Ocean Water Desalination Program Master Plan (PMP)

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The Water Division of ARCADIS

Signature Page

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Appendix 1:A

Ocean Current Assessment

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Technical Memorandum

Project	West Basin Ocean Water Desalination Program Master Plan	Date	October 18, 2011
Ref	Identification and Assessment of Potential Desalination Plant Sites		
From	Claudio Fassardi, Elio Arniella, Ernesto Gianella and Bill Rudolph		
To	Steve Diamond (Malcolm Pirnie/ARCADIS)		

This technical memorandum describes the work performed to assist in the identification and assessment of the two sites proposed for the West Basin Municipal Water District (WBMWD) desalination plant from the marine conditions and existing intake/discharge infrastructure perspectives. The work performed aimed at providing information to:

(1) assist the Team in the selection of the preferred site for the desalination plant, and

(2) to assist in the analysis, selection and conceptual designs of intake/discharge structures; including the assessment of the existing structures.

The work presented in this memorandum is focused on the marine aspects, as well as the hydrogeology and geological conditions of the sites.

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1 Introduction

The WBMWD is contemplating co-locating a desalination plant at the existing NRG or AES power station locations in Santa Monica Bay, CA.. Two plant capacity scenarios are under consideration by the WBMWD: 20 MGD to satisfy local demand, and 60 MGD to satisfy regional demand. Figure 1 shows the locations of the power stations at El Segundo and Redondo Beach, respectively.

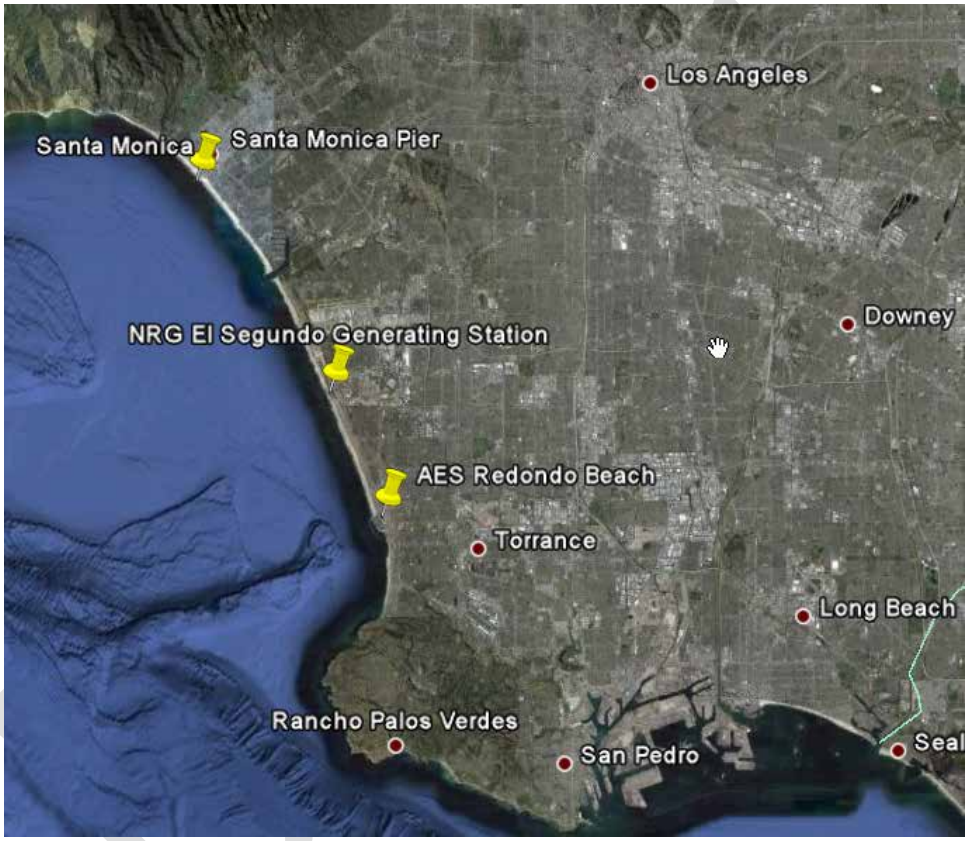

Figure 1. Location of NRG and AES power stations.

Both power stations feature cooling water intake and discharge structures that could be used for the desalination plant. At the NRG El Segundo location two pairs of tunnels exist, shown in Figure 2. The intake and discharge tunnels on the north side of the property, used for cooling water of units 1 and 2, have been decommissioned and would not be available for use. The intake and discharge tunnels on the south side of the property, used for cooling water of units 3 and 4, are currently operational. It is expected, per statements of NRG staff during the site visit on June 21 2011, that units 3 and 4 would be converted to air cooling in the near future and therefore its cooling water tunnels could be used for the desalination

plant. Units 3 and 4 cooling water tunnels are 12-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 5 feet under the seafloor in the offshore area, and at about 10 feet across the beach area. The offshore end of the intake tunnel, at approximately 2,300 feet from the shoreline at a water depth of approximately -35 feet MLLW, features a vertical 16 x 21-foot internal cross section structure, with a velocity cap, which extends approximately 10 feet above the seafloor (SCE, 1982). The shorter discharge tunnel is approximately 1,800 feet from the shoreline at a water depth of approximately -29 feet MLLW. Figure 3 shows a schematic of the circulating water system for this facility. For further details, see drawing 565156-4 "Underwater Circulating Water Conduits - Plan 8 Profiles – Southern California Edison Company".

Figure 2. NRG El Segundo tunnels layout.

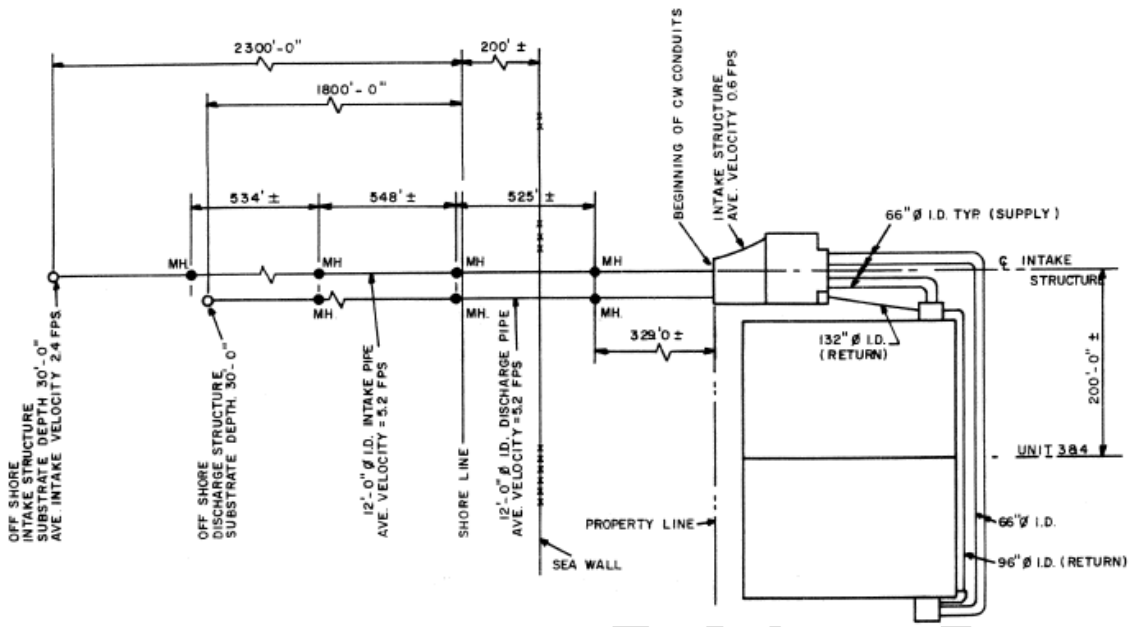

Figure 3. NRG El Segundo units 3 and 4 circulating water system (SCE, 1982).

At the AES Redondo Beach location, three pairs of tunnels exist. One within King Harbor, the second in the vicinity of the harbor entrance, and the third one just north of the breakwater on the southern end of Hermosa Beach. Figure 4 shows a layout of the tunnels. Of the three pairs of tunnels, only the pair to the north of the King Harbor breakwater is contemplated for use for the desalination plant. These tunnels have been used alternatively as intake and discharge facilities. The longer tunnel, the northern one of the pair, extends offshore approximately 2,000 feet to a water depth of approximately -33 feet MLLW. The shorter tunnel extends offshore approximately 1,800 feet to a water depth of approximately -30 feet MLLW. Both tunnels are 10-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 4 feet under the seafloor. Both tunnels featured a vertical intake structure with a 14-foot internal diameter cross section, with a velocity cap, which extends approximately 10 feet above the seafloor (SCE, 1983). Figure 5 shows a schematic of the circulating water system for this facility, referred to as units 1 to 6 cooling water tunnels by SCE (1983). For further details, see drawing 530325-2 “Plan Profiles & Sections - Underwater Circulating Water Tunnels Concrete – Southern California Edison Company”.

Figure 4. AES Redondo Beach tunnels layout.

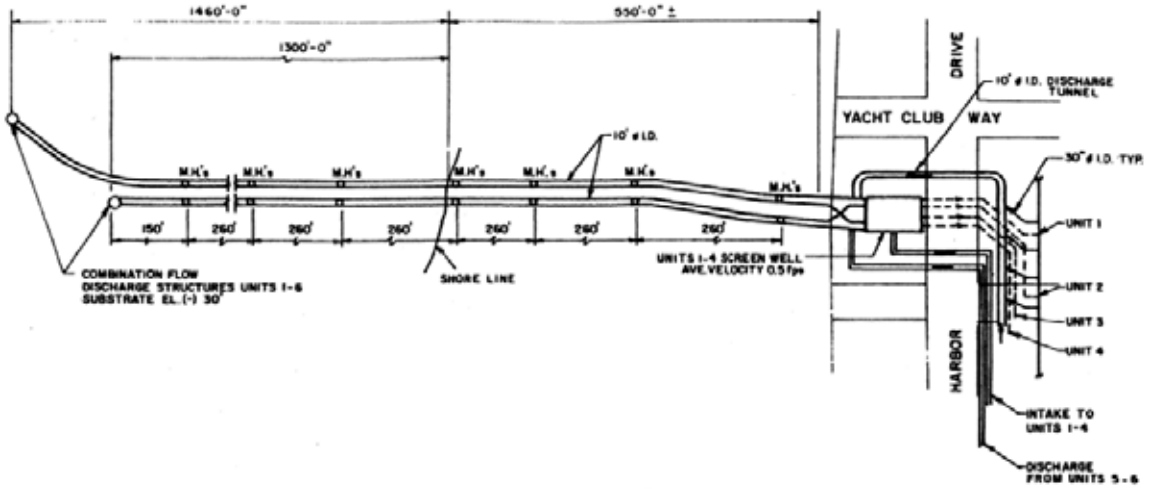

Figure 5. AES Redondo Beach units 1 to 6 cooling water tunnels (SCE, 1983).

The work performed to assist in the identification and assessment of the two sites proposed for the WBMWD desalination plant consisted of a series of tasks which included:

(1) Project kick-off meeting and site visit,

(2) Collection and analysis of data and information,

(3) Site characterization and analysis, and

(4) Evaluation of existing intake/discharge infrastructure.

These tasks focused on the marine aspects, as well as the hydrogeology and seismic setting of the sites. The following sections describe the results of the work performed.

2 Project Kick-off Meeting and Site Visit

On June 2, 2011 Halcrow participated in the project kick-off meeting at the WBMWD offices for a project overview; review of objectives; discussion on project communication; and discussions about the scope of work; status and integration of technical memos; schedule for deliverables, site visit, project meetings and workshops; information needs; and contract administration.

On June 21, Halcrow performed a one-day site visit to the two project sites. Given the marine focus of the study, Halcrow staff performing the visit concentrated in on the marine aspects of the facilities such as beach and metocean conditions, evidence of coastal erosion, overview of coastal protection structures, inspection of land end intake and discharge infrastructure, and general familiarization with the facilities.

3 Collection and Analysis of Data and Information

At the onset of the study, Halcrow received from the WBMWD through Malcolm Pirnie/ARCADIS data and information needed for the study. Lists of documents received are included in Section 9 List of Reports, and in Section 10 List of Drawings.

Halcrow pursued the collection of data and information from additional sources such as NOAA (nautical charts and bathymetries), USGS (aerial photography), USACE (reports and wave hindcasts), Los Angeles County (beach profiles). A list of references consulted is included in Section 8 References.

Halcrow reviewed all collected data and information described above, in addition to previous studies performed as part of the Ocean Water Desalination Demonstration Facility (OWDDF) development process to assist in evaluating the proposed sites.

For the conceptual level of this study, no data gaps were identified.

4 Regional Characterization and Analysis

4.1 Bathymetry and Littoral Processes

Santa Monica Bay, shown in Figure 6, extends in a 30-mile arc from Point Dume on the northwest to Malaga Cove in the southeast. The offshore bathymetry shows four distinctive features: a) the Santa Monica Shelf, b) the Dume, Santa Monica and Redondo Canyons, c) the Basin Slope; and d) the Santa Monica Basin.

The Santa Monica Shelf extends to the depth of approximately 270 feet. At this depth a pronounced steepening indicates a break where the shelf transitions through the Basin Slope to the Santa Monica Basin, where depths are in the order of 2,700 feet. The width of the Santa Monica Shelf varies from about 200 yards at the head of the Redondo Canyon to more than 8 miles between the Santa Monica and Redondo Canyons (Terry, 1956).

Figure 6. Santa Monica Bay.

Prior to 1825, the Los Angeles River discharged through the Bayona Creek on an intermittent basis, bringing substantial amount of sand to the littoral zone. The river changed its course at that time, however, and has since discharged into San Pedro Bay (located south and to the east of the Palos Verdes Peninsula). Hence, for well over a century, the Santa Monica Bay has lacked a major fluvial sediment source, a circumstance that contributed to

the narrow beach widths found in most areas, prior to the provision of artificial nourishment (Leidersdorf, 1994).

Other factors that contributed to the impoverished natural condition of the beaches included relatively high rates of littoral transport, and an active sediment sink. North of Redondo Beach, the predominantly westerly long period wave climate produces a net transport toward the east and south. Estimates of transport rates developed for Santa Monica Bay, show a transport of about 162,000 cy/year at El Segundo. The general direction of the transport is along the shore and to the south. At the south end of the Bay, at Redondo Beach, the curvature of the coastline apparently produces a net drift towards the north. The Dume Canyon acts as a partial sediment sink and probably only entraps a portion of sediment passing Point Dume. Because the Santa Monica Canyon is located too far offshore in deepwater, its impacts as a littoral sink is considered negligible. However, the Redondo Canyon with its head located close to the shoreline represents a significant sediment sink, in the order of 200,000 to 400,000 cy/year. Figure 7 shows sediment transport patterns in Santa Monica Bay (Leidersdorf, 1994 and USACE, 2009).

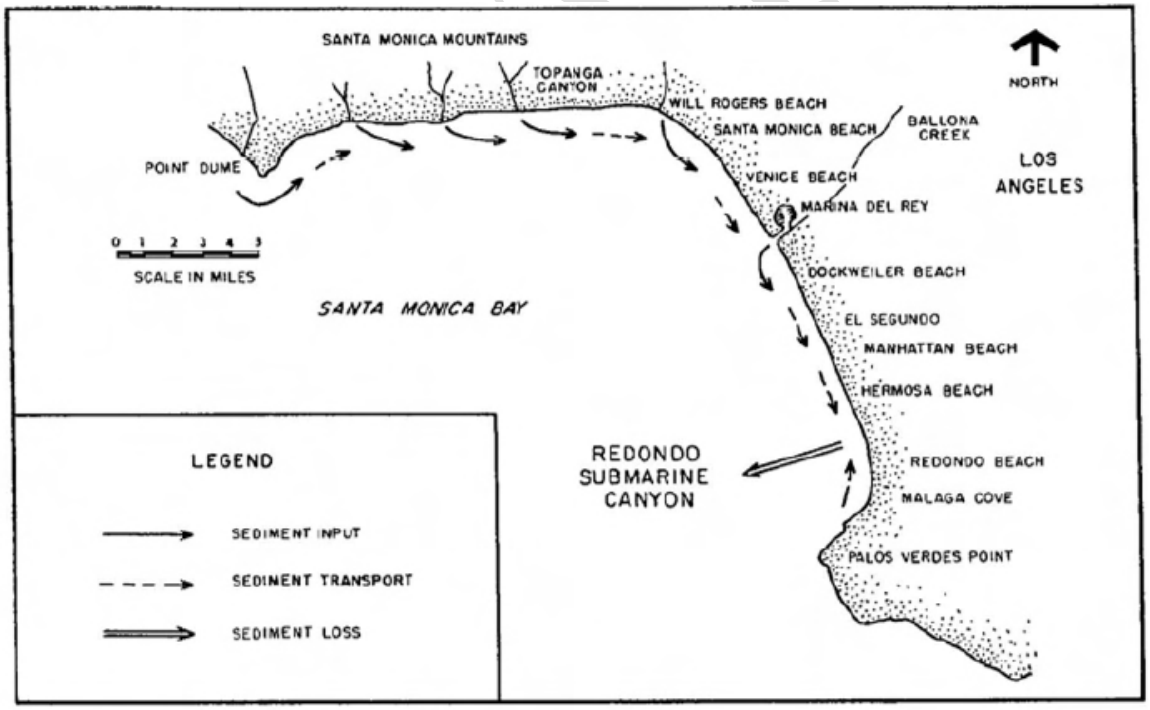

Figure 7. Sediment transport in Santa Monica Bay (Leidersdorf, 1994).

In addition to the natural causes of beach erosion described above, Santa Monica Bay has been subjected to significant human intervention in the form of coastal development,

construction of structures and beach nourishment. Since the early 1900's several structures and facilities have been constructed along the coast affecting the littoral drift and contributing to shoreline erosion. These include the Santa Monica breakwater and pier, the Venice breakwater, the Marina del Rey jetties and breakwater, the Chevron groin at El Segundo, the King Harbor breakwaters, and the Topaz groin at Redondo Beach (Leidersdorf, 1994).

Artificial nourishment commenced in 1938 with the placement of 1.8 million cy of sand at Dockweiler Beach. Subsequent projects increased the cumulative volume to about 32 million cy, all of which was placed in the central and southern portions of the bay. The largest single contributor of beach fill has been the Hyperion project which, between 1938 and 1989 contributed nearly 17 million cy to Santa Monica and El Segundo beaches. Another major source of beach fill was the Marina del Rey harbor which, between 1960 and 1963 contributed to approximately 10 million cy to the Dockweiler Beach, just north of El Segundo (Leidersdorf, 1994).

Leidersdorf (1994) notes an aspect that warrants consideration which is the pronounced decrease in the rate of beach nourishment. Between 1938 and 1969, approximately 30 million cy of nourishment material were added to the beaches in central and southern Santa Monica Bay, representing an average of about 1 million cy/year. Since 1970, however, only 1.7 million cy have been supplied resulting in an average rate of about 70,000 cy/year. Contributing factors to the decline appear to be 1) a decrease in the number of large scale coastal construction projects, 2) more stringent regulatory standards, 3) relative stability of earlier beach fills, and 4) lack of funding.

The lack of beach nourishment combined with the continuous erosive action of the waves have significantly eroded certain beaches during storm events of the 2004-2005 winter season. Affected 9 major beaches which included Dockweiler and Redondo. These, to date, have not been nourished to their pre-storm conditions (Halcrow, 2007).

In general, the central-south Santa Monica Bay nearshore area is a high-energy, wave-dominated environment. Granular materials are likely to be found in this area. The beach and surf zone likely consists primarily of fine and medium sand with little to some coarse sand. Outside of the surf zone, in water depths of 30 to 100 feet, modern seafloor sediments probably have a progressively higher percentage of fine sand, silt, and clay.

During the El Nino storms of 1982-1983, the beach at El Segundo was eroded away, exposing coarse sand and gravel on the beach. The beach bike path was destroyed by storm waves, and severe coastal erosion resulted in costly destruction of property, as well as exposing oil pipelines across the former beach zone. It is likely that seasonal sediment transport and coast-parallel erosional and depositional patterns, particularly during high storm surf conditions produced by North Pacific storms, would produce a complex series of stacked channels in the nearshore zone through geologic time.

4.2 Tides and Water Levels

Water levels are forced by different mechanisms and feature different time scales. At one end of the time scale, the Mean Sea Level (MSL) exhibits variations in a time scale of years. The Still Water Level (SWL), which oscillates about the MSL, is forced by the astronomical tide and storm surge (due to wind stress and atmospheric pressure changes), both of which have time scales of hours. In addition, locations on the U.S. Pacific Coast such as Santa Monica Bay are affected by changes due to El Niño/La Niña which have an intra-annual time scale. Finally, waves in shallow coastal areas induce a time varying elevation of the SWL, where the static (mean) elevation is often referred to as the wave setup. Figure 8 shows a schematic of these various water levels.

Figure 8. Water levels.

Given the likelihood of sea level rise due to global warming and assuming a 50-year lifetime of the desalination plant, water level for the following two scenarios are considered important for assessing the existing intake/discharge infrastructure and alternatives:

1. water levels with no global warming
2. water levels with global warming

For each of these scenarios, current tidal ranges can be used in the analysis of alternatives because these are not expected to be affected by global warming. Because no water level

measurements are available at the project locations, levels derived from measurements performed by NOAA at Station 9410840 at the Santa Monica Pier, shown in Figure 1, were used. These were considered representative and suitable for the purpose of this study. The tidal reference levels, referred to the Mean Lower Low Water (MLLW) are shown in Figure 9.

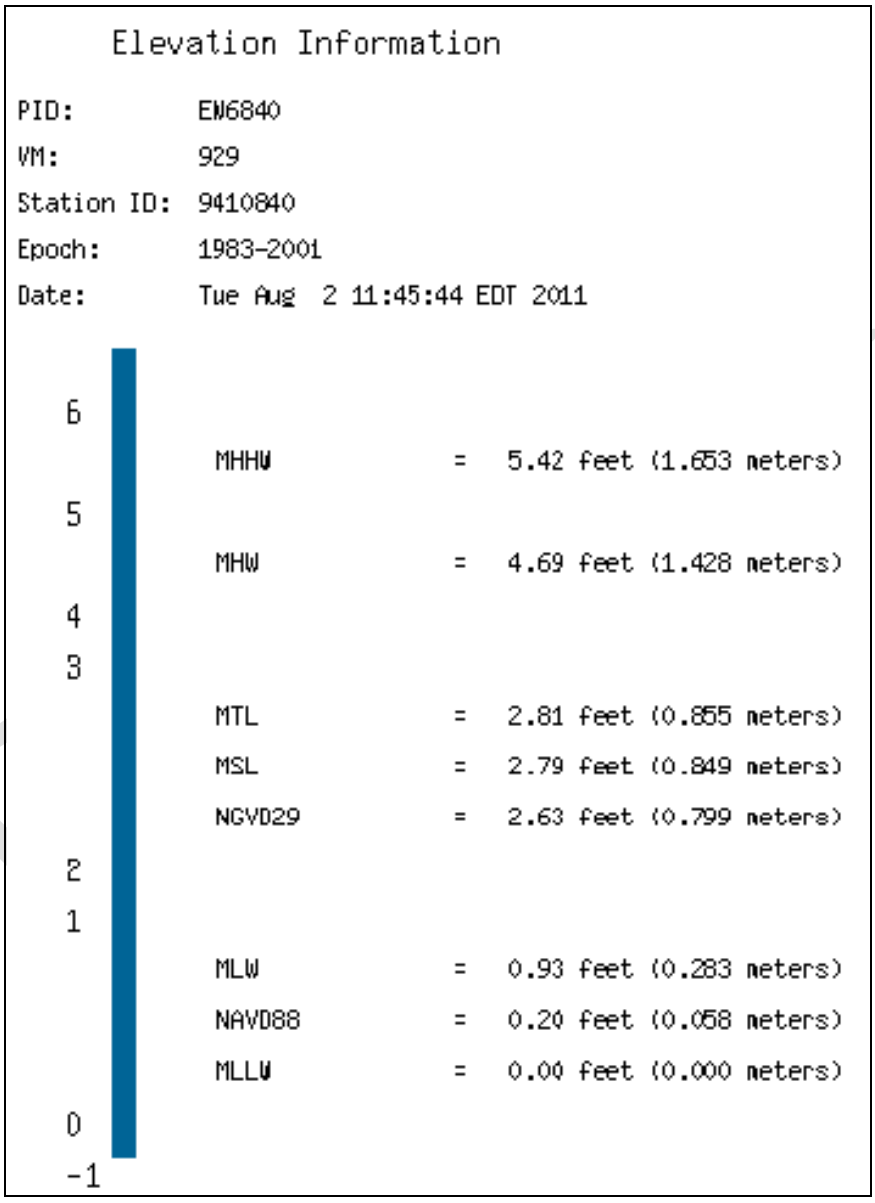

Figure 9. Santa Monica Pier reference tidal reference levels.

4.2.1 Water Levels With No Global Warming

Figure 10 shows the MSL level trend at Santa Monica, CA derived from measurements since the early 1930's to date. It is noted in Figure 10 the "spikes" in the mean sea level during the El Niño years. At this location, the estimated trend of sea level rise with no global warming is 1.46 mm/year. Assuming that this trend continues into the assumed 50-year lifetime of the desalination plant and global warming projections are not realized, the MSL by 2061 would be approximately 0.24 feet higher than what it is today. Table 1 lists the water levels to date and those by the year 2061, assuming:

- a sea level rise of 0.24 feet
- that the tidal ranges are maintained, and
- that the extreme meteorological and oceanographic events that created the maximum and minimum water levels happen again.

Levels are referenced to the North American Vertical Datum of 1988 (NAVD88), the vertical control datum established for surveying in the USA which is fixed and assumed not to change in time.

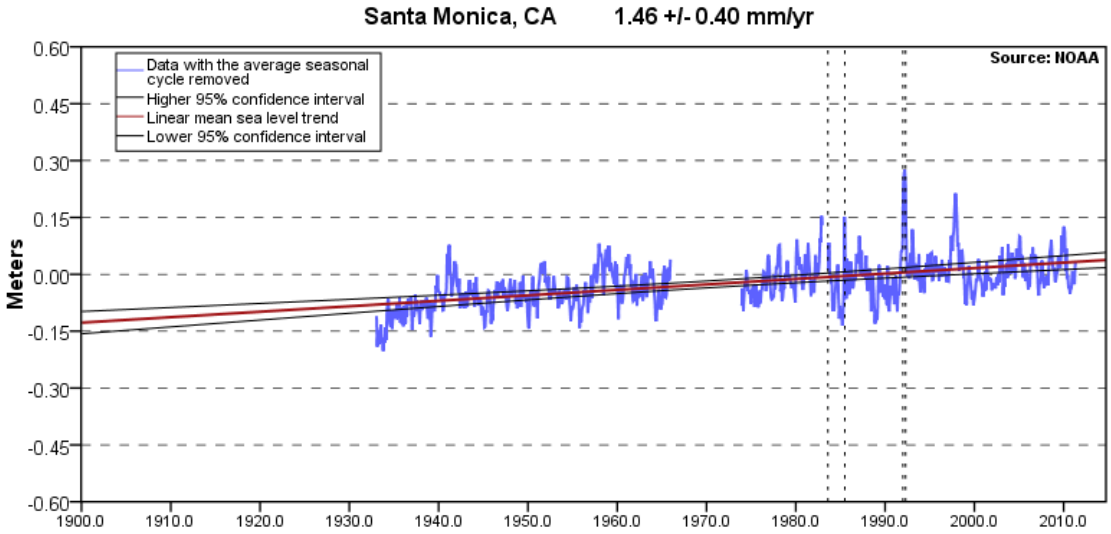

Figure 10. Sea level rise trend at Santa Monica, CA.

Table 1. Water levels referenced to NAVD88, to date and in 50 years with no global warming.

Description	Datum	re NAVD88 (feet) 2011	2061
Highest Water Level Measured	Maximum	8.31	8.55
Highest Astronomical Tide	HAT	7.08	7.32
Mean Higher-High Water	MHHW	5.24	5.48
Mean Sea Level	MSL	2.60	2.84
North American Vertical Datum 1988	NAVD88	0.00	0.00
Mean Lower-Low Water	MLLW	-0.19	0.05
Lowest Astronomical Tide	LAT	-2.16	-1.92
Lowest Water Level Measured	Minimum	-3.03	-2.79

Date/Time of Highest Water Level	Max Date	11/30/1982, 7:54
Date/Time of Lowest Water Level	Min Date	12/17/1933, 15:42

4.2.2 Water Levels With Global Warming

On the basis of a 50-year desalination plant lifetime, the sea level rise due to the effects of global warming 50 years from 2011 was selected for analysis from Heberger (2009). The A2 medium-high greenhouse-gas scenario, characterized by *"self-reliance and preservation of local identities (IPCC, 2000), and population expected to continuously increase, but economic growth and technological development are expected to be slow"* was selected, between the more and less conservative scenarios A1-F1 and B1. Shown in Figure 11, the predicted sea level rise by 2061 for scenario A2 would be in the order of 0.60 m (approximately 2 feet). Table 2 lists the water levels to date and those by the year 2061, assuming:

- a sea level rise of 2 feet,
- that the tidal ranges are maintained, and
- that the extreme meteorological and oceanographic events that created the maximum and minimum water levels happen again.

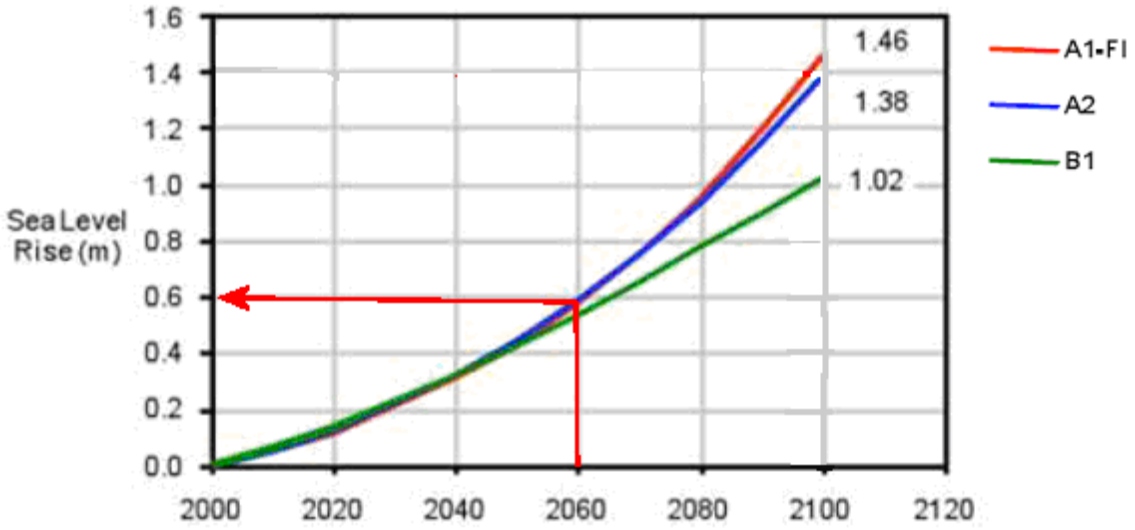

Figure 11. Selected sea level rise due to global warming (Heberger, 2009).

Table 2. Water levels referenced to NAVD88, to date and in 50 years with global warming.

Description	Datum	re NAVD88 (feet) 2011	2061
Highest Water Level Measured	Maximum	8.31	10.31
Highest Astronomical Tide	HAT	7.08	9.08
Mean Higher-High Water	MHHW	5.24	7.24
Mean Sea Level	MSL	2.60	4.60
North American Vertical Datum 1988	NAVD88	0.00	0.00
Mean Lower-Low Water	MLLW	-0.19	1.81
Lowest Astronomical Tide	LAT	-2.16	-0.16
Lowest Water Level Measured	Minimum	-3.03	-1.03

Date/Time of Highest Water Level	Max Date	11/30/1982, 7:54
Date/Time of Lowest Water Level	Min Date	12/17/1933, 15:42

4.3 Storm Surge

Storm surge is the super-elevation of the water level that results from the reduced barometric pressure (the so-called “inverted barometer effect”) and wind stress during storm events. Unlike the Atlantic and Gulf Coasts, where storm surges can attain high amplitudes on the relatively wide, shallow, and gentle slopes of the Continental Shelf, surges on the

Pacific Coast are, when compared with the tidal fluctuation, relatively small and in the order of about 1 foot along the Southern California coast (USACE, 2009).

For example, the winter storm of January 17 and 18, 1988 produced the all time record low barometric pressure. The measured water level at the Los Angeles Harbor gauge during this event was merely 0.2 meters (0.7 feet) above the predicted astronomical levels (USACE, 2009).

4.4 Tsunamis

Tsunamis can be generated by fault displacement generated by earthquakes, including large magnitude earthquakes distant from the site and local submarine earthquakes, or by submarine landslides near the site. In the project area, a "worst-case" run-up estimate of 40 feet (12 m) was adopted by Los Angeles County, and this was used by the National Tsunami Hazard Mitigation Program (NTHMP) through the California State Office of Emergency Services (OES) to prepare tsunami inundation maps for emergency planning purposes (USGS, 2008). Run-up elevation is defined in Figure 8.

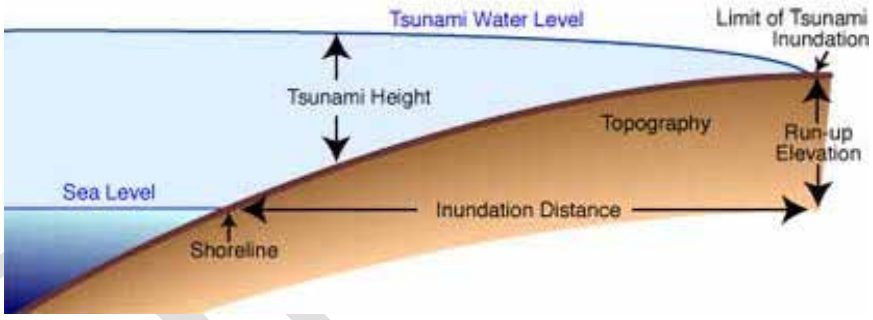

Figure 8. Schematic of Tsunami Run-up and Inundation (Fugro, 2006).

Several damaging tsunamis generated by distant earthquakes have reached the southern coastal California region in the past century. Historically, these distant-source events have caused the most damage in California. The 1964 Pacific basin-wide tsunami generated by the great Alaskan earthquake is the most damaging tsunami to date, and with significant damage in Crescent City and Santa Cruz Harbor, and lesser damage in Los Angeles and Long Beach Harbors. As instrumentation has improved, it's become clear that distant-source tsunamis affect California every few years on average, but they are rarely damaging. To date, no accurate estimate of a return period for distant-sourced tsunamis affecting California has been compiled (Fugro, 2006).

Locally-generated tsunamis are also a hazard. Local tsunamis may be generated by seismic displacement of the seabed, or by a submarine landslide triggered by ground shaking from even a moderate earthquake in the coastal region. A review by Fugro (2006) notes that in 1927, an earthquake offshore of Point Arguello produced run-up of 6 feet (1.8 m) at Surf, near Guadalupe. In December 1812, historical accounts record several local earthquakes near Santa Barbara causing significant damage to structures, and were associated with sea waves of several meters recorded in Gaviota, Santa Barbara and Ventura. In 1930, an M 5.2 earthquake off of Redondo Beach may have triggered a landslide that generated unusually large waves or a local tsunami with a 6-foot (1.8-m) run-up resulting in serious damage and one fatality in Santa Monica. Recurrence intervals for local events will be similar to the recurrence intervals for large, offshore earthquakes, generally hundreds to thousands of years; or, in the case of large offshore landslides, on the order of hundreds of years. The following is a list of historical tsunamis affecting Santa Monica Bay (Fugro, 2006):

(1) Date: August 31, 1930, Source: Southern California – 20 feet run-up
(2) Date: May 22, 1960, Source: South Central Chile – 5.2 feet run-up

4.5 Hydrogeology

Both the El Segundo and Redondo Beach desalination sites are located in the West Coast Basin which is a major coastal groundwater basin located in the Los Angeles Coastal Plain, as shown on Figure 12. The basin contains relatively thick (1,200 feet) Pleistocene age strata that include several groundwater-bearing zones (aquifers) that are utilized for water supply in the coastal area of Los Angeles County.

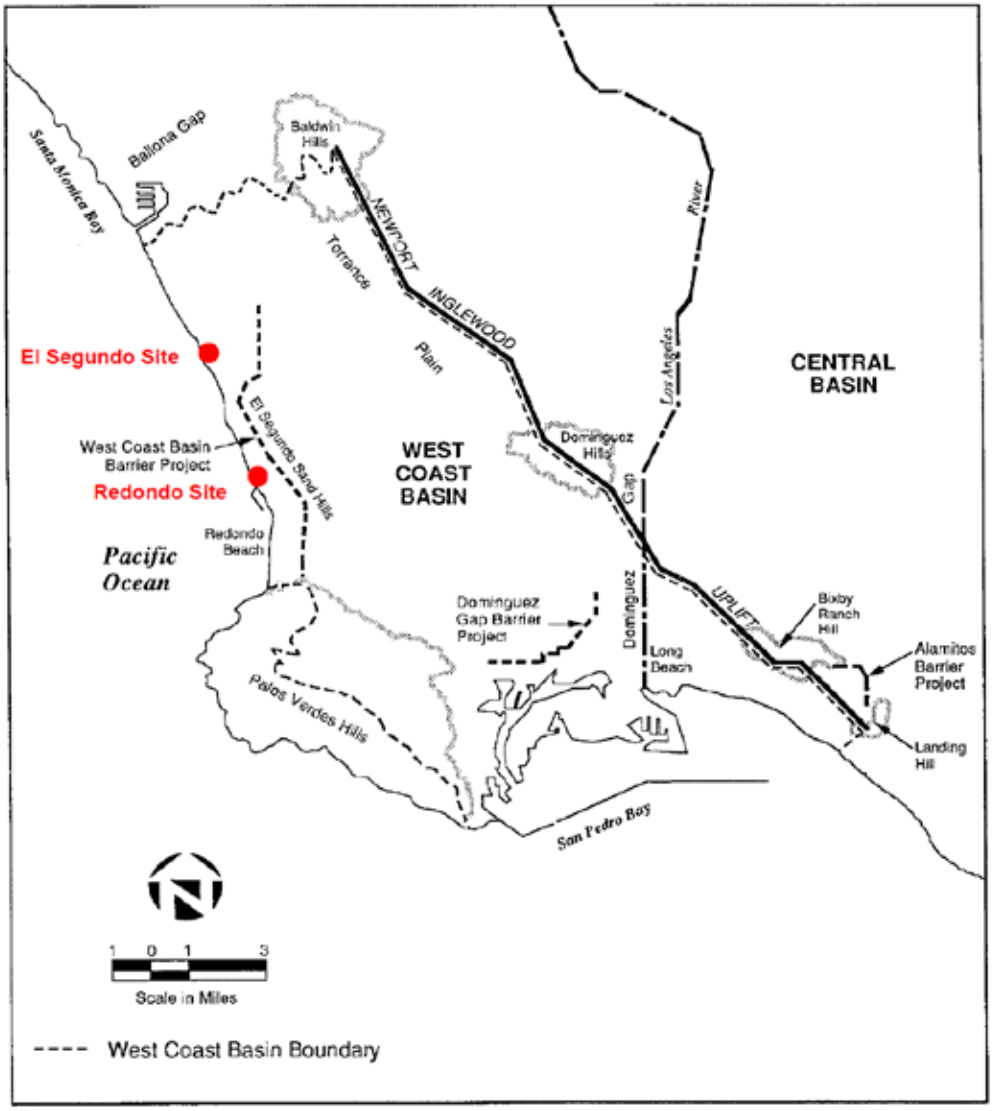

Figure 12. Location of the West Coast Groundwater Basin.

The principal lithologic units and corresponding elevations of importance to the hydrogeology of the West Coast basin are summarized in Figure 13. The figure correlates the lithology to the hydro-stratigraphic unit designations, geologic formation titles and geologic age. The significant hydrogeologic characteristics of each unit shown in Figure 13 are summarized in Table 3.

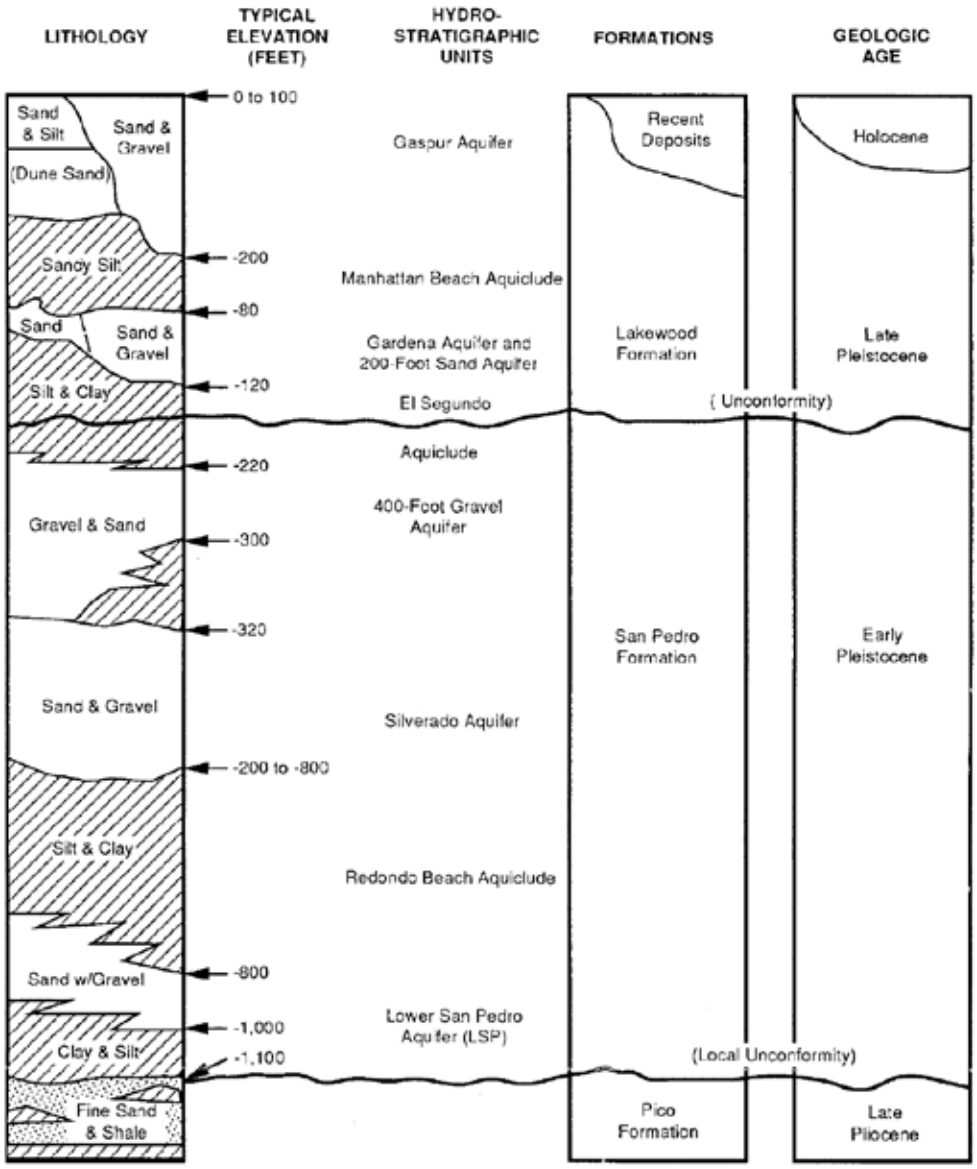

Figure 13. Generalized West Coast Basin hydro-stratigraphic section.

Table 3. Summary of regional hydrogeologic conditions.

Geologic Age	Hydro-stratigraphic Unit	Geologic Formation	Description / Notes		
Holocene	Gaspar Aquifer	Recent	Floodplain despots, lagoonal marshland sediments beach deposits playa like deposits and dune sands.	Currently not used for water supply. High saline concentration contaminated by oil brines and industrial wastes.	Limited in aerial extent to ancestral Los Angeles floodplain, Not present at either desalination project sites.
Late Pleistocene	Older Dune Sand	Older Dune Sand	Older dunes consisting of fine to medium grained sand with varying amounts of gravel, silt and clay	Contains semi-perched groundwater generally above regional groundwater levels, allows percolation of surface water to underlying Lakewood Formation	Predominant surficial deposit at both desalination sites.
Late Pleistocene	Manhattan Beach Aquiclude	Lakewood Formation	Highly variable silts, clays and interbedded sand and gravels.	Generally represents and low permeable aquitards overlying the 200-foot San Aquifer, merges with the El Segundo Aquitards to the south.	Becomes more silty and sandy to the south, becomes less effective confining zone south of Redondo Beach.
Late Pleistocene	Gardena Aquifer and 200-foot Sand Aquifer	Lakewood Formation	Limited in aerial extents near Redondo Beach site. Inter-fingered stream and estuarine deposits which locally replace the 200-foot Sand aquifer.	Gardena Aquifer is on the order of 50 to 75 feet thick near the Redondo Beach site and yields appreciable quantities of groundwater, locally hydraulically connected to 200-foot Aquifer, hydraulic conductivity estimate to be about 1,000 gpd/ft^2 , transmissivity range 50,000 – 130,000 gpd/ft.	Not present at El Segundo Site.

Geologic Age	Hydro-stratigraphic Unit	Geologic Formation	Description / Notes		
Late Pleistocene	200-foot Sand Aquifer	Lakewood Formation	Deepest water bearing member of the Lakewood Formation, highly permeable sand and gravel with silt an clay lenses, thickness varies 30 to 150 feet.	Gardena Aquifer is on the order of 50 to 75 feet thick near the Redondo Beach site and yields appreciable quantities of groundwater, locally hydraulically connected to 200-foot Aquifer, hydraulic conductivity estimate to be about 500 gpd/ft^2 , transmissivity range 16,000 – 60,000 gpd/ft.	Replaced by Gardena Aquifer at Redondo Beach Site.
Pleistocene	El Segundo Aquiclude	Lakewood/San Pedro Formation	Lower permeability silty sand and clay.	Typically occurs 80 to 200 feet below sea level.	Locally absent and result in merging of the 200-foot Sand and underlying Silverado Aquifer.
Early Pleistocene	400-foot Gravel Aquifer	San Pedro Formation	Fine gravel, coarse sand, sandy silt, silt and clay.	Primarily found in the eastern and southern portions of the West Coast Basin, Average thickness on the order of 50 ft.	In central portions of the basin connected to underlying Silverado Aquifer.
Early Pleistocene	Silverado Aquifer	San Pedro Formation	Highly permeable sand and gravel with localized discontinuous beds of sandy silt, silt and clay, becomes more fine grained towards the ocean.	Typically 200 to 400 feet thick, hydraulic conductivity estimate to be about 700 gpd/ft^2 , transmissivity range 45,000 – 270,000 gpd/ft.	Principal water-bearing zone which serves as groundwater supply for numerous water supply well in the West Coast Basin.

Geologic Age	Hydro-stratigraphic Unit	Geologic Formation	Description / Notes		
Early Pleistocene	Redondo Beach Aquiclude	San Pedro Formation	Low permeability salty and clayey silt layer.	Attains a maximum thickness of about 400 feet, generally continuous in the north-south direction.	Where absent Silverado aquifer merges with lower San Pedro Aquifer.
Early Pleistocene	Lower San Pedro Aquifer (LSP)	San Pedro Formation	composed of thin lenses of marine sediments (coarse sand, sandy gravel and silty sand) interbedded with silt and silty sand.	Estimated thickness of the LSP is variable, ranging from 100 to 250 feet, hydraulic conductivity estimate to be about 300 gpd/ft, transmissivity range 0 – 100,000 gpd/ft.	Present at the Redondo Beach site, but is not present at the El Segundo site, where younger materials directly overlie the Pico Formation.
Late Pliocene	Pico Formation	Pico Formation	The Pliocene-age Pico Formation underlies the San Pedro Formation throughout the basin. The formation consists of sand, silt and clay with interbedded marine gravels. This lithologic unit is known principally from deep oil well drilling records which suggest that the sediments are locally permeable at depth. The local thickness of the Pico Formation is about 1,800 feet. The Pico Formation is underlain by Lower Pliocene sediments of the Repetto Formation (USGS, 1965). Deeper formations are the primary oil-producing horizons in the area.		

4.6 Groundwater

Groundwater in the West Coast Basin occurs under confined conditions in the deeper aquifers as semi-confined conditions in the shallow aquifers. Historically the deeper aquifers (200-foot sand Aquifer and deeper) are replenished by fresh water as through-flow into the West Coast Basin from the Central Basin to the east. Absent groundwater extraction for water supply use, the fresh water would flow to Santa Monica Bay. Natural recharge to the basin is minimal and percolation of precipitation, irrigation and urban runoff is largely prevented by shallow aquitards. Hence, groundwater impacted by industrial contaminants is largely limited to the shallow aquifers.

Pumping of the deeper confined aquifers historically resulted in sea-water intrusion. The most significant feature controlling groundwater is the West Coast Basin Barrier adjacent to both the El Segundo and Redondo Beach sites. The barrier is part of two sea-water barrier projects; the West Coast Basin Barrier and the Dominguez Gap Barrier which consist of a line of 153 injection wells extending from the Palos Verdes Hills to the Los Angeles International Airport. For the West Coast Barrier a combination of recycled and imported water is injected into the 200-foot Sand, Silverado and LSP aquifers at a rate of approximately 17.5 MGD. The injection creates a groundwater mound as high as 10 feet above sea level and a groundwater divide along the barrier alignment. Thus groundwater flow occurs east of the barrier and seaward west of the barrier. Because both sites are located seaward of the barrier, the regional groundwater flow is towards Santa Monica Bay. No potable water supply wells are located seaward of the barrier.

Piezometric groundwater level in the 200-foot Sand, Silverado and LSP aquifers are around 6 to 8 feet above sea level. Groundwater levels within the shallow Older Dune Sands vary due to locally perched groundwater conditions and the influence of pumping for groundwater remediation at the Chevron Refinery at El Segundo and by dewatering operations within a fuel tank area at the Redondo Beach site.

Schematic hydrogeologic cross sections for each site are presented in Figure 14. The figures show the approximate location of the primary aquifers, the West Coast Barrier injection wells, potential contaminant source locations, salt water intrusion zones and potential intake well locations.

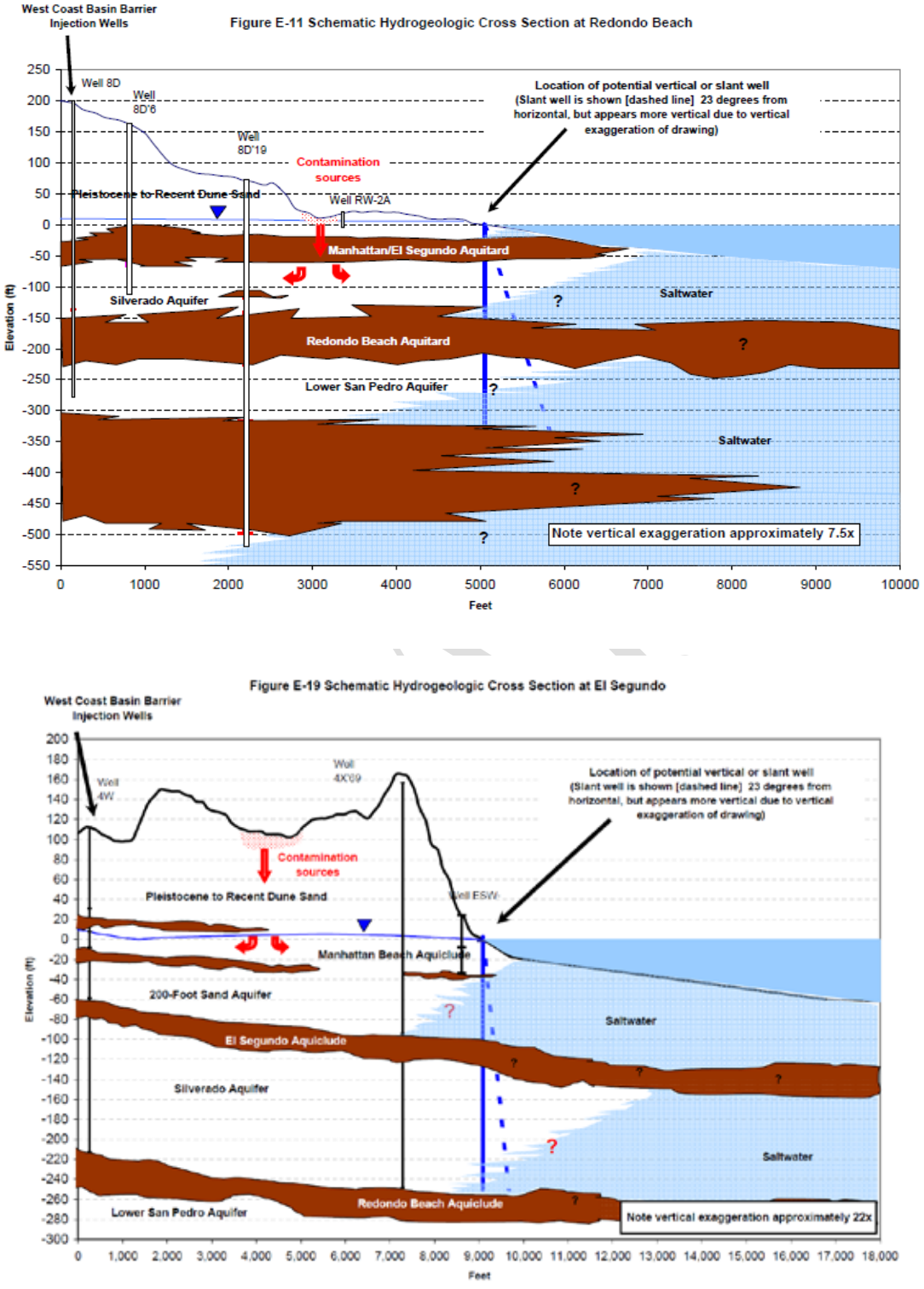

Figure 14. Schematic hydrogeologic cross sections (MWH, 2007).

4.7 Geology

4.7.1 Faulting

The proposed project area, like all of southern California, is an active seismic area affected by local fault earthquakes and distant earthquakes. All of these earthquakes are the result of large-scale earth processes in which the Pacific Plate slides northwestward relative to the North American Plate at about 2 inches/year. This plate motion results in horizontal slip (primarily on the San Andreas "strike-slip" fault) as well as a component of compression that has created the series of east-west trending "thrust" faults with vertical motions that are responsible for the prominent mountain ranges and intervening valleys situated between Santa Monica and Santa Barbara. The closest faults to the site include two strike-slip faults, the San Pedro Basin Fault and the Palos Verdes Fault, in addition to a presumed-active buried thrust fault beneath the shelf projection anticlinorium (a set of folded rocks). Numerous other faults and fault zones are located within the general region, such as the Whittier-Elsinore, Santa Monica, Hollywood, Raymond, San Fernando, Sierra Madre, Cucamonga, San Jacinto and San Andreas. All of these faults contribute to the overall seismicity of the area. Figure 15 shows there are no known active and potential active faults which cross potential intake alignments at either the El Segundo or Redondo Beach sites.

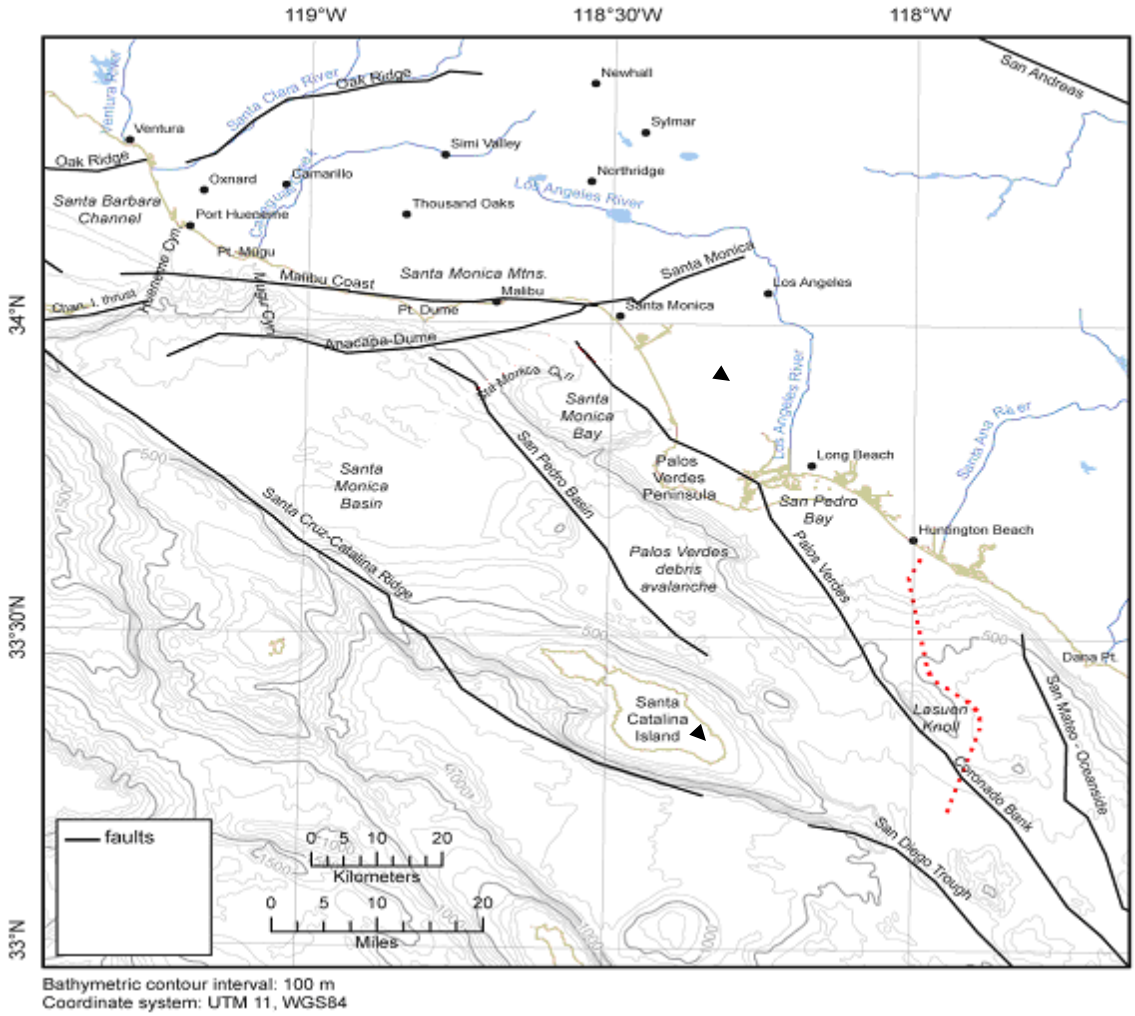

Figure 15. Fault Map (USGS, 2008).

4.7.2 Liquefaction Potential

Liquefaction occurs in both onshore and offshore environments when earthquake shaking causes wet and loose sandy material to liquefy and lose almost all of its shear strength. Liquefaction during strong shaking can cause horizontal displacements as large as tens of feet and can be especially damaging to buried utilities and unsupported foundations. The venting of groundwater as it is expelled from the liquefied sands can unevenly displace and tilt foundations, affecting both buried and surface structures.

The beach deposits at both sites are potentially susceptible to liquefaction. Sand boils on the beaches in the area were reported during the 1994 Northridge earthquake. The nearshore area is a high-energy, wave-dominated environment and granular materials are likely found in this area. The beach and surf zone consists primarily of fine and medium sand with little to some coarse sand. Outside of the surf zone, in water depths of 30 to 100 feet, modern

seafloor sediments have a progressively higher percentage of fine sand, silt, and clay. Similar deposits are found in the shallow subsurface in the near shore area. Liquefaction and lateral spreading of the of the beach deposits is likely to be limited to depths of less than 50 feet. However site specific exploration is necessary to confirm the liquefaction/lateral spreading risks.

4.7.3 Ground Acceleration

Strong ground acceleration should be expected during large earthquakes in the region. The estimated peak ground acceleration as a percentage of gravity with of a 2% probability of exceedance in 50 years (2,475 years return period) will be on the order of 0.6 g to 0.7g.

5 Site Characterization and Analysis

5.1 Currents

Jenkins (2005) provides a detailed description of currents in central-south Santa Monica Bay. Current forcing is predominantly tidal in the offshore Santa Monica Bay, and is a combination of tidal and wave-induced currents in the nearshore. Tidal currents flow parallel to the shore in a northwestward direction on flood tide and southeastward on an ebb tide. The tidal current speed diminishes towards shore due to friction in the shallow coastal boundary layer, and the phase of the tidal motion varies in the cross-shore direction such that during tidal reversals from ebb to flood, the phase of the inshore motion is lagging the offshore motion. The maximum currents in the offshore domain are typically 40 to 70 cm/sec. Along the Santa Monica/ Manhattan Beach coast, the tidal currents are ebb dominated such that over one tidal day (24 hr 50 min) the net current flows downcoast to the southeast as shown in Figure 17. The progressive vector plot in Figure 17 is composed of self-scaling vectors in units of cm/sec proportional to the vector length in the lower left hand corner, which represents the largest current vector found anywhere on the plot. Wave induced currents predominate in the nearshore where wave shoaling effects are maximum. Wave induced currents increase with increasing wave height and remain significant over a nearshore domain extending 4 to 5 surf zone widths seaward of the shoreline. They flow longshore generally in the direction of longshore wave energy flux (down-drift). These longshore currents increase with increasing wave height and obliquity and flow away from bright spots and converge on shadows. This convergence results in a compensating seaward flowing current within the shadow known as a “rip current.” Even though the dilution of brine by mixing may be less in a shadow, dilution by rip current advection (ventilated dilution) will be increased. As a net result, shadows can sometimes be areas of enhanced overall dilution. Figure 10 shows daily mean tidal current velocities at the Scatterwood outfall, located approximately 0.7 miles north of the NRG El Segundo generating station. For the purposes of this study, these velocities can be considered representative of those at the planned desalination plant locations.

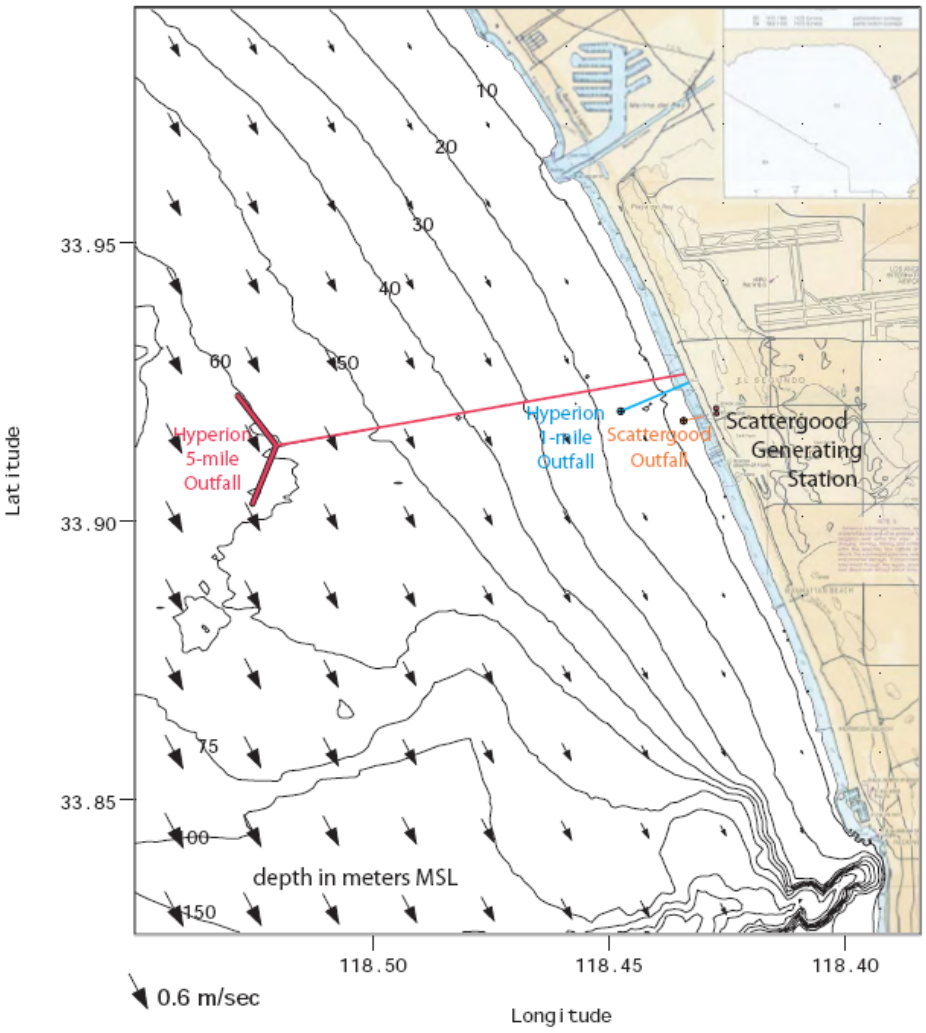

Figure 9. Net tidal drift during a mean tidal range (Jenkins, 2005).

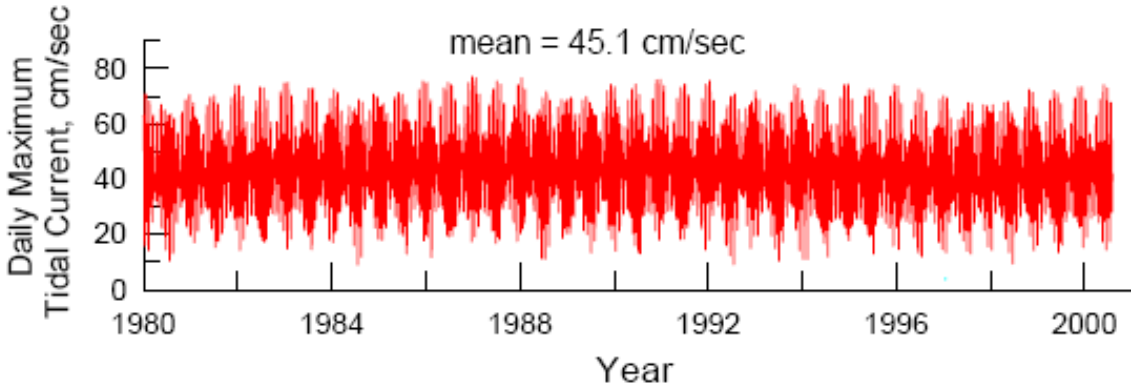

Figure 10. Daily maximum tidal current velocity at the Scatterwood (Jenkins, 2005)

5.2 Ocean Water Temperature

Jenkins (2005) provides a detailed description of ocean water temperature in central Santa Monica Bay. Figure 16 shows a 20.5-year record of daily mean ocean water temperatures from NPDES monitoring data with gaps filled by temperature monitoring data from the CDIP Santa Monica Station (#028) and by the Scripps Pier Shore Station. A pronounced seasonal variation in these temperatures is quite evident with the maximum recorded daily mean temperature reaching 25.1 C during the summer of the 1993 El Niño and the minimum falling to 9.9 C during the winter of the 1999-2000 La Niña. The 20.5 year mean temperature was found to be 17.6 C. For the purposes of this study, these temperatures can be considered representative of those at the planned desalination plant locations.

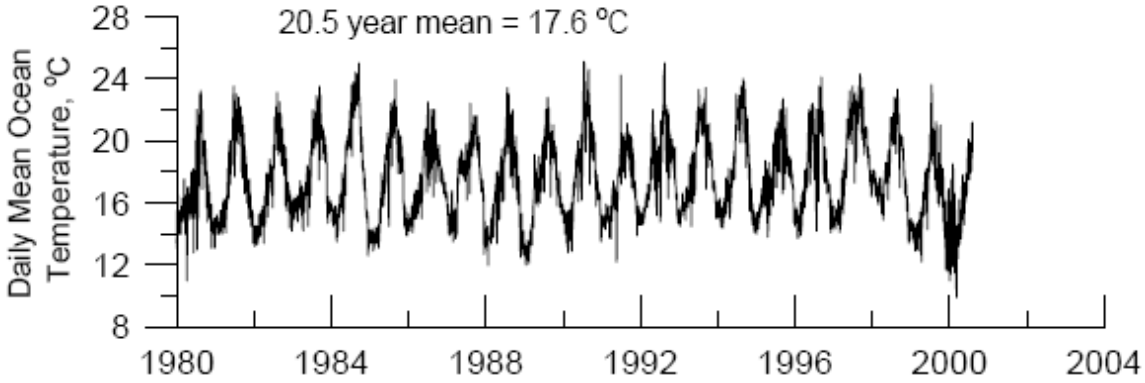

Figure 16. Daily mean ocean temperature at Scattergood (Jenkins, 2005)

5.3 Salinity

Jenkins (2005) provides a detailed description of ocean water salinity in central Santa Monica Bay. Figure 17 shows the variation in daily mean salinity in the coastal waters off Scattergood derived from 20.5 years of NPDES monitoring data of the Scattergood and Hyperion outfalls for the period from 1980 until mid-2000. Gaps in these daily records were filled salinity monitoring data from the CDIP Santa Monica Station (#028) with residue gaps filled by the Scripps Pier Shore Station. Inspection of Figure 17 indicates that the ocean salinity varies naturally by 10% between summer maximums and winter minimums, with a long term average value of 33.52 parts per thousand (ppt). Maximum salinity was 34.34 ppt during the 1998 summer El Nino when southerly winds transported high salinity water from southern Baja up into the Southern California Bight. Minimum salinity was about 31.02 ppt during the 1993 winter floods. The variation between maximum and minimum salinity is about 3.32 ppt, which is about 10 % of the average value of 33.5 ppt. The ocean salinity exceeded the 33.5 ppt average value during 2,488 days out of 7,523 days during the period of record, and were below average during 1,543 days. Therefore above average salinities are more common than below average salinities. Average salinities were observed a total of 3,492 days of the

period of record, or about 46 % of the time. For the purposes of this study, these salinities can be considered representative of those at the planned desalination plant locations.

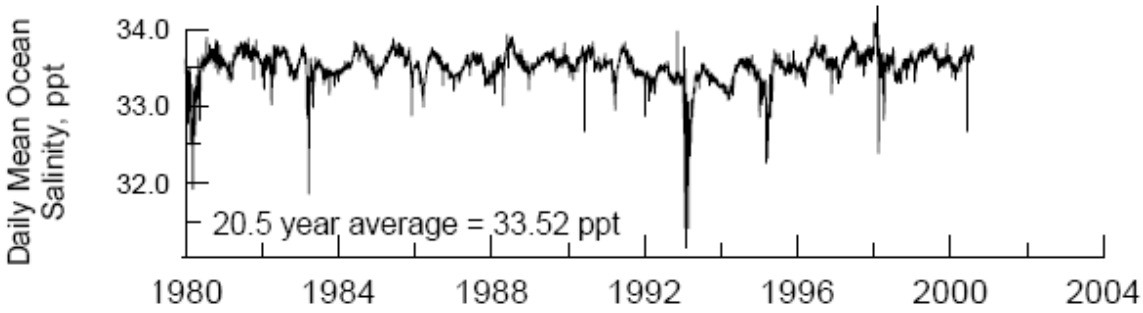

Figure 17. Daily mean ocean salinity at off Scattergood outfall (Jenkins, 2005).

5.4 Upwelling

Northwesterly winds are responsible for 1arge scale upwelling along the California coast. Between February and October northwesterly winds induce offshore water movement, causing deeper upwelling of ocean waters near the coast. The upwelled water is colder, more saline, lower in oxygen, and higher in nutrient concentrations than surface waters. The phenomenon alters the physical properties of the surface waters and enhances biological productivity (Southern California Edison Company, 1983)

The Redondo Beach area, and in particular King Harbor, is biologically productive and diverse due to habitat availability, nutrient-rich water from, the Redondo Canyon, and thermal diversity. Many resident fish species reproduce in King Harbor, and its waters serve as nursery areas for others. The harbor and adjacent waters of Santa Monica Bay, therefore, provide habitats for the propagation and sustenance of fish and other forms of marine life (Southern California Edison Company, 1983).

5.5 Wind

Winds in Santa Monica Bay are typically light and dominated by the northwesterly sea breeze the sets in around noon. Jenkins (2005) compiled wind data from Los Angeles International Airport where human observations of surface winds were collected and archived by NCDC beginning 1 January 1964 until 28 February 1997, after which wind observations were taken by means of the Automated Surface Observing System (ASOS). Combining these 2 data bases, Jenkins (2005) assembled a continuous 20.5-year surface wind record starting in 1980. The mean wind speed for this period of record is 5.6 knots. However, El Niño storms and North Pacific cold fronts episodically increase wind speeds to a maximum 24 hour mean of 19.6 knots, as occurred during the 1997 El Niño storms. The minimum daily mean wind speed is 0 knots.

5.6 Waves

5.6.1 NRG El Segundo

Wave conditions at El Segundo are typically mild, with wave heights H < 1.5 m (approx. 5 feet) for 85% of the time. Wave periods are typically long and range from 12 to 18 sec. The predominant wave direction is from a narrow range in the 240 to 260 degrees sector.

Due to the complex bathymetry and offshore island effects, extreme waves at El Segundo are typically the highest in the entire Santa Monica Bay. Table 4 shows the extreme significant wave heights offshore El Segundo computed for a range of return periods (RP) using a 36-year wave hindcast produced by the USACE (2009).

Table 4. Extreme waves at El Segundo.

RP (years)	Hs (ft)
5	20.6
10	25.0
25	30.6
50	34.7
100	38.7

The storm of March 1-3 of 1983, one of the most severe storms on record produced, according to the USACE (2009) hindcast, a 20-second significant wave height of 36 feet offshore El Segundo. The highest total water level (TWL) during this storm, computed on the basis of hindcast waves, local beach profile, water level measurements at Santa Monica Pier and the run-up model of Stockdon (2006) was approximately 15 feet (MLLW). It is noted that, per Table 4, the 1983 storm has a return period between 50 and 100 years, and that the 1% risk TWL at this location would likely be higher than the TWL = 15 feet predicted for this storm, in particular if sea level rise predictions due to global warming are realized. AECOM (2011) notes that the Units 1 to 4 and retention pond areas are at an elevation approximately 20 feet (MSL) which translates to approximately 22.8 feet (MLLW), see Figure 9.

5.6.2 AES Redondo Beach

Wave conditions at Redondo Beach are typically mild, with wave heights H < 1 m (approx. 3 feet) for 88% of the time. Wave periods are typically long and range from 12 to 18 sec. The predominant wave direction is from a narrow range in the 230 to 260 degrees sector. Table 5 shows the extreme significant wave heights at Redondo Beach computed for a range of return periods (RP) using a 36-year wave hindcast produced by the USACE (2009).

Table 5. Extreme waves at Redondo Beach.

RP (years)	Hs (ft)
5	12.6
10	14.6
25	17.0
50	18.8
100	20.4

The storm of March 1-3 of 1983, one of the most severe storms on record produced, according to the USACE (2009) hindcast, a 14-second significant wave height of 18.2 feet in offshore Redondo Beach. The highest total water level during this storm, computed on the basis of hindcast waves, local beach profile, water level measurements at Santa Monica Pier and the run-up model of Stockdon (2006) was approximately 12.7 feet (MLLW). It is noted that the 1983 storm, per Table 5, has a return period of approximately 50 years, and that the 1% risk TWL at this location would likely be higher than the TWL = 12.7 feet predicted for this storm, in particular if sea level rise predictions due to global warming are realized. The USGS topographic map for the area suggests that the elevation of the AES site is approximately 20 feet (MSL) which translates to approximately 22.8 feet (MLLW), see Figure 9.

Figure 18 shows an example of wave refraction and wave focusing effect at El Segundo, and the relative lower wave heights at Redondo Beach for a storm condition with wave height Hs = 2.25 m (7.4 feet), T = 15 seconds and direction 265 degrees.

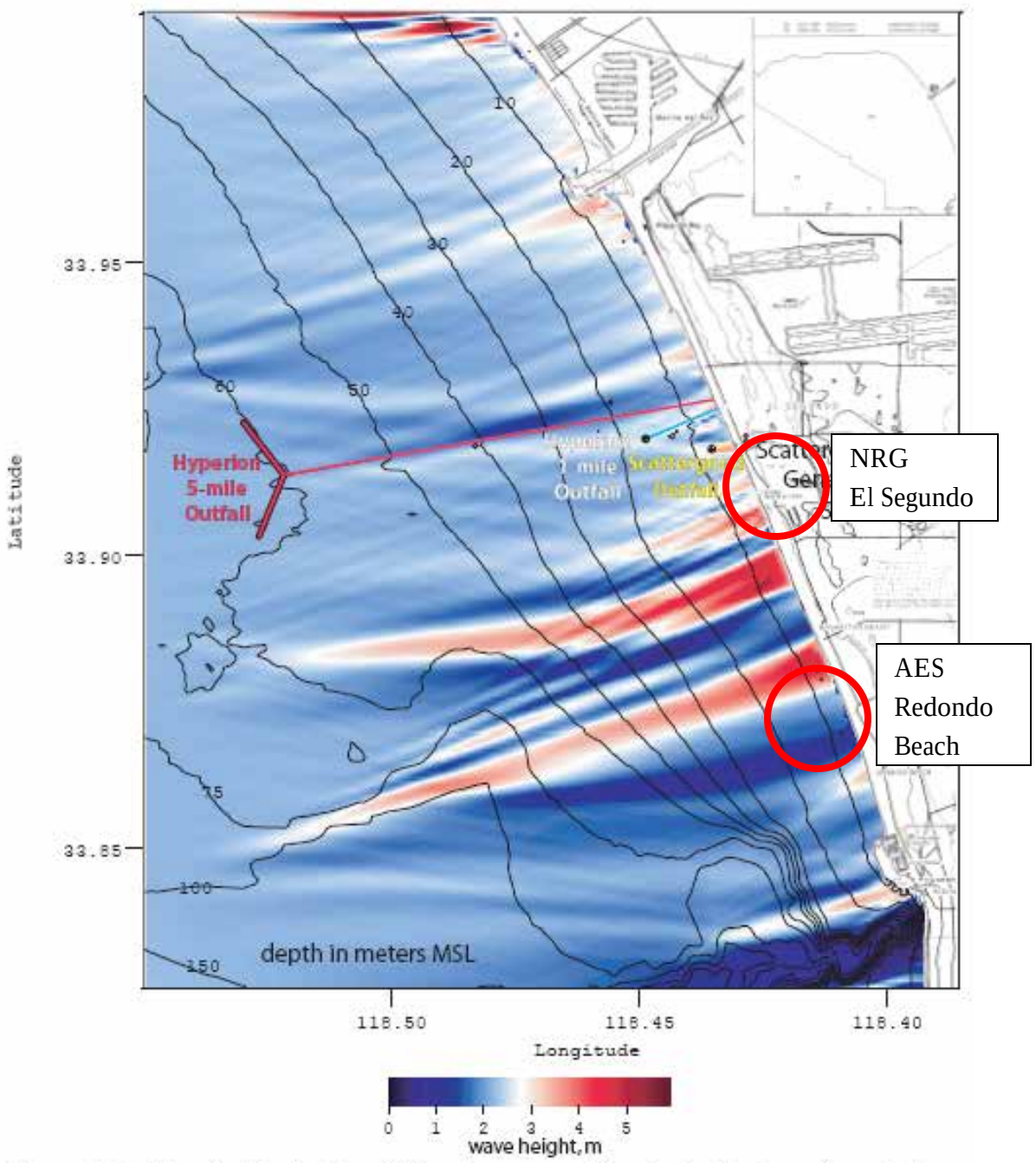

Figure 3.2b. Nearfield refraction / diffraction computation for hydrodynamic modeling of the LADWP Scattergood Desalination Project based on NOS digital bathymetry (NIMA, 2004); storm of 13 January 1993 with 2.25 m high 15 sec waves, approaching Santa Monica Bay from 265°.

Figure 18. Example of wave refraction and wave focusing effect at El Segundo (Jenkins, 2005).

5.7 Beach Characteristics

5.7.1 NRG El Segundo

Figure 19 shows locations of beach profiles at NRG El Segundo. Figure 20 shows beach profiles collected on 2002 and 2005 at station 30+00S. There are not enough profiles at this station to draw any conclusions about the behavior of the beach. Figure 21 shows a view of El Segundo Beach to the north with NRG El Segundo Generating Station in the background The approximate beach width in this area is less than 100 feet. It is noted that the presence of the Chevron groin blocks the sediment transport to the south limiting the sand supply to the beach fronting the power station. This, combined to the fact that large waves tend to focus at this location, makes the beach in this area very vulnerable to erosion and, therefore, beach nourishment is required. The mean grain size at El Segundo is in the order of 0.5 mm (USACE, 2009).

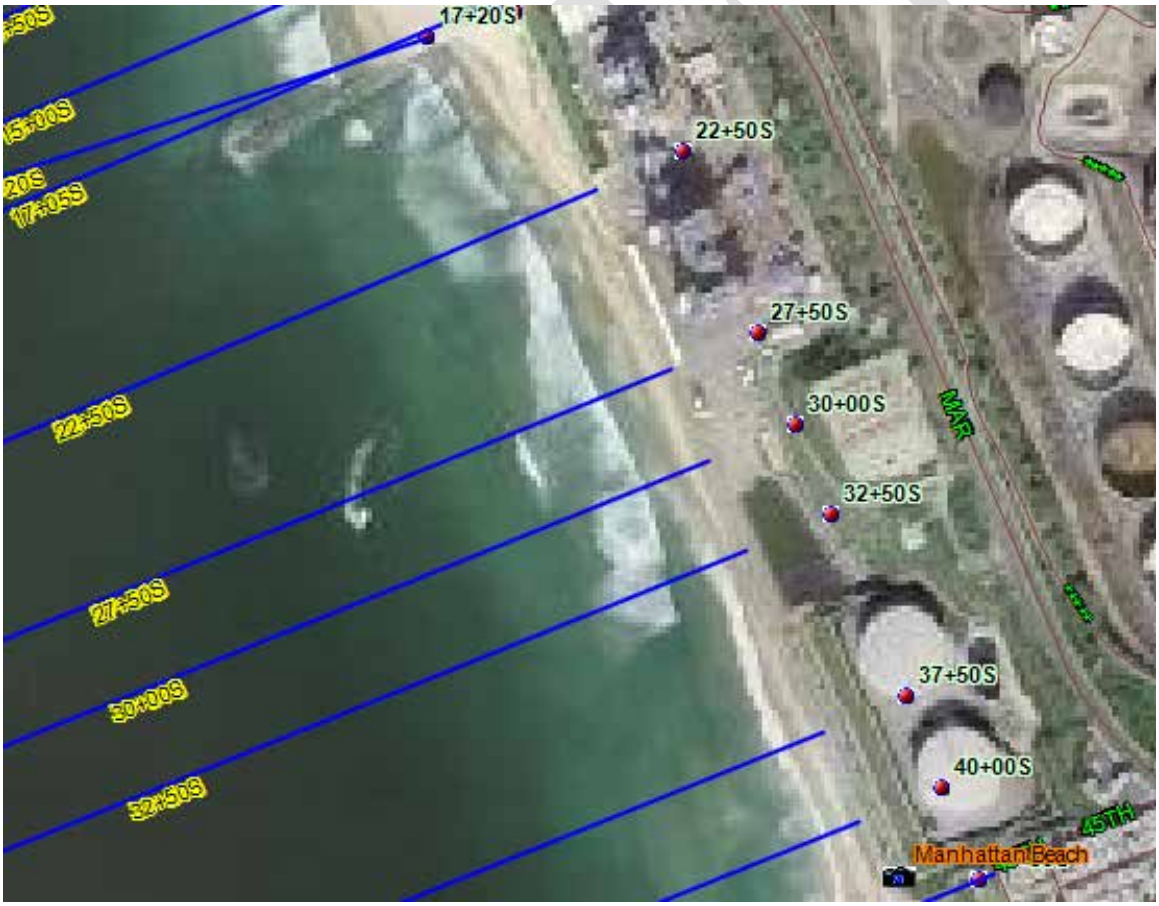

Figure 19. Beach profile locations at NRG El Segundo.

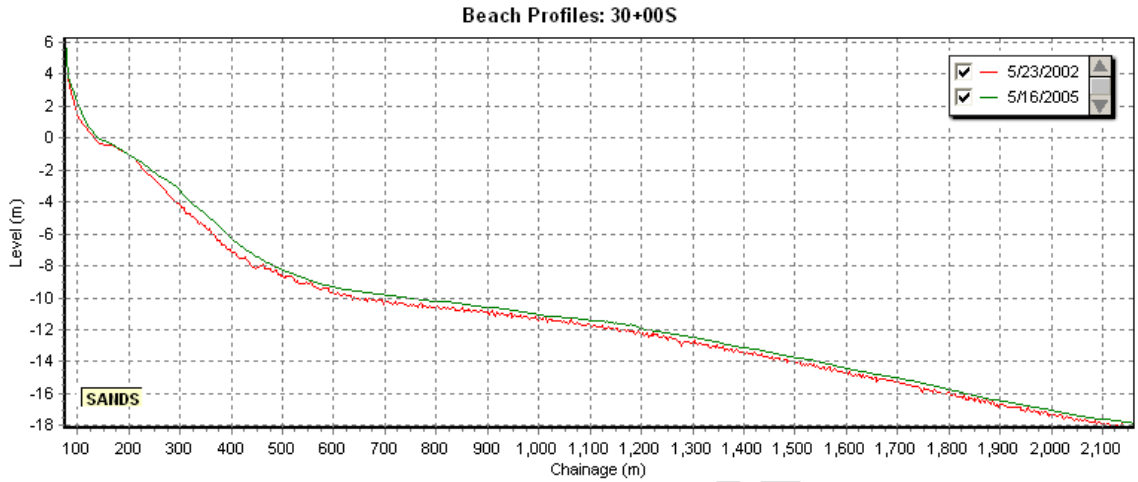

Figure 20. 2002 and 2005 beach profiles at station 30+00S, NRG El Segundo.

Figure 21. View of El Segundo Beach to the north, NRG El Segundo Generating Station in the background.

5.7.2 AES Redondo Beach

Figure 22 shows locations of beach profiles just north of King Harbor at Hermosa Beach. Figure 23 shows beach profiles collected from 2002 to 2005 at station 245+00S where the beach slope appears relative stable from -6 to -8 m (approximately 18 to 24 feet) seaward. It could be hypothesized that at this location the depth of closure (depth beyond which the seafloor sediment does not move due to the action of the waves) is approximately 18 to 24 feet. Figure 24 shows a view of Hermosa Beach to the south with King Harbor in the background. The approximate beach width in this area is 500 feet. It is noted that the presence of the King Harbor breakwater blocks the sediment transport to the south developing an accumulation of sand (fillet) at Hermosa Beach which is not typical of other beaches in Santa Monica Bay. For this reason the beach in this area is not subjected to erosion and, therefore, it does not require beach nourishment. The mean grain size at Hermosa Beach is in the order of 0.5 mm (USACE, 2009).

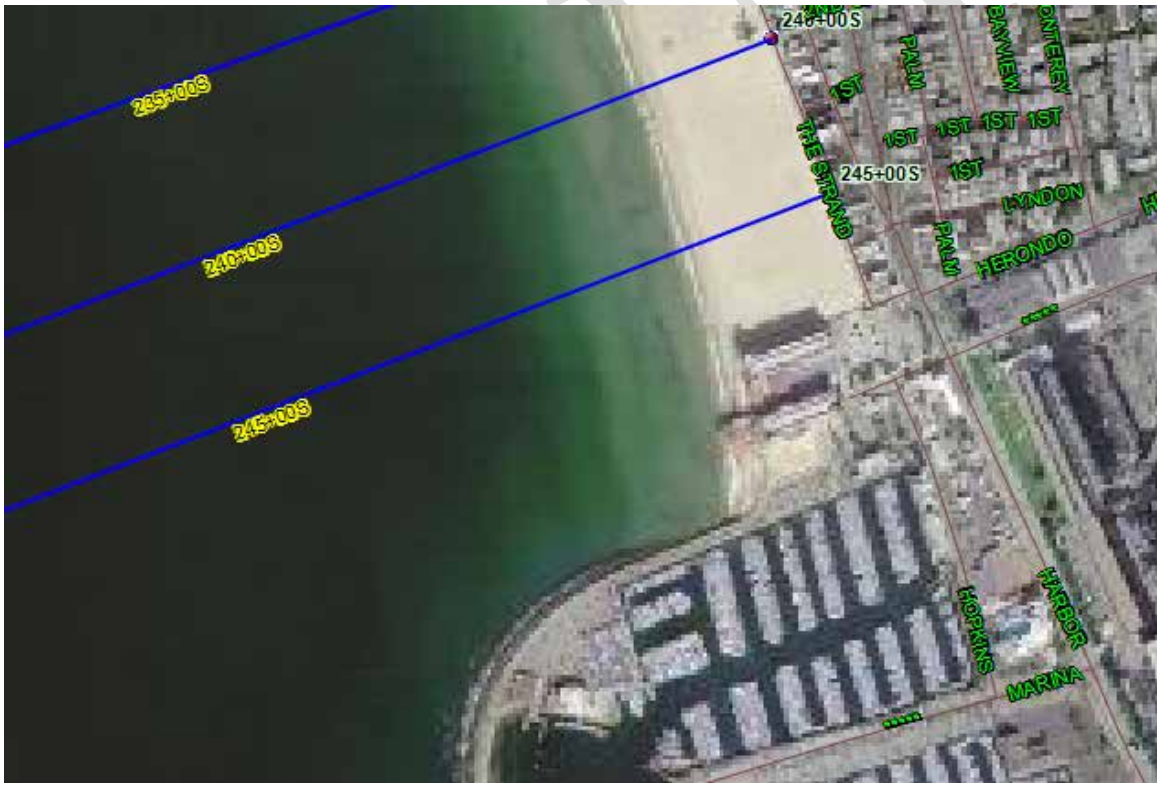

Figure 22. Beach profile locations at Hermosa Beach just north of King Harbor.

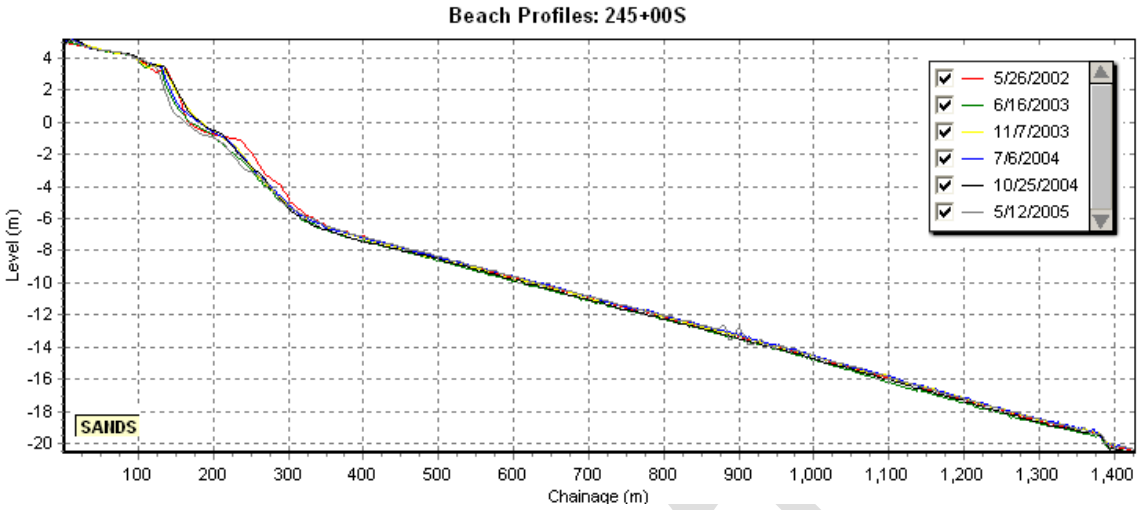

Figure 23. Hermosa Beach profiles from 2002 to 2005 at station 245+00S, just north of King Harbor.

Figure 24. View of Hermosa Beach to the south, King Harbor in the background.

5.8 Bathymetry

5.8.1 NRG El Segundo

Figure 25 shows the nearshore bathymetry at NRG El Segundo where some contours are labeled in feet and chart soundings are in fathoms (1 fathom = 6 feet). The beach slope in the area is relatively flat, with the -60 foot contour at approximately 7,000 feet from the coastline, and the -100 foot contour at approximately 12,000 feet from the coastline.

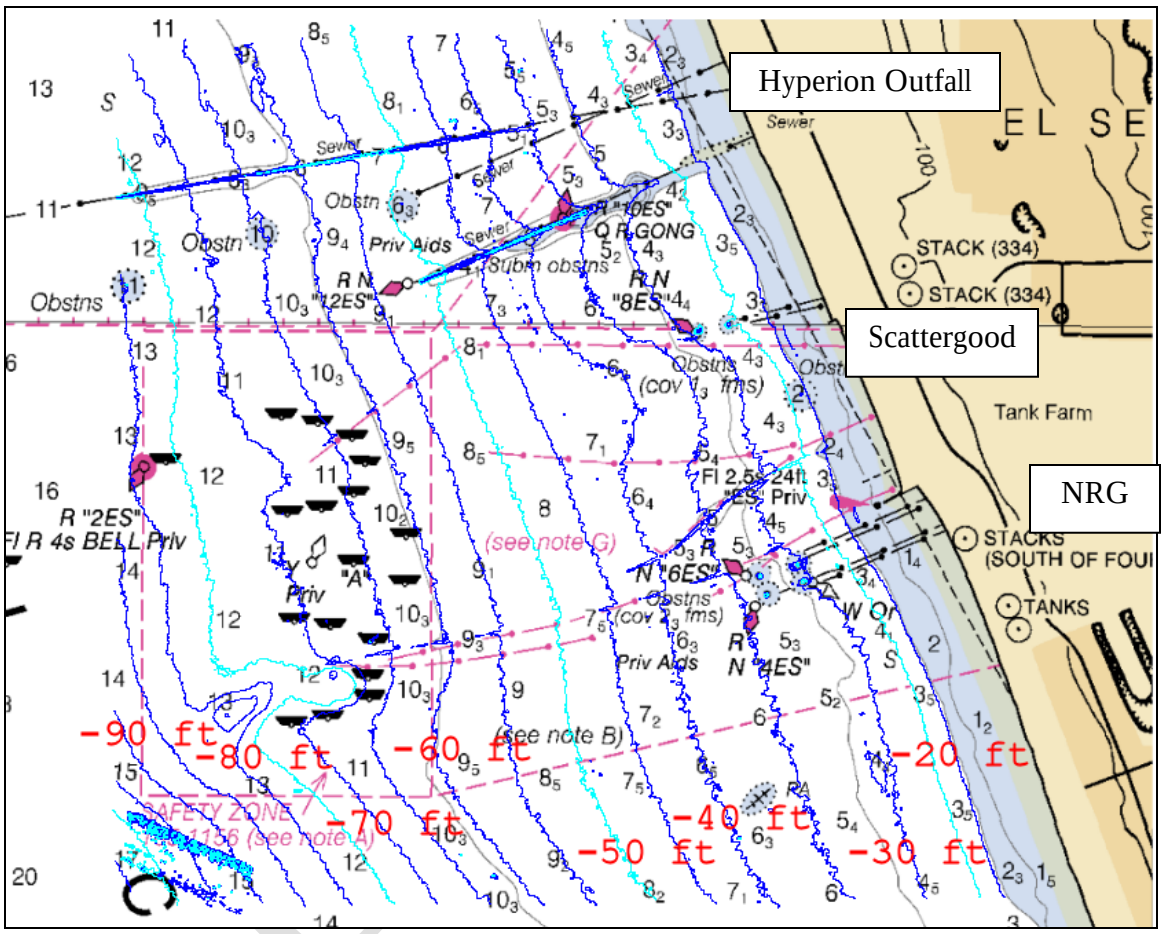

Figure 25. Nearshore bathymetry at NRG El Segundo (chart soundings in fathoms).

5.8.2 AES Redondo Beach

Figure 26 shows the nearshore bathymetry in the vicinity of King Harbor, where chart soundings are in fathoms (1 fathom = 6 feet). The AES intake and outfall are shown to the north of the King Harbor breakwater. The beach slope in the area is steeper than at NRG El Segundo, with the -60 foot contour at approximately 3,500 feet from the coastline, and the -

100 foot contour at approximately 5,000 feet from the coastline. Note the various fish havens just offshore the harbor.

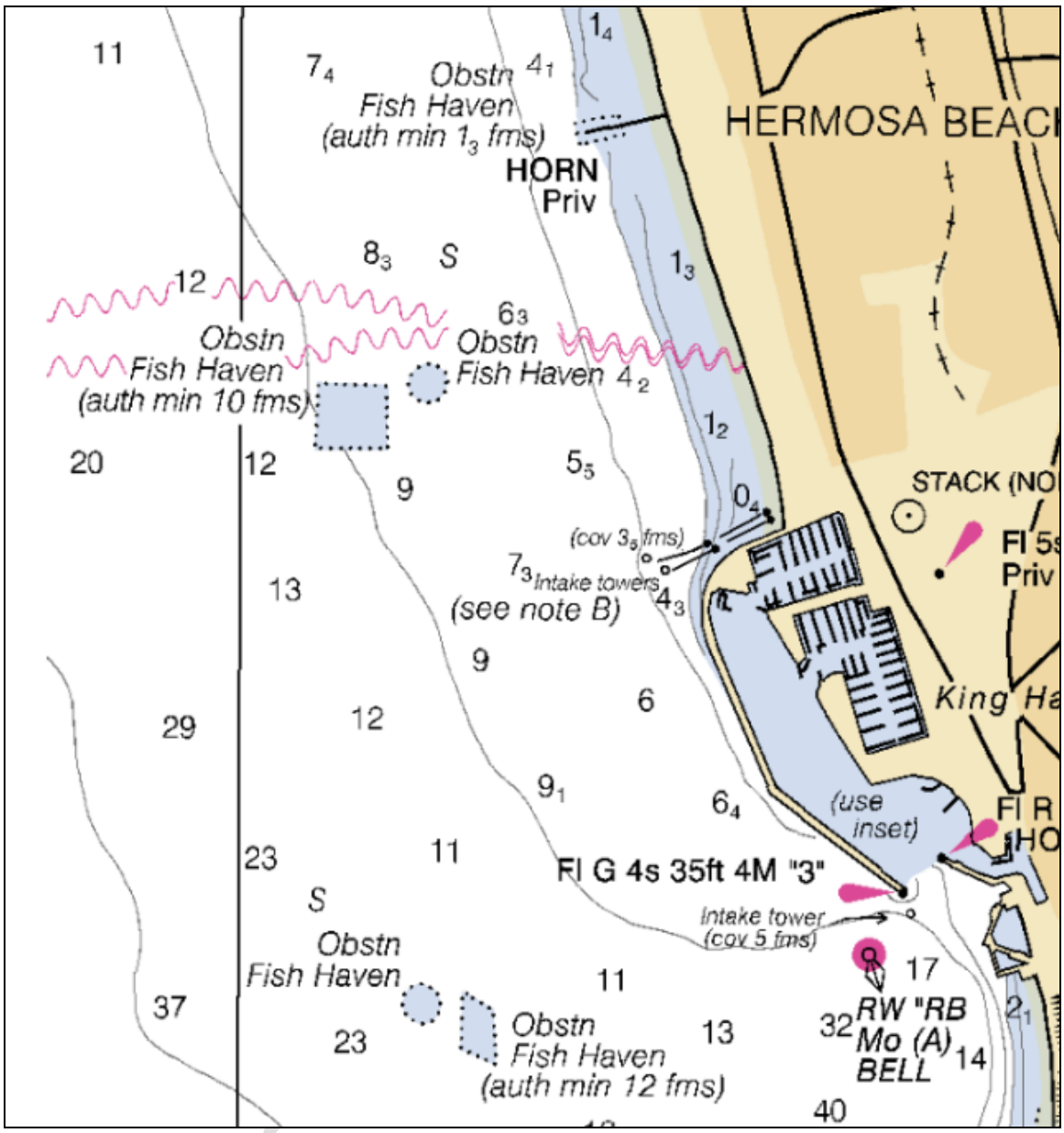

Figure 26. Nearshore bathymetry in the vicinity of King Harbor (chart soundings in fathoms).

5.9 Groundwater

For both sites the preliminary assessment of groundwater contamination is based on limited reviews of previous studies and investigations. Groundwater contamination issues at both sites are complex and have significant impact on subsurface intake alternative. Groundwater contamination issues warrant considerable additional evaluation.

5.9.1 NRG El Segundo

Groundwater contamination has been detected at the Chevron El Segundo refinery and at the NRG El Segundo generating station. Table 6 summarizes the highest values reported at this location as summarized by MHW (2007). Shallow groundwater at the site exceeds primary or secondary Maximum Contaminant Levels (MCL, 2nd MCL) or EPA Notification Levels (NL) for several inorganic and volatile organic compounds. While MHW (2007) does not provide a specific summary of contaminant concentrations it is clear that significant groundwater contamination exists at the Chevron El Segundo refinery and that active groundwater remediation and migration control is ongoing. The 2007 Regional Water Quality control Board documents indicate that significant quantities of free petroleum hydrocarbon product were being extracted from the site. However up to 12 feet of free product remained. Additional groundwater contamination was detected in the area of land farm disposal pits (circa 1911) where toluene, xylene and manganese were detected. A groundwater pump and treat system exists at this site as well. Importantly the documents indicate that "*The Silverado and Gage aquifers beneath the refinery are contaminated and water in these aquifers within 2000 feet of the refinery is not used as a result of the RWQCB order*".

Table 6. El Segundo generating station groundwater contaminants summary of highest values reported.

Inorganic Contaminants		
Contaminant	**MCL**	**Concentration**
Lead (µg/L)	15 µg/L	18.47 µg/L
Nitrate (mg/L)	45 mg/L	47 mg/L
	2nd MCL	
Chloride (mg/L)	250 mg/L	492 mg/L
Iron (mg/L)	0.3 mg/L	48.9 mg/L
Manganese (µg/L)	50 µg/L	10500 µg/L
Volatile Organic Compounds		
Contaminant	**MCL**	**Concentration**
Benzene (µg/L)	1 µg/L	2,000 µg/L
m/p Xylenes (µg/L)	1750 µg/L	4900 µg/L
MTBE (µg/L)	13 µg/L	24,000 µg/L
Contaminant	**NL**	**Concentration**
1,2,4-Trimethylbenzene (µg/L)	330 µg/L	1700 µg/L
1,3,5 Trimethylbenzene (µg/L)	330 µg/L	590 µg/L
Ethylbenzene (µg/L)	300 µg/L	4400 µg/L
Isopropylbenzene (µg/L)	770 µg/L	1600 µg/L
Naphthalene (µg/L)	17 µg/L	530 µg/L
n-Proplybenzene (µg/L)	260 µg/L	380 µg/L

5.9.2 AES - Redondo Beach

The shallow groundwater beneath Redondo Beach is impacted by several inorganic and semi-volatile/volatile organic compounds which exceed USEPA or California Department of Health Services (CDHS) drinking water standards in four areas (Oil/Gas Separator Area, Power Block Area, Hazardous Waste Storage Area, and Solvent Wash Station). Table 7 presents a summary of the highest values reported by MWH (2007) at the AES Redondo Beach generation station. The wells where groundwater contamination was detected were all completed in shallow groundwater zone. There is no data indicating whether the deeper aquifers are impacted.

Table 7. Redondo Beach generating station groundwater contaminants summary of highest values reported.

Inorganic Contaminants		
Contaminant	**MCL**	**Concentration**
Aluminum	1 mg/L	2.71 mg/L
Antimony	6 µg/L	7.03 µg/L
Arsenic	10 µg/L	222 µg/L
Chromium	50 µg/L	135 µg/L
Fluoride	2 mg/L	6.00 mg/L
Lead	15 µg/L	33.00 µg/L
Mercury	2 µg/L	31.30 µg/L
Nickel	100 µg/L	460 µg/L
Thallium	2 µg/L	2.50 µg/L
Contaminant	**2nd MCL**	**Concentration**
Chloride	250 mg/L	5790 mg/L
Iron	0.3 mg/L	208 mg/L
Manganese (µg/L)	50 µg/L	4410 µg/L
Sulfate	250 mg/L	2300 mg/L
Contaminant	**NL**	**Concentration**
Vanadium	0.05 mg/L	35.40 mg/L
Volatile and Semi-volatile Organic Compounds		
Contaminant	**MCL**	**Concentration**
1,1-Dichloroethane (µg/L)	5 µg/L	27 µg/L
1,1-Dichloroethene (µg/L)	6 µg/L	8 µg/L
1,4-Dichlorobenzene (µg/L)	5 µg/L	10 µg/L
Vinyl Chloride (µg/L)	0.5 µg/L	4.00 µg/L
Tetrachloroethene (µg/L)	5 µg/L	51 µg/L
Trichloroethene (µg/L)	5 µg/L	13 µg/L
Contaminant	**NL**	**Concentration**
1,4-Dioxane (µg/L)	3 µg/L	20 µg/L
Naphthalene	17 µg/L	167.6 µg/L

5.10 Stratigraphy

The surface geology of the El Segundo and Redondo Beach sites are shown of Figure 27 and Figure 28, respectively. An explanation of the geologic units is presented in Table 8.

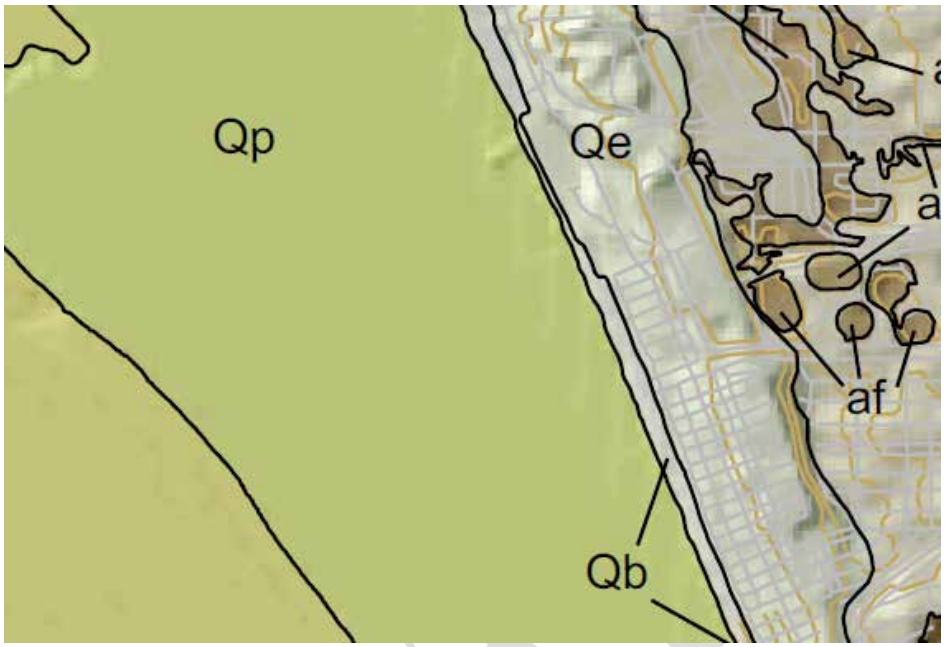

Figure 27. El Segundo geologic map (Geologic Map of the Long Beach 30'X60' Quadrangle, California, 2003)

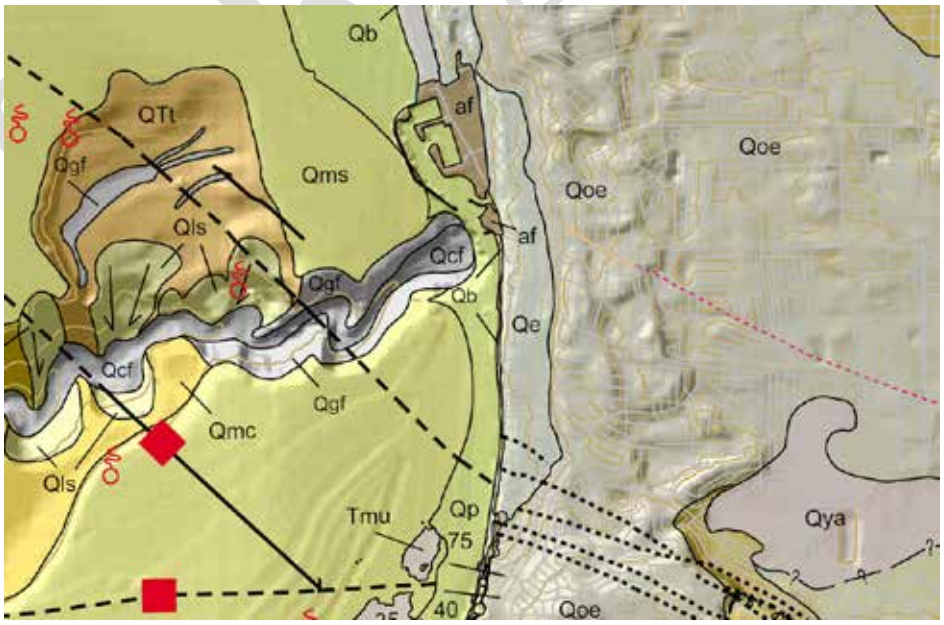

Figure 28. Redondo Beach geology map (Geologic Map of the Long Beach 30'X60' Quadrangle, California, 2003)

Table 8. Key to geologic units in Figure 27 and Figure 28.

af	Artificial Fill	Qms	Unconsolidated Shelf Deposits
Qls	Landslide Deposits	Qgf	Gully Fill
Qb	Beach Deposits	Qcf	Canyon Fill
Qe	Eolian Deposits	Qms	Unconsolidated Shelf Deposits
Qoe	Old Eolian Deposits	QTt	Plio-Pleistocene Terrace Deposits
Qp	Pleistocene Sedimentary Deposits Undivided	Tmu	Miocene Sedimentary Rock Undivided

5.10.1 NRG El Segundo

The NRG El Segundo site is located on an eolian dune complex overlooking a wide flat sandy beach. The eolian sands (Qe) are fine to medium grained dune sands that are generally dense. Pleistocene sedimentary deposits (Qp) underlie the elevated onshore plain and extend offshore. While the geologic map show these deposits as undivided, the stratigraphic units discussed in the Hydrogeology section and on Figure 27 provide more detail as to the probable variation of subsurface conditions with depth.

In the nearshore zone the margin between the dune sands and Pleistocene sediments is overlain by recent beach deposits (Qb). The nearshore area is a high-energy, wave-dominated environment. Granular materials are found in this area. The beach and surf zone consists primarily of fine and medium sand with little to some coarse sand. Outside of the surf zone, in water depths of 30 to 100 feet, modern seafloor sediments have a progressively higher percentage of fine sand, silt, and clay.

AECOM (2011) notes that previous reports, based on soil boring data, indicate that the site is underlain by engineered fill and by a sandy unit knows as the Old Dune/Gage Sand. The Old Dune/Gage Sand generally consists of brown, medium dense, silty fine- to medium-grained poorly graded sand with lenses of sandy gravel and occasional cobbles. The Old Dune/Gage Sand extends from the surface to about 50 to 57 feet below ground surface.

There no significant offshore bathymetric features near the El Segundo site.

5.10.2 AES Redondo Beach

The AES Redondo Beach site is geologically similar to the El Segundo site along the shoreline, except that the beach deposits (Qb) are locally overlain by artificial fill (af). In relatively close proximity to the shoreline the Pleistocene sediments are overlain by

unconsolidated shelf deposits (Qms). These sediments are generally soft clays and silts. The offshore geology of Redondo Beach area is dominated by the submerged Redondo Canyon.

6 Evaluation of Existing Intake and Discharge Infrastructure

For purposes of this evaluation, it was assumed that prevailing currents run from north to south and that, at each location, the tunnel to be used as intake would be the tunnel on the north side and upstream of the predominant currents, and that the discharge tunnel would be the tunnel on the south side and downstream of the predominant currents.

At each location, two intake/discharge alternatives were evaluated using the existing infrastructure, as follows:

1. Alternative 1 consists of using the existing intake/discharge tunnels in their current configuration.
2. Alternative 2 consists of installing small diameter pipes in the "North Tunnel" for the purpose of maintaining a minimum 2 feet per second velocity in the intake pipes to prevent sedimentation; and using the existing South Tunnel for discharge.

A hydraulic model of the intake and discharge system was developed to evaluate both alternatives, at each location, in terms of conduit and pump station requirements. For both alternatives, the 20 MGD and 60 MGD scenarios were evaluated. Conduit sizing is based on a 50% recovery for the RO system.

The following general conditions were applied in the hydraulic model:

- For the existing concrete tunnels a roughness coefficient (C-factor) of 110 was applied.
- Ductile iron is used for new conduits and a C-factor of 130 is applied.
- At El Segundo, the elevation at intake point was assumed to be -35 ft MLLW and the elevation at the discharge point was assumed to be -29 ft MLLW.
- At Redondo Beach, the elevation at intake and discharge points was assumed to be -37 ft MLLW.
- The intake pipe velocity to remain between 2 and 6 ft/sec.
- The intake and discharge points were modeled as reservoirs that incorporate variations in head due to the tide.
- Variable speed pumps are used to maintain required flow at all times.

The hydraulic model was used to evaluate flow velocities and pump capacities for the 20 MGD and 60 MGD scenarios. For Alternative 1, the existing tunnels diameters were used; and for Alternative 2, the model was used to size two pipes to be installed inside the intake tunnels that would meet the velocity requirements.

6.1 NRG El Segundo

At the NRG El Segundo location two pairs of tunnels exist, shown in Figure 2. The intake and discharge tunnels on the north side of the property, used for cooling water of units 1 and 2, have been decommissioned and would not be available for use. The intake and discharge tunnels on the south side of the property, used for cooling water of units 3 and 4, are currently operational. It is expected, per statements of NRG staff during the site visit on June 21 2011, that units 3 and 4 would be converted to air cooling in the near future and therefore its cooling water tunnels could be used for the desalination plant. Units 3 and 4 cooling water tunnels are 12-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 5 feet under the seafloor in the offshore area, and at about 10 feet across the beach area. The offshore end of the intake tunnel, at approximately 2,300 feet from the shoreline at a water depth of approximately -35 feet MLLW, features a vertical 16 x 21-foot internal cross section structure, with a velocity cap, which extends approximately 10 feet above the seafloor (SCE, 1982). The shorter discharge tunnel is approximately 1,800 feet from the shoreline at a water depth of approximately -29 feet MLLW. See Section 1 for additional details.

Table 9 shows flow rates and velocities for both alternatives. Figure 29 and Figure 30 show the Alternative 1 layouts, and Figure 31 and Figure 32 show the Alternative 2 layouts.

Table 9. Preliminary flow rates and velocities intake and discharge at NRG El Segundo.

Alternative	Plant Production (MGD)	Intake			Discharge		
		Flow Capacity (MGD)	Conduit Diameter (inches)	Velocity (ft/s)	Flow Capacity (MGD)	Conduit Capacity (inches)	Velocity (ft/s)
Existing Intake and Discharge	20	40	144	0.55	20	144	0.27
	60	120	144	1.64	60	144	0.82
Pipe Inside Intake Tunnel	20	40	2 x 42	3.22	20	144	0.27
	60	120	2 x 60	2.36	60	144	0.82

For the 20 MGD scenario, results for Alternative 1 show that minimum required velocity will not be met by using the existing 12 feet diameter intake tunnel since sedimentation would be likely to occur. Two 42-inch pipes seem to be a better option to achieve the

required velocity inside the pipes. Similarly, for the 60 MGD scenario, using the existing tunnel is not viable, while using 2 x 60-inch pipes would achieve the required velocity.

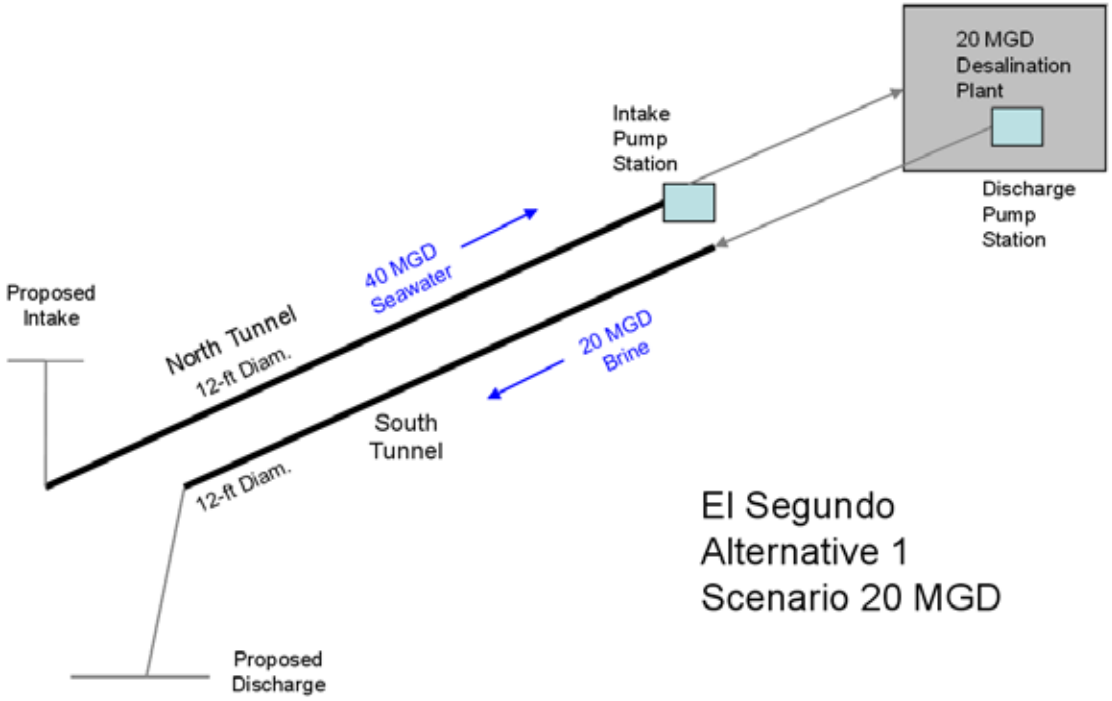

Figure 29. NRG El Segundo existing intake / discharge Alternative 1, 20 MGD layout.

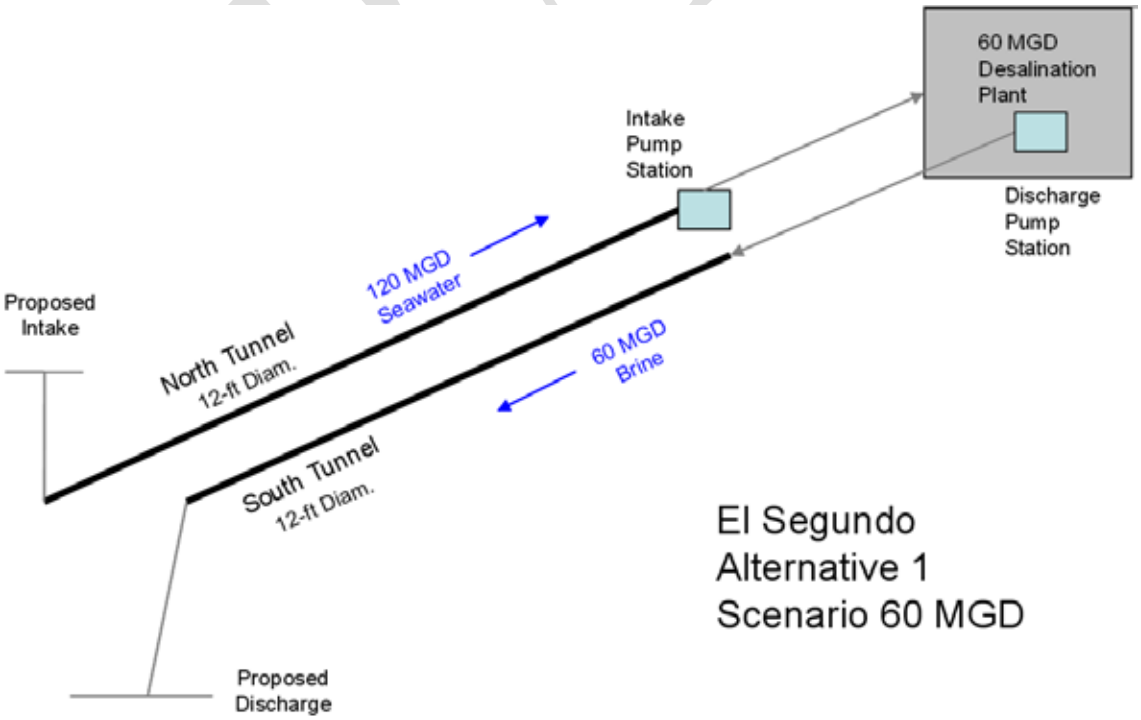

Figure 30. NRG El Segundo existing intake / discharge Alternative 1, 60 MGD layout.

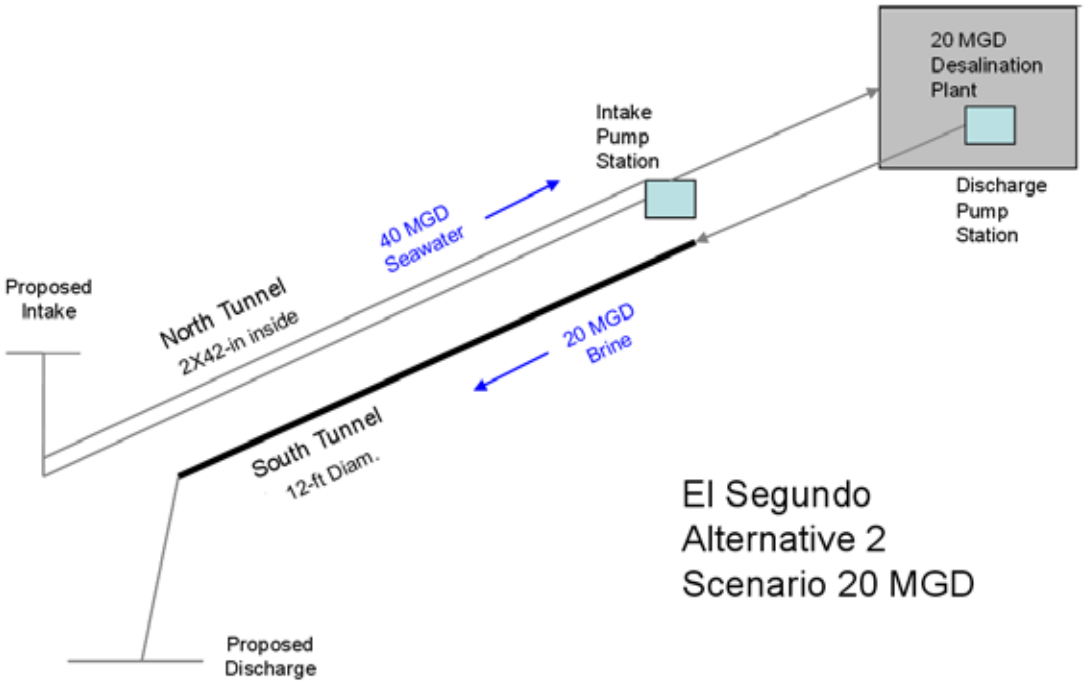

Figure 31. NRG El Segundo existing intake/discharge Alternative 2, 20 MGD layout.

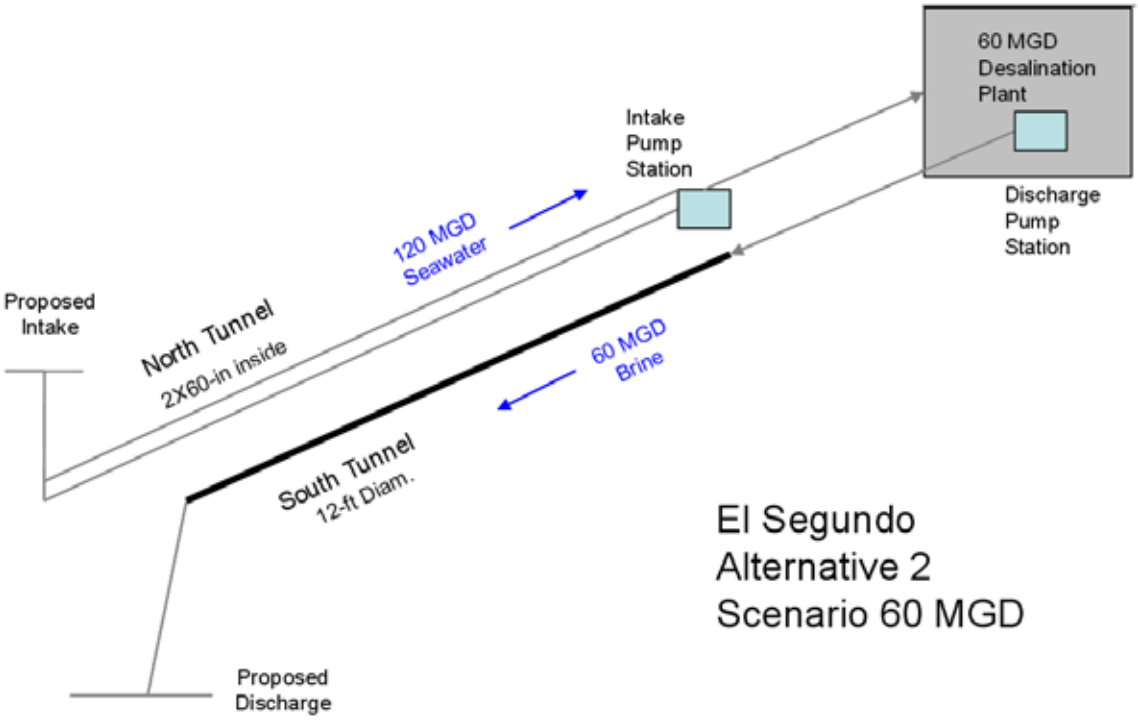

Figure 32. NRG El Segundo existing intake/discharge Alternative 2, 60 MGD layout.

6.2 AES Redondo Beach

At the AES Redondo Beach location, three pairs of tunnels exist. One within King Harbor, the second in the vicinity of the harbor entrance, and the third one just north of the breakwater on the southern end of Hermosa Beach. Figure 4 shows a layout of the tunnels. Of the three pairs of tunnels, only the pair to the north of the King Harbor breakwater is contemplated for use for the desalination plant. These tunnels have been used alternatively as intake and discharge facilities. The longer tunnel, the northern one of the pair and hereafter the "North Tunnel", extends offshore approximately 2,000 feet to a water depth of approximately -33 feet MLLW. The shorter tunnel, hereafter the "South Tunnel", extends offshore approximately 1,800 feet to a water depth of approximately -30 feet MLLW. Both tunnels are 10-foot inside diameter, shore-perpendicular concrete pipes, buried approximately 4 feet under the seafloor. Both tunnels featured a vertical intake structure with a 14-foot internal diameter cross section, with a velocity cap, which extends approximately 10 feet above the seafloor. See Section 1 for additional details.

Table 10 shows flow rates and velocities for both alternatives. Figure 33 and Figure 34 show the Alternative 1 layouts, and Figure 35 and Figure 36 show the Alternative 2 layouts.

Table 10. Preliminary flow rates and velocities intake and discharge at AES Redondo Beach.

		Intake			Discharge		
Alternative	Plant Production (MGD)	Flow Capacity (MGD)	Conduit Diameter (inches)	Velocity (ft/s)	Flow Capacity (MGD)	Conduit Capacity (inches)	Velocity (ft/s)
Existing Intake	20	40	120	0.79	20	120	0.39
and Discharge	60	120	120	2.36	60	120	1.18
Pipe Inside	20	40	2 x 42	3.22	20	120	0.39
Intake Tunnel	60	120	2 x 54	5.8	60	120	1.18

For the 20 MGD scenario, results for Alternative 1 show that minimum required velocity will not be met by using the existing 10 feet diameter intake tunnel since sedimentation would be likely to occur. Two 42-inch pipes seem to be a better option to achieve the required velocity inside the pipes. For the 60 MGD scenario, using the existing tunnels is viable while using two 54-inch pipes may increase head losses to undesirable levels.

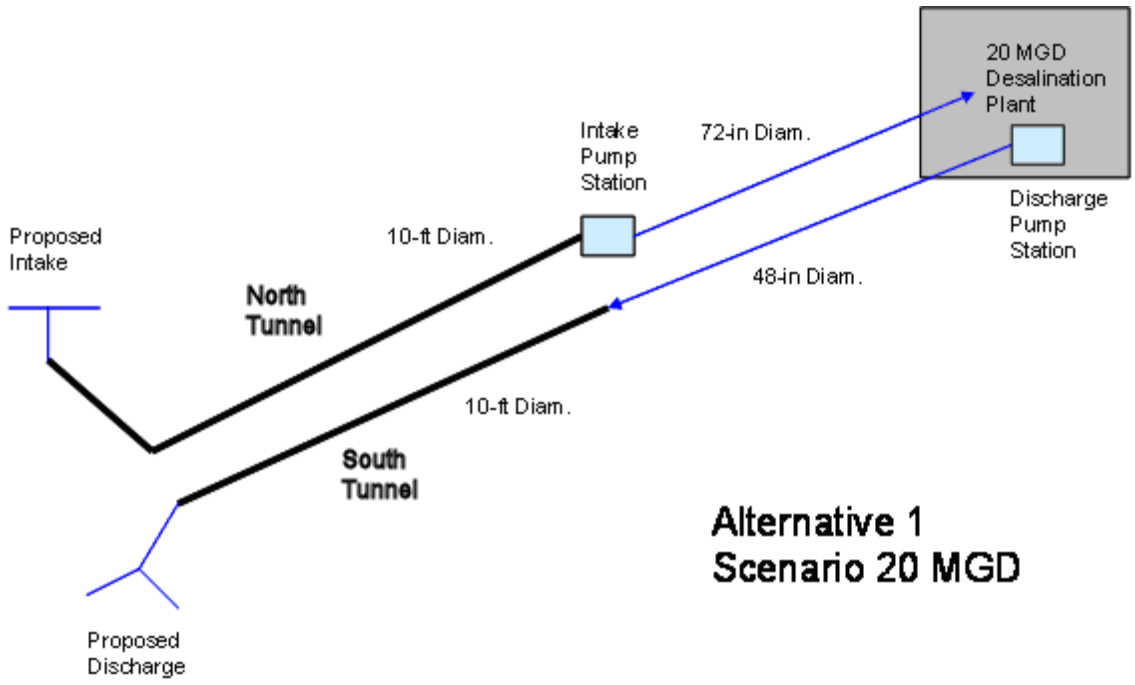

Figure 33. AES Redondo existing intake / discharge Alternative 1, 20 MGD layout.

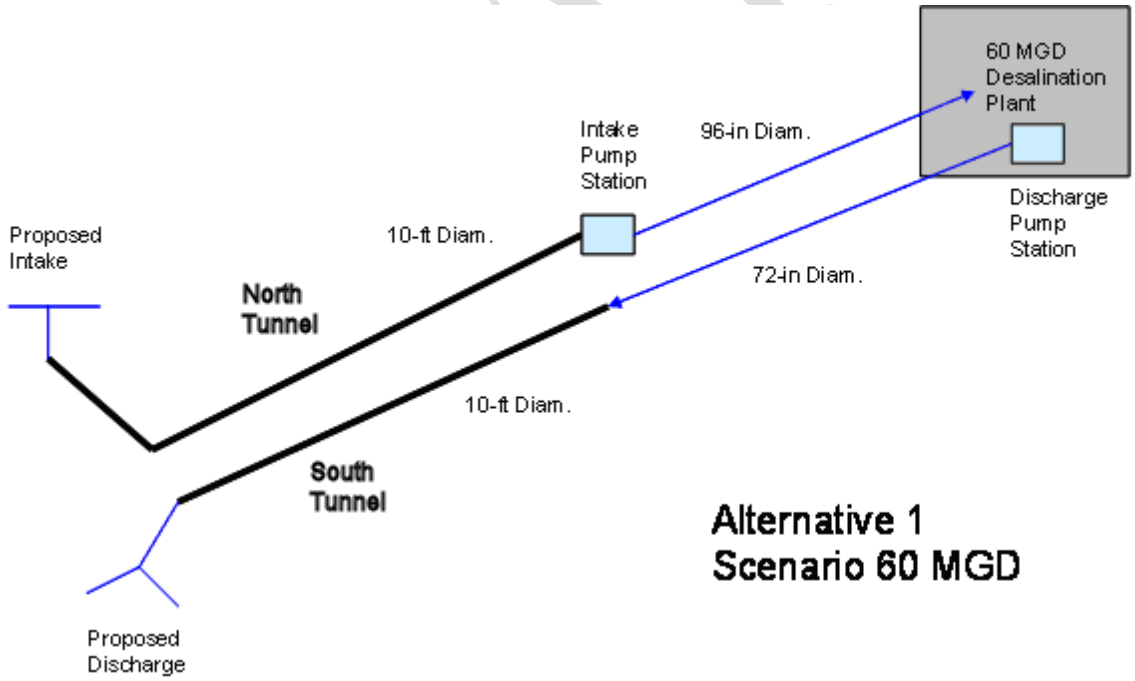

Figure 34. AES Redondo existing intake / discharge Alternative 1, 60 MGD layout.

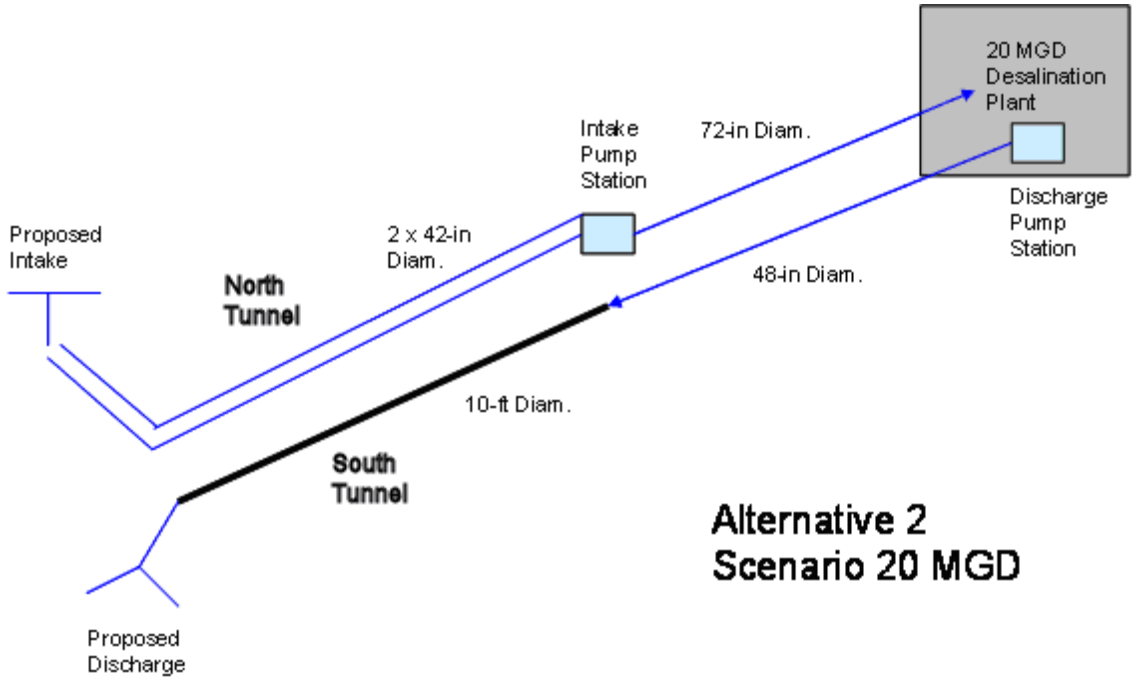

Figure 35. AES Redondo existing intake / discharge Alternative 2, 20 MGD layout.

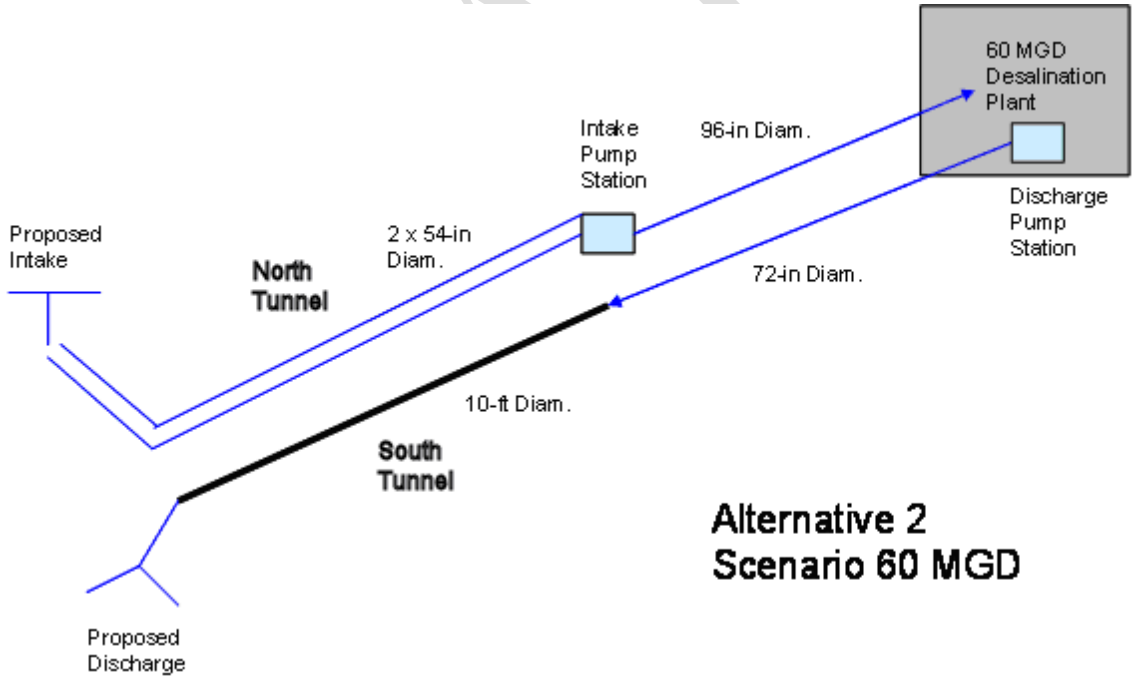

Figure 36. AES Redondo existing intake / discharge Alternative 2, 60 MGD layout.

7 Conclusions and Recommendations

Upon review of the site characteristics the following conclusions were made:

1. Sediment transport rates along the central-south Santa Monica Bay coastline are in the order of 200,000 cy/year from north to south, and conducive to produce severe erosion, in particular during winter storms. Intake concepts which rely on a stable coastal morphology like infiltration galleries or beach wells could be at risk.

2. While beaches and nearshore slopes could be artificially nourished, and this would minimize the impact of erosion, federal/state funding for nourishment has decreased in recent years and is a variable outside the WBMWD control.

3. El Segundo is more vulnerable to erosion than Redondo Beach due to the presence of the Chevron jetty that interferes with sediment transport from the north and the relatively more severe wave climate. The planned site at Redondo Beach (actually Hermosa Beach) gets the benefit of the King Harbor breakwater that allows accumulation of sand and mitigates beach erosion. Redondo Beach appears a better site for beach based intake concepts like wells. However, the high rates of sediment transport at both locations may preclude the consideration of subsurface intakes such as infiltration galleries, and could even pose a sedimentation problem to surface intakes due to excessive sediment in suspension.

4. The tide range in the area is approximately 5.5 feet, storm surge is relatively small and in the order of 1 foot. These are not considered limiting factors for the design of the desalination plant.

5. Tsunami risk along the Santa Monica Bay coastline appears to be small, with two events of 20 and 5.2 feet run-up registered in Santa Monica in 1930 and 1960, respectively. This is not considered a limiting factor for the design of the desalination plant.

6. El Segundo and Redondo Beach are located in the West Coast Basin which is a major coastal groundwater source. While groundwater could be a viable source of intake water, groundwater contamination due to industrial activities in the area would preclude the use of this source and related subsurface intake technologies.

7. El Segundo and Redondo Beach potential intake/discharge alignments do not cross known active or potentially active faults. Liquefaction in the beach areas within the top 50 feet may be possible and considered in the design.

8. Strong ground accelerations, in the order of 0.6 to 0.7 g should be expected during large earthquakes in the region and considered in the design.

9. Currents along the coast are tidal and wave-induced and could be in the order of 40 to 70 cm/sec (around 1 knot), with net current flow to the south. Current is not considered a limiting factor for the design of the desalination plan. In fact, these currents would help the dilution of the brine discharge.

10. Ocean water temperature and salinity conditions in Santa Barbara Bay are typical of coastal areas, and winds are relatively mild. These are not considered limiting factors for the design of the desalination plant.

11. Upwelling in the vicinity of Redondo Beach is particularly important and responsible for a very biologically productive environment. Careful consideration must be given to the effects of brine dispersion in that area.

12. The typical wave climate at both sites is relatively mild with waves on the 1 to 1.5 m, and 12 to 18 seconds range. Extreme waves at El Segundo are significantly higher (i.e. Hs = 30 feet) than at Redondo Beach (Hs = 20 feet). Consequently, wave run-up and total water levels at El Segundo could be significant and affect infrastructure on the beach and beyond the bike path. At El Segundo, wave loads on open surface intakes should be carefully studied, and any infrastructure on the seafloor will require relatively larger anchoring and scour protection. From a wave climate perspective Redondo Beach is a more favorable site, as anchoring and scour protection solutions for open surface concepts would be less expensive, and scour potential for infiltration galleries should be relatively less.

13. The bathymetry offshore El Segundo is relatively less steeper than at Redondo Beach. Therefore, Redondo Beach would be more favorable for the implementation of open surface intake concepts than seek the minimization of environmental impacts with deeper water installation.

14. In general, subsurface intake options are considered less feasible than most open surface intake options. The main drawbacks of these alternatives include:

a. Severe impact on the beach and nearshore seabed for the installation of wells,
b. Thousands of feet of subsurface collection wells covering several acres of land.
c. Concerns about scouring potential, particularly in the vicinity of El Segundo site.

15. When compared to most open surface options, it is apparent that the economical breakpoint of all subsurface intake alternatives is exceeded for seawater desalination plants with design capacities ranging from 20 to 60 MGD.

16. The use of existing intake and discharge infrastructure with certain modifications seems to be the most cost-effective solution for intake and discharge. This existing structure would require certain modifications and improvements, and additional investigations.

17. From the hydraulic standpoint, using the existing intake for a 60 MGD plant is more favorable than for a 20 MGD plant. The higher capacity option allows intake pipe velocities higher than 2 ft/sec. With the 20 MGD demand option the velocities are significantly low and have the potential of sedimentation on the intake pipe.

18. In general, the conditions for using the existing intake and discharge infrastructure at the El Segundo site seems to be less favorable than at the Redondo Beach site. Some factors influencing this include:

    a. no assessments of existing condition of the intake/discharge tunnels,
    b. strong wave activity,
    c. groundwater contamination, and
    d. less steep seabed slope.

19. Seismic concerns are considered about evenly weighted for either site.

The following recommendations are made:

1. Infiltration galleries, beach wells and intake/discharge concepts that rely on stable coastal morphology are not advisable from a sediment transport and wave climate perspective, in particular at El Segundo.

2. For planning purposes, a 50-year lifetime of the desalination could be considered and sea level rise due to global warming of approximately 2 feet is recommended for design.

3. Los Angeles County has adopted a "worst case" tsunami run-up estimate of 40 feet. All desalination plant land based infrastructure should evaluated and designed from this perspective.

4. Groundwater contamination should be studied in detailed if subsurface intake concepts are to be further contemplated.

5. Site specific investigations are recommended to confirm liquefaction/lateral spreading, and define the geotechnical conditions of the selected site.

6. A detailed multi-beam bathymetric survey should be performed for the selected site.

7. Brine dispersion in the highly biological productive area of Redondo Beach must be studied to assess any potential impacts.

8. A wave run-up study is recommended, accounting for sea level rise due to global warming.

9. If a 20 MGD demand scenario is contemplated at NRG El Segundo, Alternative 2 is recommended. This alternative consists of using two 42-inch diameter pipes to be placed inside the existing 12-feet diameter North Tunnel for intake, and using the existing 12-foot diameter South Tunnel for discharge.

10. If a 60 MGD demand scenario is contemplated at NRG El Segundo, Alternative 2 is recommended. This alternative consists of using two 60-inch diameter pipes to be placed inside the existing 12-feet diameter North Tunnel for intake, and using the existing 12-foot diameter South Tunnel for discharge.

11. If a 20 MGD demand scenario is contemplated at AES Redondo Beach, Alternative 2 is recommended. This alternative consists of using two 42-inch diameter pipes to be placed inside the existing 10-feet diameter North Tunnel for intake, and using the existing 10-foot diameter South Tunnel for discharge.

12. If a 60 MGD demand scenario is contemplated at AES Redondo Beach, Alternative 1 is recommended using the existing 10-foot diameter tunnels for intake and discharge.

8 References

AECOM (2011). Phase I Environmental Site Assessment of El Segundo Energy Center Facility. February 2011

Fugro West, Inc. (2006). Pipeline Route Site Characterization Report. December 2006.

Halcrow (2007). Los Angeles County Beach Nourishment Project, Data Review and Nourishment Need Assessment. September 2007.

Herberger, M., Cooley H., Herrera P., Gleick P., and Moore E. (2009). The Impacts of Sea-Level Rise on the California Coast. Sacramento. California Climate Change Center.

Intergovernmental Panel on Climate Change, 2000. Special Report on Emissions Scenarios. Cambridge University Press, UK.

Jenkins, S. and Wasyl, J. (2005). Oceanographic Considerations for Desalination Plants in Southern California Coastal Waters. February 2005.

Leidersdorf, C. B., Hollar, R. C. and Woodell, G. (1994). Human Intervention With the Beaches of Santa Monica Bay, California. Shore and Beach. July 1994, pp. 29-38.

MWH (2007). West Basin Municipal Water District, Temporary Ocean Water Desalination Demonstration Project, Technical Memorandum 2, References and Appendices. February 9, 2007.

Southern California Edison (SCE) Company (1982). El Segundo Generation Station 316(b) Demonstration. September 1982.

Southern California Edison (SCE) Company (1983). Redondo Beach Generation Station 316(b) Demonstration. January 1983.

Stockdon, H.F., Holman, R.A., Howd, P.A., and Sallenger Jr., A.H. (2006). Empirical Parameterization of Setup, Swash, and Runup. Coastal Engineering, 53(7), pp. 573-588.

9 List of Reports

List of reports collected and reviewed for each site.

9.1 NRG El Segundo

Addendum to February 2011 Phase I Environmental Site Assessment
Generating Station 316b Demonstration
Phase I Environmental Site Assessment February 2011
Phase I Updated Environmental Site Assessment May 2011 Final

9.2 AES Redondo Beach

20 and 100 MGD Cost Memo Figures and Appendix
Generating Station 316b Demonstration
Inspection Lyman Henn Report Revised Draft
Physical and Hydraulic Descriptions Circulation Water Systems
Tunnel Investigation Sonar Hibbard Onshore Report 061210

9.3 SEALab Demo Plant

Preliminary design report SEALab 092007
Technical Memo 1 Water Assessment 10102006
Technical Memo 2 References and Appendices
Technical Memo 2 Treatment Technologies and Processes 02092007
Technical Memo 5 Permitting Requirements 09132006
Technical Memo 6 Physical Siting 05182007
Technical Memo 7 Cost Estimating 082007
Technical Memo 8 Continued Research and Development 03252007
WB Ocean Water Desalination Demonstration Project Test Plan 08162010
WB Ocean Water Desalination Pilot Program Final Comprehensive Report 0902010

10 List of Drawings

10.1 NRG El Segundo

Drawings with revision numbers (Rev.) were collected and reviewed. All others (shown shaded) were identified. In addition, ALTA land title survey 20110428 Sheet 1 to 4, and Rev02 20110722 Sheet 1 to 5 were collected and reviewed.

Number	Rev.	Date	Description
537112			Utility Plan Building Area
565156	4		Plan and Profile Underwater Circulating Water Conduits
565310			Grading Plant Area
565508	4	?	Plot Plan
565511			Grading SY Area
565521	7	10/23/1962	Utilities Plant Area
565521	22	10/23/1962	Utilities Plant Area
565522			Utilities Switchyard Area
565523	6	1/7/1963	Utilities Details Sheet 1
565524			Utilities Details Sheet 2
565530	3	8/23/1962	Yard Fire Protection
565531			Retention Basin Details
565541	9	7/10/1962	Circulating Water System Plan
565541	10	7/10/1962	Circulating Water System Plan
565542	4	9/17/1962	Circulating Water System Anchor Block No 1 Sheet 1
565543	4	9/17/1962	Circulating Water System Anchor Block No 1 Sheet 2
565544			Circulating Water System Anchor Block No 2
565548	1	11/16/1962	Misc Fabricated Steel Details
565550	7	8/13/1962	Intake Structure Bottom Mat Plan and Section
565551	6	10/17/62?	Intake Structure Pumpwell Top Decks Plan
565552	6	8/13/1962	Intake Structure Gate Chambers Plan
565553			Intake Structure Section Sheet 3
565554			Intake Structure Section Sheet 2
565556	8	8/13/1962	Intake Structure Section Sheet 4
565557	5	8/13/1962	Intake Structure Section Sheet 5
565558	4	8/13/1962	Intake Structure Details Sheet 1
565559			Intake Structure Details Sheet 2
565560			Intake Structure Details Sheet 3
565561			Intake Structure Details Sheet 4
565563			Stop and Recirculation Gates Sheet 2
565565			Plan at Elevation +1.0 and Sections
565596			Electrical Manholes Sheet 1
565662			Typical Stairs and HR Details
565750			Fuel Oil Tank Site
566203	24	5/25/1962	Conduit Arrangement Plot Plan
566206	6	11/13/1962	Conduit Arrangement Below Grade Intake Structure
566207	5	11/13/1962	Conduit Details Intake Structure Sheet 1
566208			Conduit Details Intake Structure Sheet 2
566213			Details of MH's 3.1 to 3.5
566214			Details of MH's 3.6 to 3.10
566217			Handhole Details
566220			Duct Bank Section Sheet 1
566221			Conduit Details Duct Bank Section
566223			Profile of Duct Banks Sheet 1
566225			Duct Bank Profiles Sheet 3
566615			Excavation Plan Building Area
5130916			Misc Plans Sections and Details
5134611			Blowdown Transfer Sump
5134612			Blowdown Treatment Pump
5153906	4	?	Extended Aeration Waste Treatment Plant Layouts
5153907			Waste Treatment Plant Sections and Details
5153908			Misc Sections and Details
5153909			Waste Treatment Plant Profiles
5153910			Waste Treatment Plant Profiles

10.2 AES Redondo Beach

Drawings shown shaded were identified, all others were collected and reviewed.

Number	Rev.	Date	Description
579982	6	12/??/64	Circulating Water System Plan
579985			Misc Fabricated Steel Details
530325	2	10/19/1946	Circulating Water Tunnels Plan Profile and Sections
8795-FC-42		1953	Operating Sequence Circulating Water Lines
		11/22/1996	ALTA Survey
		1/18/1974	Vicinity Map Proposed Development Plan
5174264	15	5/25/1983	Plot Plan (as built)
8795-FC-1		8/29/1952	Screen Well Outline Sheet 1 Plant 2 Unit 5
8795-FC-7		10//7/52	Transition Structure Outline Sheet 1 Plant 2 Unit 5
		10/3/1997	Existing Configuration Easements and License Agreements Sheet 2
		9/1/1954	Plants 1 and 2 Combined Profile Intakes Circulating Water Normal Operation
		10/3/1997	Lot Line Adjustment Map Proposed Parcels
		9/1/1953	Plant 2 Pressure Gradients for Circulating Water Plants 1 and 2 Combined
		12/18/1952	Profile Discharge Line Circulating Water Normal Operation Plants 1 and 2 Combined
		3/6/1953	Profile Intakes Circulating Water Normal Operation Plants 1 and 2 Combined
565751	5	2/18/1964	Fuel Oil Tank Site and Sections and Details
565750	9	2/18/1964	Fuel Oil Tank Site

Appendix 1:B

Water Quality and Operational Considerations for Pumping Desalinated Water from the West Basin Municipal Water District into Metropolitan's Distribution System

Memorandum 4 --Water Quality and Operational Considerations for Pumping Desalinated Water from the West Basin Municipal Water District into Metropolitan's Distribution System

1. EXECUTIVE SUMMARY

This memorandum outlines water quality and operational requirements and considerations for a seawater desalination project proposed by the West Basin Municipal Water District (West Basin). The proposed project consists of a West Basin owned and operated seawater reverse osmosis (SWRO) treatment plant that would be used to provide water to both West Basin's and the Metropolitan Water District of Southern California's (Metropolitan's) treated water distribution systems. The desalinated water must meet all federal and state drinking water quality standards and be permitted by the California Department of Public Health (CDPH) as a domestic water supply. For most water quality constituents, Metropolitan's ambient and historical water quality concentrations will be used to establish acceptable ranges for pump-in water quality. Acknowledging that seawater desalination projects will have difficulty meeting some of Metropolitan's constituent levels, there are exceptions to this requirement for bromide, chloride, and boron. Further studies are needed to resolve issues of corrosion, disinfectant stability, disinfectant by-product formation potential, temperature effects, aesthetics, and microbial issues. A tentative SWRO study program that includes bench-, pilot-, and demonstration-scale evaluations and pipe loop testing over a two to three year period is proposed to resolve these issues.

The system design and operation of the full-scale SWRO treatment plant must include sufficient redundancy, monitoring and operational safeguards to ensure 100-percent compliance with all water quality regulations and to ensure that Metropolitan facilities would not be put at risk in the event of a SWRO shutdown. Supervisory controls and data acquisition system (SCADA) communications between West Basin and Metropolitan will need to be established, emergency response plans must be clearly delineated, and a coordinated operating agreement must be developed to ensure smooth operations. West Basin will be responsible for meeting all state and federal drinking water regulations, including permitting, performance, monitoring, and reporting requirements for the water they treat. There will also be additional monitoring and reporting requirements for Metropolitan as this new source is added to the distribution system.

The following actions are recommended:

1. Conduct the proposed SWRO Water Quality Study (described in Section 3.3). This study should resolve water quality issues of corrosion, disinfectant stability, disinfectant by-product formation, temperature differences, aesthetics and microbial issues. This information can then be used to design and size full-scale desalination and post-treatment facilities, and provide operational criteria.
2. Identify flow limitations to the pump-in caused by either water quality issues identified in the SWRO Water Quality Study or by required minimum flows in Metropolitan's treatment plants and distribution system.

3. Develop a coordinated operating agreement between West Basin and Metropolitan to ensure clear communications and a safe, reliable flow into Metropolitan's system that will not adversely impact either Metropolitan's facilities or water quality.

2. INTRODUCTION

The purpose of this memorandum is to outline water quality and operational requirements and considerations for a seawater desalination project proposed by West Basin. The proposed project consists of a West Basin owned and operated SWRO treatment plant that would be used to provide potable water to both West Basin's and Metropolitan's treated water distribution systems. The specifications presented herein reflect our current understanding and current regulations; requirements may change as more information becomes available, and as new regulations are enacted.

3. WATER QUALITY CRITERIA

Prior to pumping into Metropolitan's distribution system the desalinated water must be permitted as a CDPH domestic water supply and meet all federal and state drinking water quality standards. As part of the permitting process, CDPH requires a demonstration of the filter technology's ability to provide a minimum of 99 percent *Giardia lamblia* cyst removal, 90 percent virus removal, 99 percent *Cryptosporidium* oocyst removal, and meet specified turbidity performance standards (section 64657.30(a)(2), Title 22, California Code of Regulations). The water must be of consistent, predictable, and acceptable quality, and may not degrade water quality downstream of the point of injection (either for Metropolitan or our member agencies). Furthermore, because solute rejection decreases with increasing temperature [1], West Basin must demonstrate that acceptable water quality will be produced even at the highest anticipated source water temperatures.

For many constituents, Metropolitan's ambient and historical water quality concentrations may be used to establish acceptable ranges in pump-in water quality. These known values are discussed in Section 3.1 "Historical and Ambient Constituent Levels". However, several areas, notably corrosion control, disinfectant stability, disinfectant by-product (DBP) formation potential, and taste cannot currently be based on specific constituent levels, and will require more testing to ensure that neither Metropolitan nor downstream member agencies will be negatively affected by the introduction of desalinated water. This will require evaluation of various blends of desalinated and Metropolitan water, various system detention times, and various piping materials from Metropolitan and member agency systems to ensure no degradation within Metropolitan's or downstream member agencies' distribution systems. Only blends of desalinated and Metropolitan water will be tested; resources do not permit testing the multitude of possible blends within member agency and sub-agency distribution systems.

3.1 Historical and Ambient Constituent Levels

The water quality requirements for the SWRO pump-in will vary by specific distribution pipeline and point of injection. For example, if this project pumps into a Jensen plant

distribution pipeline, it will be evaluated against Jensen plant effluent concentrations. Central Pool area pump-ins will be compared to Jensen, Weymouth and Diemer plant effluent concentrations. Matching Metropolitan's water quality will ensure no degradation of water quality or increased corrosion of downstream facilities.

Concentrations of constituents (measured at the point of introduction into Metropolitan's system) should be consistent with historical Metropolitan water quality levels as shown in Appendix 1. Constituents exceeding levels described in Appendix 1 will be evaluated on a case-by-case basis to assess potential adverse water quality conditions. Constituents, including alkalinity, pH, fluoride, and total chlorine, may not be less than Metropolitan's water quality concentrations shown in Appendix 1 at the point of introduction into Metropolitan's system. Constituents found in concentrations lower than these historical ranges may be evaluated on a case-by-case basis to determine whether water quality impacts would be acceptable

3.1.1 Alkalinity and pH

Desalinated water will require post-treatment to raise alkalinity and pH concentrations to the levels found in Metropolitan's distribution system. These constituents are critical to controlling corrosion within the distribution system, and may play an important role in N-nitrosodimethylamine (NDMA) formation [2] as well as water palatability [3].

3.1.2 Fluoride

Because fluoride treatment only recently commenced at Metropolitan, the historical fluoride levels are not appropriate target concentrations. The regulatory fluoride target level must be reliably maintained. Currently this level is 0.8 mg/L with a control range of 0.7-1.3 mg/L fluoride; however this may be reduced in the near future.

3.1.3 Disinfection/Disinfectant Residual

All regulatory disinfection requirements must be met prior to introduction into Metropolitan's system. West Basin shall assume all responsibility for monitoring and reporting the disinfection process (e.g. the disinfectant CTs, minimum disinfectant residuals, and bacteriological analyses) to CDPH and to Metropolitan. The desalinated water must reliably maintain stabilized chloramine residuals (with a 5:1 Cl_2:NH_3-N ratio) such that it will not cause increased residual decay rates in Metropolitan's system. The chloramine residual must be comparable to that of Metropolitan's distribution system at the proposed injection point (approximately 2.5 mg/L as Cl_2). Metropolitan's distribution system shall not be used to stabilize the disinfectant residual.

3.2 Special Water Quality Considerations

Acknowledging that seawater desalination projects will have difficulty maintaining certain constituent levels at or below those listed in Appendix 1, several exceptions to this requirement will be made, as noted below, for bromide, chloride, and boron.

3.2.1 Bromide, Disinfectant Residual Stability, and Disinfection By-Products (DBPs),
Several issues arise from the elevated bromide concentrations associated with seawater. Bromide quickly reacts with free chlorine to form hypobromous acid, and represents a source of chlorine demand [4]. Furthermore, when ammonia is subsequently added, bromamine will form in addition to the chloramines. Because dibromamine is very active compared to chloramines it decomposes rapidly, resulting in an unstable disinfectant residual. In addition, when desalinated water is blended with surface water containing total organic carbon (TOC), the dibromamine and hypobromous acid will react with the TOC to form brominated DBPs.

Recent studies suggest that bromide concentrations $\leq$ 0.3 mg/L in the desalinated water may reduce the problems with disinfectant stability and DBP formation [5]. Therefore, bromide levels exceeding Metropolitan's historical and ambient treated water levels may be permitted in the pump-in. This is consistent with Metropolitan's State Water Project pump-in policy of allowing small increases in some constituents provided there is an overall water quality benefit from the program. However, studies conducted at Metropolitan indicate that increases in bromide from 0.1 mg/L to 0.3 mg/L resulted in elevated levels of NDMA — an unregulated chloramine disinfection by-product that is expected to be regulated in the future [6]. Further studies are needed to ensure reliable stabilization of the disinfectant residual prior to entering Metropolitan's distribution system. Sufficient holding time will likely be required after ammonia addition to ensure near complete decay of the bromamines, and additional chlorine may be required to react with the resultant free ammonia prior to blending with Metropolitan supplies. Furthermore, blending studies should be conducted to ensure that the pump-in will not cause an increase in DBP concentrations (including NDMA) downstream of the injection point greater than the increases currently produced in Metropolitan's system.

3.2.2 Chloride,
The chloride concentration in the desalinated water should be maintained at or below 100 mg/L. This level is well below the 250 mg/L chloride drinking water maximum contaminant level (MCL); however, increasing chloride in Metropolitan's distribution system above 100 mg/L may create problems for Metropolitan's customers. The West Basin chloride goal was set at 100 mg/L because various industries in the area have expectations of chloride levels on the order of 100 mg/L or less, and because at concentrations above this level, the chloride ion toxicity to some plants could limit the use of this water for irrigation [7]. Moreover, chloride discharges to groundwater is also limited to 100 mg/L in many groundwater basins within Metropolitan's service area.

3.2.3 Boron,
Boron concentrations in the pump-in water may exceed Metropolitan's ambient concentrations (< 0.02-0.37 mg/L) but must remain at or below 0.5 mg/L. This level is recommended by the World Health Organization and is below the CDPH notification level of 1 mg/L. Both levels were based on health effects. The lower level was selected both to protect consumers and to avoid boron toxicity issues when irrigating plants. Boron concentrations between 0.5- and 1.0-mg/L adversely affect many plants and trees commonly found in Southern California.

3.3 Further Evaluation /Research Needs

Specific constituent levels cannot currently be set for corrosion control, disinfectant stability, DBP formation potential, or taste and will require more testing to ensure that neither Metropolitan nor downstream member agencies using desalinated/Metropolitan blends will be negatively affected by the introduction of desalinated water. Further investigation is needed into potential impacts of varying water temperatures on pipeline integrity. Anecdotal evidence suggests that thermal stress caused by large temperature changes, as well as low water temperatures may damage pipelines. Microbial studies should be conducted to assess the presence and concentration of pathogens in untreated and treated water and the release of bacteria from biofilms on the downstream side of RO membranes into process water. And finally, the SWRO water quality study should include a summary of results from current West Basin studies of algal toxins in Southern California coastal waters and their removal by RO.

3.3.1 Corrosion

Desalination produces water with low dissolved solids and little to no hardness or alkalinity, that is corrosive, and requires treatment prior to potable use. Low alkalinity and hardness, as well as elevated chloride, and high chloride-to-sulfate mass ratios (i.e. > 0.5) [8], may lead to corrosion of distribution system piping and fixtures, potentially leading to accelerated release of lead, copper, iron, and/or manganese. These conditions can result in health effects, regulatory violations, red water, and damage to infrastructure.

Because the complex chemistry involved in corrosion, particularly when blending different water types, is not well understood, numerical criteria that will definitively prevent corrosion issues are not established. Nor can we presume treatment that worked in another water system will necessarily resolve all issues within our system and those of our member agencies. Post-reverse osmosis treatment will be required to add alkalinity, hardness and increase pH. However, it is not known if the desalinated water can be, or needs to be, treated to match Metropolitan's water quality. Concentrations of constituents known to affect corrosion rates, such as alkalinity, hardness, pH, temperature, chloride and chloride-to-sulfate mass ratios, are likely to be different in the desalinated water. Therefore, further studies must be conducted to provide assurance that the project will not cause corrosion issues in Metropolitan's or downstream agencies' distribution systems.

Corrosion studies must be conducted to evaluate optimal methods for stabilizing the water. This would include various methods of "hardening" the water, (e.g., treatment with calcite, lime and CO_2 or other methods of raising the pH and alkalinity). The study should also include a survey to determine what pipe materials are used within Metropolitan and member agency distribution systems. Representative and harvested piping material should then be used in pipe-loop studies conducted with representative blends of desalinated and Metropolitan water. Lead and copper corrosion control strategies would be developed from these studies.

3.3.1.1 Lead and Copper

A major source of lead in drinking water is typically not the source water, but the corrosive action of the water on materials in plumbing systems. Water velocity, residence time, temperature, and water quality (pH, hardness, alkalinity, dissolved oxygen, chloride:sulfate ratio, etc.) can affect corrosion rates of common plumbing systems. While a typical pH target value of 8.0–8.5 usually balances the accelerated corrosion at lower pH values with the excessive scaling and copper corrosion problems at higher pH values, a trade-off exists when attempting to simultaneously control copper and lead corrosion. Copper release is controlled mainly by pH, alkalinity, and to a lesser extent sulfates, silica, and temperature. Lead solubility (as a lead carbonate) decreases with increasing pH values and reaches a minimum near pH 10. However, raising pH to these levels also increases alkalinity and carbonate concentrations, which may exacerbate copper corrosion and by-product release (as copper carbonates and hydroxides). The addition of silicates could be an effective corrosion control agent, and orthophosphates have been shown to be effective at controlling lead and copper corrosion. Polyphosphates have actually been shown to increase lead solubility and should not be used.

Corrosion inhibitors (e.g., phosphate, polyphosphate, and silicate) are intended to form a protective film on pipe surfaces that impedes corrosion and corrosion by-product release. However, in some systems the use of these inhibitors may have negative impacts, such as destabilizing and releasing scale particulates and increasing the aqueous phase concentrations of metals via complexation. Corrosion issues within distribution systems are complex, and are further complicated by sequential distribution systems, multiple water sources, and multiple materials used in the distribution and home plumbing systems. A corrosion inhibitor may work in one part of the system but create problems in another part. Moreover, as Tampa Bay Water and University of Central Florida indicated, use of phosphorous- or silicate-based inhibitors resulted in higher biological activity as indicated by bulk HPC bacteria and biofilm HPC densities relative to the pH control under the conditions studied [9]. The addition of phosphate may also interfere with reuse of treated wastewater effluent within the distribution area. Because of the potential for negative impacts, corrosion inhibitors cannot be used in the SWRO effluent process stream; other methods of corrosion control should be studied and employed.

3.3.1.2 Iron and Manganese

Iron and manganese release in the distribution system could lead to consumer complaints for colored water below their respective secondary MCLs. Iron and manganese release can be effectively controlled through pH and alkalinity adjustment or the addition of corrosion inhibitors. However, as indicated above, corrosion inhibitors may have negative impacts in some systems, such as destabilizing and releasing scale particulates and increasing the aqueous phase concentrations of metals, and should not be used in Metropolitan's system.

3.3.2 Disinfectant Stability

Desalinated water will require disinfection with chlorine and chloramines or chloramines alone to meet regulatory disinfection requirements prior to pumping into Metropolitan's

distribution system. To avoid blending issues and prevent changes in the distribution system disinfectant residuals, the chlorine to ammonia ratios and total chlorine residuals must match Metropolitan's levels at the point of injection. Currently, a 2.5 mg/L chloramine residual is the target at Metropolitan's treatment plant effluents with a goal of greater than or equal to 1.8 mg/L chloramine residual at all of Metropolitan's service connections. The chlorine-to-ammonia (as N) ratio is targeted at 5:1 on a weight-to-weight basis.

The stability of the chloramine residual is an area of concern in SWRO product water due to the relatively high concentrations of bromide. In the presence of bromide, free chlorine residual rapidly converts bromide to bromine, or if chlorine and ammonia is added, chloramines to bromamines. The relatively rapid decay rates of the resultant bromamines are problematic as they increase the decay rate of the distribution system disinfectant. Recent research has shown that this may be controlled by using preformed chloramines [10], or through significant dilution with another potable water supply. Provision of an adequate stabilization period prior to pumping into Metropolitan facilities may also reduce disinfectant stability issues [11]. Studies are needed to ensure reliable stabilization of the disinfectant residual in the post SWRO treated water prior to entering Metropolitan's distribution system. Bench-, pilot, and demonstration-scale experiments are proposed to answer the following questions:

- What is the effect of varying bromide levels on chlorine/chloramine stability?
- What is the minimum chlorine and ammonia dose needed to overcome bromide demand in SWRO product water to achieve a stable 2.5 mg/L chloramine residual at a 5:1 w/w chlorine-to-ammonia ratio?
- What is the appropriate retention time needed to ensure all chlorine/bromine reactions run to completion and thereby prevent rapid chloramine residual decay in the distribution system?
- What is the impact of using pre-formed chloramines on chloramine stability?

3.3.3 Disinfectant By-Product Formation Potential

Several studies have shown that disinfection of SWRO permeate water produces low levels of the traditionally regulated DBPs (trihalomethanes [THMs] and haloacetic acids [HAAs]). However, when high bromide water (such as SWRO permeate) is blended with water containing organics, DBPs will continue to form with increasing water age in the distribution system. Studies conducted at the Long Beach Water Department and Santa Cruz Water Department demonstrated that the blending of low DBP-high bromide desalinated water with distribution system water increased the DBPs in the blended water over time[12][3]. The presence of bromide and iodide typically found in SWRO permeate will also shift the types of DBPs found in the water toward currently unregulated compounds such as brominated and iodinated analogs of the regulated THMs and HAAs. In addition, recent studies conducted at Metropolitan indicate that increases in bromide resulted in elevated levels of NDMA — an unregulated chloramine disinfection by-product. The concern is that these unregulated DBPs may in the future be found to have health effects and may become regulated compounds.

To address these issues, an evaluation of the formation potential for regulated and unregulated DBPs, as well as NDMA formation in the distribution system must be conducted. Weekly or bi-weekly sampling for simulated distribution system (SDS) testing to evaluate DBP formation in various blends of desalinated and Metropolitan water is recommended to assure compliance with drinking water regulations (Stage 2 D/DBP Rule) for THMs and HAAs.

Bench-, pilot-, and demonstration-scale experiments are proposed to answer the following questions:

- What is the effect of varying bromide levels in various blends of desalinated and Metropolitan water on DBP formation?
- What is the impact of variable total organic carbon (TOC) levels on chloramine stability and DBP formation?
- What is the impact of using pre-formed chloramines on DBP formation?

3.3.4 Temperature

Temperatures in desalinated water may be significantly higher or lower than the water temperatures in Metropolitan's distribution system. During studies conducted by West Basin, feedwater temperature ranged from 11.4 to 24.4 ^{o}C with an average of 16 ^{o}C when using ambient seawater [13]. (Temperature ranged as high as 36.8^{o}C when using power plant outfall water; however it is not anticipated to be used in the future.) In comparison, Jensen plant water ranged from 5.5 to 22.9 ^{o}C with an average of 15 ^{o}C. Higher water temperatures may increase corrosion rates and the growth of microorganisms in the distribution system. Low water temperatures, or large changes in temperature, may increase incidences of pipe breakage. Therefore, batch pipe-loop tests are proposed to evaluate the effects of mixing dissimilar temperature SWRO permeate with various blends of Metropolitan water on pipe breakage, corrosion, and bacterial growth.

3.3.5 Taste and Odor

Consumers use taste and odor as an indicator of the quality and healthfulness of their drinking water. Specific Threshold Odor Numbers are indicated in Appendix 1, but there is no specification for water palatability. Small off-flavors or just a change in flavor can cause consumer complaints. However, this may not be a problem; in blind taste tests conducted in Marin County, consumers preferred the taste of desalinated RO water over conventionally treated water [3]. Furthermore, a study conducted by the Santa Cruz Water District indicated that by adjusting the alkalinity to 30–40 mg/L as $CaCO_3$ they could produce SWRO water that tasted similar to their typical conventionally treated water [3]. Further study is needed to evaluate various blends of desalinated and Metropolitan water to ensure that no off-flavors will be produced.

3.3.6 Microbiological Assessment

Anthropogenic sources such as sewage overflows, inadequately treated sewage, urban and agricultural run-off, and storm water can introduce human pathogens into seawater.

In addition, some indigenous marine microbes represent a potential human health risk. Human pathogenic protozoa such as *Cryptosporidium* and *Toxoplasma gondii* have been detected in seawater and there is strong evidence that high *Toxoplasma gondii* infection rates are partly responsible for the decline in southern sea otter populations in Southern California coastal waters[14]. Other pathogens found in seawater include *Vibrio* spp., *Shewanella* spp., *Photobacterium damselae*, adenoviruses, and enteroviruses. Adenoviruses have been detected in coastal waters and human adenovirus and enterovirus nucleic acids were detected in coastal waters and estuaries [15], [16],[17]. Importantly, standard bacterial indicators of water quality did not correlate with human pathogenic viruses in Santa Monica Bay [18]. Also, microbial biofilms on the downstream side of RO membranes can release bacteria into the finished water thereby degrading water quality.

A wide variety of toxins are produced by marine phytoplankton, sometimes leading to harmful algal blooms (HAB). Some of these toxins are known to have adverse human health effects while the link has not been clearly established for others. Toxin-producing marine algae include *Karenia brevis* (red tides), dinoflagellates and diatoms, *Alexandrium* spp., *Pseudo-nitzschia, Pfiesteria piscicida, Aureococcus*, and *Auroeumbra*. As reviewed by Caron et al. [19], there is convincing evidence that the frequency of HAB events is increasing along the U.S. west coast, including recent toxic blooms in the Santa Barbara channel, San Pedro Channel, Long Beach-LA harbor, and along the San Diego coast. The occurrence of *Pseudo-nitzschia* spp. correlated with measurements of domoic acid close to the intake of West Basin's pilot-scale desalination plant in El Segundo with maximum concentrations occurring in the spring [19].

Correctly operating desalination processes should effectively remove all types of bacterial, protozoan, and viral pathogens. However, a thorough understanding of source water quality is necessary for process optimization. Although all viruses should theoretically be removed by RO membranes, actual removal may vary depending on the type, condition, and configuration of the membrane and the integrity of the entire RO system, including seals. Breaches of membrane integrity or damaged seals can lead to the passage of pathogens into process water. There are no published studies on the removal of dissolved algal toxins by RO so empirical studies are necessary.

Although the CDPH permitting process requires demonstrating minimum removal of 99% of *Cryptosporidium* and *Giardia* and 90% of viruses, studies should be conducted to assess the presence and concentration of pathogens in seawater and desalinated water. This assessment may include direct detection of pathogens along with standard bacterial indicators of seawater quality such as enterococci. In addition, the SWRO water quality study should include a summary of results from the ongoing West Basin-Caron collaboration on the occurrence of algal toxins in Southern California coastal waters and their removal by RO. Finally the potential for release of bacteria from biofilms on the downstream side of RO membranes into process water and the resulting impact on finished water quality should be evaluated.

3.4 Proposed SWRO Water Quality Study

Metropolitan is proposing a study to resolve the water quality issues identified above, however, it has not yet been approved or funded. This section is an overview of Metropolitan's proposed SWRO water quality study; a summary of the proposed study is provided in Table 1. Pending approval and funding, testing will be conducted at the bench-, pilot-, and demonstration-scales. The major areas of concern are:

- How will Metropolitan maintain regulatory compliance?
- What is the appropriate corrosion control strategy to protect Metropolitan's infrastructure and distribution system water quality?

3.4.1 Literature Review

A literature review of current SWRO practices in the United States and worldwide will be conducted. The purpose of the literature review will be to aid in the proper design of the bench-, pilot-, and demonstration-scale research platforms. In addition, a survey of SWRO facilities will be conducted to gather information on existing SWRO plants and piping materials that are used within their distribution systems. A survey of piping materials used in the Metropolitan and member agency service areas of the proposed SWRO facility will also be conducted. Information from the surveys will be used to design the pipe-loop facility and study plan.

3.4.2 Research Platforms

Bench-, pilot-, and demonstration-scale research platforms will be constructed to evaluate the major areas of concern. Bench-scale research platforms will consist of coupon testing to evaluate material compatibility and corrosivity as well as bench top lab experiments to evaluate disinfectant stability and by-product formation tests.

A pilot-scale, pipe-loop test apparatus will be constructed to operate in either continuous flow-through or recirculating systems. Segments of pipe will be harvested from within Metropolitan and member agency distribution systems for both the pilot-scale and demonstration-scale pipe-loop systems. Each pipe loop will consist of a single material for better control and understanding of the corrosion processes for each material. The flow-through system better simulates conditions found in a distribution system. However, it is more complex as it requires a continuous feed of source water and continuous chemical feeds. In addition, the flow-through system typically requires several months of operation before results can be obtained. A recirculating system operates with a batch of water in a closed loop over an extended period of time. During recirculation, measurements of the corrosivity of the water can be taken and will provide more rapid results within 1 to 2 months. Pilot-scale pipe loop systems typically operate at 0.5-2 gpm and require 3 to 9 feet of piping material.

Demonstration-scale pipe loops shall also be constructed to operate in continuous flow. The demonstration-scale pipe loops typically operate at 1-5 gpm, but the length of piping will range between 30 to 100 feet. Testing at demonstration-scale will allow evaluation of distribution system issues at conditions that better mimic full-scale hydraulic and mixing conditions.

3.4.3 Regulatory Compliance

The following list of constituents will be monitored from both the pilot- and demonstration-scale SWRO test platforms:

- Boron
- Bromide
- Chloride
- NDMA
- THMs and HAAs
- Title 22 Constituents
- TOC
- Flavor Profile Analysis
- Microbial Analysis

3.4.4 Corrosion

Coupon tests and pipe loop studies shall be conducted to evaluate the appropriate corrosion control strategy to prevent lead and copper corrosion, as well as issues associated with iron and manganese release. Piping materials shall be selected and harvested to be representative of those materials commonly found within the service area impacted by SWRO product water. Potential post-treatment options shall include pH adjustment, alkalinity enhancement, chloramine stabilization, and blending.

Bench-scale studies using pipe material coupons will be used to evaluate what is the appropriate metric by which corrosion potential shall be measured. Several metrics have been used by other agencies with varying results. These corrosion potential metrics include Langelier Saturation Index (LSI), Calcium Carbonate Precipitation Potential (CCPP), Ryznar Saturation Index (RSI), and chloride-to-sulfate mass ratio. Common stabilization techniques to be evaluated include:

- Lime addition to increase pH, alkalinity, and Ca^{2+} concentration
- Lime and CO_2 addition to increase Ca^{2+} and alkalinity while controlling pH
- Addition of corrosion inhibitors
- Blending RO permeate with other, less corrosive water

3.4.5 Technical Advisory Committee

Three technical experts in seawater desalination will be hired to form a technical advisory committee (TAC). One potential candidate identified is Dr. Michael McGuire. The function of the TAC will be to provide its expertise and knowledge of seawater desalination and the potential impacts to Metropolitan and member agency distribution systems. In addition, the TAC will review and comment on all technical documents such as: scopes of work or test plans, technical memorandums, and technical reports (e.g. progress reports, final reports, etc.). Four workshops with the TAC will also be planned to: 1) review initial test plans, 2) review preliminary results, 3) present results to upper management, and 4) present results to impacted Member Agencies.

3.4.6 Schedule

Figures 1 and 2 provide two potential schedules for the SWRO study program. The first projected schedule is estimated to take 3 years with approximately 1 year each for bench, pilot, and demonstration-scale work. The second schedule reduces the study to a 2-year project through parallel efforts at the bench, pilot, and demonstration-scale, and would require consultants to do a greater portion of the work.

4. OPERATION AND DESIGN ISSUES

A Coordinated Operating Agreement between West Basin and Metropolitan should be developed as a separate document to work out operational details. Included below are brief discussions of some of the operational and design issues that directly impact water quality.

4.1 Reliability, Safeguards, and Process Monitoring

The system design and operation of the full-scale SWRO treatment plant must include sufficient redundancy, monitoring and operational safeguards to ensure 100-percent compliance with all water quality regulations. Per section 64661 of Title 22 California Code of Regulations, the treatment plant must be operated in accordance with an operations plan that has been approved by CDPH. The operations plan shall consist of a description of the utility's treatment plant performance monitoring program, unit process equipment maintenance program, filter inspection program, operating personnel, including numbers of staff, certification levels and responsibilities; how and when each unit process is operated; laboratory procedures; procedures used to determine chemical dose rates; records; response to plant and watershed emergencies; and reliability features. Specific features that should be included in the design/operation of the full-scale plant are outlined below.

4.1.1 Redundancy, Alarm, and Monitoring Requirements

All treatment chemical feed systems must be equipped with sufficient redundancy to ensure complete reliability. This includes redundant feed pumps, feed lines, tanks, etc. Flow meters near the point of chemical injection must be alarmed and monitored at all times. Membrane integrity must be continuously monitored with on-line conductivity meters and pressure gauges, and the post-membrane processes must be continuously monitored with free and total chlorine analyzers, ammonia analyzer, fluoride analyzer, turbidimeter, pH meter, flow meters and temperature probe. These analyzers must be alarmed and monitored at all times.

The fluoride system must have a fail-safe system to automatically shutdown in the event fluoride levels approach the upper limits of the regulatory control range. Anti-siphon measures must be incorporated into all chemical feed systems to prevent chemical overfeeds.

4.1.2 SCADA Communications Between West Basin and Metropolitan

The supervisory controls and data acquisition system (SCADA) used to control the West Basin treatment plant must provide information to the Metropolitan SCADA system. Key data needs include the following:

- Flow to Metropolitan
- Total chlorine residual
- Total ammonia
- Turbidity
- Fluoride residual
- Temperature
- pH
- System CT ratio (ratio of achieved disinfection/required disinfection) at the point of injection into Metropolitan's system
- RO effluent electroconductivity

4.1.3 Vulnerability Assessment

Drinking water source assessments are required by CDPH as part of the source water permitting process. As part of this assessment, West Basin will be required to identify past and present activities -- and others that are proposed (to the extent feasible) -- that may pose a threat to the drinking water supply, based on their potential for contamination of source seawater. A vulnerability assessment must be conducted to determine the most significant threats to the quality of the water supply. A preliminary vulnerability assessment should be conducted by West Basin early in the design process to ensure that adequate treatment and contingency plans are developed to deal with contamination events.

4.1.4 Back Up Plans – Emergency Response and Responsibilities

Emergency response plans must be clearly defined for potential treatment plant and watershed emergencies. Backup plans to either ensure continuous operation and compliance with all water quality regulations or immediately take the system off line and provide appropriate notification to West Basin and Metropolitan staff must be developed. Responsibilities and lines of communication must be clearly established.

4.2 Blending

Metropolitan distribution facilities may not be used to blend down contaminants in pump-in water to acceptable levels. If the project blends multiple sources of water prior to input into Metropolitan's facilities, the water must be adequately mixed before reaching Metropolitan's treated water distribution system. West Basin may be required to provide dynamic fluid modeling to show that adequate blending will be achieved prior to input to Metropolitan's distribution system.

Blending restrictions may be required due to corrosion, disinfectant stability or disinfection by-product issues. It is likely that Metropolitan will take a phased approach to the acceptance of desalinated water into the distribution system and limit initial flows until the studies in section 3.3 and greater operating experience can provide assurance that blending restrictions will not be required.

4.3 Pump-In Flow Limitations

Because any flow into Metropolitan's distribution system will require concurrent flow cuts upstream, pump-in flow into Metropolitan's pipeline may be limited to prevent upstream water quality impacts. Treatment plant and distribution system flows below minimum rates adversely affect chemical feed control, chemical mixing, filtration performance, chloramine decay, and may promote nitrification. Therefore the pump-in flow cannot impinge on the ability of Metropolitan to maintain required flows in its system. A Coordinated Operating Agreement between West Basin and Metropolitan should be developed as a separate document to work out flow and flow change issues.

5. MONITORING & REPORTING REQUIREMENTS

5.1 Regulatory Monitoring and Reporting

West Basin will be responsible for meeting all state and federal potable water regulations, including permitting, performance, monitoring, and reporting requirements for the water it treats. There will also be additional monitoring and reporting requirements for Metropolitan as this new source is added to the distribution system.

The California drinking water regulations listed in Title 22 California Code of Regulations and the federal regulations listed in the Federal Register specify the requirements for permitting, treatment plant performance, water quality monitoring, and reporting. The regulatory requirements are lengthy and are therefore incorporated into this document by reference. The drinking water regulations include:

- Water Permits,
- Domestic Water Quality and Monitoring Regulations,
- Disinfectant Residuals and Disinfection By-products
- Surface Water Treatment,
- Lead and Copper,
- Stage 2 Disinfectant/ Disinfection By-products Rule,
- Long Term 2 Surface Water Treatment Rule, and
- The Total Coliform Rule.

Copies of water quality compliance reports sent to CDPH should also be sent to Metropolitan.

6. RECOMMENDATIONS

The following actions are recommended:

1. Conduct the proposed SWRO Water Quality Study. This study should resolve water quality issues of corrosion, disinfectant stability, disinfectant by-product formation, temperature differences, aesthetics, and microbial issues. This information can then be used to produce a performance specification for the design and operation of full-scale desalination and post-treatment facilities.
2. Identify flow limitations to the pump-in caused by either water quality issues identified in the SWRO Water Quality Study or minimum flows in Metropolitan's treatment plants and distribution system.
3. Develop a coordinated operating agreement between West Basin and Metropolitan to ensure clear communications and a safe, reliable flow into Metropolitan's system that will not adversely impact either Metropolitan's facilities or water quality.

TABLES & FIGURES

Table 1. SWRO Distribution System Test Matrix

- *Literature review of current SWRO practices in the United States and worldwide; survey of existing SWRO plants and piping materials used within the proposed and existing SWRO service area*
- *Bench-Scale Tests*
  - *Effect of varying bromide and TOC levels and blends of desalinated and Metropolitan water on chlorine/chloramine stability*
  - *Minimum chlorine and ammonia dose needed to overcome bromide demand in SWRO product water to achieve a stable ≥ 1.8 mg/L chloramine residual at Metropolitan's service connections at a 5:1 w/w chlorine-to-ammonia ratio*
  - *Retention time needed to ensure all chlorine/bromine reactions run to completion, such that the pump-in does not cause a rapid decay of chloramine residuals in the distribution system*
  - *Changes in DBP formation potential at various bromide and TOC levels and blends of permeate/Metropolitan water*
  - *Changes in DBP speciation: next-generation iodinated and brominated DBP compounds in SWRO permeate*
  - *Effect of pH and alkalinity on DBP formation in SWRO permeate*
  - *Coupon testing to evaluate different metrics for corrosion potential in potable-water distribution systems under the influence of SWRO permeate*
- *Pilot-Scale Tests*
  - *Maintaining disinfection residuals in distribution systems under the influence of SWRO permeate*
  - *Changes in DBP speciation: next-generation iodinated and brominated DBP compounds in SWRO permeate*
  - *Batch pipe-loop testing to determine the impacts of SWRO permeate on corrosion potential of various pipe materials*
  - *Batch pipe loop testing to determine effects of temperature changes on pipe breakage and corrosion*
  - *Batch pipe –loop testing to evaluate the effects of corrosion inhibitors (e.g., phosphate, polyphosphate, and silicate) to prevent lead and copper corrosion*
  - *Water quality monitoring of SWRO permeate to meet regulatory and regional water quality criteria*
- *Demonstration/Full-Scale Tests*
  - *Flow-through pipe-loop testing to determine the impacts of SWRO permeate on corrosion potential of various pipe materials*
  - *Impacts of adding pre-formed chloramines at SWRO influent on disinfection residual stability and DBP formation*
  - *DBP speciation*
  - *Water quality monitoring of SWRO permeate to meet regulatory and regional water quality criteria*

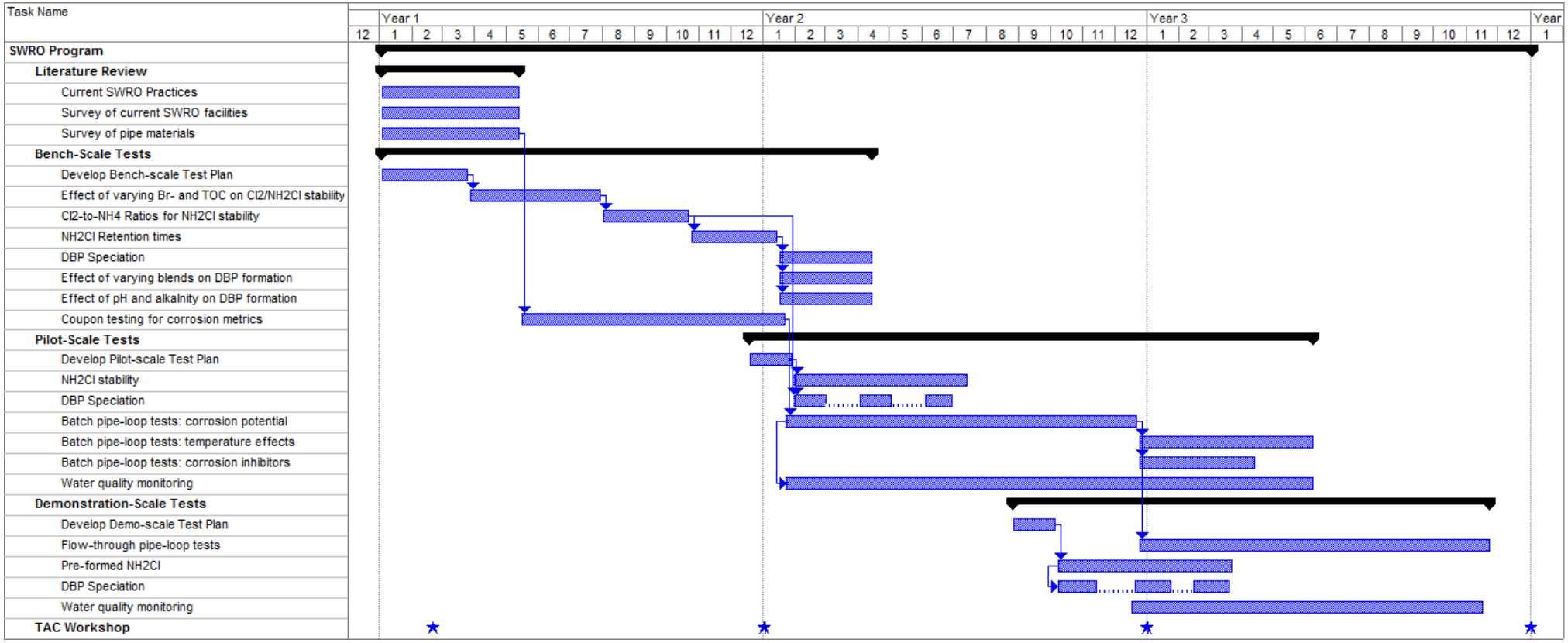

Figure 1. Possible Schedule for SWRO Study Program—3 Year Option

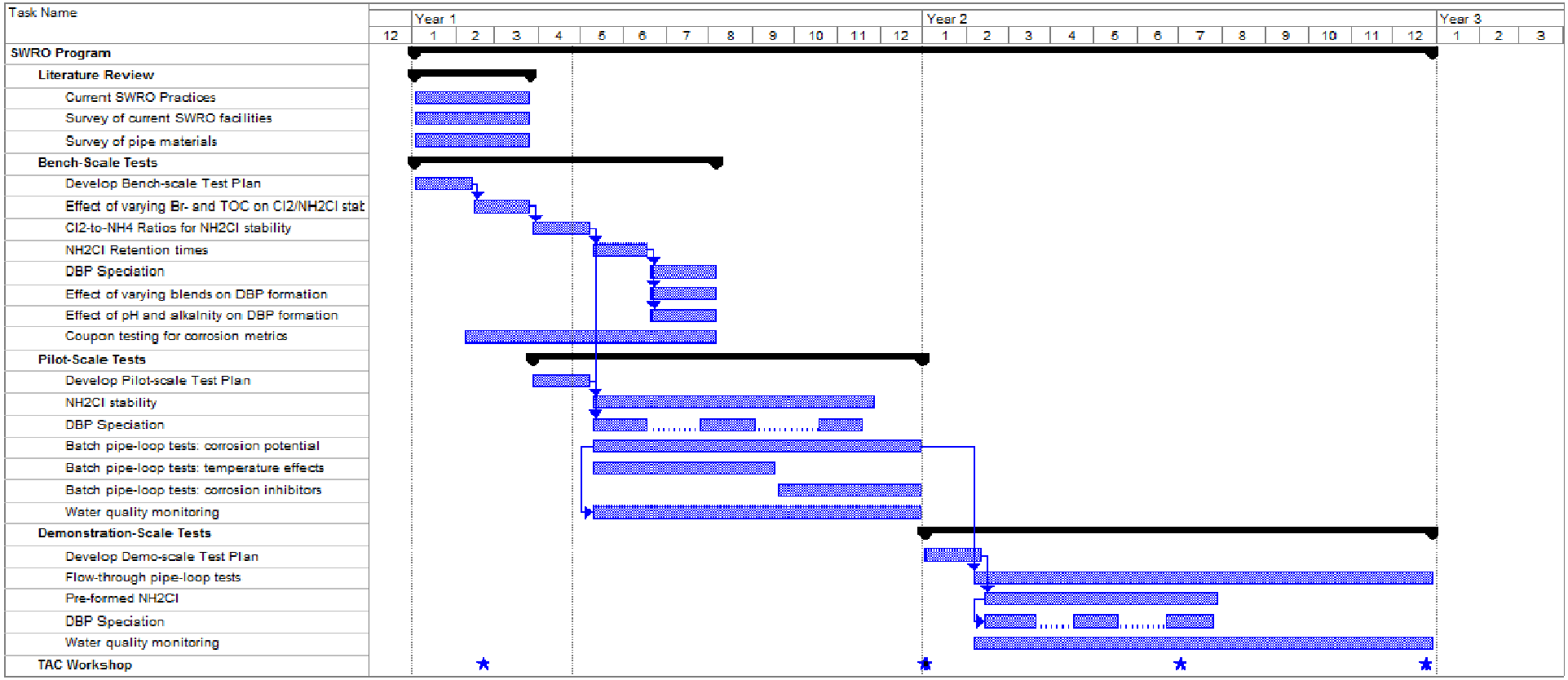

Figure 2. Possible Schedule for SWRO Study Program—2 Year Option

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APPENDIX 1. Historical Treated Water Quality

Water Quality from Jan 2000-Dec 2009 --(*Revision 5/25/2011)*

Constituent	MWD MRL[1] & Units	CDPH MCL / (2° *MCL*)	CDPH notification or action level /(PHG)	USEPA MCL	Robert B. Diemer WTP Eff			Joseph Jensen WTP Eff			Henry J. Mills WTP Eff			Robert A. Skinner WTP Eff			F. E. Weymouth WTP Eff		
					min	max	ave	min	max	ave	min	max	ave	min	max	ave	min	max	ave
Inorganic Sampling (General Physical)																			
Color	1 Unit	(15 2nd)		15 2nd	ND	3	1.40	1	4	1.65	ND	3	1.31	1	3	1.68	1	4	1.6
Odor	Unit	(3 2nd)		3 2nd	1.4	2.4	1.7	1.4	3	2.0	1.4	3.0	2.2	1	29	10	1.4	3	2.2
Temperature	°C				10.2	28.8	18.7	5.5	22.9	15.2	6.4	26.9	17.2	10	30.1	19.7	7.0	27.5	18.1
Turbidity	NTU	0.3 (5 2nd)		0.5	0.04	0.07	0.04	0.04	0.07	0.04	0.05	0.12	0.07	0.04	0.15	0.06	0.05	0.07	0.06
Inorganic Sampling (General Mineral)																			
Bicarbonate Alkalinity	mg/L	NS																	
Carbonate Alkalinity	mg/L	NS																	
Hydroxide Alkalinity	mg/L	NS																	
Total Alkalinity	1 mg/L	NS			88	122	110	80	99	87	61	95	78	92	117	108	101	116	111
Bromate	0.003 mg/L	0.01	(0.0001)	0.01				ND	0.012	0.006	ND	0.026	0.007	ND	ND	ND			
Bromide[2]	0.02 mg/L				ND	0.04	0.02	0.11	0.2	0.18	0.1	0.2	0.2	ND	0.08	0.04	ND	0.04	0.02
Calcium	0.1 mg/L	NS			24	75	49	22	37	27	12	30	21	38	74	56	24	76	48
Chlorate	0.005 mg/L		0.80		0.018	0.066	0.045	0.015	0.076	0.031	0.026	0.067	0.042	0.019	0.041	0.028	0.038	0.085	0.057
Chloride	2 mg/L	(250 2nd)		250 2nd	47	110	82	40	96	68	27	128	77	68	100	87	42	104	81
Chlorite	0.005 mg/L	1	(0.05)	1															
Cyanide	0.05 mg/L	0.15	(0.15)	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride[3]	0.02 mg/L	2	(1.00)	4, (2 2nd)	0.1	0.9	0.5	0.1	0.9	0.5	0.1	0.9	0.4	0.2	0.9	0.6	0.1	1.0	0.6
Foaming Agents (MBAS)	mg/L	(0.5 2nd)		0.5 2nd	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium	0.1 mg/L	NS			12	29	21	11	15.5	13	6	16	12	18	29	23	11	30	21
Ammonia as N	0.03 mg/L	NS			0.41	0.59	0.50	0.44	0.61	0.52	0.44	0.66	0.53	0.42	0.82	0.54	0.44	0.85	0.54
Nitrate as NO3	0.1 mg/L	45	(45)		ND	6.0	1.6	1.3	4.2	2.4	0.4	6.5	2.9	ND	3.3	1.2	ND	5.8	1.7
Nitrate as N	0.023 mg/L		(10)	10	ND	1.36	0.38	0.29	0.94	0.55	ND	1.47	0.65	ND	0.75	0.27	ND	1.31	0.38
Nitrite as N	0.005 mg/L	1	(1)	1	ND	0.008	ND	ND	0.010	ND	ND	0.006	ND	ND	0.005	ND	ND	ND	ND
Total Nitrate + Nitrite (as N)	mg/L	10	(10)	10	0.226	0.794	0.526	0.298	0.810	0.578	0.339	1.360	0.942	0.219	0.542	0.359	0.248	0.839	0.547
Perchlorate	2 ug/L	6	(6)		ND	6.1	2.4	ND	ND	ND	ND	4.5	ND	ND	6	2	ND	6	2.5
pH	units	NS		6.5-8.5 2nd	7.82	8.40	8.01	7.41	8.44	8.22	7.96	8.58	8.36	7.86	8.18	8.04	7.48	8.38	8.10
Potassium	0.1 mg/L	NS			2.7	5.1	3.8	2.3	3.3	2.8	1.7	3.7	2.8	3.5	5.0	4.1	2.5	5.3	3.8
Sodium	0.1 mg/L	NS			52	106	79	39	74	55	27	82	60	62	102	81	48	109	79
Sulfate	4 mg/L	(250 2nd)		(250 2nd)	41	272	164	39	102	59	22	92	50	103	254	178	41	275	161
Electrical Conductivity	umho/cm	(900 2nd)			341	1138	799	367	612	534	223	866	502	650	1053	835	482	1094	799
TDS	mg/L	(500 2nd)			290	686	497	241	347	307	147	380	278	393	658	525	288	693	493
Total Hardness	1 mg/L	NS			109	304	217	106	178	129	58	134	101	122	301	231	110	308	214
Total Organic Carbon	0.2 mg/L	NS			2.11	3.07	2.56	2.19	2.76	2.47	1.76	3.10	2.20	2.30	2.49	2.37	2.25	3.20	2.54
Asbestos	0.2 million fibers/L > 10 microns	7		7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ultra Violet 254 nm	0.004 abs/cm	NS			0.034	0.080	0.045	0.046	0.068	0.054	0.032	0.078	0.054	0.040	0.044	0.042	0.041	0.073	0.048
Cl:SO4							0.50			1.15			1.54			0.49			0.50
Inorganic Sampling (Trace Metals)																			
Aluminum	0.01 mg/L	1 (0.2 2nd)	(0.60)	0.05-0.2 2nd	ND	0.515	0.10	ND	0.123	0.057	ND	0.164	0.025	ND	0.151	0.013	ND	0.457	0.098
Antimony	0.002 mg/L	0.006	(0.0007 draft)	0.006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (total)	0.0005 mg/L	0.01	(0.000004)	0.01	ND	0.003	0.001	ND	0.004	0.002	ND	0.003	0.001	ND	0.001	0.001	ND	0.003	0.001
Barium	0.005 mg/L	1	(2)	2	0.044	0.13597	0.08	0.027	0.037	0.033	0.026	0.039	0.031	0.047	0.118	0.085	0.042	0.140	0.079
Beryllium	0.0005 mg/L	0.004	(0.001)	0.004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron	0.020 mg/L		1.00		ND	0.16	0.12	0.15	0.37	0.21	0.09	0.27	0.15	0.1	0.16	0.13	0.09	0.19	0.13
Cadmium	0.0001 mg/L	0.005	(0.00004)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0001	ND	ND	ND	ND
Chromium (Total)	0.001 mg/L	0.05		0.1	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent Chromium	0.00003 mg/L		(draft 0.00002)		0.00004	0.00059	0.0001	0.00008	0.00024	0.000122	0.00003	0.00061	0.0002	0.00005	0.000162	0.00010	0.00003	0.00033	0.000109
Copper	0.01 mg/L	(1.0 2nd)	1.3 (0.3)	1.3 action level	ND	0.012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	0.05mg/L	(0.3 2nd)		0.3 2nd	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND
Lead	0.001 mg/L		0.015 (0.0002)	0.015 action level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	0.005 mg/L	(0.05 2nd)	0.50	0.05 2nd	ND	ND	ND	ND	ND	ND	ND	0.11	0.005	ND	ND	ND	ND	ND	ND
Mercury	0.0002 mg/L	0.002	(0.0012)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.002mg/L	0.1	(0.012)	0.1	ND	0.004	0.002	ND	0.003	0.002	ND	0.005	ND	0.002	0.005	0.003	ND	0.004	0.002
Selenium	0.005 mg/L	0.05	(0.03)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.005 mg/L	(0.1 2nd)		0.10 2nd	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	0.001 mg/L	0.002	(0.0001)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	0.001mg/L		0.05		ND	0.00396	0.002	ND	0.007	0.003	ND	0.007	0.002	ND	0.002	ND	ND	0.004	0.002
Zinc	0.02 mg/L	(5 2nd)		5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radiological																			
Gross Alpha	3 pCi/L	15 (gross α - uranium)		15	ND	9.3	3.1	ND	7.3	ND	ND	5.5	ND	ND	5.5	3.4	ND	7.6	ND
Gross Beta (data reported as pCi/L)	4 pCi/L	4 mrems/yr		4 mrems/yr	ND	6.4	4.1	ND	6.2	ND	ND	ND	7.5	ND	8.8	ND	ND	9.7	4.0
Radium 226	1 pCi/L		(0.05)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radium 228	1 pCi/L		(0.019)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Combined Radium 226 & 228	1 pCi/L	5		5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radon	100 pCi/L			Draft 300 or 4,000 MMM	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	119	ND
Strontium-90	2 pCi/L	8	(0.35)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tritium	1,000 pCi/L	20,000	(400)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium	1 pCi/L	20	(0.43)	0.030mg/L	ND	3.7	1.9	ND	2.1	1.4	ND	2.8	1.1	1.5	3.2	2.2	ND	3.7	2.0
Semivolatile Organic Compounds																			
Benzo (A) Pyrene (PAH)	mg/L	0.0002	(0.000007)	0.0002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di (2-Ethylhexyl) Adipate	mg/L	0.4	(0.20)	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di (2-Ethylhexyl) Phthalate	mg/L	0.004	(0.012)	0.006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Volatile Organic Compounds																			
Benzene	0.0005 mg/L	0.001	(0.00015)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	0.0005 mg/L	THM	(draft 0.0004)	THM	0.0058	0.02961	0.0163	0.0009	0.02812	0.01	0.0009	0.02874	0.01	0.0071	0.033	0.0171	0.0067	0.02761	0.0162
Bromoform	0.0005 mg/L	THM	(draft 0.005)	THM	ND	0.01582	0.0047	0.0005	0.02	0.01	ND	0.03141	0.01	0.0006	0.0093	0.0032	ND	0.01337	0.0045
Bromomethane (methyl bromide)	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	0.0005 mg/L		0.26		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	0.0005 mg/L		0.26		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	0.0005 mg/L		0.26		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	0.0005 mg/L		0.16		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.0005 mg/L	0.0005	(0.0001)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.0005 mg/L	0.07		0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	0.0005 mg/L	THM	(draft 0.0007)	THM	0.0050	0.030	0.0152	0.0023	0.0318	0.0153	0.0024	0.0366	0.0138	0.0076	0.0240	0.0147	0.0043	0.0270	0.0146
Chloroethane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.0005 mg/L	THM	(draft 0.001)	THM	0.0032	0.0333	0.0124	ND	0.0250	0.0061	ND	0.0388	0.0049	0.0045	0.0310	0.0133	0.0047	0.0320	0.0126

APPENDIX 1. Historical Treated Water Quality (cont.)

Constituent	MWD MRL[1] & Units	CDPH MCL / (2° MCL)	CDPH notification or action level /(PHG)	USEPA MCL	Robert B. Diemer WTP Eff			Joseph Jensen WTP Eff			Henry J. Mills WTP Eff			Robert A. Skinner WTP Eff			F. E. Weymouth WTP Eff		
					min	max	ave	min	max	ave	min	max	ave	min	max	ave	min	max	ave
Chloromethane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene or o-Chlorotoluene	0.0005 mg/L		0.14		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene or p-Chlorotoluene	0.0005 mg/L		0.14		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene (o)	0.0005 mg/L	0.6	(0.6)	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene (p)	0.0005 mg/L	0.005	(0.006)	0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.0005 mg/L	0.0005	(0.0004)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.0005 mg/L	0.005	(0.003)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.0005 mg/L	0.006	(0.01)	0.007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.0005 mg/L	0.006	(0.1)	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.0005 mg/L	0.01	(0.06)	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane (Freon 12)	0.0005 mg/L		1		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.0005 mg/L	0.005	(0.0005)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropene	0.0005 mg/L	0.0005	(0.0002)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETBE (Ethyl tertiary butyl ether)	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.0005 mg/L	0.3	(0.30)	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	0.0005 mg/L		0.77		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride (dichloromethane)	0.0005 mg/L	0.005	(0.004)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	0.0005 mg/L	0.013 (0.005[2nd])	(0.013)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	0.0005 mg/L		0.017		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.0005 mg/L		0.26		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	0.0005 mg/L	0.1	(0.0005)	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TAME (Tertiary amyl methyl ether)	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.0005 mg/L	0.001	(0.0001)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	0.0005 mg/L	0.005	(0.00006)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.0005 mg/L	0.15	(0.15)	1	ND	0.0040	ND	ND	0.00075	ND	ND	0.00065	ND	ND	0.0007	ND	ND	ND	ND
1,2,3-Trichlorobenzene	0.0005 mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	0.0005 mg/L	0.005	(0.005)	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.0005 mg/L	0.2	(1)	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.0005 mg/L	0.005	(0.0003)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.0005 mg/L	0.005	(0.0017)	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	0.0005 mg/L	0.15 (0.7)			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.0005 mg/L		0.000005		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane (FREON 113)	0.0005 mg/L	1.2	(4)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	0.0005 mg/L		0.33		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	0.0005 mg/L		0.33		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.0005 mg/L	0.0005	(0.00005)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (single isomer or sum of isomers)	0.0005 mg/L	1.75	(1.8)	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL Trihalomethanes	0.0005 mg/L	0.080		0.080	0.021	0.085	0.049	0.0054	0.084	0.041	0.0066	0.092	0.038	0.022	0.089	0.048	0.025	0.075	0.048
Organochlorine Pesticides																			
Alachlor	mg/L	0.002	(0.004)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin	mg/L		0.000002		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlordane	mg/L	0.0001	(0.00003)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	mg/L		0.000002		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	mg/L	0.002	(0.0018)	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	mg/L	0.00001	(0.000008)	0.0004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	mg/L	0.00001	(0.000006)	0.0002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	mg/L	0.001	(0.00003)	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorocyclopenta-diene	mg/L	0.05	(0.05)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lindane (gamma-BHC)	mg/L	0.0002	(0.000032)	0.0002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	mg/L	0.03	(0.00009)	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls	mg/L	0.0005	(0.00009)	0.0005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1016 (PCB-1016)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1248 (PCB-1248)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1254 (PCB-1254)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260 (PCB-1260)	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Propachlor	mg/L		0.09		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toxaphene	mg/L	0.003	(0.00003)	0.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fumigants																			
Ethylene dibromide (EDB)(1,2-dibromoethane)	mg/L	0.00005	(0.00001)	0.00005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloropropane (DBCP) (1,2-dibromo-3-chloropropane)	mg/L	0.0002	(0.0000017)	0.0002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Organochlorine Herbicides																			
Bentazon (Basagran)	mg/L	0.018	(0.2)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-D	mg/L	0.07	(0.02)	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dalapon	mg/L	0.2	(0.79)	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dinoseb	mg/L	0.007	(0.014)	0.007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	mg/L	0.001	(0.0003)	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pichloram (picloram)	mg/L	0.5	(0.5)	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silvex (2,4,5-TP)	mg/L	0.05		0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbamate Pesticides																			
Diuron	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldicarb	mg/L		0.007		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldicarb sulfone	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldicarb sulfoxide	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Baygon	mg/L		0.03		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbofuran	mg/L	0.018	(0.0017)	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbaryl	mg/L		0.7		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxamyl (Vydate)	mg/L	0.05	(0.026)	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Miscellaneous																			

APPENDIX 1. Historical Treated Water Quality (cont.)

Constituent	MWD MRL[1] & Units	CDPH MCL / (2° MCL)	CDPH notification or action level /(PHG)	USEPA MCL	Robert B. Diemer WTP Eff			Joseph Jensen WTP Eff			Henry J. Mills WTP Eff			Robert A. Skinner WTP Eff			F. E. Weymouth WTP Eff		
					min	max	ave	min	max	ave	min	max	ave	min	max	ave	min	max	ave
Diquat	mg/L	0.02	(0.015)	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endothall	mg/L	0.1	(0.58)	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glyphosate	mg/L	0.7	(0.9)	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Paraquat	mg/L				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,3,7,8-TCDD Dioxin	mg/L	3×10^{-8}	(5×10^{-11})	3×10^{-8}	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrogen/Phosphorus Pesticides																			
Atrazine	mg/L	0.001	(0.00015)	0.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diazinon	mg/L		0.0012		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethoate	mg/L		0.001		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Malathion[4]	mg/L		0.16																
Molinate	mg/L	0.02	(0.001)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Simazine	mg/L	0.004	(0.004)	0.004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thiobencarb (Bolero)	mg/L	0.07 (*0.001 2nd*)	(0.07)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Microbiology																			
Heterotrophic Plate Counts[5]	cfu/mL	TT		TT	<1	7	<1	<1	20	<1	<1	140	0.18	<1	22	<1	<1	43	<1
Total Coliforms[5]	% positive	0.05		0.05	0.0	11.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.1
Fecal Coliforms (Not tracked)	MPN/ 100mL	t		t															
E. coli[5]	% positive	t		t	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cryptosporidium	oocysts/ 100L	TT		TT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Giardia	cysts/100L	TT		TT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Enteric Viruses (Total Culturable Virus)	MPNIU/ 100L	TT		TT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other Organic Chemicals																			
a-Benzene Hexachloride (a-BHC)	mg/L		0.000015		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
b-Benzene Hexachloride (b-BHC)	mg/L		0.000025		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	mg/L		0.1		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane[4]	mg/L		0.001																
Methyl Isobutyl Ketone (MIBK)	0.0005 mg/L		0.12		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HAA5	0.001 mg/L			0.060	0.0056	0.0541	0.02	0.002	0.0296	0.0134	0.0023	0.057	0.0138	0.004	0.038	0.02	0.0056	0.0539	0.021
N-Nitroso-dimethylamine (NDMA)	2.0 ng/L		10		ND	2.7	ND	ND	8.6	2.50	ND	10	2.60	ND	3	ND	ND	5.1	ND
Tert butyl alcohol	0.002 mg/L		0.012		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trithion[4]	mg/L		0.007																

ND = Non-detect or less than MWD minimum reporting level (MRL) if value is given, or if no value is listed in column 2, less than California detection limit for purposes of reporting (DLR).

1. MWD Minimum Reporting Level
2. Bromide data from 4/10- 11/10
3. Fluoride average includes data from before fluoride addition. Current dosages must produce 0.8 mg/L residual
4. Did not monitor during this time period
5. Microbiological data from Jan 1999-Dec 2009. The average percentage is calculated from monthly positive samples, annual averages, then averaged over eleven years (Jan 99 - Dec 09). Mimium and maximum percentages are monthly values .

MWD = Metropolitan Water District of Southern California

CDPH = California Department of Public Health

MCL = Maximum Contaminant Level 2^{o} or 2^{nd} = secondary PHG = Public Health Goal

Appendix 1:C

Diurnal Analysis

Diurnal Analysis

Other factors for consideration as part of the site selection process are onsite storage needs to accommodate (1) diurnal variation in demands and (2) disinfection. To assess these needs, data from the month of February 2010 for the Manhattan Beach connection WB-4 were plotted in 15-minute intervals. Figure D-1 shows that the coefficient variation was consistent across the month of February (within a pumping range of 0.7 to 1.5) with the exception of a few days.

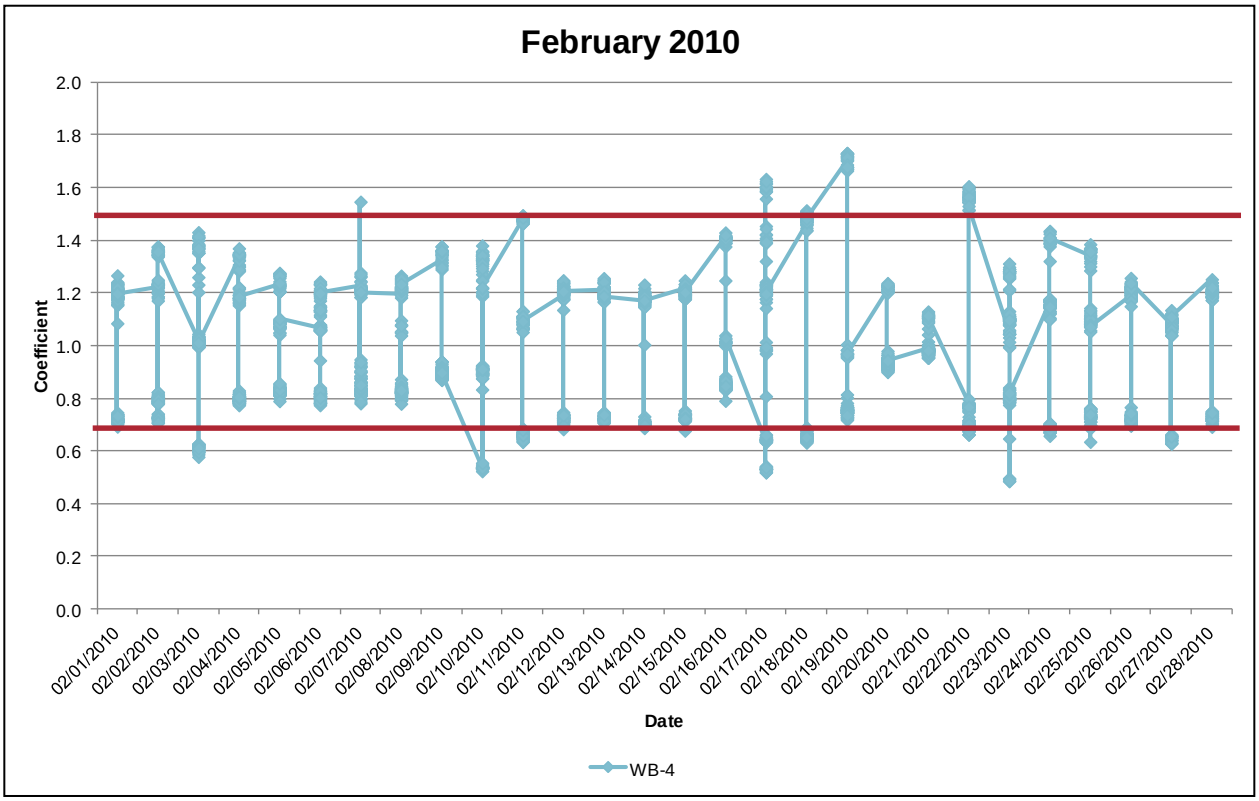

Figure D-1: Diurnal Peaks

The analysis was then further refined by looking at the standard coefficient variation in more detail over three days in February. Three days which showed normal/expected daily coefficient variation (0.7 to 1.5) towards the end of the month were selected. The days Tuesday February 23, Friday February 26, and Sunday February 28 were plotted on a 24-hour timeframe graph along with a 3-day average for each of the 15-minute intervals (Figure D-2).

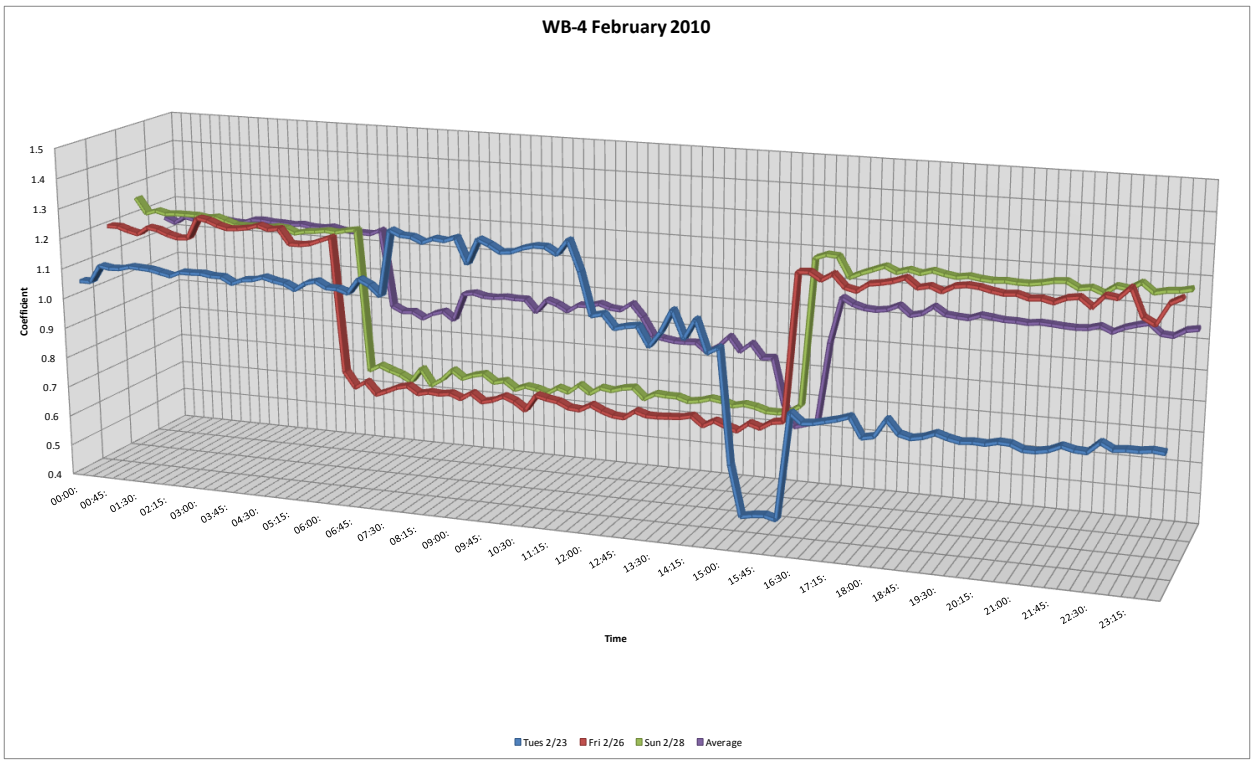

Figure D-2: Diurnal Analysis

The analysis showed an average flow deviation of +25% for 12 hours along with a -25% average flow deviation for the remaining 12 hours. This equates to a 12.5% storage volume for 12 hours. Rounding up, this will result in a plan for 13% of plant capacity for onsite storage for diurnal variation; however, the reservoir may also require additional storage to achieve CT for disinfection.

Appendix 1:D

Preliminary Regional Conveyance & Pump Station Study

INTEGRATION STUDY FOR THE WEST BASIN DESALINATION PROGRAM

PRELIMINARY REGIONAL CONVEYANCE & PUMP STATION STUDY

INFORMATION PACKET

September 2011

Table of Contents

SECTION 1 -

List of Potential Ocean Water Desalination Plant locations

&

Potential Regional Intertie Locations

1.1. POTENTIAL DESALINATION LOCATIONS

Two sites have been identified by West Basin for the location of an ocean water desalination plant. As shown in Figure 1, these sites are located at the AES Power Plant in Redondo Beach, and NRG's Generating Station in El Segundo.

1.2. POTENTIAL INTERTIE LOCATIONS

Eleven potential intertie locations for delivery of desalinated ocean water to Metropolitan's treated water distribution system have been identified to date. These intertie locations are summarized below and are shown on Figure 1.1.

A) Desalination Plant at El Segundo to:
   1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00)
   2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80)
   3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00)
   4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00)
   5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00)
   6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61)
   7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80)
   8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38)
   9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00)
   10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50)
   11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00)

B) Desalination Plant at Redondo Beach to:
   1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00)
   2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80)
   3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00)
   4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00)
   5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00)
   6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61)
   7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80)
   8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38)
   9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00)
   10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50)
   11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00)

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El Segundo Plant

Redondo Beach Plant

Pacific Ocean

West Coast Feeder

West Basin Feeder

Sepulveda Feeder

Inglewood Lateral

Palos Verdes Feeder

Victoria Street Lateral

Torrance Lateral

Second Lower Feeder

Long Beach Lateral Feeder

No.1

No.2

No.3

No.3A

No.4

No.5

No.6

No.7

No.8

No.9

No.10

Integration Points

1. Second Lower Feeder - Sta.2116+00
2. Palos Verders Feeder - Sta. 1538+80
3. Second Lower Feeder - Sta. 1862+00

3A. Sepulveda Feeder - Sta.2137+00

4. West Basin Feeder - Sta. 170+00
5. West Basin Feeder - Sta. 368+61
6. West Coast Feeder - Sta. 585+80
7. West Coast Feeder - Sta. 768+69.38
8. Sepulveda Feeder - Sta. 2025+00
9. Sepulveda Feeder - Sta. 1918+50
10. Sepulveda Feeder - 2260+00

Projects\West_Basin_Desalination_Plant\GIS\Potential_Intertie_LLocations.mxd [Printed 08/10/2011] Photography Date: Bing Maps Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-08-06

SECTION 2 -
Preliminary Hydraulic Summary

2.1. HYDRAULICS OF ALIGNMENTS

A hydraulic analysis was completed for two proposed West Basin Desalination Plants, one at the AES Power Plant in Redondo Beach and the other at NRG's Generating Station in El Segundo. For each of these plants, 11 intertie locations into Metropolitan's distribution system were evaluated. Ten of the locations are direct tie-ins into pressurized pipelines/feeders and one is a direct connection into the Palos Verdes Reservoir. Pump Stations would be required at the selected desalination plant to pump product water into Metropolitan's system.

The hydraulic control point at the desalination plant is currently assumed to be a water surface elevation of 42 ft from two storage tanks with approximately 5 million gallons of storage per tank. This is based on a preliminary analysis of potential storage needs, sizing, and site layout for a 10 MGD desalination plant. For this phase of this study, the hydraulic control point estimated for a 10 MGD desalination plant was used in analyzing potentially larger plant sizes. This assumption would need to be further refined as the West Basin Ocean Water Program Master Plan develops.

The hydraulic control point at the downstream end of the system is the design hydraulic grade elevation (HGEL) or the maximum hydrostatic grade elevation for each of the 10 pipeline/feeder intertie locations. For the Palos Verdes Reservoir connection, the control will be the maximum/minimum water surface elevation (although another pump station is required near the reservoir to deliver reverse flow back into Metropolitan's Palos Verdes Feeder).

Two flows were analyzed for each case: 10 MGD and 30 MGD. The head loss in the desalination pump station discharge pipe was limited to 150 ft or less to reduce long term pumping costs (cost analysis of pumping costs vs. pipeline costs should be verified at a later phase of the study).

Table 2-1 and Table 2-2 summarize the required total dynamic head and pipe size for each pump station scenario/tie-in.

These scenarios do not consider potential blending requirements, and may be further refined as the proposed Metropolitan Water Quality Study develops.

For case 1, pumping from the desalination plants directly into the Palos Verdes Reservoir:

- The 10 MGD case delivers flow directly to service connections WB-32 and LA-21A & B out of the reservoir.
- The 30 MGD case requires another pump station at the reservoir to deliver a net flow of 20 MGD (30-10) in reverse flow through the Palos Verdes Feeder.

For each pump station a surge analysis must be completed to evaluate surge mitigation measures for the pump suction line, pump discharge pipe, and the interconnection pipeline/feeder. This

surge analysis is usually started during preliminary design when many of the physical components have been identified and sized.

A hydraulic summary for each potential desalination plant site and intertie location is included in Table 2-1 and Table 2-2.

Regional Conveyance Hydraulic Summary - Desalination Plant at El Segundo

Assumptions:

1. Due to the preliminary nature of the study, both desalination plants' water surface tank elevations are assumed to be the same. This elevation is ground elevation taken from Google Earth at the proposed AES site in Redondo Beach and is approx. 17 ft.
2. Pipe is from the proposed El Segundo site to the proposed MWD intertie location.
3. The hydraulic control point estimated for a 10 MGD desalination plant was used in analyzing potentially larger plant sizes.

Number of Tanks =	2		
Water Depth in Tanks =	25	ft (assumed)	Manning's n-value for all cases = 0.012
Tank D =	185	ft (calculated)	
Area =	26738	sf	
Volume =	5,000,000	gal	
W.S. El. in Tanks =	42	ft	

El Segundo Desalinaton Plant Summary

								Max. Hydrostatic Grade El.				Design Hydraulic Grade El.			
MWD Tie-in Point	Locaton	Station	Desal Capacity (mgd)	Desal Capacity (cfs)	Desal Integration Pipe I.D. (ft)	Integration Pipe Velocity (fps)	Desal Integration Pipe Length (mi)	HG El. at MWD Pipeline (ft)	Integration Pipe Headloss (ft)	HG El. at Desal Pump Discharge (ft)	Pump TDH (ft)	HG El. at MWD Pipeline (ft)	Integration Pipe Headloss (ft)	HG El. at Desal Pump Discharge (ft)	Pump TDH (ft)
1	Palos Verdes Reservoir		10	15	2.50	3.2	15.3	315	108	423	381	290	108	398	356
			30	46	3.75	4.2	15.3	315	112	427	385	290	112	402	360
	Second Pump to pump out		10	15	*Second pump not required, all flows delivered to service connections downstream of PV Reservoir*										
	of PV Reservoir (reverse				*Net Pumped Flow*			*High WS*		*PV HG El.*	*TDH*	*Low WS*		*PV HG El.*	*TDH*
	flow to PV Feeder)		30	46	*20 mgd (30-10)*			315		363	48	290		363	73
2	Palos Verdes Fdr	1538+80	10	15	2.00	4.9	6.4					325	149	474	432
	(normal flow combined		30	46	3.25	5.6	6.4	*Not Applicable (falling grade)*				398	101	499	457
	with reverse flow, PV														
3	2nd Lower Fdr	1862+00	10	15	2.50	3.2	13.0	660	92	752	710	356	92	448	406
			30	46	3.50	4.8	13.0	660	137	797	755	356	137	493	451
3A	Sepulveda Fdr	2137+00	10	15	2.25	3.9	10.4	660	129	789	747	401	129	530	488
			30	46	3.50	4.8	10.4	660	110	770	728	401	110	511	469
4	West Basin Fdr	170+00	10	15	2.25	3.9	8.4	415	104	519	477	356	104	460	418
			30	46	3.25	5.6	8.4	415	132	547	505	356	132	488	446
5	West Basin Fdr	368+61	10	15	2.00	4.9	4.7	415	108	523	481	313	108	421	379
			30	46	3.25	5.6	4.7	415	73	488	446	313	73	386	344
6	West Coast Fdr	585+80	10	15	2.25	3.9	7.4	650	92	742	700	379	92	471	429
			30	46	3.25	5.6	7.4	650	116	766	724	379	116	495	453
7	West Coast Fdr	768+69	10	15	2.00	4.9	2.6	650	61	711	669	325	61	386	344
			30	46	3.25	5.6	2.6	650	41	691	649	325	41	366	324
8	Sepulveda Fdr	2025+00	10	15	2.25	3.9	8.3	660	103	763	721	425	103	528	486
			30	46	3.25	5.6	8.3	660	130	790	748	425	130	555	513
9	Sepulveda Fdr	1918+50	10	15	2.25	3.9	7.3	660	90	750	708	449	90	539	497
			30	46	3.25	5.6	7.3	660	114	774	732	449	114	563	521
10	Sepulveda Fdr	2260+00	10	15	2.50	3.2	12.8	660	90	750	708	454	90	544	502
			30	46	3.50	4.8	12.8	660	134	794	752	454	134	588	546

Table 2-2

Regional Conveyance Hydraulic Summary - Desalination Plant at Redondo Beach

Assumptions:

1. Due to the preliminary nature of the study, both desalination plants' water surface tank elevations are assumed to be the same. This elevation is ground elevation taken from Google Earth at the proposed AES site in Redondo Beach and is approx. 17 ft.
2. Pipe is from the proposed Redondo Beach site to the proposed MWD intertie location.
3. The hydraulic control point estimated for a 10 MGD desalination plant was used in analyzing potentially larger plant sizes.

Number of Tanks	2		
Water Depth in Tanks =	25	ft (assumed)	Manning's n-value for all cases = 0.012
Tank D =	185	ft (calculated)	
Area =	26738	sf	
Volume =	5,000,000	gal	
W.S. El. in Tanks =	42	ft	

Redondo Beach Desalinaton Plant Summary

								Max. Hydrostatic Grade El.				Design Hydraulic Grade El.			
MWD Tie-in Point	Locaton	Station	Desal Capacity (mgd)	Desal Capacity (cfs)	Desal Integration Pipe I.D. (ft)	Integration Pipe Velocity (fps)	Desal Integration Pipe Length (mi)	HG El. at MWD Pipeline (ft)	Integration Pipe Headloss (ft)	HG El. at Desal Pump Discharge (ft)	Pump TDH (ft)	HG El. at MWD Pipeline (ft)	Integration Pipe Headloss (ft)	HG El. at Desal Pump Discharge (ft)	Pump TDH (ft)
1	Palos Verdes Reservoir		10	15	2.25	3.9	9.0	315	111	426	384	290	111	401	359
			30	46	3.25	5.6	9.0	315	141	456	414	290	141	431	389
	Second Pump to pump out		10	15	*Second pump not required, all flows delivered to service connections downstream of PV Reservoir*										
	of PV Reservoir (reverse				Net Pumped Flow			High WS		PV HG El.	TDH	Low WS		PV HG El.	TDH
	flow to PV Feeder)		30	46	*20 mgd (30-10)*			315		363	48	290		363	73
2	Palos Verdes Fdr	1538+80	10	15	2.25	3.9	7.8					325	96	421	379
	(normal flow combined		30	46	3.25	5.6	7.8	*Not Applicable (falling grade)*				398	122	520	478
	with reverse flow, PV														
3	2nd Lower Fdr	1862+00	10	15	2.25	3.9	7.2	660	89	749	707	356	89	445	403
			30	46	3.25	5.6	7.2	660	113	773	731	356	113	469	427
3A	Sepulveda Fdr	2137+00	10	15	2.00	4.9	4.7	660	109	769	727	401	109	510	468
			30	46	3.25	5.6	4.7	660	73	733	691	401	73	474	432
4	West Basin Fdr	170+00	10	15	2.00	4.9	6.8	415	157	572	530	356	157	513	471
			30	46	3.25	5.6	6.8	415	106	521	479	356	106	462	420
5	West Basin Fdr	368+61	10	15	2.00	4.9	4.1	415	95	510	468	313	95	408	366
			30	46	3.25	5.6	4.1	415	64	479	437	313	64	377	335
6	West Coast Fdr	585+80	10	15	2.25	3.9	10.6	650	131	781	739	379	131	510	468
			30	46	3.50	4.8	10.6	650	112	762	720	379	112	491	449
7	West Coast Fdr	768+69	10	15	2.00	4.9	6.2	650	143	793	751	325	143	468	426
			30	46	3.25	5.6	6.2	650	97	747	705	325	97	422	380
8	Sepulveda Fdr	2025+00	10	15	2.25	3.9	6.8	660	84	744	702	425	84	509	467
			30	46	3.25	5.6	6.8	660	106	766	724	425	106	531	489
9	Sepulveda Fdr	1918+50	10	15	2.25	3.9	10.5	660	130	790	748	449	130	579	537
			30	46	3.50	4.8	10.5	660	111	771	729	449	111	560	518
10	Sepulveda Fdr	2260+00	10	15	2.25	3.9	7.0	660	86	746	704	454	86	540	498
			30	46	3.25	5.6	7.0	660	109	769	727	454	109	563	521

SECTION 3
Geotechnical Considerations

3.1 GEOTECHNICAL CONSIDERATIONS

The purpose of this report is to provide a preliminary geotechnical overview of the possible pipeline alignments for the conveyance of treated desalinated water into Metropolitan's treated water distribution system. The report is based on available literature and historic studies. Further geotechnical exploration and analysis would be required after the viable alternatives have been determined. Geotechnical references can be found in Appendix C.

3.2 GEOLOGY

3.2.1 Regional Geology Description

The Los Angeles Basin is the coastal sediment-filled plain located between the Peninsular and Transverse ranges in southern California in the United States containing the central part of the city of Los Angeles as well as its southern and southeastern suburbs (both in Los Angeles and Orange counties). It is approximately 35 miles (56 km) long and 15 miles (24 km) wide, bounded on the north by the Santa Monica Mountains and Puente Hills, and on the east and south by the Santa Ana Mountains and San Joaquin Hills. The Palos Verdes Peninsula, formerly an island, marks the outer edge of the basin along the coast. The confluence of the Los Angeles and Rio Hondo rivers is the center of the basin.

The sediment in the basin is up to 6 miles (10 km) deep. The basin began to form during the Neogene approximately 15 million years ago (mya), when the terrain was underwater, during a crustal upheaval caused by a clockwise shift in the surrounding mountains. The underlying crustal weakening resulted in the formation of the large bowl of the basin. Sediment from the sea and rivers accumulated in the undersea bowl, building up in thick layers. Approximately 5 million years ago, the crustal stretching subsided and the ocean floor of the basin was forced to the surface. Additional sediment accumulated during the upswell resulting in the floor of the basin as it exists today. The sedimentary character of the basin is the principal reason why it is considered especially susceptible to excessive damage during earthquakes.

3.2.2 Groundwater

Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the water table. Groundwater is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands. Groundwater is also often withdrawn for agricultural, municipal and industrial use by constructing and operating extraction wells. Within the area of study, the groundwater ranges from 5 feet below the surface near the ocean, to 30 feet below the surface further inland per Plate 3 of the Los Angeles County Safety Element.

3.2.3 Notable Faults

NEWPORT-INGLEWOOD FAULT ZONE

- **Type of Faulting**: right-lateral; local reverse slip associated with fault steps
- **Length**: 75 km
- **Nearby Communities**: Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa
- **Most Recent Major Rupture**: March 10, 1933, M_W6.4 (but no surface rupture)
- **Slip Rate**: 0.6 mm/yr
- **Interval Between Major Ruptures**: unknown
- **Probable Magnitudes**: M_W6.0 - 7.4
- **Other Notes:** Surface trace is discontinuous in the Los Angeles Basin, but the fault zone can easily be noted there by the existence of a chain of low hills extending from Culver City to Signal Hill. South of Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and becomes the Newport-Inglewood - Rose Canyon fault zone.

PALOS VERDES FAULT ZONE

- **Type of Faulting**: right-reverse (?)
- **Length**: roughly 80 km
- **Nearby Communities**: San Pedro, Palos Verdes Estates, Torrance, Redondo Beach
- **Most Recent Surface Rupture**: Holocene, offshore; Late Quaternary, onshore
- **Slip Rate:** between 0.1 and 3.0 mm/yr
- **Interval Between Major Ruptures:** unknown
- **Probable Magnitudes:** M_W6.0 - 7.0 (or greater?); fault geometries may allow only partial rupture at any one time
- **Other Notes:** Has two main branches (see below). Continues southward as the Palos Verdes - Coronado Bank fault zone.

REDONDO CANYON FAULT

- **Type of Faulting**: right-reverse (?)
- **Length**: 11 km
- **Nearby Communities**: Palos Verdes Estates, Redondo Beach
- **Most Recent Surface Rupture**: Holocene
- **Slip Rate**: uncertain
- **Interval Between Major Ruptures**: unknown
- **Probable Magnitudes**: M_W5.8 - 6.5

CABRILLO FAULT

- **Type of Faulting**: right-normal (?)
- **Length**: 20 km
- **Nearby Communities**: Rancho Palos Verdes, Rolling Hills Estates, San Pedro
- **Most Recent Surface Rupture**: Holocene, offshore; Late Quaternary, onshore
- **Slip Rate:** uncertain
- **Interval Between Major Ruptures:** unknown
- **Probable Magnitudes:** M_W6.0 - 6.8

- **Other Notes:** Dips to the north.

3.3 GEOLOGIC HAZARDS

3.3.1 Subsidence

Subsidence occurs when too much water is pumped out from underground, deflating the space below the above-surface, and thus causing the ground to actually collapse. The result can look like craters on plots of land. This occurs because in its natural equilibrium state, the hydraulic pressure of groundwater in the pore spaces of the aquifer and the aquifer supports some of the weight of the overlying sediments. When groundwater is removed from aquifers by excessive pumping, pore pressures in the aquifer drop and compression of the aquifer may occur. This compression may be partially recoverable if pressures rebound, but much of it is not. When the aquifer gets compressed it may cause land subsidence, a drop in the ground surface. Subsidence is a regional geologic occurrence and would be monitored over a long timeframe.

3.3.2 Flowing Sand

Flowing sand is a condition where poorly graded granular material is not able to withstand the lateral earth pressures caused by flowing water in saturated materials or exceeding the angle of repose for dry materials. This tendency will cause slumping or flowing failures at the side walls of an excavation.

3.3.3 Earthquake

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are caused mostly by rupture of geological faults. At the Earth's surface, earthquakes manifest themselves by shaking and sometimes displacing the ground. The moment magnitude of an earthquake is conventionally reported, with magnitude 3 or lower earthquakes being mostly imperceptible and magnitude 7 causing serious damage over large areas. The depth of the earthquake also matters, the shallower the earthquake, the more damage to structures. Ground ruptures and shear wave ground motion are the two major causes of damage in an earthquake event. Any structure in Southern California can expect to be subjected to significant earthquakes during the planned lifetime.

Ground Rupture

Ground rupture is the displacement of the ground surface due to an earthquake. Ground rupture only occurs along the fault zone that moves during the earthquake. The abrupt differential displacement can cause damage to structures and utilities. The Palos Verdes fault zone could cause ground rupture displacement within the study area.

Ground Motion

Ground motion is the movement of the earth's surface from earthquakes or explosions. Ground motion is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface. The

ground motion can cause damage to structures by the inertial response to the shear waves at the ground level. Southern California is a seismically active region and strong ground motions are expected.

3.3.4 Liquefaction

Liquefaction is a process by which geologically young and loose sands or silts (and even gravels) below the groundwater table temporarily lose strength and behave as a viscous liquid rather than a solid.

Liquefaction can be caused by seismic shear waves passing through saturated, granular soil structure causing collapse and a tendency for volume decrease.

If drainage is unable to occur, the volume reduction tendency results in an increase in pore water pressure. If pore water pressure increases to the overburden soil pressure, effective overburden pressure, which is total overburden pressure minus pore water pressure, approaches zero and the soil liquefies.

Regions of Liquefaction within the area of study are shown on the Torrance, Redondo Beach, Inglewood, and Venice Beach Quadrangle Seismic Hazard Zones Maps.

3.3.5 Landslide

A landslide is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released.

Landslides occur when the stability of a slope changes from a stable to an unstable condition. A change in the stability of a slope can be caused by a number of factors, acting together or alone. Natural causes of landslides include:

- groundwater (porewater) pressure acting to destabilize the slope
- Loss or absence of vertical vegetative structure, soil nutrients, and soil structure (e.g. after a wildfire)
- erosion of the toe of a slope by rivers or ocean waves
- weakening of a slope through saturation by snowmelt, glaciers melting, or heavy rains
- earthquakes adding loads to barely-stable slope
- earthquake-caused liquefaction destabilizing slopes

The Palos Verdes peninsula has many areas of slope instability as shown on the Torrance and Redondo Beach Quadrangle Seismic Hazard Zones Maps.

3.4 ENGINEERING RECOMMENDATIONS

3.4.1 Dewatering

The groundwater levels in the area of study are expected to be in the range of 5 to 30 feet below the ground surface per Plate 3 of the Los Angeles County Safety Element. During excavation, dewatering wells would need to be constructed if further exploration reveals that water would impact the trenches. The wells will need to be established in advance to allow time to draw down the surrounding water to acceptable levels for construction.

3.4.2 Shoring

The presence of thick poorly graded alluvial deposits and the possibility of a high groundwater table would indicate the need for shoring. The choice between soldier piles and lagging or sheet piles would be based on the available construction space and the geometry of existing utilities. High lateral earth pressures would be expected to impact the shoring design.

3.4.3 Further Studies

The nature of this study is preliminary. After the primary alignments have been selected, a comprehensive geotechnical investigation would need to be performed to completely characterize the geologic conditions discussed in this report.

SECTION 4

Preliminary Pipeline Alignment Analysis

4.1 PRELIMINARY ANALYSIS

The purpose of this preliminary assessment is to identify viable pipe routes from two possible locations for the West Basin Desalination Plant (AES Power Plant in Redondo Beach and NRG's Generating Station in El Segundo) to Metropolitan's regional distribution system. Eleven potential intertie locations to Metropolitan's regional distribution system were analyzed with routes from each potential desalination plant site. Further study may be initialized upon further development of the West Basin Ocean Water Desalination Program.

The scope of this assessment includes the following aspects of a preliminary conveyance feasibility assessment:

4.1.1 Alignment Options

A study of general corridors for a regional distribution system from potential desalination plant locations to potential Metropolitan intertie locations was conducted using existing GIS data, Google Earth, and on-site route investigations.

4.1.2 Constructability

The following elements were identified as part of the study: special construction measures, shoring requirements, including depth and minimum street width, jack and bore locations for major street crossings, and staging and lay down areas.

4.1.3 Traffic Impacts and Access Issues

The following elements were identified as part of this study: potential traffic impacts and constraints to construction, avoiding traffic impacts on major arterial streets, such as El Segundo Boulevard, Manhattan Beach Boulevard, Torrance Boulevard, and Hawthorne Boulevard as much as possible. This was done by selecting streets and roadways that would have lesser traffic impacts and would require minimal traffic detours during pipeline construction, but wide enough to accommodate a pipe of up to 4.75 feet in diameter.[1]

4.1.4 Utility Impacts

During on-site investigations, visual inspections were conducted and underground and overhead utilities were identified. These utilities may be impacted along each alternative alignment, which may include water, sewer, drainage, electrical, oil, gas, and telephone facilities. Utility drawings were not utilized for this initial assessment.

[1] The approach for the preliminary alignment assessment allowed for flexibility in potential pipe sizes, including sizes larger than that required for the initial upper flow range of 30 MGD (subsequently reduced to 25 MGD based on demand and operational analyses). A 4.75-foot diameter pipe would potentially convey about 60 MGD.

4.1.5 Land Use

The land use within the alignment alternatives were identified, such as residential, industrial, and commercial zones, schools, hospitals, churches, parks, golf courses, and refineries. Environmentally sensitive or restricted areas, historical landfills, and contaminated sites were also identified, if visually located.

Based on the above scope of work, alternative pipeline alignments have been identified and studied for each potential desalination plant location and intertie location. The current study does not select the preferred alignment to each intertie location.

Desalination Plant at El Segundo to:

1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00) – 4 Alternatives
2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80) – 4 Alternative
3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00) – 2 Alternatives
4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00) – 1 Alternative
5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00) – 1 Alternative
6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61) – 1 Alternative
7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80) – 2 Alternatives
8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38) – 2 Alternatives
9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00) – 1 Alternative
10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50) – 2 Alternatives
11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00) – 2 Alternatives

Desalination Plant at Redondo Beach to:

1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00) – 5 Alternatives
2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80) – 5 Alternatives
3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00) – 2 Alternatives
4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00) – 1 Alternative
5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00) – 3 Alternatives
6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61) – 3 Alternatives
7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80) – 3 Alternatives
8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38) – 3 Alternatives
9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00) – 3 Alternatives
10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50) – 3 Alternatives
11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00) – 2 Alternatives

Diagrams of each alignment alternative and tables listing pertinent information for each alternative can be found in **Appendix A**. Field notes and street pictures can be found in **Appendix B**.

4.2 El Segundo Plant Alternative Alignments

4.2.1 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 1

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **North Redondo Avenue** and continues in a southerly direction for 7,600 feet (See street picture no. 83). Twenty one (21) intersection crossings are encountered along North Redondo Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, Metropolitan feeder, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School.

From North Redondo Avenue, the pipe turns left on **Mathews Avenue** and continues in an easterly direction for 2,500 feet (See street picture no. 94). Three (3) intersection crossings are encountered along Mathews Avenue with the major intersection crossing being South Aviation Boulevard.

From Mathews Avenue, the pipe turns right onto **Blossom Lane** and continues in a southerly direction for 5,700 feet (See street picture nos. 34, 35, and 36). Sixteen (16) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Artesia Boulevard, Grant Avenue, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, storm drain, and residential.

From Blossom Lane, the pipe turns left onto **West 190th Street** and continues in an easterly direction for 2,900 feet (See street picture no. 28). Two (2) intersection crossings are encountered along West 190th Street. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, local utilities, gas, power, utility trunk lines, residential, commercial, and high traffic.

From West 190th Street, the pipe turns right onto **Anza Avenue** and continues in a southerly direction for 14,000 feet (See street picture no. 95). Eighteen (18) intersection crossings are encountered along Anza Avenue with the major intersection crossings being Del Amo Boulevard, Torrance Boulevard, West Carson Street, and West Sepulveda Boulevard. The following utility and environmental concerns are expected along Anza Avenue: storm drain, water, Pacific Bell, Southern California Edison crossing, residential, commercial, medium traffic, and Saint James School.

From Anza Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 13,900 feet (See street picture nos. 55 and 56). Eighteen (18) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Hawthorne Boulevard, Crenshaw Boulevard, and Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: storm drain, sanitary sewer, power poles, residential, businesses, a hospital, and commercial and industrial tank farm.

From Lomita Boulevard, the pipe turns right onto **Narbonne Avenue** and continues in a southerly direction for 8,000 feet (See street picture no. 57). Nine (9) intersection crossings are encountered along Narbonne Avenue with the major intersection crossing being Pacific Coast Highway. The following utility and environmental concerns are expected along Narbonne Avenue: sanitary sewer, storm drain, power poles, MWD feeder, residential, businesses, Lomita Elementary School, and a hospital.

Narbonne Avenue becomes **Palos Verdes Drive East** and the pipe continues an additional 4,700 feet (See street picture no. 58). Two (2) intersection crossings are encountered

along Palos Verde Drive East with the major crossing being Palos Verdes Drive North. The following utility and environmental concerns are expected along Palos Verdes Drive East: Metropolitan feeder, a park, and a golf course. On Palos Verde Drive East, the pipe ties in to the Second Lower Feeder / Palos Verdes Reservoir at Station 2116+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 7,500 feet (See street picture no. 81). Sixteen (16) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **Aviation Boulevard** and continues in a southwesterly direction for 12,000 feet (See street picture no. 110). Twenty eight (28) intersection crossings are encountered along Aviation Boulevard with the major intersection crossings being Grant Avenue, Artesia Boulevard, and Manhattan Beach Boulevard. The following utility and environmental concerns are expected along Aviation Boulevard: power,

residential, Aviation Park, Aviation High School, Redondo Beach Recreation Department, commercial, and Prospect Heights School.

From Aviation Boulevard, the pipe turns left on **Prospect Avenue** and continues in a southerly direction for 11,000 feet (See street picture no. 51). Thirty three (33) intersection crossings are encountered along Prospect Avenue with the major intersection crossings being Anita Street, Beryl Street, and Del Amo Boulevard. The following utility and environmental concerns are expected along Prospect Avenue: sanitary sewer, storm drain, power poles, residential, commercial, Roadway Park, Our Lady of Guadalupe School, South Bay Medical Center, Redondo Beach School, and Hillcrest School.

From Prospect Avenue, the pipe turns left onto **Torrance Boulevard** and continues in an easterly direction for 2,200 feet(See street picture no. 111). Two (2) intersection crossings are encountered along Torrance Boulevard. The following utility and environmental concerns are expected along Torrance Boulevard: storm drain, sanitary sewer, water, Southern California Edison, Verizon, high traffic, and a school.

From Torrance Boulevard, the pipe turns right onto **Palos Verdes Boulevard** and continues in a southerly direction for 3,850 feet (See street picture no. 112). Eleven (11) intersection crossings are encountered along Palos Verdes Boulevard with the major intersection crossings being West Carson Street. The following utility and environmental concerns are expected along Palos Verdes Boulevard: water, power, sanitary sewer, storm drain, and residential.

From Palos Verdes Boulevard, the pipe turns left onto **West Sepulveda Boulevard** and continues in an easterly direction for 2,900 feet (See street picture no. 113). Four (4) intersection crossings are encountered along West Sepulveda Boulevard. The following utility and environmental concerns are expected along West Sepulveda Boulevard: utilities in sidewalk, power poles, high traffic, and residential.

From West Sepulveda Boulevard, the pipe turns right onto **Anza Avenue** and continues in a southerly direction for 2,100 feet (See street picture no. 95). One (1) intersection crossing is encountered along Anza Avenue.

From Anza Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 13,900 feet (See street picture nos. 55 and 56). Eighteen (18) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Hawthorne Boulevard, Crenshaw Boulevard, and Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: storm drain, sanitary sewer, power poles, residential, businesses, a hospital, and commercial and industrial tank farm. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

Alternative 3

Alternative 3 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **North Redondo Avenue** and continues in a southerly direction for 7,600 feet (See street picture no. 83). Twenty one (21) intersection crossings are encountered along North Redondo Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, Metropolitan feeder, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School.

From North Redondo Avenue, the pipe turns left on **Mathews Avenue** and continues in an easterly direction for 2,500 feet (See street picture no. 94). Three (3) intersection crossings are encountered along Mathews Avenue with the major intersection crossing being South Aviation Boulevard.

From Mathews Avenue, the pipe turns right onto **Blossom Lane** and continues in a southerly direction for 5,700 feet (See street picture nos. 34, 35, and 36). Sixteen (16) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Artesia Boulevard, Grant Avenue, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, storm drain, and residential.

From Blossom Lane, the pipe turns left onto **West 190th Street** and continues in an easterly direction for 6,400 feet (See street picture nos. 16, 17, and 28). Ten (10) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue and Inglewood Avenue. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, apartments, high traffic, residential, and businesses.

From West 190th Street, the pipe turns right onto **Hawthorne Boulevard** and continues in a southerly direction for 3,500 feet (See street picture no. 107). Two (2) intersection crossings are encountered along Hawthorne Boulevard. The following utility and environmental concerns are expected along Hawthorne Boulevard: various utilities, high traffic, residential, and commercial.

From Hawthorne Boulevard, the pipe turns left onto **Del Amo Boulevard** and continues in an easterly direction for 2,600 feet (See street picture no. 98). Two (2) intersection crossings were encountered along Del Amo Boulevard. The following utility and environmental concerns are expected along Del Amo Boulevard: sanitary sewer, water, low traffic, commercial, and residential.

From Del Amo Boulevard, the pipe turns right onto **Madrona Avenue** and continues in a southerly direction for 7,000 feet (See street picture nos. 116 and 117). Seventeen (17) intersection crossings are encountered along Madrona Avenue with the major intersection crossings being Torrance Boulevard and West Carson Street. The following utility and environmental concerns are expected along Madrona Avenue: Southern California Edison substation, industrial, tank farms, residential, and businesses.

From Madrona Avenue, the pipe turns left onto **Plaza Del Amo** and continues in an easterly direction for 1,800 feet.

From Plaza Del Amo, the pipe turns right onto **Maple Avenue** and continues in a southerly direction for 3,700 feet (See street picture no. 141). Five (5) intersection crossings are encountered along Maple Avenue with the major intersection crossing being Sepulveda Boulevard. The following environmental concerns are expected along Maple Avenue: traffic, residential, and businesses.

Maple Avenue becomes **West 235th Street** and the pipe continues an additional 5,200 feet (See street picture no. 141). Five (5) intersection crossings are encountered along West 235th Street with the major crossing being Crenshaw Boulevard. The following environmental concern is expected along West 235th Street: residential.

From West 235th Street, the pipe turns right onto **Pennsylvania Avenue** and continues in a southerly direction for 2,900 feet. Eight (8) intersection crossings are encountered along Pennsylvania Avenue. The following environmental concern is expected along Pennsylvania Avenue: residential.

From Pennsylvania Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 1,800 feet (See street picture nos. 55 and 56). Five (5) intersection crossings are encountered along Lomita Boulevard. The following utility and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, residential, and businesses. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

Alternative 4

Alternative 4 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **North Redondo Avenue** and continues in a southerly direction for 7,600 feet (See street picture no. 83). Twenty one (21) intersection crossings are encountered along North Redondo Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, Metropolitan feeder, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School.

From North Redondo Avenue, the pipe turns left on **Mathews Avenue** and continues in an easterly direction for 2,500 feet (See street picture no. 94). Three (3) intersection crossings are encountered along Mathews Avenue with the major intersection crossing being South Aviation Boulevard.

From Mathews Avenue, the pipe turns right onto **Blossom Lane** and continues in a southerly direction for 5,700 feet (See street picture nos. 34, 35, and 36). Sixteen (16) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Artesia Boulevard, Grant Avenue, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, storm drain, and residential.

From Blossom Lane, the pipe turns left onto **West 190th Street** and continues in an easterly direction for 14,200 feet (See street picture nos. 16, 17, and 28). Twenty one (21) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, and Prairie Avenue. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, apartments, high traffic, residential, businesses, a park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Crenshaw Boulevard** and continues in a southerly direction for 19,200 feet (See street picture nos. 124, 125, and 126). Thirty five (35) intersection crossings are encountered along Crenshaw Boulevard with the major intersection crossings being Torrance Boulevard, Sepulveda Boulevard, and West Carson Street. The following utility and environmental concerns are expected along Crenshaw Boulevard: sanitary sewer, telephone, drainage channel overcrossing, high traffic, refineries, industrial, and residential.

From Crenshaw Boulevard, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 2,700 feet (See street picture nos. 55 and 56). Seven (7) intersection crossings are encountered along Lomita Boulevard with the major intersection crossing being Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, and residential. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

4.2.2 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 2

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 1 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue. From this intersection, the pipe continues along **Lomita Boulevard** in a southeasterly direction for an additional 2,600 feet. Nineteen (19) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Hawthorne Boulevard, Crenshaw Boulevard, Pennsylvania Avenue, and Narbonne Avenue.

From Lomita Boulevard, the pipe turns left onto **Walnut Street** and continues in a northerly direction for 2,050 feet (See street picture no. 59). Five (5) intersection crossings are encountered along Walnut Street. The following utilities and environmental concerns are expected along Walnut Street: sanitary sewer, storm drain, Metropolitan water line, and residential.

From Walnut Street, the pipe turns right onto **West 242nd Place** and continues in an easterly direction for 625 feet (See street picture no. 60). One (1) intersection crossing is encountered along West 242nd Place. The following utilities and environmental concerns are expected along West 242nd Place: sanitary sewer, storm drain, and residential.

From West 242nd Place, the pipe turns left onto **Huber Avenue** and continues in a northerly direction for 100 feet (See street picture no. 61). The following utilities and environmental concerns are expected along Huber Avenue: sanitary sewer, storm drain, and residential.

From Huber Avenue, the pipe turns right onto **West 242nd Street** and continues in an easterly direction for 700 feet (See street picture no. 62). The following utility and environmental concerns are expected along West 242nd Place: sanitary sewer and residential. On West 242nd Street, the pipe ties in to the Palos Verdes Feeder at Station 1538+80.

Alternative 2

Alternative 2 beings at the potential desalination plant at El Segundo and continues in the same path as Alternative 2 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

Alternative 3

Alternative 3 beings at the potential desalination plant at El Segundo and continues in the same path as Alternative 3 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

Alternative 4

Alternative 4 beings at the potential desalination plant at El Segundo and continues in the same path as Alternative 4 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

4.2.3 DESALINATION PLANT EL SEGUNDO TO TIE-IN NO. 3

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **North Redondo Avenue** and continues in a southerly direction for 7,600 feet (See street picture no. 83). Twenty one (21) intersection crossings are encountered along North Redondo Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, Metropolitan feeder, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School.

From North Redondo Avenue, the pipe turns left on **Mathews Avenue** and continues in an easterly direction for 2,500 feet (See street picture no. 94). Three (3) intersection crossings are encountered along Mathews Avenue with the major intersection crossing being South Aviation Boulevard.

From Mathews Avenue, the pipe turns right onto **Blossom Lane** and continues in a southerly direction for 5,700 feet (See street picture nos. 34, 35, and 36). Sixteen (16) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Artesia Boulevard, Grant Avenue, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, storm drain, and residential.

From Blossom Lane, the pipe turns left onto **West 190th Street** and continues in an easterly direction for 17,500 feet (See street picture nos. 16, 17, and 28). Twenty four (24) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, MWD feeder, apartments, high traffic, residential, businesses, Columbia Park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 4,200 feet (See street picture nos. 99 and 100). Two (2) intersection

crossings are encountered along Van Ness Avenue with the major. The following utility and environmental concerns are expected along Van Ness Avenue: water, gas, sanitary sewer, power poles, telephone, MWD feeder, commercial, and industrial.

From Van Ness Avenue, the pipe turns left onto **Del Amo Boulevard** and continues in an easterly direction for 2,600 feet (See street picture no. 98). One (1) intersection crossing is encountered along Del Amo Boulevard. The following utility and environmental concerns are expected along Del Amo Boulevard: sanitary sewer, MWD feeder, light traffic, and commercial.

From Del Amo Boulevard, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 6,900 feet (See street picture no. 96). Sixteen (16) intersection crossings are encountered along South Western Avenue with the major intersection crossings being Torrance Boulevard and West Carson Street. The following utility and environmental concerns are expected along South Western Avenue: sanitary sewer, power poles, MWD feeder, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Second Lower Feeder at Station 1862+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 1, until the intersection of West 190th Street and Crenshaw Boulevard. In alternative 2, the pipe travels a distance of 14,200 feet along **West 190th Street** (See street picture nos. 16, 17, and 28). Twenty one (21) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, apartments, high traffic, residential, businesses, Columbia Park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Crenshaw Boulevard** and continues in a southerly direction for 9,900 feet (See street picture no. 119). Eleven (11) intersection crossings are encountered along Crenshaw Boulevard with the major intersection crossings being Torrance Boulevard and Del Amo Boulevard. The following utility and environmental concerns are expected along Crenshaw Boulevard: drainage channel overcrossing, sanitary sewer, storm drain, water, telephone, high traffic, Fire Department, industrial, commercial, residential, and businesses.

From Crenshaw Boulevard, the pipe turns left onto **West Carson Street** and continues in an easterly direction for 6,000 feet (See street picture no. 118). Sixteen (16) intersection crossings are encountered along West Carson Street with the major intersection crossings being Cabrillo Avenue. The following utility and environmental concerns are expected along West

Carson Street: railroad crossing, Southern California Edison, sanitary sewer, storm drain, high traffic, Nativity Catholic School, and Torrance High School.

From West Carson Street, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 1,300 feet (See street picture no. 96). Two (2) intersection crossings are encountered along South Western Avenue. The following utility and environmental concerns are expected along South Western Avenue: MWD feeder, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Second Lower Feeder at Station 1862+00.

4.2.4 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 3A

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda

Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right on **North Redondo Avenue** and continues in a southerly direction for 7,600 feet (See street picture no. 83). Twenty one (21) intersection crossings are encountered along North Redondo Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, MWD feeder, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School.

From North Redondo Avenue, the pipe turns left on **Mathews Avenue** and continues in an easterly direction for 2,500 feet (See street picture no. 94). Three (3) intersection crossings are encountered along Mathews Avenue with the major intersection crossing being South Aviation Boulevard.

From Mathews Avenue, the pipe turns right onto **Blossom Lane** and continues in a southerly direction for 5,700 feet (See street picture nos. 34, 35, and 36). Sixteen (16) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Artesia Boulevard, Grant Avenue, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, storm drain, and residential.

From Blossom Lane, the pipe turns left onto **West 190th Street** and continues in an easterly direction for 17,500 feet (See street picture nos. 16, 17, and 28). Twenty four (24) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, MWD feeder, apartments, high traffic, residential, businesses, Columbia Park, and industrial tank farms. On West 190th Street, the pipe ties in to the Sepulveda Feeder at Station 2137+00.

4.2.5 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 4

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left onto **Marine Avenue** and continues in an easterly direction for 26,000 feet (See street picture no. 81). Fifty seven (57) intersection crossing are encountered along Marine Avenue with the major intersection crossing being Sepulveda Boulevard, Aviation Boulevard, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, drainage channel overcrossing, residential, high traffic, Marine Avenue Park, industrial, Lawndale High School, Jane Adams Park, Roosevelt Elementary School, and Serra High School.

From Marine Avenue, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 2,700 feet (See street picture nos. 1, 91, and 92). Five (5) intersection crossings are encountered along Van Ness Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, residential, and Van Ness Preschool. On Van Ness Avenue, the pipe ties in to the West Basin Feeder at Station 170+00.

4.2.6 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 5

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left on **Marine Avenue** and continues in an easterly direction for 6,200 feet (See street picture no. 81). Fourteen (14) intersection crossing are encountered along Marine Avenue with the major intersection crossing being North Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, residential, high traffic, and Marine Avenue Park.

From Marine Avenue, the pipe turns right onto **North Redondo Avenue** and continues in a southerly direction for 2,600 feet (See street picture nos. 39, 40, 84, 85, and 86). Six (6) intersection crossings are encountered along North Redondo Avenue. The following utility and environmental concerns are expected along North Redondo Avenue: sanitary sewer, power poles, low traffic, residential, Manhattan Beach Middle School, Polliwog Park, Manhattan Heights Park, and Del Sol School. On North Redondo Avenue, the pipe ties in to the West Basin Feeder at Station 368+61.

4.2.7 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 6

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 10,600 feet (See street picture nos. 73 and 75). Nineteen (19) intersection crossings are encountered along West Rosecrans Avenue with the major intersection crossing being Sepulveda Boulevard. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, tank farms, and Chapman University.

From West Rosecrans Avenue, the pipe turns left onto **South Douglas Street** and continues in a northerly direction for 5,400 feet (See street picture no. 72). Seven (7) intersection crossings are encountered along South Douglas Street. The following utility and environmental concerns are expected along South Douglas Street: power, fiber, Quest, Pacific Bell, railroad crossing, medium traffic, industrial, and commercial.

From South Douglas Street, the pipe turns right onto **El Segundo Boulevard** and continues in an easterly direction for 2,700 feet (See street picture no. 71). One (1) intersection crossing is encountered along El Segundo Boulevard with the major intersection crossing being North Aviation Boulevard. The following utility and environmental concerns are expected along El Segundo Boulevard: Pacific Bell, Southern California Edison, high traffic, power, sanitary sewer, storm drain, commercial, and industrial.

From El Segundo Boulevard, the pipe turns left onto **Isis Avenue** and continues in a northerly direction for 2,700 feet (See street picture no. 70). Ten (10) intersection crossings are encountered along Isis Avenue. The following utility and environmental concerns are expected along Isis Avenue: sanitary sewer, storm drain, water, Telecom, power poles, Del Aire Park, Sepulveda School, and residential.

From Isis Avenue, the pipe turns right onto **West 120th Avenue** and continues in an easterly direction for 17,200 feet (See street picture no. 66). Twenty eight (28) intersection crossings are encountered along West 120th Avenue with the major intersection crossings being South La Cienega Boulevard, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 120th Avenue: sanitary sewer, storm drain, power poles, residential, Anza Elementary School, commercial, Hawthorne Municipal Airport, Beach Boys Historical Landmark, and Casa Loma College.

From West 120th Avenue, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 2,700 feet. Two (2) intersection crossings are encountered along Van Ness Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: sanitary sewer, storm drain, power, railroad crossing, commercial, Holly Park, industrial, Chester Washington Golf Course, and residential. On Van Ness Avenue, the pipe ties in to the West Coast Feeder at Station 585+80.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 4,400 feet (See street picture no. 73). Six (6) intersection crossings are encountered along West Rosecrans Avenue. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, and tank farms.

From West Rosecrans Avenue, the pipe turns right on **Pacific Avenue** and continues in a southerly direction for 2,700 feet (See street picture no. 80). Five (5) intersection crossings are encountered along Pacific Avenue with the major intersections being at North Valley Drive and Ardmore Avenue. The following utility and environmental concerns are expected along Pacific Avenue: gas, residential power, sanitary sewer, storm drain, and residential.

From Pacific Avenue, the pipe turns left onto **Marine Avenue** and continues in an easterly direction for 26,000 feet (See street picture nos. 81 and 87). Fifty seven (57) intersection crossing are encountered along Marine Avenue with the major intersection crossing being Sepulveda Boulevard, Aviation Boulevard, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along Marine Avenue: water, power, sanitary sewer, drainage channel overcrossing, residential, high traffic, Marine Avenue Park, industrial, Lawndale High School, Jane Adams Park, Roosevelt Elementary School, and Serra High School.

From Marine Avenue, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 7,900 feet. Seven (7) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being West Rosecrans Avenue and west 135th Street. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, Serra High School, residential, industrial, commercial, Maria Regina School, and Rowley Park. On Van Ness Avenue, the pipe ties in to the West Coast Feeder at Station 585+80.

4.2.8 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 7

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and heads south along **Vista Del Mar** for a distance of 4,500 feet. The following environmental concern is expected along Vista del Mar: industrial tank farms.

Vista del Mar becomes **North Highland Avenue** and the pipe continues for an additional 2,000 feet (See street picture no. 76). Sixteen (16) intersection crossings are encountered along North Highland Avenue. The following utility and environmental concerns are expected along North Highland Avenue: Verizon Communications (GTE), Southern California Edison, sanitary sewer, and residential.

From North Highland Avenue, the pipe turns left onto **West Rosecrans Avenue** and continues in an easterly direction for 10,600 feet (See street picture no. 73). Nineteen (19) intersection crossings are encountered along West Rosecrans Avenue with the major intersection crossing being Sepulveda Boulevard. The following utility and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, tank farms, and Chapman University.

From West Rosecrans Avenue, the pipe turns left onto **South Douglas Street** and continues in a northerly direction for 5,400 feet (See street picture no. 72). Seven (7) intersection crossings are encountered along South Douglas Street. The following utility and environmental concerns are expected along South Douglas Street: power, fiber, Quest, Pacific Bell, railroad crossing, medium traffic, industrial, and commercial.

From South Douglas Street, the pipe turns right onto **El Segundo Boulevard** and continues in an easterly direction for 1,600 feet (See street picture no. 71). One (1) intersection crossing is encountered along El Segundo Boulevard with the major intersection crossing being Aviation Boulevard. The following utility and environmental concerns are expected along El Segundo Boulevard: Pacific Bell, Southern California Edison, high traffic, power, sanitary

sewer, storm drain, and industrial. On East El Segundo Boulevard, the pipe ties in to the West Coast Feeder at Station 768+69.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and continues in the same path as alternative 1 until the intersection of West Rosecrans Avenue and South Douglas Street. From this intersection, the pipe continues in an easterly direction along **West Rosecrans Avenue** for an additional 1,400 feet. Thirteen (13) intersection crossings are encountered along West Rosecrans Avenue with the major intersection crossing being Sepulveda Boulevard. The following utilities and environmental concerns are expected along West Rosecrans Avenue: petroleum crossing, commercial power, Southern California Edison facilities, sanitary sewer, storm drain, high traffic, commercial, residential, tank farms, Chapman University, and industrial.

From West Rosecrans Avenue, the pipe turns left onto **South Aviation Boulevard** and continues in a northerly direction for 5,300 feet (See street picture no 103). Four (4) intersection crossings are encountered along South Aviation Boulevard. The following utility and environmental concerns are expected along South Aviation Boulevard: West Basin reclaimed water, D/B conduit, storm drain, power lines, railroad crossing, residential, Vista Mar School, Da Vinci Design School, and industrial. On South Aviation Boulevard, the pipe ties in to the West Coast Feeder at Station 768+69.

4.2.9 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 8

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 1 of Tie-in no. 4 until the intersection of Marine Avenue and Van Ness Avenue. From this intersection, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 2,000 feet (See street picture nos. 1, 91, and 92). Three (3) intersection crossings are encountered along Van Ness Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, residential, and Van Ness Preschool. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 2025+00.

4.2.10 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 9

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 1 of Tie-in no. 6 until the intersection of West 120th Street and Van Ness Avenue. From this intersection, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 1,600 feet. The following utility and environmental concerns are expected along Van Ness Avenue: sanitary sewer, storm drain, power, railroad crossing, commercial, MWD feeder, Holly Park, Industrial, Chester Washington Golf Course, and residential. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 1918+50.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 2 of Tie-in No. 6 until the intersection of Marine Avenue and Van Ness Avenue. From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 9,000 feet. Nine (9) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being West Rosecrans Avenue and West 135th Street. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, Serra High School, residential, industrial, commercial, Maria Regina School, and Rowley Park. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 1918+50.

4.2.11 DESALINATION PLANT AT EL SEGUNDO TO TIE-IN NO. 10

Alternative 1

Alternative 1 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 1 of Tie-in No. 3 until the intersection of Del Amo Boulevard and South Western Avenue. From this intersection, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 5,600 feet (See street picture no. 96). Thirteen (13) intersection crossing are encountered along South Western Avenue with the major intersection crossing being Torrance Boulevard. The following utility and environmental concerns are expected along South Western Avenue: sanitary sewer, power poles, MWD feeder, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Sepulveda Feeder at Station 2260+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at El Segundo and continues in the same path as Alternative 2 of Tie-in No. 3 until the intersection of West Carson Street and South

Western Avenue. At this intersection, the pipe ties in to the Sepulveda Feeder at Station 2260+00.

4.3 Redondo Beach Site Alternative Alignments

4.3.1 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 1

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns right onto **Beryl Street** and continues in a southwesterly direction for 350 feet (See street picture nos. 19 and 47). The following environmental concern is expected along Beryl Street: residential.

From Beryl Street, the pipe turns left onto **North Elena Avenue** and continues in a southeasterly direction for 675 feet (See street picture no. 46). The following utilities and environmental concerns are expected along North Elena Avenue: sanitary sewer, storm drain, power poles, and residential.

From North Elena Avenue, the pipe turns right onto **Carnelian Street** and continues in a southwesterly direction for 400 feet (See street picture no. 48). The following environmental concern is expected along Carnelian Street: residential.

From Carnelian Street, the pipe turns left onto **North Broadway** and continues in a southerly direction for 6,400 feet (See street picture no. 49). Nine (9) intersection crossings are encountered along North Broadway with the major intersection crossings being Diamond Street and Torrance Boulevard. The following utilities and environmental concerns are expected along North Broadway: sanitary sewer, storm drain, Southern California Edison, fire station, and residential apartment buildings.

From North Broadway, the pipe turns left onto **Knob Hill Avenue** and continues in an easterly direction for 3,400 feet (See street picture no. 50). Six (6) intersection crossings are encountered along Knob Hill Avenue with the major intersection crossing being Pacific Coast Highway. The following utilities and environmental concerns are expected along Knob Hill Avenue: sanitary sewer, water, telecom, power poles, and residential.

From Knob Hill Avenue, the pipe turns right onto **South Prospect Avenue** and continues in a southerly direction for 3,000 feet (See street picture no. 51). Eight (8) intersection crossings are encountered along South Prospect Avenue with the major intersection crossing being Palos Verdes Boulevard. The following utilities and environmental concerns are expected along South Prospect Avenue: sanitary sewer, storm drain, new pavement, power poles, residential, Alta Vista Elementary School, and Tulita Elementary School.

From South Prospect Avenue, the pipe turns left onto **Avenue H** and continues in an easterly direction for 950 feet (See street picture no. 52). One (1) intersection crossing is encountered along Avenue H. The following utilities and environmental concerns are expected along Avenue H: sanitary sewer, storm drain, power poles, residential, and Tulita Elementary School.

From Avenue H, the pipe turns left onto **Sharynne Lane** and continues in an easterly direction for 3,850 feet (See street picture no. 53). Three (3) intersection crossings are encountered along Sharynne Lane. The following environmental concerns are expected along Sharynne Lane: residential and Seaside Elementary School.

From Sharynne Lane, the pipe turns left onto **Kathryn Avenue** and continues in a northerly direction for 350 feet (See street picture no. 54). The following utilities and environmental concerns are expected along Kathryn Avenue: sanitary sewer, storm drain, and residential.

From Kathryn Avenue, the pipe turns right into a **drainage channel**, which turns into **Lomita Boulevard**. The pipe continues along Lomita Boulevard in a southeasterly direction for 14,500 feet (See street picture nos. 55 and 56). Eighteen (18) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Anza Avenue, Hawthorne Boulevard, and Crenshaw Boulevard. The following utilities and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, residential, businesses, hospital, and commercial and industrial tank farm. .

From Lomita Boulevard, the pipe turns right onto **Narbonne Avenue** and continues in a southerly direction for 8,000 feet (See street picture no. 57). Nine (9) intersection crossings are encountered along Narbonne Avenue with the major intersection crossing being Pacific Coast Highway. The following utility and environmental concerns are expected along Narbonne Avenue: MWD Feeder, sanitary sewer, storm drain, power poles, residential, businesses, Lomita Elementary School, and a hospital.

Narbonne Avenue becomes **Palos Verdes Drive East** and the pipe continues an additional 4,700 feet (See street picture no. 58). Two (2) intersection crossings are encountered along Palos Verde Drive East with the major crossing being Palos Verdes Drive North. The following utility and environmental concerns are expected along Palos Verdes Drive East: MWD

Feeder, parks, and a golf course. On Palos Verdes Drive East, the pipe ties in to the Second Lower Feeder / Palos Verdes Reservoir at Station 2116+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 3,100 feet (See street picture nos. 19 and 47). Seven (7) intersection crossings are encountered along Beryl Street with the major intersection crossing being Pacific Coast Highway. The following environmental concern is expected along Beryl Street: residential.

From Beryl Street, the pipe turns right onto **North Prospect Avenue** and continues in a southeasterly direction for 6,200 feet (See street picture no. 51). Six (6) intersection crossings are encountered along North Prospect Avenue with the major intersection crossings being Del Amo Boulevard. The following utility and environmental concerns are expected along North Prospect Avenue: storm drain, sanitary sewer, power poles, new pavement, Sea Hawk Stadium/Park, and Parras Middle School.

From North Prospect Avenue, the pipe turns left onto **Torrance Boulevard** and continues in an easterly direction for 2,200 feet (See street picture no. 111). Two (2) intersection crossings are encountered along Torrance Boulevard. The following utility and environmental concerns are expected along Torrance Boulevard: sanitary sewer, storm drain, water, Southern California Edison, Verizon, high traffic, and a school.

From Torrance Boulevard, the pipe turns right onto **Palos Verdes Boulevard** and continues in a southerly direction for 3,850 feet (See street picture no. 112). Eleven (11) intersection crossings are encountered along Palos Verdes Boulevard with the major intersection crossings being Carson Street. The following utility and environmental concerns are expected along Palos Verdes Boulevard: water, power, sanitary sewer, storm drain, and residential.

From Palos Verdes Boulevard, the pipe turns left onto **West Sepulveda Boulevard** and continues in an easterly direction for 2,900 feet (See street picture no. 113). Four (4) intersection crossings are encountered along West Sepulveda Boulevard. The following utility and environmental concerns are expected along West Sepulveda Boulevard: utility under sidewalk, power poles, high traffic, and residential.

From West Sepulveda Boulevard, the pipe turns right onto **Anza Avenue** and continues in a southerly direction for 2,100 feet (See street picture no. 95). One (1) intersection crossing is encountered along Anza Avenue. The following utility and environmental concerns are expected along Anza Avenue: storm drain, water, Pacific Bell, medium traffic, and residential.

From Anza Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 13,900 feet (See street picture nos. 55 and 56). Eighteen (18) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Hawthorne Boulevard, Crenshaw Boulevard, and Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: storm drain, sanitary sewer, power poles, residential, businesses, a hospital, and commercial and industrial tank farm.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 2,900 feet (See street picture no. 28). Four (4) intersection crossings are encountered along West 190th. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, high traffic, residential apartments, and businesses.

From West 190th Street, the pipe turns right onto **Anza Avenue** and continues in a southerly direction for 14,000 feet (See street picture no. 95). Eighteen (18) intersection crossings are encountered along Anza Avenue with the major intersection crossings being Del Amo Boulevard, Torrance Boulevard, West Carson Street, and Sepulveda Boulevard. The following utility and environmental concerns are expected along Anza Avenue: storm drain, water Pacific Bell, medium traffic, businesses, and a school.

From Anza Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 13,900 feet (See street picture nos. 55 and 56). Eighteen (18) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Hawthorne Boulevard, Crenshaw Boulevard, and Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: storm drain, sanitary sewer, power poles, residential, businesses, a hospital, and a commercial and industrial tank farm.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

Alternative 4

Alternative 4 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and a park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 6,400 feet (See street picture nos. 16, 17, and 28). Ten (10) intersection crossings are encountered along West 190th Street with the major intersection crossings being Inglewood Avenue, and Anza Avenue. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, high traffic, residential apartments, and businesses.

From West 190th Street, the pipe turns right onto **Hawthorne Boulevard** and continues in a southerly direction for 3,500 feet (See street picture no. 107). Two (2) intersection crossings are encountered along Hawthorne Boulevard. The following utility and environmental concerns are expected along Hawthorne Boulevard: various utilities, high traffic, residential, and commercial.

From Hawthorne Boulevard, the pipe turns left onto **Del Amo Boulevard** and continues in an easterly direction for 2,600 feet (See street picture no. 98). Two (2) intersection crossings are encountered along Del Amo Boulevard. The following utility and environmental concerns

are expected along Del Amo Boulevard: sanitary sewer, water, low traffic, commercial, and residential apartments.

From Del Amo Boulevard, the pipe turns right onto **Madrona Avenue** and continues in a southerly direction for 7,000 feet (See street picture nos. 116 and 117). Seventeen (17) intersection crossings are encountered along Madrona Avenue with the major intersection crossings being Torrance Boulevard and Carson Street. The following utility and environmental concerns are expected along Madrona Avenue: Southern California Edison substation, industrial, tank farms, residential, and businesses.

From Madrona Avenue, the pipe turns left onto **Plaza Del Amo** and continues in an easterly direction for 1,800 feet.

From Plaza Del Amo, the pipe turns right onto **Maple Avenue** and continues in a southerly direction for 3,700 feet. Five (5) intersection crossings are encountered along Maple Avenue with the major intersection crossing being Sepulveda Boulevard. The following environmental concerns are expected along Maple Avenue: residential and businesses.

Maple Avenue becomes **West 235th Street** and the pipe continues an additional 5,200 feet. Five (5) intersection crossings are encountered along West 235th Street with the major crossing being Crenshaw Boulevard. The following environmental concern is expected along West 235th Street: residential.

From West 235th Street, the pipe turns right onto **Pennsylvania Avenue** and continues in a southerly direction for 2,900 feet. Eight (8) intersection crossings are encountered along Pennsylvania Avenue. The following environmental concern is expected along Pennsylvania Avenue: residential.

From Pennsylvania Avenue, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 1,800 feet (See street picture nos. 55 and 56). Five (5) intersection crossings are encountered along Lomita Boulevard. The following utility and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, residential, and businesses.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

Alternative 5

Alternative 5 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major

intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and a park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 14,200 feet (See street picture nos. 16, 17, and 28). Twenty one (21) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, and Prairie Avenue. The following utility and environmental concerns are expected along West 190th Street: sanitary sewer, storm drain, water, power, telephone trunk line, local utilities in sidewalk, substation, high traffic, residential apartments, businesses, a park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Crenshaw Boulevard** and continues in a southerly direction for 19,200 feet (See street picture nos. 124, 125, and 126). Thirty five (35) intersection crossings are encountered along Crenshaw Boulevard with the major intersection crossings being Torrance Avenue, Sepulveda Boulevard, and Carson Street. The following utility and environmental concerns are expected along Crenshaw Boulevard: drainage channel overcrossing, sanitary sewer, telephone, high traffic, refineries, industrial, Wilson Park, and residential.

From Crenshaw Boulevard, the pipe turns left onto **Lomita Boulevard** and continues in a southeasterly direction for 2,700 feet (See street picture nos. 55 and 56). Seven (7) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Pennsylvania Avenue. The following utility and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, residential, and businesses.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1.

4.3.2 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 2

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 of Tie-in No. 1 until the intersection of Lomita Boulevard and Narbonne Avenue.

From this intersection, the pipe continues along **Lomita Boulevard** in a southeasterly direction for an additional 2,600 feet. Twenty one (21) intersection crossings are encountered along Lomita Boulevard with the major intersection crossings being Anza Avenue, Hawthorne Boulevard, and Crenshaw Boulevard. The following utilities and environmental concerns are expected along Lomita Boulevard: sanitary sewer, storm drain, power poles, residential, hospitals, and industrial tank farms.

From Lomita Boulevard, the pipe turns left onto **Walnut Street** and continues in a northerly direction for 2,050 feet (See street picture no. 59). Five (5) intersection crossings are encountered along Walnut Street. The following utilities and environmental concerns are expected along Walnut Street: sanitary sewer, storm drain, MWD water line, and residential.

From Walnut Street, the pipe turns right onto **West 242nd Place** and continues in an easterly direction for 625 feet (See street picture no. 60). One (1) intersection crossing is encountered along West 242nd Place. The following utilities and environmental concerns are expected along West 242nd Place: sanitary sewer, storm drain, and residential.

From West 242nd Place, the pipe turns left onto **Huber Avenue** and continues in a northerly direction for 100 feet (See street picture no. 61). The following utilities and environmental concerns are expected along Huber Avenue: sanitary sewer, storm drain, and residential.

From Huber Avenue, the pipe turns right onto **West 242nd** Street and continues in an easterly direction for 700 feet (See street picture no. 62). The following utilities and environmental concerns are expected along West 242nd Place: sanitary sewer and residential. On West 242nd Street, the pipe ties in to the Palos Verdes Feeder at Station 1538+80.

Alternative 2

Alternative 2 beings at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 2 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

Alternative 3

Alternative 3 beings at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 3 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

Alternative 4

Alternative 4 beings at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 4 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue. From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

Alternative 5

Alternative 5 beings at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 5 of Tie-in Number 1 until the intersection of Lomita Boulevard and Narbonne Avenue.

From the intersection of Lomita Boulevard and Narbonne Avenue, the pipe continues in the same path as Alternative 1 of Tie-in No. 2.

4.3.3 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 3

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 17,500 feet (See street picture nos. 16, 17, and 28). Twenty four (24) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utilities and environmental concerns are expected along West 190th Street: water, sanitary sewer, storm drain, power, telephone trunk line, local utilities

in sidewalk, substation, apartments, MWD feeder, high traffic, residential, businesses, Columbia Park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Van Ness Avenue** and continues in a southerly direction for 4,200 feet (See street picture nos. 99 and 100). Two (2) intersection crossings are encountered along Van Ness Avenue. The following utilities and environmental concerns are expected along Van Ness Avenue: water, local gas, sanitary sewer, power poles, telephone, MWD Feeder, commercial, and industrial.

From Van Ness Avenue, the pipe turns left onto **Del Amo Boulevard** and continues in an easterly direction for 2,600 feet (See street picture no. 98). One (1) intersection crossing is encountered along Del Amo Boulevard. The following utility and environmental concerns are expected along Del Amo Boulevard: MWD Feeder, sanitary sewer, light traffic, and commercial.

From Del Amo Boulevard, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 6,900 feet (See street picture no. 96). Sixteen (16) intersection crossings are encountered along South Western Avenue with the major intersection crossings being Torrance Boulevard and West Carson Street. The following utility and environmental concerns are expected along South Western Avenue: sanitary sewer, MWD Feeder, power poles, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Second Lower Feeder at Station 1862+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1, until the intersection of West 190th Street and Crenshaw Boulevard. In alternative 2, the pipe travels a distance of 14,200 feet along **West 190th Street** (See street picture nos. 16, 17, and 28). Twenty one (21) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utilities and environmental concerns are expected along West 190th Street: water, sanitary sewer, storm drain, power, telephone trunk line, local utilities in sidewalk, substation, apartments, high traffic, residential, businesses, Columbia Park, and industrial tank farms.

From West 190th Street, the pipe turns right onto **Crenshaw Boulevard** and continues in a southerly direction for 9,900 feet (See street picture no. 119). Eleven (11) intersection crossings are encountered along Crenshaw Boulevard with the major intersection crossings being Torrance Boulevard and Del Amo Boulevard. The following utilities and environmental concerns are expected along Crenshaw Boulevard: drainage channel overcrossing, sanitary sewer, storm drain, water, telephone, high traffic, Fire Department, industrial, commercial, and residential.

From Crenshaw Boulevard, the pipe turns left onto **West Carson Street** and continues in an easterly direction for 6,000 feet (See street picture no. 118). Sixteen (16) intersection crossings are encountered along West Carson Street with the major intersection crossings being Cabrillo Avenue. The following utilities and environmental concerns are expected along West Carson Street: railroad crossing, Southern California Edison, sanitary sewer, storm drain, high traffic, Nativity Catholic School, and Torrance High School.

From West Carson Street, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 1,300 feet (See street picture no. 96). Two (2) intersection crossings are encountered along South Western Avenue. The following utilities and environmental concerns are expected along South Western Avenue: MWD Feeder, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Second Lower Feeder at Station 1862+00.

4.3.4 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 3A

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 17,500 feet (See street picture nos. 16, 17, and 28). Twenty four (24) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 190th Street: water, sanitary sewer, storm drain, power, telephone trunk line, local utilities in sidewalk, substation, apartments, high traffic, residential, businesses, Columbia Park, and industrial tank farms. On West 190th Street, the pipe ties in to the Sepulveda Feeder at Station 2137+00.

4.3.4 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 4

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

From Beryl Street, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 1,500 feet (See street picture no. 16). One (1) intersection crossing is encountered along West 190th Street. The following environmental concerns are expected along West 190th Street: residential and businesses.

From West 190th Street, the pipe turns left onto **Meyer Lane** and continues in a northerly direction for 1,350 feet (See street picture no. 15). The following utility and environmental concerns are expected along Meyer Lane: water, sanitary sewer, residential, and businesses.

From Meyer Lane, the pipe turns right onto **Ralston Lane** and continues in an easterly direction for 2,050 feet (See street picture no. 13). Three (3) intersection crossings are encountered along Ralston Lane. The following environmental concern is expected along Ralston Lane: residential.

From Ralston Lane, the pipe turns left onto **Felton Avenue** and continues in a northerly direction for 1,300 feet (See street picture no. 12). Four (4) intersection crossings are encountered along Felton Avenue. The following utility and environmental concerns are expected along Felton Avenue: LACFC drainage, LACSD, sanitary sewer, residential, Adams Middle School, and Washington Elementary School.

From Felton Avenue, the pipe turns onto **182nd Street** and continues in an easterly direction for 8,500 feet (See street picture nos. 6 and 11). Thirteen (13) intersection crossings are encountered along 182nd Street with the major intersection crossings being Hawthorne Boulevard and Prairie Avenue. The following utility and environmental concerns are expected along 182nd Street: LACFC drainage, LACDPW sanitary sewer, railroad crossing, power poles, railroad crossing, Pacific Crest Cemetery, El Nido Park, and North High School.

From 182nd Street, the pipe turns left onto **Yukon Avenue** and continues in a northerly direction for 4,100 feet (See street picture nos. 7, 8, 9, and 10). Four (4) intersection crossings are encountered along Yukon Avenue with the major intersection crossing being Artesia Boulevard. The following environmental concerns are expected along Yukon Avenue: Yukon Elementary School, residential, and businesses.

From Yukon Avenue, the pipe turns right onto **170th Street** and continues in an easterly direction for 5,300 feet (See street picture no. 3). Fifteen (15) intersection crossings are encountered along 170th Street with the major intersection crossing being Crenshaw Boulevard. The following utilities and environmental concerns are expected along 170th Street: sanitary sewer, storm drain, water, telephone, electrical, Carr Elementary School, and residential.

From 170th Street, the pipe turns left on **Van Ness Avenue** and continues in a northerly direction for 4,000 feet (See street picture no. 3). Nine (9) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Redondo Beach Boulevard and Manhattan Beach Boulevard. The following utilities and environmental concerns are expected along Van Ness Avenue: sanitary sewer, storm drain, MWD Feeder, drainage channel overcrossing, Lincoln Elementary School, and residential. On Van Ness Avenue, the pipe ties in to the West Basin Feeder at Station 170+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 until the intersection of Felton Avenue and 182nd Street. From this intersection, the pipe turns right onto **182nd Street** and continues in an easterly direction for 3,200 feet (See street picture nos. 6 and 11). Five (5) intersection crossings are encountered along 182nd Street. The following utility and environmental concerns are expected along 182nd Street: railroad crossing, LACFC drainage, LACDPW sanitary sewer, power poles, Pacific Crest Cemetery, El Nido Park, residential, and businesses.

From 182nd Street, the pipe turns left onto **Hawthorne Boulevard** and continues in a northerly direction for 3,200 feet (See street picture no. 127). Six (6) intersection crossings are encountered along Hawthorne Boulevard with the major intersection crossings being Artesia Boulevard. The following utility and environmental concerns are expected along Hawthorne Boulevard: various utilities, high traffic, commercial, and residential.

From Hawthorne Boulevard, the pipe turns right onto **Redondo Beach Boulevard** and continues in a northeasterly direction for 11,300 feet (See street picture no. 128). Eleven (11) intersection crossings are encountered along Redondo Beach Boulevard with the major intersection crossings being Prairie Avenue and Crenshaw Boulevard. The following utility and environmental concerns are expected along Redondo Beach Boulevard: drainage channel

overcrossing, 405 freeway, power poles, high traffic, Alondra Park, Murdock Stadium, medical centers, residential, and businesses.

From Redondo Beach Boulevard, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 600 feet (See street picture no. 1). The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder, high traffic, school zone, and residential. On Van Ness Avenue, the pipe ties in to the West Basin Feeder at Station 170+00.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 until the intersection of Beryl Street and West 190th Street. From this intersection, the pipe turns right onto **West 190th Street** and continues in an easterly direction for 17,500 feet (See street picture nos. 16, 17, and 28). Twenty four (24) intersection crossings are encountered along West 190th Street with the major intersection crossings being Anza Avenue, Inglewood Avenue, Hawthorne Boulevard, Prairie Avenue, and Crenshaw Boulevard. The following utility and environmental concerns are expected along West 190th Street: water, sanitary sewer, high traffic, residential, businesses, and commercial and industrial tank farms.

From West 190th Street, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 10,500 feet (See street picture no. 1). Twenty four (24) intersection crossings are encountered along Redondo Van Ness Avenue with the major intersection crossings being Artesia Boulevard and Redondo Beach Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder, drainage channel overcrossing, high traffic, and residential. On Van Ness Avenue, the pipe ties in to the West Basin Feeder at Station 170+00.

4.3.5 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 5

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads north along **North Francisca Avenue** for a distance of 800 feet. The following environmental concern is expected along North Francisca Avenue: industrial.

North Francisca Avenue becomes **Valley Drive** and the pipe continues an additional 12,600 feet (See street picture nos. 105 and 106). Forty two (42) intersection crossings are encountered along Valley Drive with the major intersection crossing being Gould Avenue. The

following utility and environmental concerns are expected along Valley Drive: sanitary sewer, storm drain, water, medium traffic, residential, Hermosa Beach Education Foundation, Robinson Elementary School, Clark Field, and Valle Park.

From Valley Drive, the pipe turns right onto **11th Street** and continues in an easterly direction for 7,500 feet. Twelve (12) intersection crossings are encountered along 11th Street with the major intersection crossing being Pacific Coast Highway. The following environmental concern is expected along 11th Street: residential.

From 11th Street, the pipe turns left onto **North Redondo Avenue** and continues in a northerly direction for 325 feet (See street picture nos. 39 and 40). The following environmental concern is expected along North Redondo Avenue: residential. On North Redondo Avenue, the pipe ties in to the West Basin Feeder at Station 368+61.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and heads north along **North Francisca Avenue** for a distance of 800 feet. The following environmental concern is expected along North Francisca Avenue: industrial.

From North Francisca Avenue, the pipe turns right onto **Herondo Street** and continues in an easterly direction for 2,800 feet (See street picture nos. 17 and 18). Four (4) intersection crossings are encountered along Herondo Street with the major intersection crossing being Pacific Coast Highway. The following environmental concern is expected along Herondo Street: residential.

From Herondo Street, the pipe turns left onto **North Prospect Avenue** and continues in a northerly direction for 3,800 feet (See street picture no. 51). Twenty five (25) intersection crossings are encountered along North Prospect Avenue. The following utility and environmental concerns are expected along North Prospect Avenue: sanitary sewer, power, substation on sidewalk, power poles, new pavement, and residential.

From North Prospect Avenue, the pipe turns right onto **Aviation Boulevard** and continues in a northerly direction for 9,000 feet (See street picture no. 103). Twenty eight (28) intersection crossings are encountered along Aviation Boulevard with the major intersection crossings being Grant Avenue and Artesia Boulevard. The following utility and environmental concerns are expected along Aviation Boulevard: West Basin reclaimed water, storm drain, power, telephone poles, high traffic, businesses, and residential.

From Aviation Boulevard, the pipe turns left onto **Manhattan Beach Boulevard** and continues in a westerly direction for 1,350 feet (See street picture no. 104). One (1) intersection crossing is encountered along Manhattan Beach Boulevard. The following utility and

environmental concerns are expected along Manhattan Bach Boulevard: sanitary sewer, storm drain, power, MWD feeder, high traffic, businesses, and residential. On Manhattan Beach Boulevard, the pipe ties in to the West Basin Feeder at Station 368+61.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

Beryl Street becomes **Blossom Lane** and the pipe continues in a northerly direction for an additional 10,600 feet (See street picture nos. 34, 35, and 36). Thirty one (31) intersection crossings are encountered along Blossom Lane with the major intersection crossing being Artesia Boulevard. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, water, and residential.

From Blossom Lane, the pipe turns left onto **Manhattan Beach Boulevard** and continues in a westerly direction for 2,500 feet (See street picture no. 104). Three (3) intersection crossings are encountered along Manhattan Beach Boulevard with the major intersection crossing being Aviation Boulevard. The following utility and environmental concerns are expected along Manhattan Beach Boulevard: sanitary sewer, power, MWD feeder, businesses, and Redondo Beach Performing Arts Center. On Manhattan Beach Boulevard, the pipe ties in to the West Basin Feeder at Station 368+61.

4.3.6 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 6

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 of Tie-in 4 until the intersection of 170th Street and Van Ness Avenue.

From this intersection, the pipe turns left on **Van Ness Avenue** and continues in a northerly direction for 14,500 feet (See street picture no. 3). Twenty (20) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Redondo Beach Boulevard, Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder, drainage channel overcrossing, residential, and Lincoln Elementary School. On Van Ness Avenue, the pipe ties in to the West Coast Feeder at Station 585+80.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 2 of Tie-in No. 4 until the intersection of Redondo Beach Boulevard and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 11,200 feet. Ten (10) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder and commercial. On Van Ness Avenue, the pipe ties in to the West Coast Feeder at Station 585+80.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 3 of Tie-in No. 4 until the intersection of West 190th Street and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 21,100 feet (See street picture no. 1). Thirty four (34) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Artesia Boulevard, Redondo Beach Boulevard, Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder, drainage channel overcrossing, residential, and commercial. On Van Ness Avenue, the pipe ties in to the West Coast Feeder at Station 585+80.

4.3.7 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 7

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and heads north along **North Francisca Avenue** for a distance of 800 feet.

From North Francisca Avenue, the pipe turns right onto **Herondo Street** and continues in an easterly direction for 2,300 feet (See street picture nos. 17 and 18). Three (3) intersection crossings are encountered along Herondo Street with the major intersection crossings being Valley Drive and Pacific Coast Highway. The following environmental concern is expected along Herondo Street: residential.

Herondo Street becomes **Anita Street** and the pipe continues in a northeasterly direction for an additional 3,300 feet. Four (4) intersection crossings are encountered along Anita Street with the major intersection crossings being Prospect Avenue and Flagler Lane. The following environmental concern is expected along Anita Street: residential.

Anita Street becomes **190th Street** and the pipe continues in an easterly direction for 1,050 feet (See street picture no. 16). Two (2) intersection crossings are encountered along 190th Street. The following environmental concerns are expected along 190th Street: residential and Dominquez Park.

From 190th Street, the pipe turns left onto **Blossom Lane** and continues in a northerly direction for 10,250 feet (See street picture nos. 34, 35, and 36). Thirty (30) intersection crossings are encountered along Blossom Lane with the major intersection crossings being Grant Avenue, Artesia Boulevard, and Ripley Avenue. The following utility and environmental concerns are expected along Blossom Lane: water, sanitary sewer, and residential.

From Blossom Lane, the pipe turns left onto **Warfield Avenue** and continues in a westerly direction for 2,500 feet (See street picture nos. 37 and 38). Three (3) intersection crossings are encountered along Warfield Avenue. The following utility and environmental concerns are expected along Warfield Avenue: water, MWD Feeder, storm drain, sanitary sewer, and residential.

From Warfield Avenue, the pipe turns right onto **North Redondo Avenue** and continues in a northerly direction for 5,600 feet (See street picture nos. 39 and 40). Nine (9) intersection crossings are encountered along North Redondo Avenue with the major intersection crossings being Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected along North Redondo Avenue: storm drain, MWD Feeder, sanitary sewer, Manhattan Beach Middle School, and Marine Park.

North Redondo Avenue becomes **Douglas Street** and the pipe continues in a northerly direction for an additional 5,400 feet (See street picture no. 72). Seven (7) intersection crossings are encountered along Douglas Street. The following utility and environmental concerns are expected along Douglas Street: railroad crossing, power, Pacific Bell, medium traffic, and commercial.

From Douglas Street, the pipe turns right onto **El Segundo Boulevard** and continues in an easterly direction for 1,550 feet (See street picture no. 71). One (1) intersection crossing is

encountered along El Segundo Boulevard with the major intersection crossing being Aviation Boulevard. The following utility and environmental concerns are expected along El Segundo Boulevard: power, high traffic, and commercial. On El Segundo Boulevard, the pipe ties in to the West Coast Feeder at Station 768+69.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and heads north along **North Francisca Avenue** for a distance of 800 feet. The following environmental concern is expected along North Francisca Avenue: industrial.

North Francisca Avenue becomes **Valley Drive** and the pipe continues an additional 17,200 feet (See street picture nos. 105 and 106). Fifty (50) intersection crossings are encountered along Valley Drive with the major intersection crossings being Gould Avenue and Manhattan Beach Boulevard. The following utility and environmental concerns are expected along Valley Drive: sanitary sewer, storm drain, water, medium traffic, residential, Hermosa Beach Education Foundation, Robinson Elementary School, Clark Field, Valle Park, and Live Oak Park.

From Valley Drive, the pipe turns right onto **Marine Avenue** and continues in an easterly direction for 7,500 feet (See street picture no. 81). Sixteen (16) intersection crossings are encountered along Marine Avenue with the major intersection crossing being Sepulveda Boulevard. The following utility and environmental concerns are expected along Marine Avenue: sanitary sewer, water, power, residential, and Marine Avenue Park.

From Marine Avenue, the pipe turns left onto **Aviation Boulevard** and continues in a northerly direction for 8,000 feet (See street picture no. 103). Eleven (11) intersection crossings are encountered along Aviation Boulevard with the major intersection crossing being Rosecrans Avenue. The following utility and environmental concerns are expected along Aviation Boulevard: West Basin reclaimed water, storm drain, power, telephone poles, residential, and commercial. On Aviation Boulevard, the pipe ties into the West Coast Feeder at Station 768+69.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and heads north along **North Francisca Avenue** for a distance of 800 feet. The following environmental concern is expected along North Francisca Avenue: industrial.

From North Francisca Avenue, the pipe turns right onto **Herondo Street** and continues in an easterly direction for 2,800 feet (See street picture nos. 17 and 18). Four (4) intersection crossings are encountered along Herondo Street with the major intersection crossing being

Pacific Coast Highway. The following environmental concern is expected along Herondo Street: residential.

From Herondo Street, the pipe turns left onto **North Prospect Avenue** and continues in a northerly direction for 3,800 feet (See street picture no. 51). Twenty five (25) intersection crossings are encountered along North Prospect Avenue. The following utility and environmental concerns are expected along North Prospect Avenue: sanitary sewer, power, substation on sidewalk, power poles, new pavement, and residential.

From North Prospect Avenue, the pipe turns right onto **Aviation Boulevard** and continues in a northerly direction for 19,600 feet (See street picture no. 103). Forty two (42) intersection crossings are encountered along Aviation Boulevard with the major intersection crossings being Grant Avenue, Artesia Boulevard, Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected on Aviation Boulevard: West Basin reclaimed water, storm drain, power, telephone poles, residential, commercial, and Aviation Park. On Aviation Boulevard, the pipe ties into the West Coast Feeder at Station 768+69.

Alternative 4

Alternative 4 begins at the potential desalination plant at Redondo Beach and heads southeast along **Francisca Avenue** for a distance of 1,200 feet (See street picture nos. 24 and 25). One (1) intersection crossing is encountered along Francisca Avenue with the major intersection crossing being North Catalina Avenue. The following environmental concern is expected along Francisca Avenue: residential.

From Francisca Avenue, the pipe turns left onto **Beryl Street** and continues in a northeasterly direction for 6,150 feet (See street picture nos. 19 and 47). Twelve (12) intersection crossings are encountered along Beryl Street with the major intersection crossings being Pacific Coast Highway and North Prospect Avenue. The following environmental concerns are expected along Beryl Street: residential and Dominquez Park.

Beryl Street becomes **Blossom Lane** and the pipe continues in a northerly direction for an additional 10,250 feet (See street picture nos. 34, 35, and 36). Thirty (30) intersection crossings are encountered along Blossom Lane with the major intersection crossing being Artesia Boulevard. The following utility and environmental concerns are expected along Blossom Lane: sanitary sewer, water, and residential.

From Blossom Lane, the pipe turns left onto **Warfield Avenue** and continues in a westerly direction for 1,150 feet (See street picture nos. 37 and 38). One (1) intersection crossing is encountered along Warfield Avenue. The following utility and environmental concerns are expected along Warfield Avenue: sanitary sewer, storm drain, water, and residential.

From Warfield Avenue, the pipe turns right onto **Aviation Boulevard** and continues in a northerly direction for 10,900 feet (See street picture no. 103). Sixteen (16) intersection crossings are encountered along Aviation Boulevard with the major intersection crossings being Manhattan Beach Boulevard, Marine Avenue, and Rosecrans Avenue. The following utility and environmental concerns are expected along Aviation Boulevard: West Basin reclaimed water, storm drain, power, telephone poles, residential, commercial, and Aviation Park. On Aviation Boulevard, the pipe ties into the West Coast Feeder at Station 768+69.

4.3.8 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 8

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 of Tie-in No. 4 until the intersection of 170th Street and Van Ness Avenue.

From this intersection, , the pipe turns left on **Van Ness Avenue** and continues in a northerly direction for 4,650 feet (See street picture no. 3). Ten (10) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Redondo Beach Boulevard and Manhattan Beach Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: storm drain, sanitary sewer, MWD feeder, drainage channel overcrossing, residential, and Lincoln Elementary School. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 2025+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 2 of Tie-in No. 4 until the intersection of Redondo Beach Boulevard and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 1,200 feet (See street picture no. 1). Two (2) intersection crossings are encountered along Van Ness Avenue with the major intersection crossing being Manhattan Beach Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, high traffic, school zone, and residential. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 2025+00.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 3 of Tie-in No. 4 until the intersection of West 190th Street and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 11,150 feet (**See street picture no. 1**). Twenty six (26) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Artesia Boulevard and Redondo Beach Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder, drainage channel overcrossing, high traffic, and residential. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 2025+00.

4.3.9 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 9

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 of Tie-in 4 until the intersection of 170th Street and Van Ness Avenue.

From this intersection, the pipe turns left on **Van Ness Avenue** and continues in a northerly direction for 15,600 feet (See street picture no. 3). Twenty one (21) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Redondo Beach Boulevard, Manhattan Beach Boulevard, Marine Avenue, Rosecrans Avenue and El Segundo Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: MWD Feeder, drainage channel overcrossing, residential, and Lincoln Elementary School. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 1918+50.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 2 of Tie-in No. 4 until the intersection of Redondo Beach Boulevard and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 12,300 feet. Eleven (11) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Manhattan Beach Boulevard, Marine Avenue, Rosecrans Avenue, and El Segundo Boulevard. The following utility and environmental

concerns are expected along Van Ness Avenue: MWD Feeder, and commercial. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 1918+50.

Alternative 3

Alternative 3 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 3 of Tie-in No. 4 until the intersection of West 190th Street and Van Ness Avenue.

From this intersection, the pipe turns left onto **Van Ness Avenue** and continues in a northerly direction for 22,200 feet (See street picture no. 1). Thirty four (34) intersection crossings are encountered along Van Ness Avenue with the major intersection crossings being Artesia Boulevard, Redondo Beach Boulevard, Manhattan Beach Boulevard, Marine Avenue, Rosecrans Avenue, and El Segundo Boulevard. The following utility and environmental concerns are expected along Van Ness Avenue: MWD feeder and commercial. On Van Ness Avenue, the pipe ties in to the Sepulveda Feeder at Station 1918+50.

4.3.10 DESALINATION PLANT AT REDONDO BEACH TO TIE-IN NO. 10

Alternative 1

Alternative 1 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 1 of Tie-in No. 3 until the intersection of Del Amo Boulevard and South Western Avenue.

From this intersection, the pipe turns right onto **South Western Avenue** and continues in a southerly direction for 5,600 feet (See street picture no. 96). Thirteen (13) intersection crossings are encountered along South Western Avenue with the major intersection crossing being Torrance Boulevard. The following utility and environmental concerns are expected along South Western Avenue: sanitary sewer, power poles, high traffic, commercial, and residential. On South Western Avenue, the pipe ties in to the Sepulveda Feeder at Station 2260+00.

Alternative 2

Alternative 2 begins at the potential desalination plant at Redondo Beach and continues in the same path as Alternative 2 of Tie-in No. 3 until the intersection of West Carson Street and South Western Avenue. At this intersection, the pipe ties in to the Sepulveda Feeder at Station 2260+00.

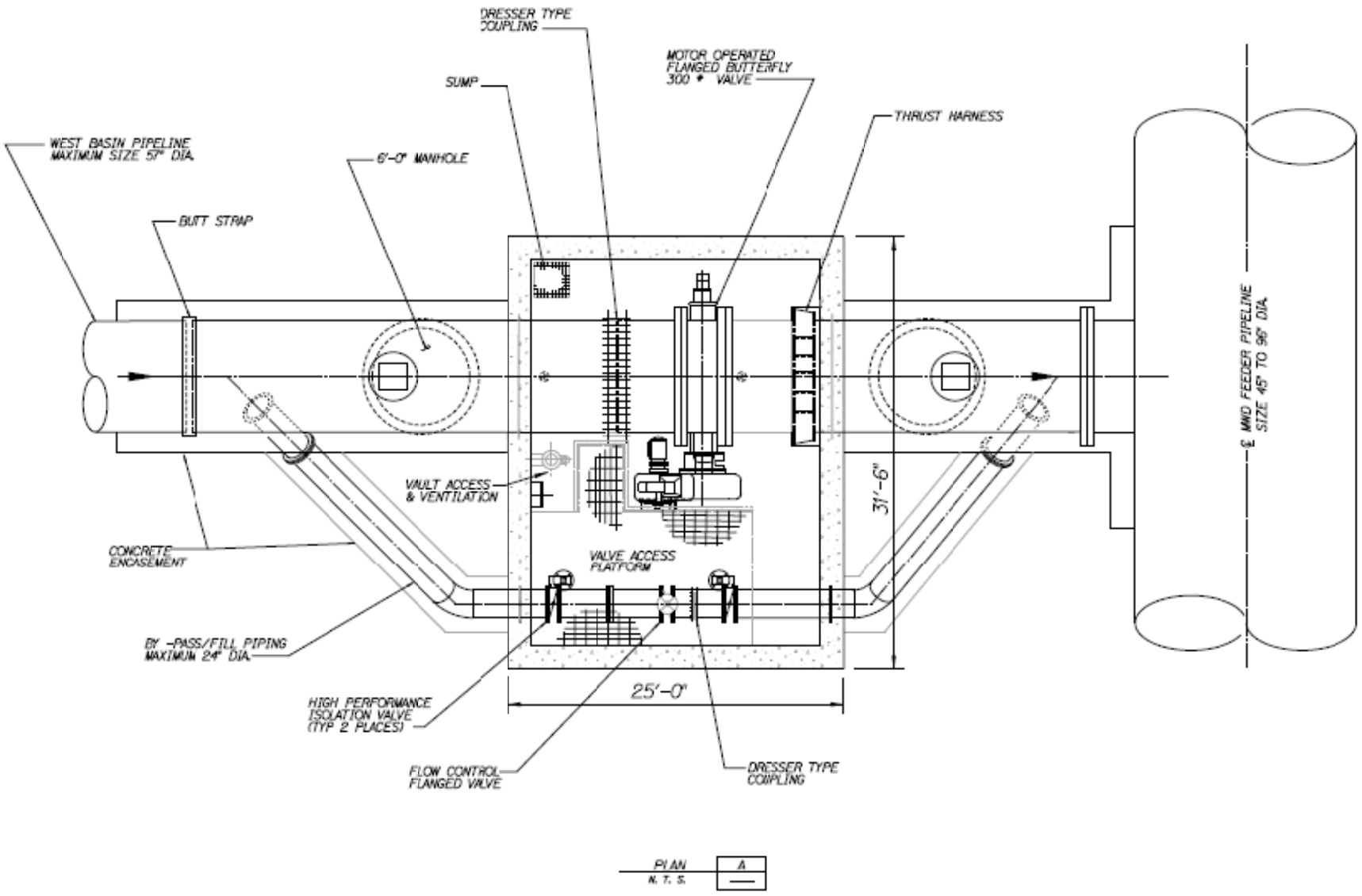
SECTION 5

Tie-in Connections

5.1 TIE-INS / CONNECTIONS / APPURTENANCES

The required tie-in connections and appurtenances of the desalination pipeline to Metropolitan Feeders are shown on the following schematic drawing of a typical tie-in facility. As shown on the schematic, the tie-in shall consist of an underground valve vault, a butterfly valve, including a dresser type coupling and thrust harness, a bypass line encased in concrete, two high performance isolation valves, and a flow control value. The underground valve vault should also include a sump, ventilation system, and access platforms.

The current study does not incorporate potential needs for out-of-pipe mixing of the desalinated water with other sources of treated potable water. Potential land acquisition needs are also not considered in this phase of the study. Further study may be initialized upon completion of the proposed Metropolitan Water Quality Study and upon further development of the West Basin Ocean Water Desalination Program Master Plan.



TYPICAL PIPELINE TIE-IN
UNDERGROUND CONCRETE VAULT

SECTION 6

Preliminary Pump Station Alternatives

6.1 Scope of Work

The scope of the preliminary pump station study includes:

- Hydraulic evaluation: provide head and flow requirements for pump configuration (reference Section 2)
- Pump station sizing: evaluate required pumping capacity, pump type, number of units
- Pump station layouts: provide equipment layout alternatives

Upon further development of the West Basin Ocean Water Desalination Program Master Plan, and selection of the best intertie locations, further study for pump station requirements may be initialized.

6.2 Product Water Pump Station Alternatives

The proposed product water pump station is considered a lifetime facility (50-plus year life), and is designed for reliability and ease of operation and maintenance. For the purposes of this study, the pump station also includes the product water storage tanks and the electrical equipment (transformers, switchgear, etc) required to operate the pumping system. Figures 6-1 and 6-2 show the potential location and space available for a pump station facility at each of the proposed desalination plant locations (AES Power Plant in Redondo Beach and NRG's Generating Station in El Segundo).

A single–lift product water pump station located at the desalination facility was selected to minimize capital and operating costs, since less equipment is required for a single pump station and the electrical cost at the desalination facility will likely be less expensive since it is supplied directly from the adjacent power plant. A two-lift pump station design, comprised of a low-head pump station located at the desalination plant and a high-head pump station located near the feeder injection point, would be more expensive to build and operate, but may be developed in the future if there are EIR or site constraint issues with locating the product water storage tanks at the desalination facility. The Palos Verdes Reservoir option does require an additional pump station at the reservoir for the 30 MGD design.

For the single-lift pump station a total of 4 alternatives were developed based on the two flow conditions and two head conditions as follows:

a. Pump Station Flow Capacity—10 MGD and 30 MGD

b. Pump Station Head Capacity—After reviewing the hydraulic data from the alignment alternatives (see Hydraulics Summary Tables 2.1 and 2.2), it was decided to normalize the pump station head capacity for two scenarios:

i. Lower Head Pump Station: 500 ft pump total discharge head (TDH) for pumping into the lower head pipelines (Palos Verdes Feeder and West Basin Feeder) and PV Reservoir.

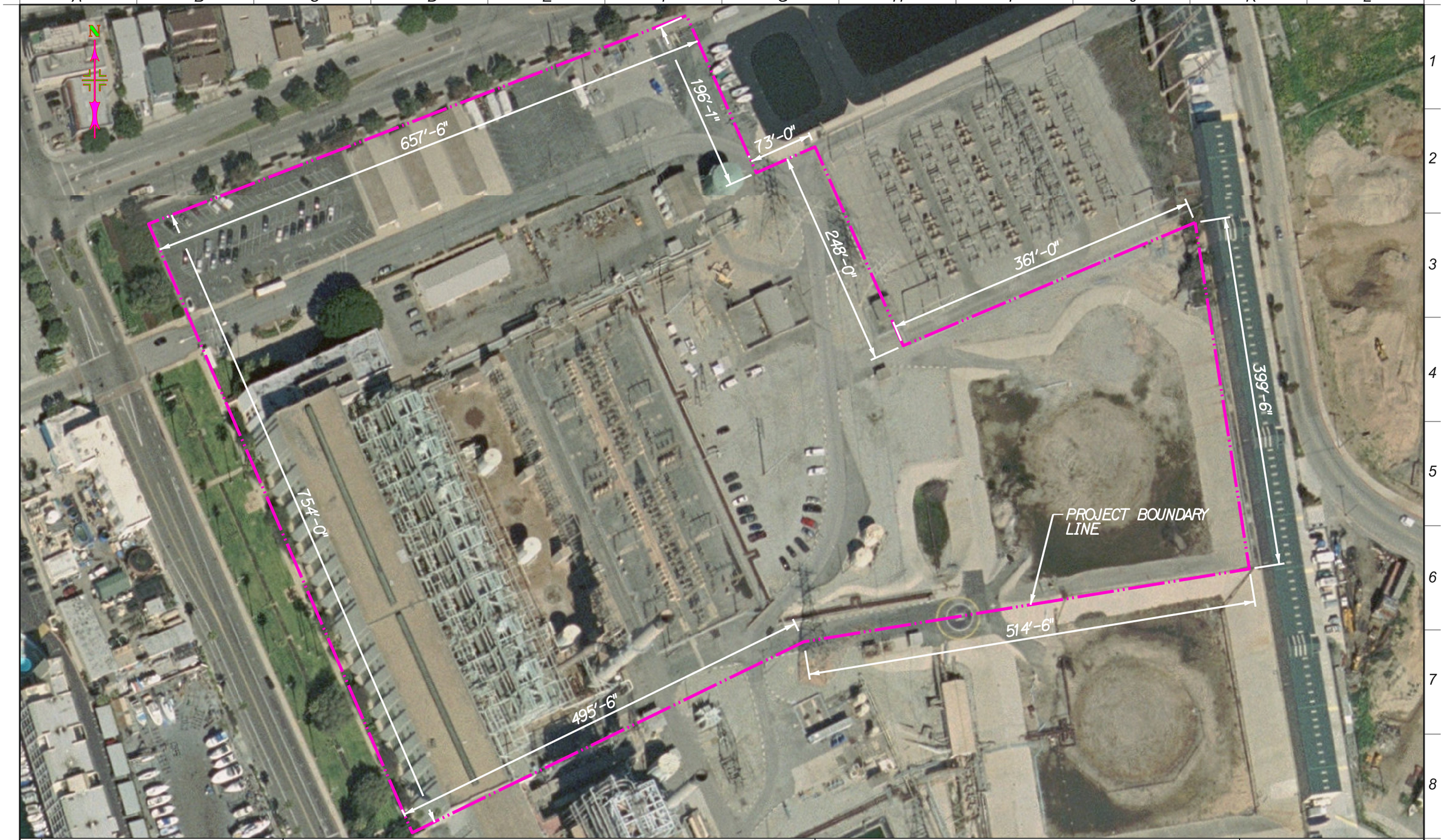
ii. Higher Head Pump Station: 750 ft TDH for pumping into the higher head pipelines (2nd Lower Feeder, Sepulveda Feeder, and West Coast Feeder).

These scenarios do not consider potential blending requirements, and may be further refined as the proposed Metropolitan Water Quality Study develops.

For the option of pumping the product water from the desalination plant directly into the Palos Verdes Reservoir, two alternatives were developed for the two flow conditions

- The 10 MGD case delivers flow directly to service connections WB-32 and LA-21A & B out of the reservoir, and requires a 10 MGD pump station with 450 ft TDH at the desalination facility.
- The 30 MGD case requires a 30 MGD pump station with 450 ft TDH at the desalination facility and a 20 MGD pump station with a 120 ft TDH at the reservoir to deliver a net flow of 20 MGD (30-10) in reverse flow through the Palos Verdes Feeder.

To meet the range of distribution system heads, a pumping arrangement utilizing 4 duty pumps in parallel plus one spare pump was selected. Three pumps operating near full speed would provide full flow at maximum head, and four pumps operating at reduced speed would supply full flow at the minimum head condition. Horizontal split case type pumps were selected for their outstanding reliability and low maintenance requirements. Variable frequency drives (VFD's) and flow metering will be required for each pump. Tables 6.1 and 6.2 summarize the configuration of the proposed alternatives.



SCALE BARS

1" = 50' 0 50 100 150 FEET

WEST BASIN DESALINATION PROJECT

REDONDO BEACH DESALINATION PLANT

FIGURE 6-1

PLOT TIME: 12-AUG-2011 06:13 | USERID: u06350 | FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-1.dgn

SCALE BARS

1" = 60' 0 60 120 180 FEET

WEST BASIN DESALINATION PROJECT

EL SEGUNDO DESALINATION PLANT

FIGURE 6-2

PLOT TIME: 12-AUG-2011 06:14 USERID: u06350 FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-2.dgn

Table 6-1

Pump Station for West Basin Desalination Program
Single Lift Pump Station Option

Higher Head Option										
Area	Flow		HP at Design Point			kw	No. Pumps (incl. 1 spare)	Pump Design Point		
	MGD	gpm	whp	bhp	ehp			Flow	TDH	Hp
DESALINATION PLANT PUMP STATION	10	6944	1315	1644	1768	1318	5	2315	750	589
	30	20832	3945	4932	5303	3954	5	6944	750	1768
Lower Head Option										
Area	Flow		HP at Design Point			kw	No. Pumps (incl. 1 spare)	Pump Design Point		
	MGD	gpm	whp	bhp	ehp			Flow	TDH	Hp
DESALINATION PLANT PUMP STATION	10	6944	877	1096	1178	879	5	2315	500	393
	30	20832	2630	3288	3535	2636	5	6944	500	1178

Table 6-2

Pump Stations for West Basin Desalination Program
Palos Verdes Reservoir Option

Pump Station 1 : Pumping from Desalination Plant to PV Reservoir

Area	Options	Pumped Flow		HP at Design Point			kw	No. Pumps (incl. 1 spare)	Pump Design Point		
		MGD	gpm	whp	bhp	ehp			Flow	TDH	Hp
DESALINATION PLANT PUMP STATION	Option 1	10	6944	789	986	1061	791	5	2315	450	354
	Option 2	30	20832	2367	2959	3182	2373	5	6944	450	1061

Pump Station 2 : Pumping from PV Reservoir into PV Feeder

Area	Options	Pumped Flow		HP at Design Point			kw	No. Pumps (incl. 1 spare)	Pump Design Point		
		MGD	gpm	whp	bhp	ehp			Flow	TDH	Hp
PV RESERVOIR PUMP STATION	Option 1	0	0	10 mgd gravity flow to local service connections, No Pumping Required							
	Option 2	20	13888	421	526	566	422	5	4629	120	189

Assumptions & Criteria

1. Horizontal split case pumps, 80% pump efficiency, 93% motor/VFD efficiency
2. Clearwells are above-grade storage tanks
3. Flows and TDH criteria normalized from Hydraulics Summary Tables 2-1 and 2-2
4. Pump size based on 3 pumps operating full speed for high system head injection and 4 pumps operating at reduced speed for low system head injection, with 1 standby pump
5. Pumps equipped with VFD's to accommodate lower system grades
6. Minimum water height in tank is 15-ft above pump centerline, min NPSHA ~48-ft

6.3 Pump Station Description

Layouts were created for the 10 MGD pump station to show the footprints required. Descriptions of the main components are summarized below.

c. Clearwell Storage Tanks: Two above grade cylindrical tanks, with a working volume of 5 million gallons each, are provided for storage of the product water prior to delivery into the distribution system. For this preliminary assessment, the tanks were sized to provide one day of storage for the 10 MGD project. The tanks are 150-ft in diameter and 60-ft tall. The minimum water level in the tanks is set to provide sufficient net positive suction head for the pumping system. Clearwell storage requirements will need to be further evaluated as part of the West Basin Ocean Water Desalination Master Plan.

d. Pump House: The pump house is provided to protect the pumps and associated equipment (30-ft by 75-ft). The pump house will consist of the following:

   i. Five Horizontal split-case pumps and motors
   ii. Discharge valves
   iii. Check valves
   iv. Magnetic flow meters for each pump
   v. Local pump control panels
   vi. Piping
   vii. Bridge crane for maintenance
   viii. Utilities: cooling water pumps, HVAC, fire suppression, etc.

   Figures 6-3 through 6-4 show the equipment layout for the 10 MGD pump station facilities on the two proposed desalination sites.

e. Surge Suppression System: Surge tanks will be provided adjacent to the pump house for both the suction and discharge side of the pumps. The surge tanks will protect the piping and equipment from damaging pressure fluctuations due to power failure or equipment malfunction. See Figures 6-5 and 6-6 for location of the surge tanks.

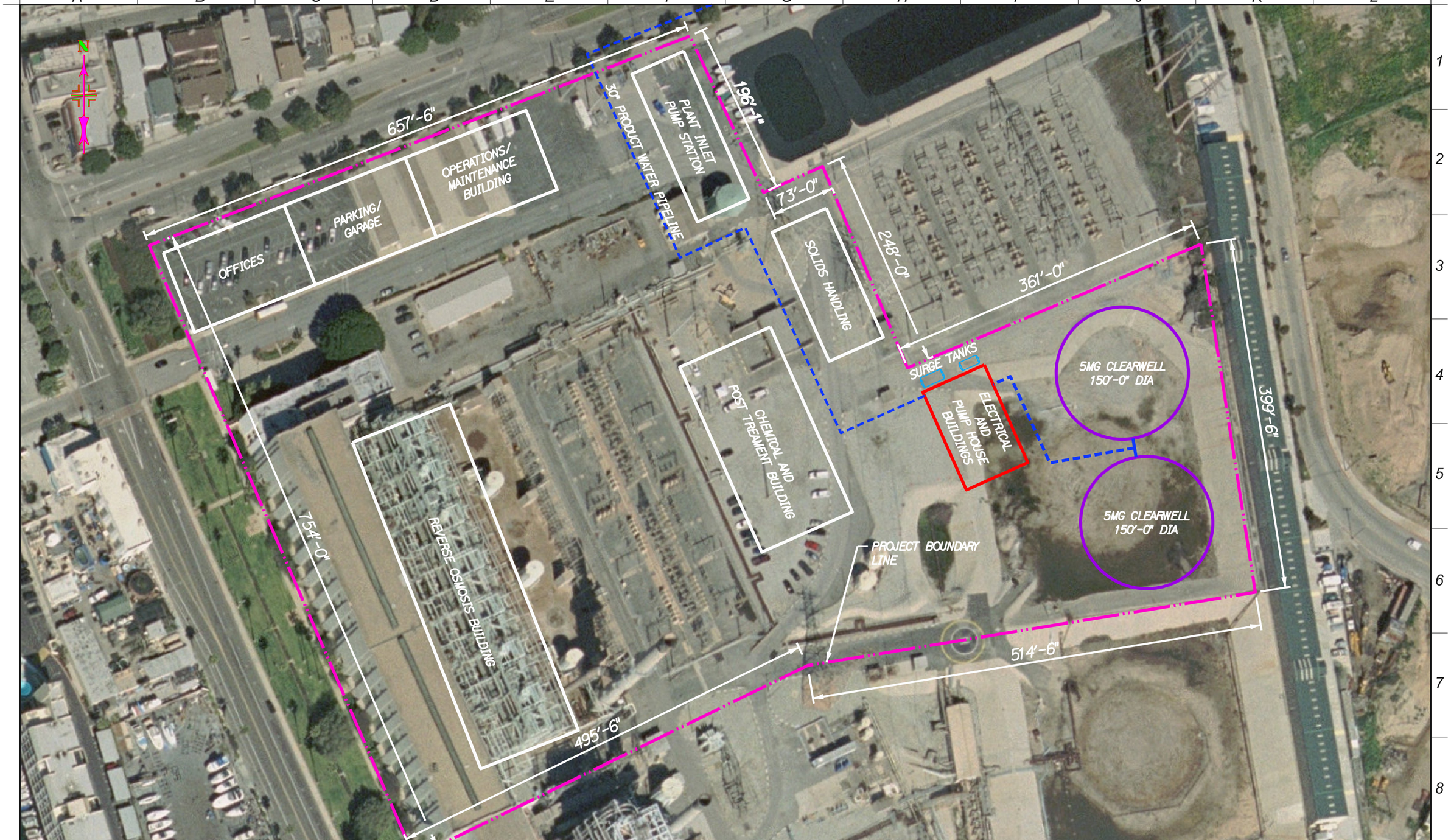
f. Electrical Power System: The electrical power system for the potable water pump station will consist of a double-ended (dual-feed) metal-clad switchgear connected to variable speed drives for pump motor control. It is assumed that the desalination plant electrical substation will have two main feeders from the serving utility and arranged to provide the pump station with two power feeders. It is also assumed that the substation will provide backup electrical power to operate the pump station

following the loss of desalination plant normal power until Metropolitan's water treatment plant(s) output can be ramped up. See Figures 6-5 and 6-6 for the layout of the electrical equipment.

g. All other electrical equipment will be located indoors. The electrical power system consists of the following:
    i. Indoor Metal-Clad Switchgear
    ii. Medium Voltage Variable Speed Drives
    iii. Auxiliary Electrical Room with Unit Substation and Motor Control Center
    iv. Control Room
    v. Battery Room
    vi. Utilities: HVAC, fire suppression, etc

Figure 6-7 shows the process flow diagram and Figure 6-8 shows a general layout of the pump house.

This assessment did not include a layout for a 30 MGD pump station. Further study may be initialized upon further development of the West Basin Ocean Water Desalination Program Master Plan.



SCALE BARS

1" = 50' 0 50 100 150 FEET

WEST BASIN DESALINATION PROJECT
REDONDO BEACH DESALINATION PLANT
10MGD PLANT OPTION
PLAN

FIGURE 6-3

PLOT TIME: 12-AUG-2011 06:14 | USERID: u06350 | FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-3.dgn

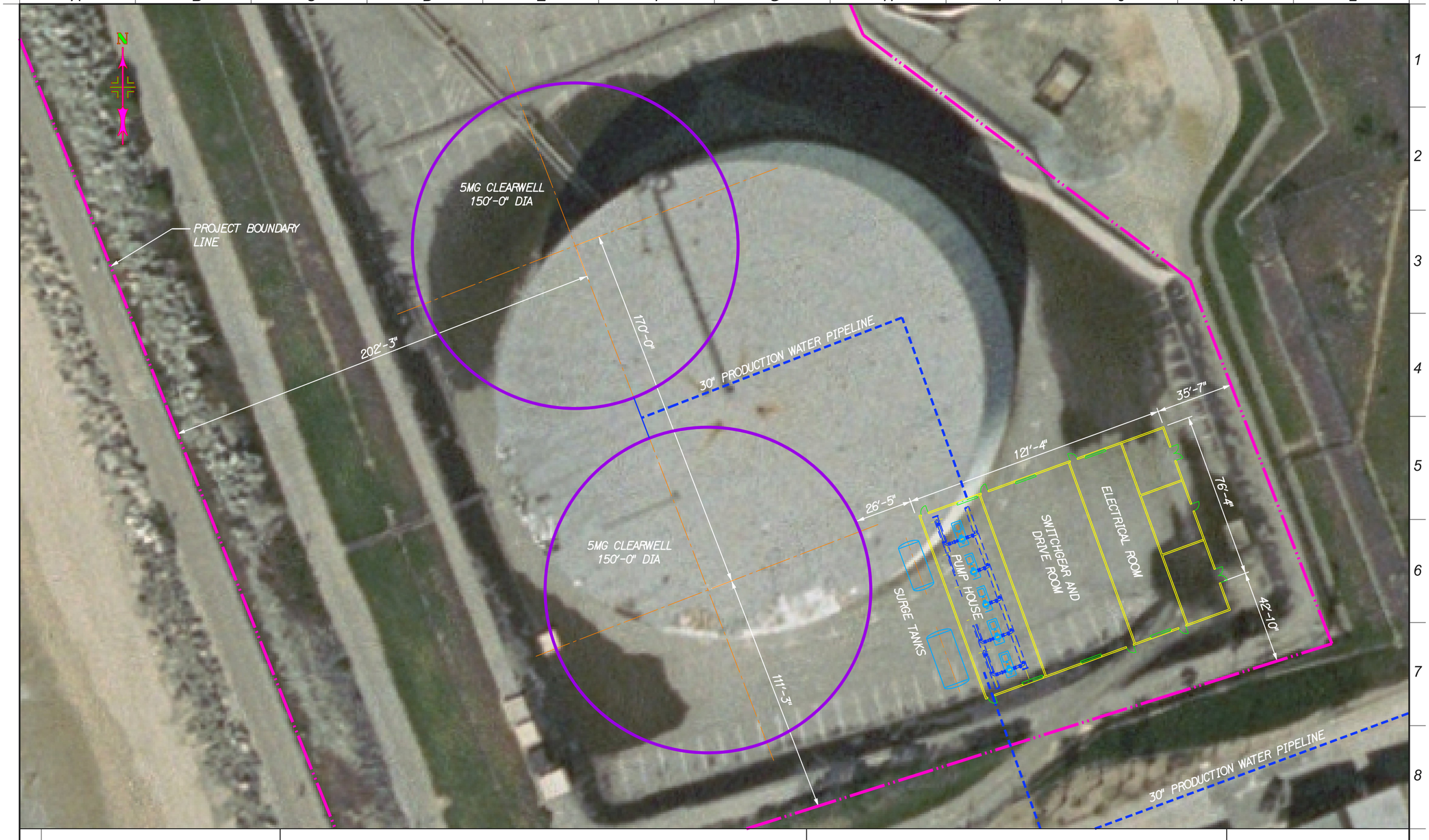
SCALE BARS

1" = 60' 0 60 120 180 FEET

WEST BASIN DESALINATION PROJECT
EL SEGUNDO DESALINATION PLANT
10MGD PLANT OPTION
PLAN

FIGURE 6-4

PLOT TIME: 12-AUG-2011 06:17 | USERID: u06350 | FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-4.dgn



SCALE BARS

1" = 20' 0 20 40 60 FEET

WEST BASIN DESALINATION PROJECT
EL SEGUNDO DESALINATION PLANT
10MGD PLANT OPTION
PLAN

FIGURE 6-5

PLOT TIME: 12-AUG-2011 09:29 USERID: u06350 FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-5.dgn

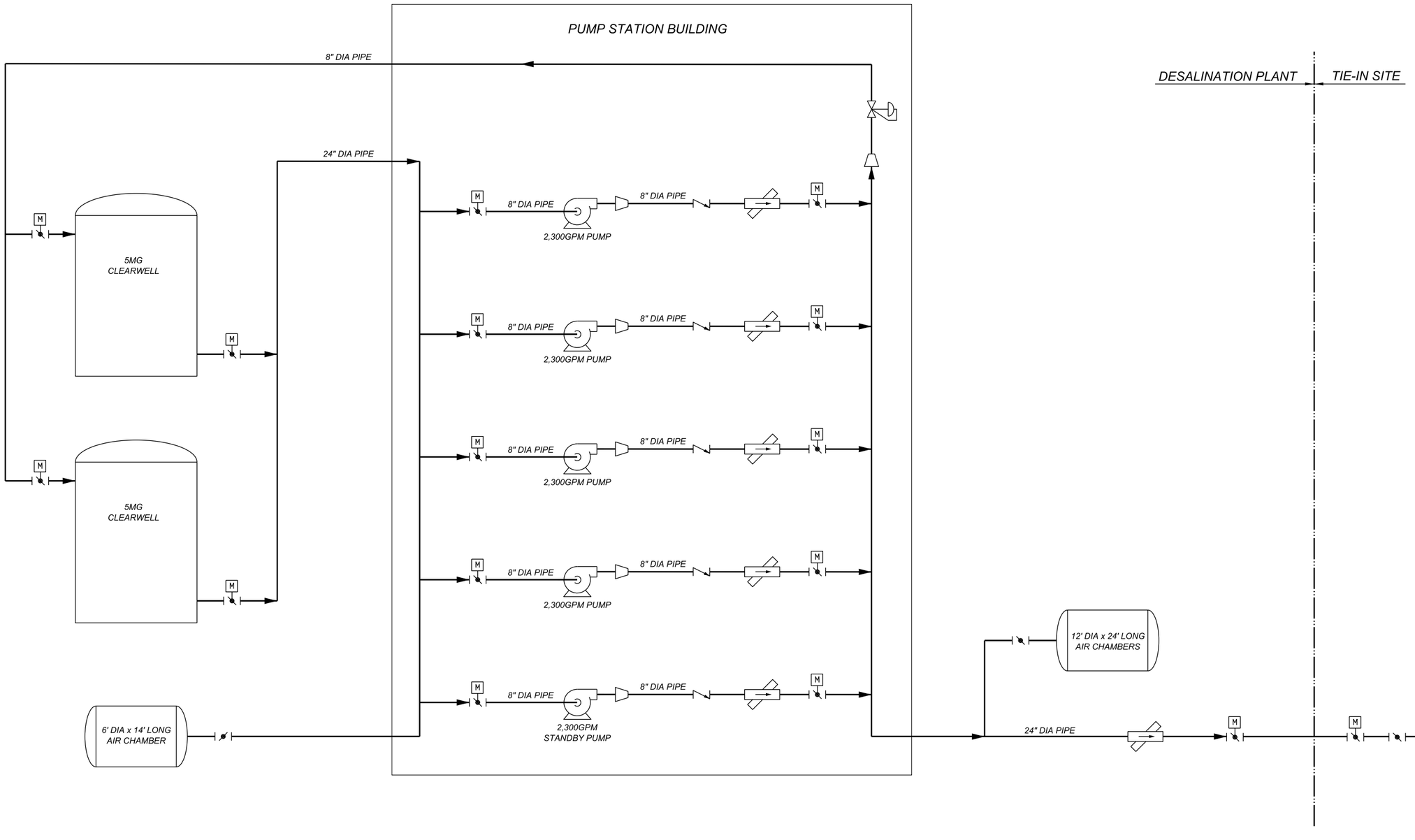
SCALE BARS

1" = 30' 0 30 60 90 FEET

WEST BASIN DESALINATION PROJECT
REDONDO BEACH DESALINATION PLANT
10MGD PLANT OPTION
PLAN

FIGURE 6-6

PLOT TIME: 12-AUG-2011 06:16 | USERID: u06350 | FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-6.dgn



SCALE BARS

WEST BASIN DESALINATION PROJECT

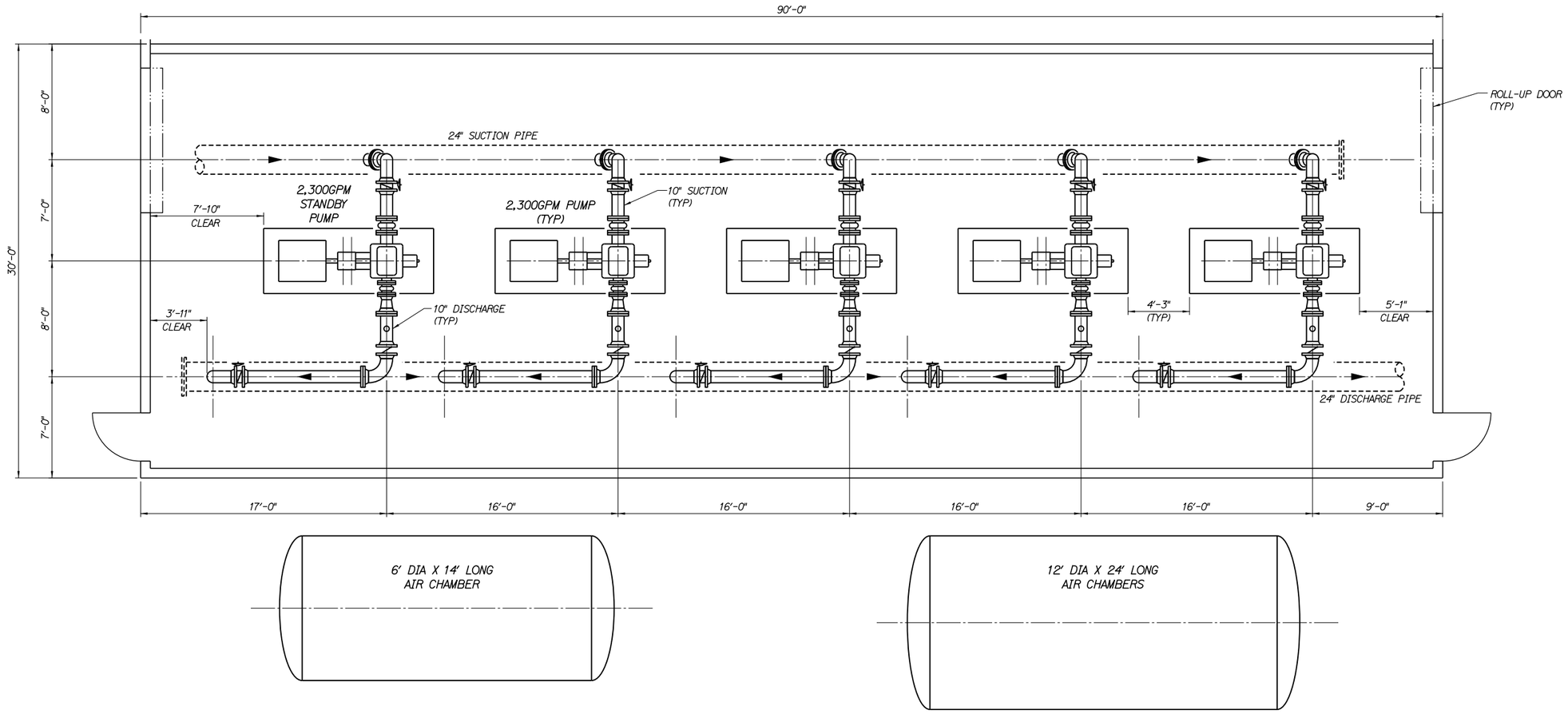
10MGD PLANT OPTION
PFD

FIGURE 6-7

PLOT TIME: 12-AUG-2011 06:18

USERID: u06350

FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-7.dgn



SCALE BARS

1/4" = 1'-0" 0 4 8 12 FEET

WEST BASIN DESALINATION PROJECT
PUMP HOUSE BUILDING
10MGD PLANT OPTION
PLAN

FIGURE 6-8

PLOT TIME: 12-AUG-2011 06:09 USERID: u06350 FILE NAME: I:\900983\WestBasinDesaltPumpStation\FIGURE 6-8.dgn

APPENDIX

Appendix A: Alignment Maps and Data Tables

Appendix B: Field Notes and Pictures

Appendix C: Geotechnical Information (Electronic version available upon request)

Appendix A

Alignment Maps and Data Tables

APPENDIX A

Alignment Maps and Data Tables

Desalination Plant at El Segundo to:

1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00) – 4 Alternatives
2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80) – 4 Alternative
3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00) – 2 Alternatives
4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00) – 1 Alternative
5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00) – 1 Alternative
6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61) – 1 Alternative
7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80) – 2 Alternatives
8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38) – 2 Alternatives
9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00) – 1 Alternative
10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50) – 2 Alternatives
11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00) – 2 Alternatives

Desalination Plant at Redondo Beach to:

1. Tie-in No. 1 (Second Lower Feeder/ Palos Verdes Reservoir at Sta. 2116+00) – 5 Alternatives
2. Tie-in No. 2 (Palos Verdes Feeder at Sta. 1538+80) – 5 Alternatives
3. Tie-in No. 3 (Second Lower Feeder at Sta. 1862+00) – 2 Alternatives
4. Tie-in No. 3A (Sepulveda Feeder at Sta. 2137+00) – 1 Alternative
5. Tie-in No. 4 (West Basin Feeder at Sta. 170+00) – 3 Alternatives
6. Tie-in No. 5 (West Basin Feeder at Sta. 368+61) – 3 Alternatives
7. Tie-in No. 6 (West Coast Feeder at Sta. 585+80) – 3 Alternatives
8. Tie-in No. 7 (West Coast Feeder at Sta. 768+69.38) – 3 Alternatives
9. Tie-in No. 8 (Sepulveda Feeder at Sta. 2025+00) – 3 Alternatives
10. Tie-in No. 9 (Sepulveda Feeder at Sta. 1918+50) – 3 Alternatives
11. Tie-in No. 10 (Sepulveda Feeder at Sta. 2260+00) – 2 Alternatives

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IT IS NOT TO BE USED, NOR IS IT INTENDED TO BE USED FOR ENGINEERING, RECORDING OR LITIGATION PURPOSES. NO WARRANTY OF ACCURACY IS IMPLIED OR GUARANTEED.

El Segundo

Hawthorne

Lawndale

Manhattan Beach

Hermosa Beach

Redondo Beach

Torrance

Gardena

Lomita

Palos Verdes Estates

Rolling Hills

Rolling Hills Estates

Harbor City

Santa Monica Bay

Pacific Ocean

- El Segundo Plant
- Alternative No.1 (14 miles)
- Alternative No.2 (14.6 miles)
- Alternative No.3 (15 miles)
- Alternative No.4 (15.2 miles)
- MWD Waterlines
- Connection Site: No.1 2nd LFD / PV Res.

No.1

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.1 El Segundo.mxd [Printed 02/24/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-28

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.1

Feet
0 4,000 8,000

El Segundo To Tie-In No. 1 (2116+00) Second Lower Feeder/ PV Reservior ALT 1

Distance: 15.0 Miles | No.1 Elevation: 370 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and Redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	70	4	2900	2	-	SS, SD, local utilities, gas, power, utility trunk lines	28	None	None	30	Residential, Commercial, High Traffic
Anza Ave	South	80	4	14000	18	Del Amo Blvd, Torrance Blvd, W Carson St, Sepulveda Blvd	SD, water, PacBell, Edison crossing	95	None	None	30	Residential, Commercial, Medium Traffic, St. James School between Spencer and Emerald Streets
Lomita Blvd	Southeast	60-80	4	13900	18	Hawthorne, Crenshaw, Pennsylvania	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr. (Arrive at No.1)	South	24	2	4700	2	Palos Verdes Drive N	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 130	**Total = 17**						

Product Water Conveyance Pipeline
Total Pipeline Length: 79100 ft 15.0 miles

El Segundo To Tie-In No. 1 (2116+00) Second Lower Feeder/ PV Reservior ALT 2

Distance: 15.5 Miles						No.1 Elevation: 370 Feet						
General		**Engineering**							**Geotechnical**			**Environmental**
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	7500	16	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo
Aviation Blvd	Southwest	55-60	4	12000	28	Grant, Artesia, Manhattan Beach Blvd.	Power	110	None	None	30	Residential, Aviation Park, Aviation High School between Space Park Dr. and Manhattan Beach Blvd., Redondo Beach Recreation Dept., Commercial, Prospect Heights School at Stanford ave.
Prospect Ave	South	65	4	11000	33	Anita, Beryl, Del Amo	SS, SD, Power poles	51	None	None	30	Residential, Commercial, Rodaway park at Gentry st., Our Lady of Guadalupe School at Massey ave., South Bay Medical Center at Diamond St., Redondo Beach School at Del Amo, Hillcrest School at Spencer st.
Torrance Blvd	East	70-80	4	2200	2	-	SD, SS, Water, Edison, Verizon	111	None	None	30	High traffic, School at Torrance and Palos Verdes Blvd
Palos Verdes Blvd	South	55	2	3850	11	Carson	Water, Power, SS, SD	112	None	None	30	Residential
W. Sepulveda Blvd	East	65-70	4	2900	4	-	Utility under side walk, Power poles	113	None	None	30	High traffic, residential
Anza Ave	South	75-80	4	2100	1	-	SD, water, Pac Bell,	95	None	None	30	Medium traffic, residential
Lomita Blvd	Southeast	60-80	4	13900	18	Hawthorne, Crenshaw, Pennsylvania	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr. (Arrive at No.1)	South	24	2	4700	2	Palos Verdes Drive N	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 151	**Total = 15**						

Product Water Conveyance Pipeline
Total Pipeline Length: 81750 ft 15.5 miles

El Segundo To Tie-In No. 1 (2116+00) Second Lower Feeder/ PV Reservior ALT 3

Distance: 15.8 Miles | No.1 Elevation: 370 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and Redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	70	4	6400	10	Inglewood, Anza	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business
Hawthorne Blvd	South	100	6	3500	2	-	Utilities may be on side streets	107	None	None	30	High traffic, residential on southbound and commercial on northbound of Hawthorne
Del Amo Blvd	East	65	4	2600	2	-	SS, water	98	None	None	30	Low traffic, commercial on west bound and residential apartments on eastbound of Del Amo
Madrona Ave	South	80	6	7000	17	Torrance, Carson	Possible Edison substation	116,117	None	None	30	Industrial, tank farms, residential and business after
Plaza Del Amo	West	55-60	4	1800	-	-	-	-	None	None	30	-
Maple Ave	South	60	2	3700	5	Sepulveda	-	141	None	None	30	Busy street, mainly residential with some businesses at Sepulveda
W 235th St (Maple becomes W 235th)	Southeast	60	2	5200	5	Crenshaw	-	141	None	None	20-30	Residential
Pennsylvania Ave	South	30-35	2	2900	8	-	-	-	None	None	20-30	Residential
Lomita Blvd	Southeast	60-80	4	1800	5	-	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr (Narbonne Becomes Palos Verdes Dr) Arrive at No. 1	South	24	2	4700	2	Palos Verdes N Drive	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 146	**Total = 16**						

Product Water Conveyance Pipeline
Total Pipeline Length: 83200 ft 15.8 miles

El Segundo To Tie-In No. 1 (2116+00) Second Lower Feeder/ PV Reservior ALT 4

Distance: 16.0 Miles | No.1 Elevation: 370 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	90	6	14200	21	Anza, Inglewood, Hawthorne, Prairie	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw
Crenshaw Blvd	South	80	6	19200	35	Torrance, Sepulveda, Carson	SS, Telephone, drainage channel	124,125,126	None	None	20-30	High traffic, refineries and industrial from 190th to Maricopa st, Wilson Park at Sepulveda and Crenshaw, Residential till tank farms at corner of Lomita and Crenshaw
Lomita Blvd	Southeast	80	4	2700	7	Pennsylvania	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr (Narbonne Becomes Palos Verdes Dr) Arrive at No. 1	South	24	2	4700	2	Palos Verdes N Drive	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 155	**Total = 18**						

Product Water Conveyance Pipeline
Total Pipeline Length: 84400 ft 16.0 miles

THIS EXHIBIT IS TO BE USED FOR APPROXIMATE POSITIONING ONLY.
IT IS NOT TO BE USED, NOR IS IT INTENDED TO BE USED FOR ENGINEERING, RECORDING OR LITIGATION PURPOSES. NO WARRANTY OF ACCURACY IS IMPLIED OR GUARANTEED.

El Segundo Plant

Alternative No.1 (13 miles)

Alternative No.2 (13.4 miles)

Alternative No.3 (13.8 miles)

Alternative No.4 (14 miles)

MWD Waterlines

Connection Site: No.2 Palos Verdes Fdr

No.2

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.1 El Segundo.mxd [Printed 02/24/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-29

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Corporate Resources Group

West Basin Desal
Alternatives to Site No.2

Feet
0 4,000 8,000

El Segundo To Tie-In No. 2 (1538+80) Palos Verdes Feeder ALT 1

Distance: 13.7 Miles | No.2 Elevation: 66 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and Redondo, Del Sol School corner of Manhattan Beach Blvd and Redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	70	4	2900	2	-	SS, SD, local utilities, gas, power, utility trunk lines	28	None	None	30	Residential, Commercial, High Traffic
Anza Ave	South	80	4	14000	18	Del Amo Blvd, Torrance Blvd, W Carson St, Sepulveda Blvd	SD, water, PacBell, Edison crossing	95	None	None	30	Residential, Commercial, Medium Traffic, St. James School between Spencer and Emerald Streets
Lomita Blvd	Southeast	75-80	4	16500	19	Hawthorne, Crenshaw, Pennsylvania, Narbonne	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential, hospitals at Hawthorne and Lomita, industrial tank fams on westbound of Lomita at Crenshaw Blvd.
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 126	**Total = 16**						

Product Water Conveyance Pipeline

Total Pipeline Length: 72475 ft 13.7 miles

El Segundo To Tie-In No. 2 (1538+80) Palos Verdes Feeder ALT 2

Distance: 14.2 Miles | No.2 Elevation: 66 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	7500	16	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo
Aviation Blvd	Southwest	55-60	4	12000	28	Grant, Artesia, Manhattan Beach Blvd.,	Power	110	None	None	30	Residential, Aviation Park, Aviation High School between Space Park Dr. and Manhattan Beach Blvd., Redondo Beach Recreation Dept., Commercial, Prospect Heights School at Stanford ave.
Prospect Ave	South	65	4	11000	33	Anita, Beryl, Del Amo	SS, SD, Power poles	51	None	None	30	Residential, Commercial, Rodaway park at Gentry st., Our Lady of Guadalupe School at Massey ave., South Bay Medical Center at Diamond St., Redondo Beach School at Del Amo, Hillcrest School at Spencer st.
Torrance Blvd	East	70-80	4	2200	2	-	SD, SS, Water, Edison, Verizon	111	None	None	30	High traffic, School at Torrance and Palos Verdes Blvd
Palos Verdes Blvd	South	55	2	3850	11	Carson	Water, Power, SS, SD	112	None	None	30	Residential
W. Sepulveda Blvd	East	65-70	4	2900	4	-	Utility under side walk, Power poles	113	None	None	30	High traffic, residential
Anza Ave	South	75-80	4	2100	1	-	SD, water, Pac Bell,	95	None	None	30	Medium traffic, residential
Lomita Blvd	Southeast	60-80	4	16500	18	Hawthorne, Crenshaw, Pennsylvania	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 146	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 75125 ft 14.2 miles

El Segundo To Tie-In No. 2 (1538+80) Palos Verdes Feeder ALT 3

Distance: 14.5 Miles | No.2 Elevation: 66 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	70	4	6400	10	Inglewood, Anza	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business
Hawthorne Blvd	South	100	6	3500	2	-	Utilities may be on side streets	107	None	None	30	High traffic, residential on southbound and commercial on northbound of Hawthorne
Del Amo Blvd	East	65	4	2600	2	-	SS, water	98	None	None	30	Low traffic, commercial on west bound and residential apartments on eastbound of Del Amo
Madrona Ave	South	80	6	7000	17	Torrance, Carson	Possible Edison substation	116,117	None	None	30	Industrial, tank farms, residential and business after
Plaza Del Amo	West	55-60	4	1800	-	-	-	-	None	None	30	-
Maple Ave	South	60	2	3700	5	Sepulveda	-	141	None	None	30	Busy street, mainly residential with some businesses at Sepulveda
W 235th St (Maple becomes W 235th)	Southeast	60	2	5200	5	Crenshaw	-	141	None	None	20-30	Residential
Pennsylvania Ave	South	30-35	2	2900	8	-	-	-	None	None	20-30	Residential
Lomita Blvd	Southeast	60-80	4	4400	5	-	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 141	**Total = 14**						

Product Water Conveyance Pipeline
Total Pipeline Length: 76575 ft 14.5 miles

El Segundo To Tie-In No. 2 (1538+80) Palos Verdes Feeder ALT 4

Distance: 14.7 Miles | No.2 Elevation: 66 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	East	90	6	14200	21	Anza, Inglewood, Hawthorne, Prairie	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw
Crenshaw Blvd	South	80	6	19200	35	Torrance, Sepulveda, Carson	SS, Telephone, drainage channel	124,125,126	None	None	20-30	High traffic, refineries and industrial from 190th to Maricopa st, Wilson Park at Sepulveda and Crenshaw, Residential till tank farms at corner of Lomita and Crenshaw
Lomita Blvd	Southeast	80	4	5300	7	Pennsylvania	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 134	**Total = 17**						

Product Water Conveyance Pipeline
Total Pipeline Length: 77775 ft 14.7 miles

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El Segundo Plant

Alternative No.1 (11.8 miles)

Alternatiive No.2 (12 miles)

MWD Waterlines

Connection Site: No.3 Sepulveda Fdr

Connection Site: No.10 Sepulveda Fdr

No.10

No.3

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.1 El Segundo.mxd [Printed 02/24/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-30

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.3 & 10

Feet
0 4,000 8,000

El Segundo To Tie-In No. 3 (STA 1862+00) Second Lower Feeder ALT 1

Distance: 12.7 Miles | No.3 Elevation: 62 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length (ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	West	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments, MWD Feeder	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Van Ness Ave	South	55	4	4200	2	-	Water, local gas, SS, power pole, telephone(above ground), MWD Feeder	99,100	None	None	30	Commercial and industrial
Del Amo Blvd	East	65	4	2600	1	-	SS, MWD Feeder	98	None	None	30	Light traffic, commercial
S Western Ave (Arrive at No. 3)	South	80	4	6900	16	Torrance Blvd, W Carson St	SS, power poles, MWD Feeder	96	None	None	30	High traffic, commercial and residential
					Total = 124	**Total = 16**						

Product Water Conveyance Pipeline
Total Pipeline Length: 66800 ft 12.7 miles

El Segundo To Tie-In No. 3 (STA 1862+00) Second Lower Feeder ALT 2

Distance: 12.7 Miles | No.3 Elevation: 62 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	West	75	4	14200	21	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Crenshaw Blvd	South	70-75	6	9900	11	Torrance Blvd, Del Amo Blvd	Drainage Channel Overcrossing, SS, SD, water, Telephone	119	None	None	30	High traffic, Fire Dept. at Carson and Crenshaw, industrial and commercial till Maricopa St, residential and small business to Carson St.
W Carson St	East	55-60	4	6000	16	Cabrillo	Railroad Crossing, Edison, SS, SD	118	None	None	30	High traffic, Nativity Catholic School and Torrance High School on Carson St.
S. Western Ave (Arrive at No.3,)	South	80	4	1300	2	-	MWD Feeder	96	None	None	30	High traffic, commercial and residential
					Total = 131	**Total = 18**						

Product Water Conveyance Pipeline
Total Pipeline Length: 67000 ft 12.7 miles

El Segundo To Tie-In No. 10 (STA 2260+00) Sepulveda Feeder ALT 1

Distance: 12.4 Miles | No.10 Elevation: 60 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and redondo
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	West	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments, MWD Feeder	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Van Ness Ave	South	55	4	4200	2	-	Water, local gas, SS, power pole, telephone(above ground), MWD Feeder	99,100	None	None	30	Commercial and industrial
Del Amo Blvd	East	65	4	2600	1	-	SS, MWD Feeder	98	None	None	30	Light traffic, commercial
S Western Ave (Arrive at No. 10)	South	80	4	5600	13	Torrance Blvd	SS, power poles, MWD Feeder	96	None	None	30	High traffic, commercial and residential
					Total = 121	**Total = 14**						

Product Water Conveyance Pipeline
Total Pipeline Length: 65500 ft 12.4 miles

El Segundo To Tie-In No. 10 (STA 2260+00) Sepulveda Feeder ALT 2

Distance: 12.4 Miles | No.10 Elevation: 60 Feet

General		Engineering						Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St	West	75	4	14200	21	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Crenshaw Blvd	South	70-75	6	9900	11	Torrance Blvd, Del Amo Blvd	Drainage Channel Overcrossing, SS, SD, water, Telephone	119	None	None	30	High traffic, Fire Dept. at Carson and Crenshaw, industrial and commercial till Maricopa St, residential and small business to Carson St.
W Carson St (Arrive at No. 10)	East	55-60	4	6000	16	Cabrillo	Railroad Crossing, Edison, SS, SD	118	None	None	30	High traffic, Nativity Catholic School and Torrance High School on Carson St.
					Total = 129	**Total = 16**						

Product Water Conveyance Pipeline
Total Pipeline Length: 65700 ft 12.4 miles

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IT IS NOT TO BE USED, NOR IS IT INTENDED TO BE USED FOR ENGINEERING, RECORDING OR LITIGATION PURPOSES. NO WARRANTY OF ACCURACY IS IMPLIED OR GUARANTEED.

No.3A

El Segundo Plant

Alignment No.1 (9.2 miles)

MWD Waterlines

Connection Site: No.3A Sepulveda Fdr

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West Basin Desal
Alternatives to Site No.3A

Feet
0 4,000 8,000

El Segundo To Tie-In No. 3A (STA 2137+00) Sepulveda Feeder ALT 1

Distance: 10.1 Miles						No.3A Elevation: 65 Feet						
General		**Engineering**							**Geotechnical**			**Environmental**
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo,
Redondo Ave	South	40	2	7600	21	Manhattan Beach Blvd	SS, Powerpole, MWD Feeder	83	None	None	30	Residential, Manhattan Beach Middle School at 15th
Matthews Ave	East	30	2	2500	3	S. Aviation Blvd	SS	94	None	None	30	Residential
Blossom Ln	South	40	2	5700	16	Artesia Blvd, Grant Ave, Ripley Ave	SS, SD	34,35,36	None	None	30	Residential
190th St (Arrive at No.3A)	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
					Total = 105	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 53100 ft 10.1 miles

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El Segundo Plant

Alignment No.1 (7.2 miles)

MWD Waterlines

Connection Site: No.4 West Basin Fdr

Connection Site: No.8 Spulveda Fdr

Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-33 [Printed 02/24/2011] Photography Date: N/A Bing Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.1 El Segundo.mxd

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West Basin Desal
Alternatives to Site No.4 & 8

Feet
0 4,000 8,000

El Segundo To Tie-In No. 4 (STA 170+00) West Basin Feeder ALT 1

Distance: 8.0 Miles | No.4 Elevation: 46 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	50	4	26000	57	Sepulveda, Aviation, Inglewood, Hawthorne, Prarie, Crenshaw,	Water, Power, SS, Drainage Channel Overcrossing	81	None	None	10-30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo, Industrial, Lawndale High School at Inglewood st., Jane Addams Park at Mansel ave., Roosevelt Elementary School, Serra High School at corner of Van Ness
Van Ness Ave (Arrive at No. 4)	South	50-60	4	2700	5	-	MWD Feeder	1,91,92	None	None	10-30	Residential, Van Ness Pre-school
					Total = 89	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 42300 ft 8.0 miles

El Segundo To Tie-In No. 8 (2025+00) Sepulveda Feeder ALT 1

Distance: 7.9 Miles | No.8 Elevation: 49 Feet

General		Engineering						Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	75-80	4	26000	57	Sepulveda, Crenshaw, Praire, Hawthorne, Inglewood, Aviation	Drainage Channel Overcrossing, SS, Power poles, Reclaimed Water, water	81,87	None	None	10-30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo, Industrial, Lawndale High School at Inglewood st., Jane Addams Park at Mansel ave., Roosevelt Elementary School, Serra High School at corner of Van Ness
Van Ness Ave (Arrive at No. 8)	South	50-60	4	2000	3	-	MWD Feeder	1,91,92	None	None	10-30	Residential, Van Ness Pre-school
					Total = 87	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 41600 ft 7.9 miles

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El Segundo Plant

Alignment No.1 (3.5 miles)

MWD Waterlines

Connection Site: No.5 West Basin Fdr

No.5

Pacific Ocean

Santa Monica Bay

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West Basin Desal
Alternatives to Site No.5

Feet
0 2,000 4,000

El Segundo To Tie-In No. 5 (STA 368+61) West Basin Feeder ALT 1

Distance: 4.2 Miles						No.5 Elevation: 80 Feet							
General		**Engineering**							**Geotechnical**			**Environmental**	
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**	
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street	
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial	
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific	
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential	
Marine Ave	East	70	4	6200	14	N Sepulveda Blvd	Water, Power, SS	81	None	None	30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park	
N Redondo Ave (Arrive at No. 5)	South	40	2	2600	6	-	SS, Powerpole, Traffic low	39,40,84,85,86	None	None	30	Residential, Manhattan Beach Middle School at 15th street, Poliwog Park, Manhattan Heights Park corner of Manhattan Beach Blvd and redondo, Del Sol School corner of Manhattan Beach Blvd and redondo	
					Total = 47	**Total = 3**							

Product Water Conveyance Pipeline
Total Pipeline Length: 22400 ft 4.2 miles

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No.9
No.6

El Segundo Plant
Alternative No.1 (8.3 miles)
Alternative No.2 (8.4 miles)
MWD Waterlines
Connection Site: No.6 West Coast Fdr
Connection Site: No.9 Sepulveda Fdr

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West Basin Desal
Alternatives to Site No.6 & 9

Feet
0 4,000 8,000

El Segundo To Tie-In No. 6 (STA 585+80) West Coast Feeder ALT 1

Distance: 9.1 Miles						No.6 Elevation: 62 Feet						
General		**Engineering**							**Geotechnical**			**Environmental**
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	80	5	10600	19	Sepulveda Blvd	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73,75	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Sepulveda, Chapman University between Park Way and Market Pl.
S. Douglas St	North	35-40	2	5400	7	-	Power, Fiber, Quest, Pac Bell, Rail Crossing	72	None	None	30	Industrial, Commercial, medium traffic
El Segundo Blvd	East	90-95	6	2700	1	N. Aviation Blvd	Pac Bell, Edison, high traffic volumes, Power, SS, SD	71	None	None	30	Commercial, Industrial
Isis Ave	North	35	2	2700	10	-	SS, SD,Water, Telecom, Powerpole	70	None	None	30	Del Aire Park at 126th st., Sepulveda School, Residential
W. 120th St	East	55	4	17200	28	S. La Cienega, Inglewood, Hawthorne, Prarie, Crenshaw	SS, SD, Powerpoles (fiber)	66	None	None	30	Residential, Anza Elemntary School at corner of La Cienega, Commercial, Hawthorne Municipal Airport at Prairie St., Beach Boys Historic Landmark, Casa Loma College at Crenshaw Blvd.
Van Ness Ave (Arrive at No.6)	South	60	4	2700	2	-	SS, SD, power, railroad crossing, golf course, commercial building on right	N.A	None	None	30	Holly Park at Corner of 120th, Industrial, Chester Washington Golf Course, Residential
					Total = 83	**Total = 8**						

Product Water Conveyance Pipeline
Total Pipeline Length: 47800 ft 9.1 miles

El Segundo To Tie-In No. 6 (STA 585+80) West Coast Feeder ALT 2

Distance: 9.0 Miles									No.6 Elevation: 62 Feet			
General		**Engineering**							**Geotechnical**			**Environmental**
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	75-80	4	26000	57	Sepulveda, Crenshaw, Praire, Hawthorne, Inglewood, Aviation	Drainage Channel Overcrossing	81,87	None	None	10-30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo, Industrial, Lawndale High School at Inglewood st., Jane Addams Park at Mansel ave., Roosevelt Elementary School, Serra High School at corner of Van Ness
Van Ness Ave (Arrive at No.6)	North	65-70	4	7900	7	W. Rosecrans Ave, W. 135th St.	MWD Feeder	N.A	None	None	10-30	Serra High School on corner of Marine ave., Residential, Industrial, Commercial, Maria Regina
					Total = 91	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 47500 ft 9.0 miles

El Segundo To Tie-In No. 9 (STA 1918+50) Sepulveda Feeder ALT 1

Distance: 8.8 Miles | No.9 Elevation: 65 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	80	5	10600	19	Sepulveda Blvd	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73,75	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Sepulveda, Chapman University between Park Way and Market Pl.
S. Douglas St	North	35-40	2	5400	7	-	Power, Fiber, Quest, Pac Bell, Rail Crossing	72	None	None	30	Industrial, Commercial, medium traffic
El Segundo Blvd	East	90-95	6	2700	1	N. Aviation Blvd	Pac Bell, Edison, high traffic volumes, Power, SS, SD	71	None	None	30	Commercial, Industrial
Isis Ave	North	35	2	2700	10	-	SS, SD,Water, Telecom, Powerpole	70	None	None	30	Del Aire Park at 126th st., Sepulveda School, Residential
W. 120th St	East	55	4	17200	28	S. La Cienega, Inglewood, Hawthorne, Prarie, Crenshaw	SS, Edison conduits near sidewalk, reclaimed water	66	None	None	30	Residential, Anza Elemntary School at corner of La Cienega, Commercial, Hawthorne Municipal Airport at Prairie St., Beach Boys Historic Landmark, Casa Loma College at Crenshaw Blvd.
Van Ness Ave (Arrive at No.9)	South	60	4	1600	-	-	SS, SD, power, railroad crossing, MWD Feeder	N.A	None	None	30	Holly Park at Corner of 120th, Industrial, Chester Washington Golf Course, Residential,
					Total = 65	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 46700 ft 8.8 miles

El Segundo To Tie-In No. 9 (STA 1918+50) Sepulveda Feeder ALT 2

Distance: 9.2 Miles						No.9 Elevation: 65 Feet						
General		**Engineering**							**Geotechnical**			**Environmental**
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	70	4	4400	6	-	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Pacific
Pacific Ave	South	40	2	2700	5	N Valley Dr, Ardmore Ave	SS (New pipes are being put in), SD, Gas, Power (residential)	80	None	None	30	Residential
Marine Ave	East	75-80	4	26000	57	Sepulveda, Crenshaw, Praire, Hawthorne, Inglewood, Aviation	Drainage Channel Overcrossing, SS, Power poles, Reclaimed Water, water	81,87	None	None	10-30	Residential, High Traffic from Sepulveda to Redondo, Marine Ave. Park at Redondo, Industrial, Lawndale High School at Inglewood st., Jane Addams Park at Mansel ave., Roosevelt Elementary School, Serra High School at corner of Van Ness
Van Ness Ave (Arrive at No.9)	North	65-70	4	9000	9	W. Rosecrans Ave, W. 135th St.	MWD Feeder	N.A	None	None	10-30	Serra High School on corner of Marine ave., Residential, Industrial, Commercial, Maria Regina
					Total = 93	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 48600 ft 9.2 miles

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No.7

El Segundo Plant

Alternative No.1 (3 miles)

Alternative No.2 (3.8 miles)

MWD Waterlines

Connection Site: No.7 West Coast Fdr

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West Basin Desal
Alternatives to Site No.7

Feet
0 2,000 4,000

El Segundo To Tie-In No. 7 (STA 768+69.38) West Coast Feeder ALT 1

Distance: 4.6 Miles | No.7 Elevation: 96 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	80	5	10600	19	Sepulveda Blvd	Petroleum crossing, High traffic, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Sepulveda, Chapman University between Park Way and Market Pl.
S. Douglas St	North	35-40	2	5400	7	-	Power, Fiber, Quest, Pac Bell, Rail Crossing, Medium Traffic	72	None	None	30	Industrial, Commercial, medium traffic
El Segundo Blvd (Arrive at No. 7)	East	90-95	6	1600	1	Aviation	Pac Bell, Edison, high traffic volumes, Power, SS, SD	71	None	None	30	Industrial
					Total = 43	**Total = 3**						

Product Water Conveyance Pipeline
Total Pipeline Length: 24100 ft 4.6 miles

El Segundo To Tie-In No. 7 (STA 768+69.38) West Coast Feeder ALT 2

Distance: 4.5 Miles | No.7 Elevation: 96 Feet

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Vista Del Mar	South	45	4	4500	-	-	-	-	None	None	30	Tank farms til 45th street
N Highland Ave (Vista Del Mar becomes Highland)	South	50	4	2000	16	-	Verizon, Edison, SS	76	None	None	30	Residential from 45th to Rosecrans, commercial
W Rosecran Ave	East	80	6	12000	13	Sepulveda Blvd	Petroleum crossing, commercial power; Rosecrans and Pacific: Edison facilities, SS, SD	73	None	None	30	High Traffic, Commercial, Residential, Tank farms from Highland to Sepulveda, Chapman University between Park Way and Market Pl., Industrial
S Aviation Blvd	North	75-80	5	5300	4	-	Railroad Crossing, Reclaimed Water(West Basin), D/B conduit, SD, power line on both sides	103	None	None	30	High traffic, residential, Vista Mar School at Hawaii St., Da Vinci Design School at 135th st., Industrial
					Total = 33	**Total = 2**						

Product Water Conveyance Pipeline
Total Pipeline Length: 23800 ft 4.5 miles

THIS EXHIBIT IS TO BE USED FOR APPROXIMATE POSITIONING ONLY.
IT IS NOT TO BE USED, NOR IS IT INTENDED TO BE USED FOR ENGINEERING, RECORDING OR LITIGATION PURPOSES. NO WARRANTY OF ACCURACY IS IMPLIED OR GUARANTEED.

Redondo Plant

Alternative No.1 (9 miles)

Alternative No.2 (9 miles)

Alternative No.3 (9.5 miles)

Alternative No.4 (10.4 miles)

Alternative No.5 (10.6 miles)

MWD Waterlines

Connection Site: No.1 2nd LFD / PV Res.

No.1

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.1 Redondo.mxd [Printed 02/25/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-19

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.1

Feet
0 3,000 6,000

Redondo To Tie-In No. 1 (STA 2116+00) Second Lower Feeder / Palos Verdes Reservoir ALT 1

Distance: 9.0 Miles | **No.1 Elevation: 370 Feet**

General		Engineering						Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Francisca Ave	Southeast	45-50	2	1200	1	N. Catalina Ave	-	24,25	None	None	30	Residential
Beryl St	Southwest	50-55	2	350	-	-	-	19,47	None	None	30	Residential
N Elena Ave	Southeast	45-50	2	675	-	-	SS, SD, Power poles	46	None	None	30	Residential
Carnelian St	Southwest	54-58	2	400	-	-	-	48	None	None	30	Residential
N Broadway	South	55-60	2	6400	9	Diamond,Torrance	SS, SD, SCE(on the right after Diamond st, on the left after Torrance Blvd), fire station at Pearl St	49	None	None	30	Residential (Apartment buildings)
Knob Hill Ave	East	45-50	2	3400	6	Pacific Coast Hwy	SS, Water, Power poles, Telecom(Under walkway)	50	None	None	30	Residential
S Prospect Ave	South	40-45	4	3000	8	Palos Verdes Blvd	SD, SS, Power poles on both sides, new pavement	51	None	None	30	Residential, Alta Vista Elementary School on corner of Knob Hill and Prospect, Tullita School from S Herberta to Ave H on Prospect Ave
Ave H	East	35-40	2	950	1	-	SD, SS, Power poles	52	None	None	30	Residential, Tullita School on corner of H and Prospect
Sharynne Ln	East	35-40	2	3850	3	-	-	53	None	None	30	Residential, Seaside Elementary School on Dennis and Sharynne
Kathryn Ave	North	35-40	2	350	-	-	SD, SS	54	None	None	30	Residential
Lomita Blvd	Southeast	75-80	4	14500	18	Anza, Hawthorne, Crenshaw	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, power poles on both sides before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr. (Arrive at No.1)	South	24	2	4700	2	Palos Verdes Drive N.	MWD Feeder	58	None	None	20-30	Parks, golf course
					Total = 57	**Total = 10**						

Product Water Conveyance Pipeline
Total Pipeline Length: 47775 ft 9.0 miles

Redondo To Tie-In No. 1 (STA 2116+00) Second Lower Feeder / Palos Verdes Reservoir ALT 2

Distance: 9.1 Miles						No.1 Elevation: 370 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N. Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	3100	7	PCH	-	19,47	None	None	30	Residential
N. Prospect Ave	Southeast	60-65	4	6200	6	Del Amo Blvd	SD, SS, Power poles on both sides, new pavement	51	None	None	30	Sea Hawk Stadium/ Park, Parras Middle School on Prospect and Emerald
Torrance Blvd	East	70-80	4	2200	2	-	SD, SS, Water, Edison, Verizon	111	None	None	30	High traffic, School at Torrance and Palos Verdes Blvd
Palos Verdes Blvd	South	55	2	3850	11	Carson	Water, Power, SS, SD	112	None	None	30	Residential
W. Sepulveda Blvd	East	65-70	4	2900	4	-	Utility under side walk, Power poles	113	None	None	30	High traffic, residential
Anza Ave	South	75-80	4	2100	1	-	SD, water, Pac Bell,	95	None	None	30	Medium traffic, residential
Lomita Blvd	Southeast	60-80	4	13900	18	Hawthorne, Crenshaw, Pennsylvania	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr. (Arrive at No.1)	South	24	2	4700	2	Palos Verdes Drive N	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 61	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 48150 ft 9.1 miles

Redondo To Tie-In No. 1 (STA 2116+00) Second Lower Feeder / Palos Verdes Reservoir ALT 3

Distance: 9.6 Miles						No.1 Elevation: 370 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70	4	2900	4	-	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	28	None	None	30	High traffic, residential, business
Anza Ave	South	65-70	4	14000	18	Del Amo Blvd, Torrance, W. Carson, Sepulveda	SD, water, Pac Bell,	95	None	None	30	Medium traffic, business, school at Emerald and Anza, residential
Lomita Blvd	Southeast	60-80	4	13900	18	Hawthorne, Crenshaw, Pennsylvania	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential till Los Codona Ave.,business, hospital, commercial & industrial tank farm
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr. (Arrive at No.1)	South	24	2	4700	2	Palos Verdes Drive N	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 64	**Total = 12**						

Product Water Conveyance Pipeline
Total Pipeline Length: 50850 ft 9.6 miles

Redondo To Tie-In No. 1 (STA 2116+00) Second Lower Feeder / Palos Verdes Reservoir ALT 4

Distance: 10.4 Miles						No.1 Elevation: 370 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, park at Beryl and 190th
190th St	East	70	4	6400	10	Inglewood, Anza	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business
Hawthorne Blvd	South	100	6	3500	2	-	Utilities may be on side streets	107	None	None	30	High traffic, residential on southbound and commercial on northbound of Hawthorne
Del Amo Blvd	East	65	4	2600	2	-	SS, water	98	None	None	30	Low traffic, commercial on west bound and residential apartments on eastbound of Del Amo
Madrona Ave	South	80	6	7000	17	Torrance, Carson	Possible Edison substation	116,117	None	None	30	Industrial, tank farms, residential and business after Torrance Blvd.
Plaza Del Amo	West	55-60	4	1800	-	-	-	-	None	None	30	-
Maple Ave	South	60	2	3700	5	Sepulveda	-	141	None	None	30	Busy street, mainly residential with some businesses at Sepulveda
W 235th St (Maple becomes W 235th)	Southeast	60	2	5200	5	Crenshaw	-	141	None	None	20-30	Residential
Pennsylvania Ave	South	30-35	2	2900	8	-	-	-	None	None	20-30	Residential
Lomita Blvd	Southeast	60-80	4	1800	5	-	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr (Narbonne Becomes Palos Verdes Dr) Arrive at No. 1	South	24	2	4700	2	Palos Verdes N Drive	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 78	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 54950 ft 10.4 miles

Redondo To Tie-In No. 1 (STA 2116+00) Second Lower Feeder / Palos Verdes Reservoir ALT 5

Distance: 10.6 Miles						No.1 Elevation: 370 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, park at Beryl and 190th
190th St	East	90	6	14200	21	Anza, Inglewood, Hawthorne, Prairie	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw
Crenshaw Blvd	South	80	6	19200	35	Torrance, Sepulveda, Carson	SS, Telephone, drainage channel	124,125,126	None	None	20-30	High traffic, refineries and industrial from 190th to Maricopa st, Wilson Park at Sepulveda and Crenshaw,
Lomita Blvd	Southeast	80	4	2700	7	Pennsylvania	SS, SD, power poles	55,56	None	None	20-30	Residential with some business
Narbonne Ave	South	60	4	8000	9	PCH	SS, SD, Power poles before PCH, MWD Feeder	57	Palos Verdes Fault	None	20-30	Residential, business, Lomita Elemetary School at Narbonne & 247th, hospital at Narbonne & PCH
Palos Verdes Dr (Narbonne Becomes Palos Verdes Dr) Arrive at No. 1	South	24	2	4700	2	Palos Verdes N Drive	MWD Feeder	58	None	None	20-30	Park, golf course next to Palos Verdes Dr.
					Total = 87	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 56150 ft 10.6 miles

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No.2

Redondo Plant

Alternative No.1 (7.8 miles)

Alternative No.2 (7.8 miles)

Alternative No.3 (8.4 miles)

Alternative No.4 (9.2 miles)

Alternative No.5 (9.4 miles)

MWD Waterlines

Connection Site: No.2 Palos Verdes Fdr

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No.2 Redondo.mxd [Printed 02/25/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-37

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.2

Feet
0 3,000 6,000

Redondo To Tie-In No. 2 (STA 1538+80) Palos Verdes Feeder ALT 1

Distance: 7.8 Miles						No.2 Elevation: 66 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N. Catalina	-	24,25	None	None	30	Residential
Beryl St	Southwest	50-55	2	350	-	-	-	19,47	None	None	30	Residential
N Elena Ave	Southeast	45-50	2	675	-	-	SS, SD, Power poles	46	None	None	30	Residential
Carnelian St	Southwest	54-58	2	400	-	-	-	48	None	None	30	Residential, Redondo Beach Police Department on corner of Carnelien and Broadway
N Broadway	South	55-60	2	6400	9	Diamond,Torrance	SS, SD, SCE(on the right after Diamond st, on the left after Torrance Blvd)	49	None	None	30	Residential houses and apartments, numerous churches from Diamond St to Saphire St on Broadway, preschool at Garnet and Broadway
Knob Hill Ave	East	45-50	2	3400	6	Pacific Coast Hwy	SS, Water, Power poles, Telecom(Under walkway)	50	None	None	30	Residential, churches east of Saphire St, Alta Vista Elementary School on corner of Knob Hill and Prospect
S Prospect Ave	South	40-45	4	3000	8	Palos Verdes Blvd	SD, SS, Power poles on both sides, new pavement	51	None	None	30	Residential, Tulita School at corner of H and Prospect
Ave H	East	35-40	2	950	1	-	SD, SS, Power poles	52	None	None	30	Residential
Sharynne Ln	East	35-40	2	3850	3	-	-	53	None	None	30	Residential, Seaside Elementary School at Dennis and Sharynne
Kathryn Ave	North	35-40	2	350	-	-	SD, SS	54	None	None	30	Residential
Lomita Blvd	Southeast	75-80	4	17100	21	Anza, Hawthorne, Crenshaw, Narbonne	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential, hospitals at Hawthorne and Lomita, industrial tank fams on westbound of Lomita at Crenshaw Blvd.
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 54	Total = 9						

Product Water Conveyance Pipeline
Total Pipeline Length: 41150 ft 7.8 miles

Redondo To Tie-In No. 2 (STA 1538+80) Palos Verdes Feeder ALT 2

Distance: 7.9 Miles						No.2 Elevation: 66 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N. Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	3100	7	PCH	-	19,47	None	None	30	Residential
N. Prospect Ave	Southeast	60-65	4	6200	6	Del Amo Blvd	SD, SS, Power poles on both sides, new pavement	51	None	None	30	Sea Hawk Stadium/ Park, Parras Middle School on Prospect and Emerald
Torrance Blvd	East	70-80	4	2200	2	-	SD, SS, Water, Edison, Verizon	111	None	None	30	High traffic, School at Torrance and Palos Verdes Blvd
Palos Verdes Blvd	South	55	2	3850	11	Carson	Water, Power, SS, SD	112	None	None	30	Residential
W. Sepulveda Blvd	East	65-70	4	2900	4	-	Utility under side walk, Power poles	113	None	None	30	High traffic, residential
Anza Ave	South	75-80	4	2100	1	-	SD, water, Pac Bell	95	None	None	30	Medium traffic, residential
Lomita Blvd	Southeast	75-80	4	16500	19	Hawthorne, Crenshaw, Pennsylvania, Narbonne	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential, hospitals at Hawthorne and Lomita, industrial tank fams on westbound of Lomita at Crenshaw Blvd.
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 57	Total = 8						

Product Water Conveyance Pipeline
Total Pipeline Length: 41525 ft 7.9 miles

Redondo To Tie-In No. 2 (STA 1538+80) Palos Verdes Feeder ALT 3

Distance: 8.4 Miles						No.2 Elevation: 66 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70	4	2900	4	-	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	28	None	None	30	High traffic, residential, business
Anza Ave	South	65-70	4	14000	1		SD, water, Pac Bell,	95	None	None	30	Residential from 190th to Del Amo, medium traffic, commercial and small business from Del Amo to Torrance, residential to Lomita
Lomita Blvd	Southeast	75-80	4	16500	19	Hawthorne, Crenshaw, Pennsylvania, Narbonne	SD, SS, Power poles before Hawthorne, and after Crenshaw	55,56	None	None	20-30	Residential, hospitals at Hawthorne and Lomita, industrial tank fams on westbound of Lomita at Crenshaw Blvd.
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 43	**Total = 7**						

Product Water Conveyance Pipeline
Total Pipeline Length: 44225 ft 8.4 miles

Redondo To Tie-In No. 2 (STA 1538+80) Palos Verdes Feeder ALT 4

Distance: 9.2 Miles						No.2 Elevation: 66 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, park at Beryl and 190th
190th St	East	70	4	6400	10	Inglewood, Anza	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business
Hawthorne Blvd	South	100	6	3500	2	-	Utilities may be on side streets	107	None	None	30	High traffic, residential on southbound and commercial on northbound of Hawthorne
Del Amo Blvd	East	65	4	2600	2	-	SS, water	98	None	None	30	Low traffic, commercial on west bound and residential apartments on eastbound of Del Amo
Madrona Ave	South	80	6	7000	17	Torrance, Carson	Rail crossing, possible Edison substation	116,117	None	None	30	Industrial, tank farms, residential and business after Torrance Blvd.
Plaza Del Amo	West	55-60	4	1800	-	-	-	-	None	None	30	-
Maple Ave	South	60	2	3700	5	Sepulveda	-	-	None	None	30	Mainly residential with some businesses at Sepulveda
W 235th St (Maple becomes W 235th)	Southeast	60	2	5200	5	Crenshaw	-	-	None	None	20-30	Residential
Pennsylvania Ave	South	30-35	2	2900	8	-	-	-	None	None	20-30	Residential
Lomita Blvd	Southeast	75-80	4	4600	10	Narbonne	SS, SD, power poles	55,56	None	None	20-30	Residential with some small business
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 78	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 48525 ft 9.2 miles

Redondo To Tie-In No. 2 (STA 1538+80) Palos Verdes Feeder ALT 5

Distance: 9.4 Miles						No.2 Elevation: 66 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N.Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, park at Beryl and 190th
190th St	East	90	6	14200	21	Anza, Inglewood, Hawthorne, Prairie	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw
Crenshaw Blvd	South	80	6	19200	35	Torrance, Sepulveda, Carson	SS, Telephone, drainage channel	124,125,126	None	None	20-30	High traffic, refineries and industrial from 190th to Maricopa st, Wilson Park at Sepulveda and Crenshaw, Residential till tank farms at corner of Lomita and Crenshaw
Lomita Blvd	Southeast	75-80	4	5500	11	Pennsylvania, Narbonne	SS, SD, power poles	55,56	None	None	20-30	Residential with some small business
Walnut St	North	30-35	4	2050	5	-	SS, SD,MWD water line	59	None	None	30	Residential
W 242nd Pl	East	30-35	2	625	1	-	SS, SD	60	None	None	30	Residential
Huber Ave	North	30-35	2	100	-	-	SS, SD	61	None	None	30	Residential
W 242nd Pl	East	30-35	2	700	-	-	SS	62	None	None	30	Residential
					Total = 86	**Total = 12**						

Product Water Conveyance Pipeline
Total Pipeline Length: 49725 ft 9.4 miles

THIS EXHIBIT IS TO BE USED FOR APPROXIMATE POSITIONING ONLY.
IT IS NOT TO BE USED, NOR IS IT INTENDED TO BE USED FOR ENGINEERING, RECORDING OR LITIGATION PURPOSES. NO WARRANTY OF ACCURACY IS IMPLIED OR GUARANTEED.

No.10

No.3

Redondo Plant

Alternative No.1 (7.2 miles)

Alternative No.2 (7.3 miles)

MWD Waterlines

Connection Site: No.3 Sepulveda Fdr

Connection Site: No.10 Sepulveda Fdr

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West Basin Desal
Alternatives to Site No.3 & 10

Feet
0 3,000 6,000

Redondo To Tie-In No. 3 (STA 1862+00) Second Lower Feeder ALT 1

Distance: 7.3 Miles						No.3 Elevation: 62 Feet						
General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	West	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments, MWD Feeder	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Van Ness Ave	South	55	4	4200	2	-	Water, local gas, SS, power pole, telephone(above ground), MWD Feeder	99,100	None	None	30	Commercial and industrial
Del Amo Blvd	East	65	4	2600	1	-	SS, MWD Feeder	98	None	None	30	Light traffic, commercial
S Western Ave (Arrive at No. 3)	South	80	4	6900	16	Torrance Blvd, W Carson St	SS, power poles, MWD Feeder	96	None	None	30	High traffic, commercial and residential
					Total = 56	**Total = 10**						

Product Water Conveyance Pipeline
Total Pipeline Length: 38550 ft 7.3 miles

Redondo To Tie-In No. 3 (STA 1862+00) Second Lower Feeder ALT 2

Distance: 7.3 Miles						No.3 Elevation: 62 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	West	75	4	14200	21	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Crenshaw Blvd	South	70-75	6	9900	11	Torrance Blvd, Del Amo Blvd	Drainage Channel Overcrossing, SS, SD, water, Telephone	119	None	None	30	High traffic, Fire Dept. at Carson and Crenshaw, industrial and commercial till Maricopa St, residential and small business to Carson St.
W Carson St	East	55-60	4	6000	16	Cabrillo	Railroad Crossing, Edison, SS, SD	118	None	None	30	High traffic, Nativity Catholic School and Torrance High School on Carson St.
S. Western Ave (Arrive at No.3,)	South	80	4	1300	2	-	MWD Feeder	96	None	None	30	High traffic, commercial and residential
					Total = 63	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 38750 ft 7.3 miles

Redondo To Tie-In No. 10 (STA 2260+00) Sepulveda Feeder ALT 1

Distance: 7.1 Miles						No.10 Elevation: 60 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	West	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Van Ness Ave	South	55	4	4200	2	-	Water, local gas, SS, power pole, telephone(above ground), MWD Feeder	99,100	None	None	30	Commercial and industrial
Del Amo Blvd	East	65	4	2600	1	-	SS, MWD water	98	None	None	30	Light traffic, commercial
S Western Ave (Arrive at No. 10)	South	80	4	5600	13	Torrance Blvd	SS, power poles	96	None	None	30	High traffic, commercial and residential
					Total = 53	**Total = 8**						

Product Water Conveyance Pipeline
Total Pipeline Length: 37250 ft 7.1 miles

Redondo To Tie-In No. 10 (STA 2260+00) Sepulveda Feeder ALT 2

Distance: 7.1 Miles						No.10 Elevation: 60 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	West	75	4	14200	21	Anza, Inglewood, Hawthorne, Prairie	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
Crenshaw Blvd	South	70-75	6	9900	11	Torrance Blvd, Del Amo Blvd	Drainage Channel Overcrossing, SS, SD, water, Telephone	119	None	None	30	High traffic, Fire Dept. at Carson and Crenshaw, industrial and commercial till Maricopa St, residential and small business to Carson St.
W Carson St (Arrive at No. 10)	East	55-60	4	6000	16	Cabrillo	Railroad Crossing, Edison, SS, SD	118	None	None	30	High traffic, Nativity Catholic School and Torrance High School on Carson St.
					Total = 61	**Total = 12**						

Product Water Conveyance Pipeline
Total Pipeline Length: 37450 ft 7.1 miles

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No.3A

Redondo Plant

Alternative No.1 (4.7 miles)

MWD Waterlines

Connection Site: 3A Sepulveda Fdr

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Corporate Resources Group

West Basin Desal
Alternatives to Site No.3A

Feet
0 3,000 6,000

Redondo To Tie-In No. 3A (2137+00) Sepulveda Feeder

Distance: 4.7 Miles						No.3 Elevation: 65 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St (Arrive at No.3A)	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	SS, SD (LACFC), Water, Power (Edison, both above and underground), Telephone trunkline, local utilities on sidewalk, substation and apartments	16,17,28	None	None	30	High traffic, residential, business, Columbia Park at 190th and Hawthorne, Industrial tank farms from Hawthorne to Crenshaw on eastbound of 190th
					Total = 37	**Total = 8**						

Product Water Conveyance Pipeline
Total Pipeline Length: 24850 ft 4.7 miles

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No.8
No.4

Redondo Plant
Alternative No.1 (6.8 miles)
Alternative No.2 (6.2 miles)
Alternative No.3 (6.8 miles)
MWD Waterlines
Connection Site: No.4 West Basin Fdr
Connection Site: No.8 Sepulveda Fdr

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The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.4 & 8

Feet
0 3,000 6,000

Redondo To Tie-In No. 4 (STA 170+00) West Basin Feeder ALT 1

Distance: 6.7 Miles | **No.4 Elevation: 46 Feet**

General		Engineering							Geotechnical			Environmental
Street	**Direction**	**Street Width (ft)**	**No. of Lanes**	**Street Length(ft)**	**No. of Street Crossing**	**Major Intersection Crossings**	**Major Utilities**	**Street Picture**	**Active Fault Crossings**	**Liquefaction Potential**	**Historical Groundwater Level**	**Environmental Concerns**
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1		-	16	None	None	30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	8500	13	Hawthorne, Prairie Ave	LACFC Drainage, LACDPW SS, Power poles, Railroad crossing	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Yukon Ave	North	30-35	2	4100	4	Artesia Blvd	-	7,8,9,10	None	None	30	Yukon Elementary School, residential and small business
170th St	East	30-35	2	5300	15	Crenshaw Blvd	SS, SD, water, telephone/electrical	3	None	None	10-30	Carr Elementary School on 170th, residential
Van Ness Ave (Arrive at No.4)	North	70-75	4	4000	9	Redondo Beach Blvd, Manhatton Beach Blvd	SD, SS, MWD Feeder, Drainage Channel Overcrossing	3	None	YES	10-30	Lincoln Elementary, residential
					Total = 28	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 35450 ft 6.7 miles

Redondo To Tie-In No. 4 (STA 170+00) West Basin Feeder ALT 2

Distance: 6.0 Miles						No. 4 Elevation: 46 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1	-	-	16	None	None	30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	3200	5	-	Railroad Crossing, LACFC Drainage, LACDPW SS, power poles	6,11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, residential and small business
Hawthorne Blvd	North	100	6	3200	6	Artesia	Utilities possible on side streets	127	None	None	30	High traffic, commercial, residential
Redondo Beach Blvd	Northeast	70-75	4	11300	11	Prairie, Crenshaw	Drainage Channel Overcrossing, 405 freeway, Powerpole on both sides	128	None	YES	10-30	High traffic, Alondra Park, Murdock Stadium, three small medical centers before the 405 freeway, residential and small business
Van Ness Ave (Arrive at No.4)	North	70-75	4	600	-	-	MWD Feeder	1	None	None	10-30	High traffic, school zone, residential
					Total = 17	**Total = 8**						

Product Water Conveyance Pipeline
Total Pipeline Length: 31850 ft 6.0 miles

Redondo To Tie-In No. 4 (170+00) West Basin Feeder ALT 3

Distance: 6.7 Miles						No.3 Elevation: 46 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	Water,SS	16, 17, 28	None	None	30	High traffic, Residential, small business, commercial and industrial tank farms from Prairie to Van Ness
Van Ness Ave (Arrive at No.4)	North	70-75	4	10500	24	Artesia, Redondo Beach Blvd	MWD Feeder, Drainage Channel Overcrossing	1	None	YES	10-30	High traffic, mainly residential
					Total = 60	**Total = 11**						

Product Water Conveyance Pipeline
Total Pipeline Length: 35350 ft 6.7 miles

Redondo To Tie-In No. 8 (STA 2025+00) Sepulveda Feeder ALT 1

Distance: 6.8 Miles						No. 8 Elevation: 49 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1			16			30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	8500	13	Hawthorne	LACFC Drainage, LACDPW SS, Power poles, Railroad Crossing	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Yukon Ave	North	30-35	2	4100	4	Artesia Blvd	-	7,8,9,10	None	None	30	Yukon Elementary School, residential and small business
170th St	East	30-35	2	5300	15	Crenshaw Blvd	SS, SD, water, telephone/electrical	3	None	None	10-30	Carr Elementary School on 170th, residential
Van Ness Ave (Arrive at No.8)	North	70-75	4	4650	10	Redondo Beach Blvd, Manhatton Beach Blvd	SD, SS, MWD Feeder, Drainage Channel Overcrossing	3	None	YES	10-30	Lincoln Elementary, residential
					Total = 63	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 36100 ft 6.8 miles

Redondo To Tie-In No. 8 (STA 2025+00) Sepulveda Feeder ALT 2

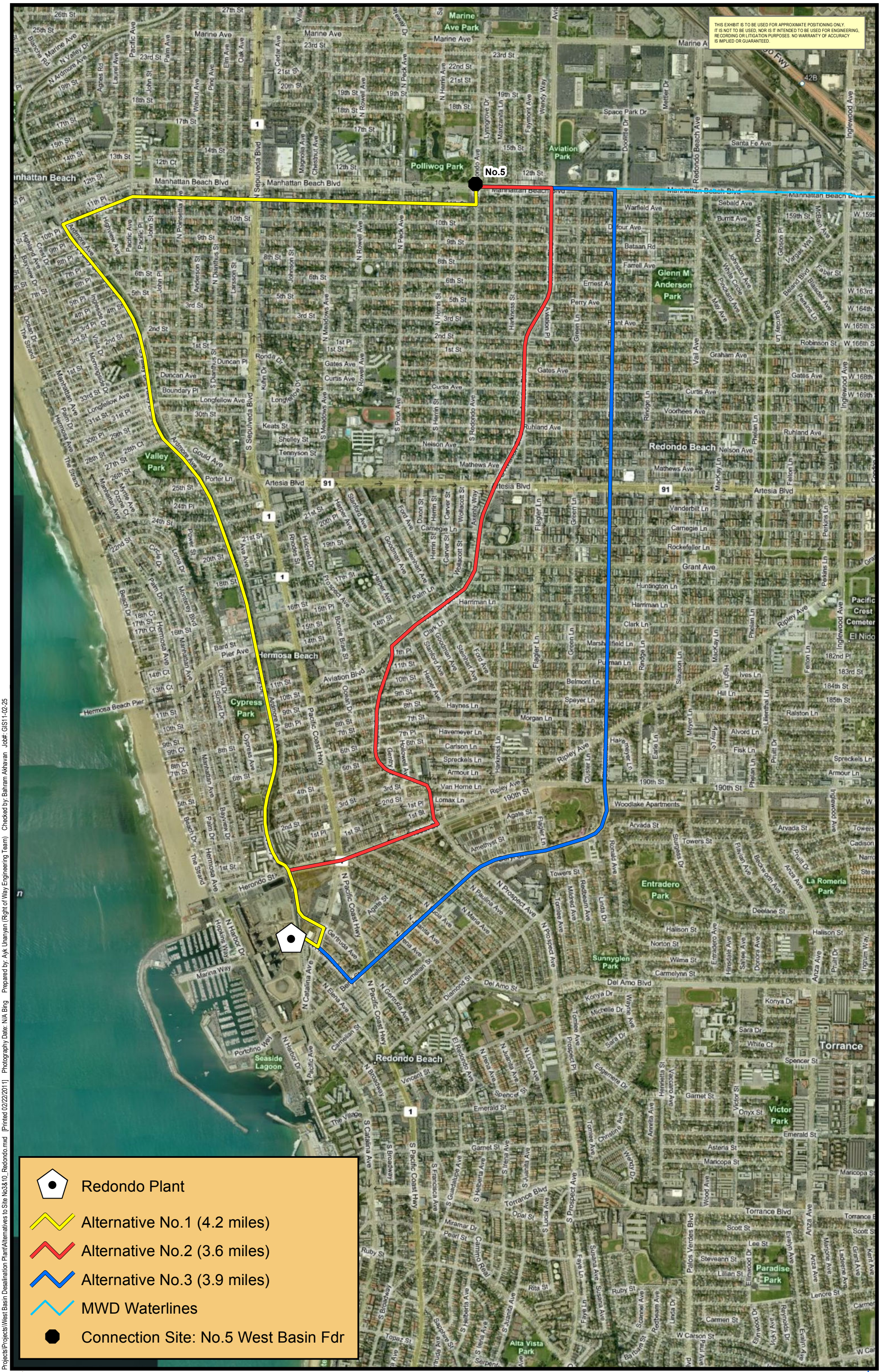
Distance: 6.2 Miles						No. 8 Elevation: 49 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1			16			30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	3200	5	-	Railroad Crossing, LACFC Drainage, LACDPW SS, power poles	6,11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, residential and small business
Hawthorne Blvd	North	100	6	3200	6	Artesia	Utilities possible on side streets	127	None	None	30	High traffic, commercial, residential
Redondo Beach Blvd	Northeast	70-75	4	11300	11	Prairie, Crenshaw	Drainage Channel Overcrossing, 405 freeway, Powerpole on both sides	128	None	YES	10-30	High traffic, Alondra Park, Murdock Stadium, three small medical centers before the 405 freeway, residential and small business
Van Ness Ave (Arrive at No.8)	North	70-75	4	1250	2	Manhattan Beach Blvd	MWD Feeder	1	None	None	10-30	High traffic, school zone, residential
					Total = 45	**Total = 9**						

Product Water Conveyance Pipeline
Total Pipeline Length: 32500 ft 6.2 miles

Redondo To Tie-In No. 8 (2025+00) Sepulveda Feeder ALT 3

Distance: 6.8 Miles						No.3 Elevation: 49 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	Water,SS, traffic	16, 17, 28	None	None	30	Residential, small business, commercial and industrial tank farms from Prairie to Van Ness
Van Ness Ave (Arrive at No.8)	North	70-75	4	11150	26	Artesia, Redondo Beach Blvd	MWD Feeder, Drainage Channel Overcrossing	1	None	YES	10-30	High traffic, mainly residential
					Total = 63	**Total = 10**						

Product Water Conveyance Pipeline
Total Pipeline Length: 36000 ft 6.8 miles



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The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.5

Feet
0 1,500 3,000

Redondo To Tie-In No. 5 (368+61) West Basin Feeder ALT 1

Distance: 4.0 Miles						No.5 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
N.Francisca Ave	North	50	2	800	-	-	-	-	None	None	30	Industrial
N Valley Dr (Francisca becomes Valley)	North	30-35	2	12600	42	Gould Ave	SS,SD, Water	105,106	None	None	30	Medium traffic, mainly residential, schools and parks: Hermosa Beach Education Foundation, Robinson Elementary, Clark Field, Valle Park
11th St	Northeast	30	2	7500	12	PCH	-	-	None	None	30	Residential
N Redondo Ave (Arrive at No. 5)	North	30-35	2	325	-	-	Water, SS	39,40	None	None	30	Residential
					Total = 54	**Total = 2**						

Product Water Conveyance Pipeline
Total Pipeline Length: 21225 ft 4.0 miles

Redondo To Tie-In No. 5 (368+61) West Basin Feeder ALT 2

Distance: 3.4 Miles						No.5 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
N.Francisca Ave	North	50	2	800	-	-	-	-	None	None	30	Industrial
Herondo St	East	75-80	4	2800	4	PCH	-	17,18	None	None	30	Residential
N Prospect Ave	Northwest	30	2	3800	25	-	SS, power, substation on sidewalk, powerpoles on both sides, new pavement	51	None	None	30	Residential
Aviation Blvd	North	55	4	9000	28	Grant Ave, Artesia	Reclaimed water by West Basin, SD, Power (D/B conduit), Tele. Pole	103	None	None	30	High traffic, small business and residential
Manhattan Beach Blvd (Arrive at No.5)	West	65-70	4	1350	1	-	SS,SD, Power (Edison), MWD Feeder	104	None	None	30	High traffic, small business and residential
					Total = 54	**Total = 3**						

Product Water Conveyance Pipeline
Total Pipeline Length: 17750 ft 3.4 miles

Redondo To Tie-In No. 5 (368+61) West Basin Feeder ALT 3

Distance: 3.9 Miles						No.5 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N. Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast & North	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
Blossom Ln (Beryl becomes Blossom)	North	25	2	10600	31	Artesia	SS, Water	34,35,36	None	None	30	Residential
Manhattan Beach Blvd (Arrive at No.5)	West	65-70	4	2500	3	Aviation	SS,SD, Power (Edison), MWD Feeder	104	None	None	30	Small business, Redondo Beach Performing Arts Center
					Total = 47	**Total = 5**						

Product Water Conveyance Pipeline
Total Pipeline Length: 20450 ft 3.9 miles

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No.9

No.6

Redondo Plant

Alternative No.1 (8.8 miles)

Alternative No.2 (8.1 miles)

Alternative No.3 (8.8 miles)

MWD Waterlines

Connection Site: No.6 West Coast Fdr

Connection Site: No.9 Sepulveda Fdr

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No3&10 Redondo.mxd [Printed 02/22/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-27

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.6 & 9

Feet
0 3,000 6,000

Redondo To Tie-In No. 6 (STA 585+80) West Coast Feeder ALT 1

Distance: 8.7 Miles						No.6 Elevation: 62 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1		-	16			30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	8500	13	Prairie, Hawthorne	LACFC Drainage, LACDPW SS, Power poles, railroad crossing	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Yukon Ave	North	30-35	2	4100	4	Artesia Blvd	-	7,8,9,10	None	None	30	Yukon Elementary School, residential and small business
170th St	East	30-35	2	5300	15	Crenshaw Blvd	SS, SD, water, telephone/electrical	3	None	None	10-30	Carr Elementary School on 170th, residential
Van Ness Ave (Arive at No.6)	North	60	4	14500	20	Redondo Beach Blvd, Manhattan Beach, Marine, Rosecrans	MWD Feeder, Drainage Channel Overcrossing	3	None	YES	10-30	Residential, Lincoln Elementary
					Total = 73	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 45950 ft 8.7 miles

Redondo To Tie-In No. 6 (STA 585+80) West Coast Feeder ALT 2

Distance: 8.0 Miles						No. 6 Elevation: 62 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1	-	-	16	None	None	30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	3200	5	Hawthorne	LACFC Drainage, LACDPW SS, Power poles, railroad crossing	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Hawthorne Blvd	North	100-105	6	3200	6	Artesia	Utilities may be on side street	127	None	None	30	High traffic, commercial on southbound, residential on northbound
Redondo Beach Blvd	Northeast	70-75	4	11300	11	Prairie, Crenshaw	Power pole on both sides	128	None	YES	10-30	High traffic, golf course, school, commercial on both sides
Van Ness Ave (Arive at No.6)	North	60	4	11200	10	Manhattan Beach, Rosecrans, Marine, El Segundo	MWD Feeder	-	None	None	10-30	Commercial
					Total = 53	**Total = 12**						

Product Water Conveyance Pipeline
Total Pipeline Length: 42450 ft 8.0 miles

Redondo To Tie-In No. 6 (585+50) West Coast Feeder ALT 3

Distance: 8.7 Miles						No.6 Elevation: 62 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	Traffic, Water,SS	16, 17, 28	None	None	30	Residential and commercial up to Hawthorne Blvd., residential on westbound and industrial tank farms east bound from Prairie to Van Ness
Van Ness Ave (Arrive at No.6)	North	60	4	21100	34	Artesia, Redondo Beach Blvd, Manhattan Beach Blvd, Marine, Rosecrans	MWD Feeder, Drainage Channel Overcrossing	1	None	YES	10-30	Residential and commercial
					Total = 71	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 45950 ft 8.7 miles

Redondo To Tie-In No. 9 (STA 1918+50) Sepulveda Feeder ALT 1

Distance: 8.9 Miles						No. 9 Elevation: 65 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1			16			30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	8500	13	Hawthorne	LACFC Drainage, LACDPW SS, Power poles, RR	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Yukon Ave	North	30-35	2	4100	4	Artesia Blvd	-	7,8,9,10	None	None	30	Yukon Elementary School, residential and small business
170th St	East	30-35	2	5300	15	Crenshaw Blvd	SS, SD, water, telephone/electrical	3	None	None	10-30	Carr Elementary School on 170th, residential
Van Ness Ave (Arrive at No.9)	North	60	4	15600	21	Redondo Beach Blvd, Manhattan Beach, Marine, Rosecrans, El Segundo	MWD Feeder, Drainage Channel Overcrossing	3	None	YES	10-30	Residential, Lincoln Elementary
					Total = 74	**Total = 13**						

Product Water Conveyance Pipeline
Total Pipeline Length: 47050 ft 8.9 miles

Redondo To Tie-In No. 9 (STA 1918+50) Sepulveda Feeder ALT 2

Distance: 8.2 Miles						No. 9 Elevation: 65 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	70-75	4	1500	1	-	-	16	None	None	30	Residential, small business
Meyer Ln	North	35-40	2	1350	-	-	Water, SS	15	None	None	30	Residential, small business
Ralston Ln	East	30-35	2	2050	3	-	-	13	None	None	30	Residential
Felton Ave	North	30-35	2	1300	4	-	LACFC Drainage, LACSD, SS	12	None	None	30	Residential, Adams Middle School and Washington Elementary on southbound of Felton
182nd St	East	55-60	4	3200	5	Hawthorne	LACFC Drainage, LACDPW SS, Power poles, RR	6, 11	None	None	30	Pacific Crest Cemetery at Inglewood and 182nd, El Nido Park, North High School on corner of Yukon and 182nd
Hawthorne Blvd	North	100-105	6	3200	6	Artesia	Utilities may be on side street	127	None	None	30	High traffic, commercial on southbound, residential on northbound
Redondo Beach Blvd.	Northeast	70-75	4	11300	11	Prairie, Crenshaw	Power pole on both sides	128	None	YES	10-30	High traffic, golf course, school, commercial on both sides
Van Ness Ave (Arrive at No.9)	Nroth	60	4	12300	11	Manhattan Beach Blvd, Rosecrans, Marine, El Segundo	MWD Feeder	-	None	None	10-30	Commercial
					Total = 54	**Total = 12**						

Product Water Conveyance Pipeline
Total Pipeline Length: 43550 ft 8.2 miles

Redondo To Tie-In No. 9 (1918+50) Sepulveda Feeder ALT 3

Distance: 8.9 Miles						No.9 Elevation: 65 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	45-50	2	1200	1	N Catalina	-	24, 25	None	None	30	Residential
Beryl St	Northeast	50-55	2	6150	12	PCH, Prospect	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
190th St	East	75	4	17500	24	Anza, Inglewood, Hawthorne, Prairie, Crenshaw	Water,SS	16, 17, 28	None	None	30	Residential and commercial up to Hawthorne Blvd., residential on westbound and industrial tank farms east bound from Prairie to Van Ness
Van Ness Ave (Arrive at No.9)	North	60	4	22200	34	Artesia, Redondo Beach Blvd, Manhattan Beach Blvd, Marine, Rosecrans, El Segundo	MWD Feeder, Drainage Channel Overcrossing	1	None	YES	10-30	Residential and commercial
					Total = 71	**Total = 15**						

Product Water Conveyance Pipeline
Total Pipeline Length: 47050 ft 8.9 miles

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No.7

Redondo Plant

Alternative No.1 (6.6 miles)

Alternative No.2 (5.4 miles)

Alternative No.3 (5.6 miles)

MWD Waterlines

Connection Site: No.7 West Coast Fdr

Projects\Projects\West Basin Desalination Plant\Alternatives to Site No3&10_Redondo.mxd [Printed 02/22/2011] Photography Date: N/A Bing Prepared by: Ayk Unanyan (Right of Way Engineering Team) Checked by: Bahram Akhavan Job#: GIS11-02-26

The Metropolitan Water District of Southern California
Corporate Resources Group

West Basin Desal
Alternatives to Site No.7

Feet
0 2,000 4,000

Redondo To Tie-In No. 7 (768+69.38) West Coast Feeder ALT 1

Distance: 6.3 Miles						No.7 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
N. Francisca Ave	North	50	2	800	-	-	-	-	None	YES	30	Industrial
Valley Dr (Francisca becomes Valley)	North	30-35	2	17200	50	Gould, Manhattan Beach Blvd	SS,SD, Water	105,106	None	None	30	Medium traffic, mainly residential, schools and parks: Hermosa Beach Education Foundation, Robinson Elementary, Clark Field, Valle Park, Live Oak Park
Marine Ave	East	25-70	4	7500	16	Sepulveda	SS, water, power	81	None	None	30	Residential, Marine Ave Park near Aviation Blvd.
Aviation Blvd (Arrive at No. 7,)	North	70	4	8000	11	Rosecrans	Reclaimed water by West Basin, SD, Power (D/B conduit), Tele. Pole	103	None	None	30	Residential north of Rosecrans, commercial on southbound of Aviation
					Total = 77	**Total = 4**						

Product Water Conveyance Pipeline
Total Pipeline Length: 33500 ft 6.3 miles

Redondo To Tie-In No. 7 (768+69.38) West Coast Feeder ALT 2

Distance: 5.1 Miles						No.7 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
N. Francisca Ave	North	50	2	800	-	-	-	-	None	YES	30	Industrial
Herondo St	East	75-80	4	2800	4	PCH	-	17,18	None	None	30	Residential
N Prospect Ave	Northeast	30	2	3800	25	-	SS, power, substation on sidewalk, powerpoles on both sides, new pavement	51	None	None	30	Residential
Aviation Blvd (Arrive at No. 7,)	North	70	4	19600	42	Grant, Artesia, Manhattan Beach Blvd, Marine, Rosecrans	Reclaimed water by West Basin, SD, Power (D/B conduit), Tele. Pole	103	None	None	30	Commercial to Artesia Blvd., Residential Till Manhattan Beach Blvd., Aviation Park at Aviation and Manhattan Beach Blvd., residential north of Rosecrans, commercial on southbound of Aviation
					Total = 71	**Total = 6**						

Product Water Conveyance Pipeline
Total Pipeline Length: 27000 ft 5.1 miles

Redondo To Tie-In No. 7 (768+69.38) West Coast Feeder ALT 3

Distance: 5.6 Miles						No.7 Elevation: 80 Feet						
General		Engineering							Geotechnical			Environmental
Street	Direction	Street Width (ft)	No. of Lanes	Street Length(ft)	No. of Street Crossing	Major Intersection Crossings	Major Utilities	Street Picture	Active Fault Crossings	Liquefaction Potential	Historical Groundwater Level	Environmental Concerns
Francisca Ave	Southeast	50	2	1200	1	N. Catalina	-	24,25	None	None	30	Residential
Beryl St	Northeast	60	2	6150	12	Prospect, PCH	-	19,47	None	None	30	Residential, Dominquez Park at Beryl and 190th
Blossom Ln (Beryl becomes Blossom)	North	25-30	2	10250	30	Artesia	SS, Water	34,35,36	None	None	30	Residential
Warfield Ave	West	25-30	2	1150	1	-	SS, SD, water	37,38	None	None	30	Residential
Aviation Blvd	North	70	4	10900	16	Manhattan Beach Blvd, Marine, Rosecrans	Reclaimed water by West Basin, SD, Power (D/B conduit), Tele. Pole	103	None	None	30	Residential north of Rosecrans, commercial on southbound of Aviation, Aviation Park at Aviation and Manhattan Beach Blvd
					Total = 60	**Total = 7**						

Product Water Conveyance Pipeline
Total Pipeline Length: 29650 ft 5.6 miles

Appendix B

Field Notes and Pictures

12/27/10

(1)

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: 488

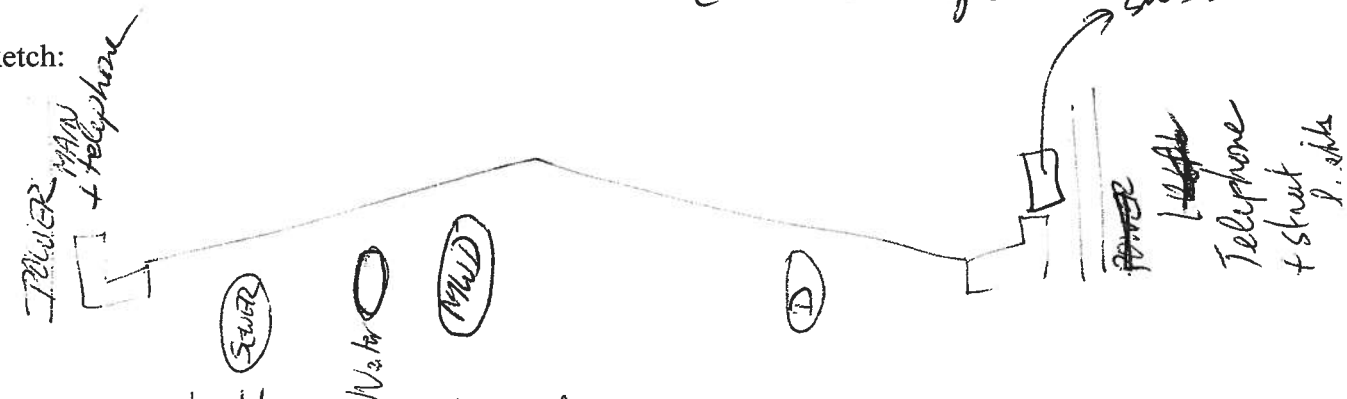
Alignment Name: Redondo to 488

Street Address: Van Nes

Nearest Cross Street: 169th

Picture Number, direction and Location: (1) @ 169 looking south

Sketch:



☒ Water: probably an 8" or less

☒ Power: Poles

☒ Gas: local

☒ Sewer: major collector w/ manhole @ intersection

☒ Telephone: above ground

☒ Storm Drains: W storm water 36" manhole

☐ Trunk Line: D

☐ Trunk Line: _____

☐ Traffic: 4 Lane, 2 each way, school zone

☐ Transportation: _____

☐ Facilities: School / Wash

2

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: 4 & 8

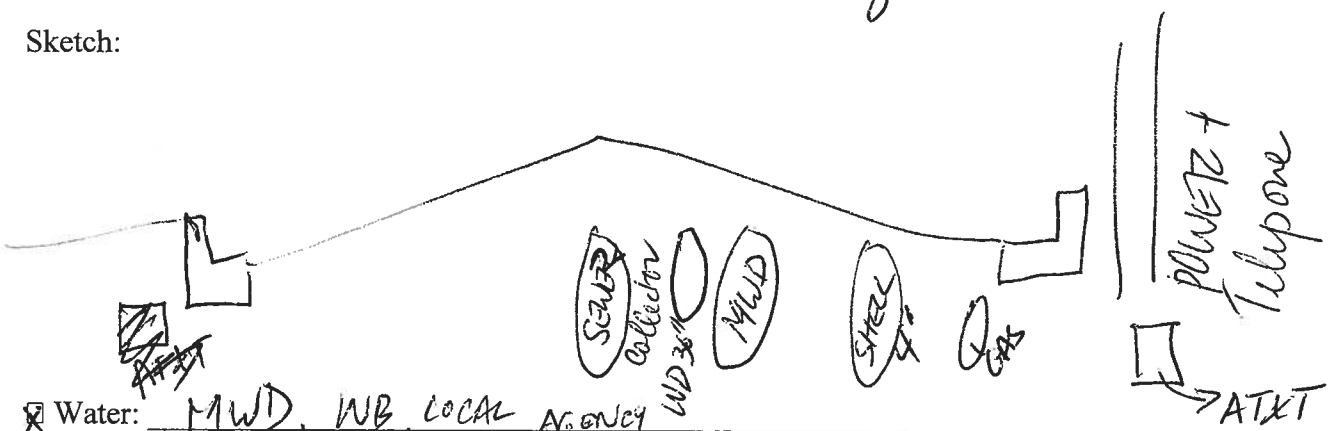
Alignment Name: beyond alignment

Street Address: Van Ness

Nearest Cross Street: 173 Rd St.

Picture Number, direction and Location: (2) looking south

Sketch:



☒ Water: MWD, WB, LOCAL AGENCY

☒ Power: above ground

☒ Gas: local

☒ Sewer: _____

☒ Telephone: above ground on

☒ Storm Drains: _____

☒ Trunk Line: WB, ~~STEEL~~

☐ Trunk Line: SHELL

☒ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

2

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

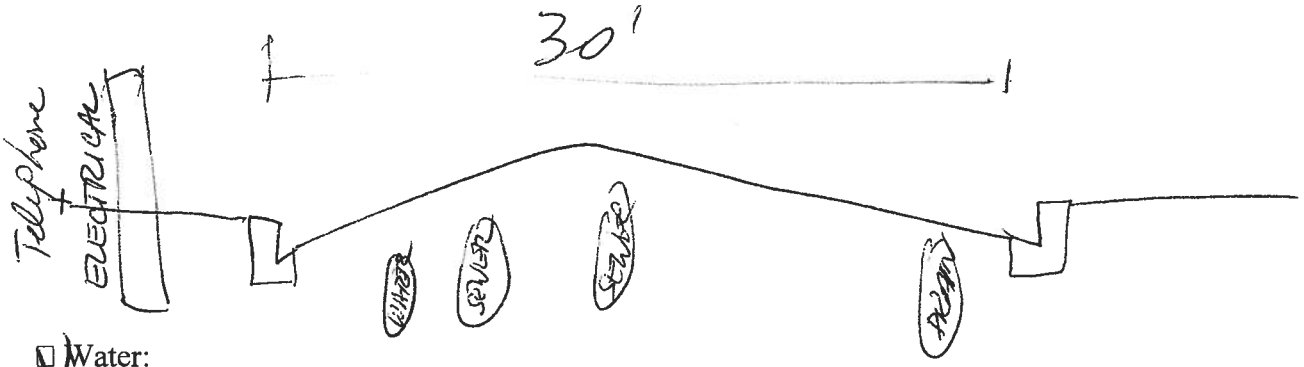
Alignment Name: 4,8

Street Address: 17041 SY

Nearest Cross Street: Wilkie

Picture Number, direction and Location: (3) _____

Sketch:



☑ Water: _____

☐ Power: _____

☐ Gas: _____

☑ Sewer: _____

☑ Telephone: _____

☐ Storm Drains: _____

☑ Trunk Line: Sewer

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

3

4

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

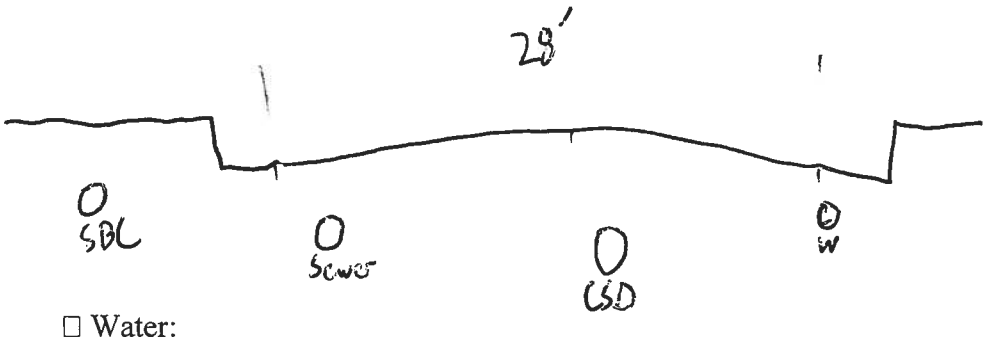
Alignment Name: _____

Street Address: 171st St. (east pic 4)

Nearest Cross Street: Yukon (south pic 5)

Picture Number, direction and Location: (4, 5)

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

4, 5

4

5

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Yukon

Nearest Cross Street: Artesia, Artesia, 177th, 405, 182nd

Picture Number, direction and Location: (6,7,8,9,10

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

6, 7, 8, 9, 10

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

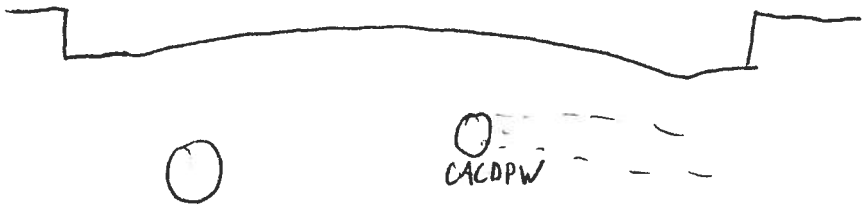
Alignment Name: _____

Street Address: 182nd

Nearest Cross Street: Yukon

Picture Number, direction and Location: (_____) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

7

10

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: 187 _____

Nearest Street: Hawthorne _____

Picture number, direction and Location: (11)

Sketch:

Water:

☐ Gas: _____

☐ Telephone

☐ Storm Drains

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____


Hawthorne Blvd
TJ-max

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

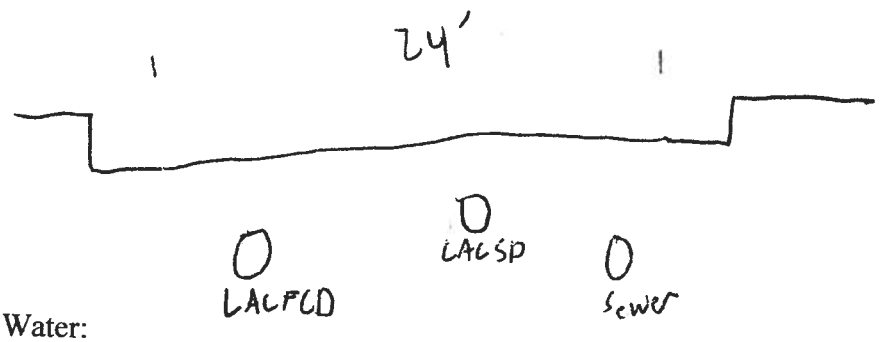
Alignment Name: _____

Street Address: Felton

Nearest Cross Street: 183rd St

Picture Number, direction and Location: (12) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☑ Sewer: _____

☐ Telephone: _____

☑ Storm Drains: _____

☑ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Ralston ln

Nearest Cross Street: Felton

Picture Number, direction and Location: (13) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

13

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Meyer Ln

Nearest Cross Street: Ralston Ln

Picture Number, direction and Location: (14) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

14

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

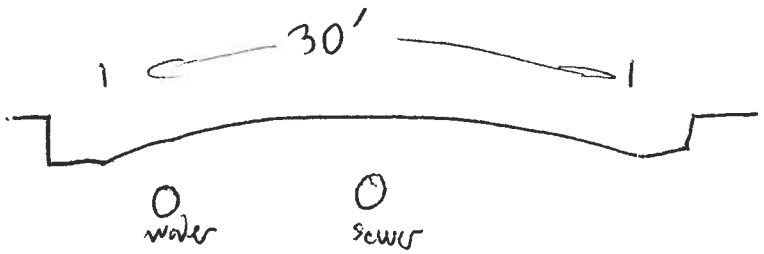
Alignment Name: _____

Street Address: Meyer

Nearest Cross Street: Meyer 190th

Picture Number, direction and Location: (15) _____

Sketch:



☑ Water: _____

☐ Power: _____

☐ Gas: _____

☑ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

15

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: 190th

Nearest Cross Street: Meyer ln

Picture Number, direction and Location: (16) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____


SPECIAL

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Hermosa

Nearest Cross Street: PCH

Picture Number, direction and Location: (17) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

17

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Hermosa

Nearest Cross Street: Redondo Beach Desal Outlet

Picture Number, direction and Location: (18) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

18

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

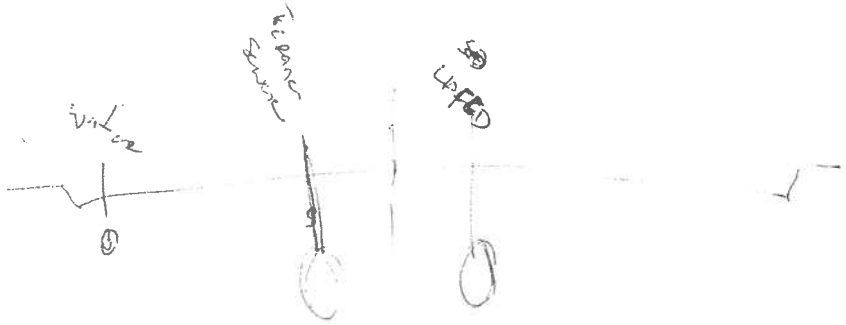
Alignment Name: _____

Street Address: Beryl ~~190th~~ Looking South

Nearest Cross Street: 190th

Picture Number, direction and Location: (18) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

30

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Btwn (looking East along powerline)

Nearest Cross Street: 190th

Picture Number, direction and Location: (~~19~~ 20, 21

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

20, 21

WARNING

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Beryl St look South.

Nearest Cross Street: _____

Picture Number, direction and Location: (~~22~~ 22, 23)

Sketch:

☐ Water: _____

☐ Power: _____

☒ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

22 23

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Francisca

Nearest Cross Street: Beryl St.

Picture Number, direction and Location: (24) 25 looking North

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

24, 25


RAM VAN
4HOF954

25

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: _____

Nearest Cross Street: Catalina ~~st~~ on Francisco – next to Starbucks by Pla

Picture Number, direction and Location: (_____) _____

Sketch: 26 looking north east
27 looking north west at stu

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

26, 27

27

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: 190th St. looking east 3, 4, 8,

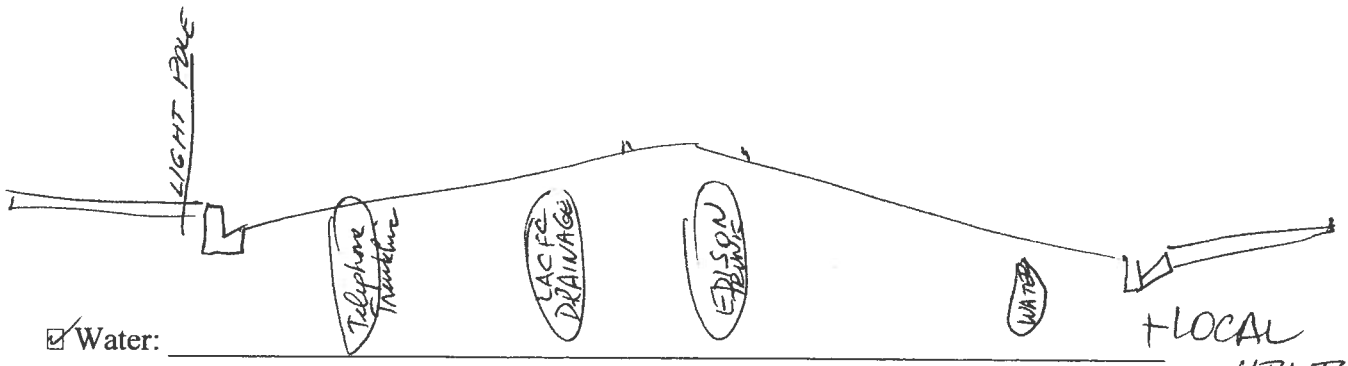
Alignment Name: 190th

Street Address: Intersection of BERYL & 190th

Nearest Cross Street: BERYL

Picture Number, direction and Location: (28) looking east on 190th

Sketch:



☑ Water: _____

☑ Power: Both underground and above ground – Huge

☑ Gas: _____

☑ Sewer: _____

☑ Telephone: _____

☑ Storm Drains: _____

☐ Trunk Line: MOBILE, ARCO, OTHER OIL LINES TURN DOWN BERYL

☐ Trunk Line: _____

☒ Traffic: High traffic area

☒ Transportation: _____

☒ Facilities: Substation + Apartments

↳ north side ↳ south side

28

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

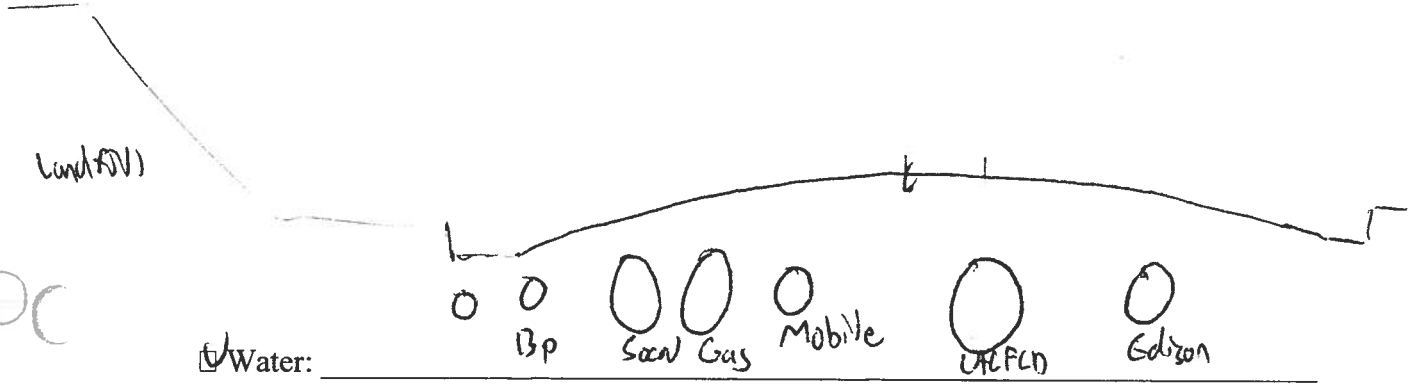
Alignment Name: _____

Street Address: 140th

Nearest Cross Street: Beryl

Picture Number, direction and Location: (_____) _____

Sketch:



☑ Water: _____

☑ Power: Edison

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☑ Storm Drains: LACFCD

☑ Trunk Line: BP, Mobile (O.V)

☑ Trunk Line: SoCW Gas

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Entrada

Nearest Cross Street: Arvada

Picture Number, direction and Location: (29) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

29

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

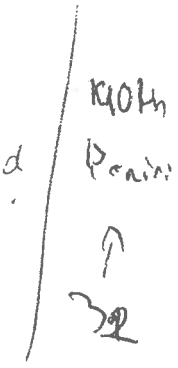
Alignment Name: Hawthorne Hawthorne going toward 190 st.

Street Address: ~~Hawthorne~~ La Cienega

Nearest Cross Street: _____

Picture Number, direction and Location: (_____) 30 & 31

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

30, 31, 32

32

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: 190th #3

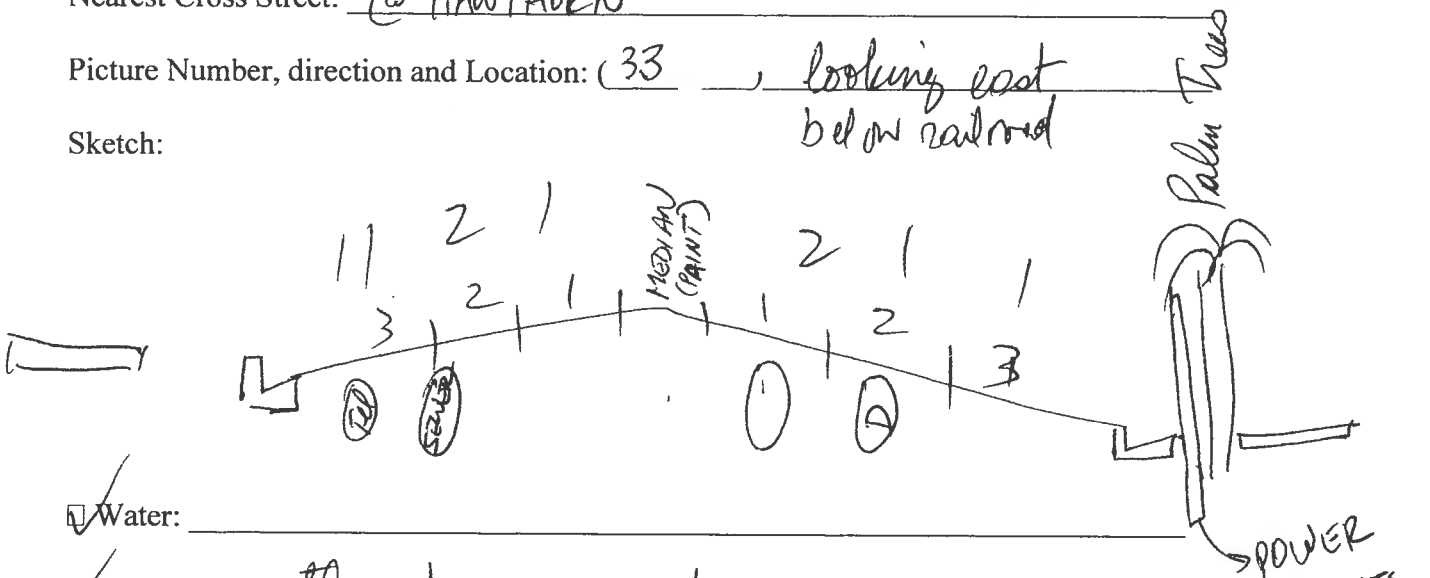
Alignment Name: 190th going east

Street Address: ~~HAWTHORN~~ Various, driving east.

Nearest Cross Street: @ HAWTHORN

Picture Number, direction and Location: (33 , looking east below railroad

Sketch:



☑ Water: _____

☑ Power: mostly above ground

☑ Gas: _____

☑ Sewer: _____

☑ Telephone: above ground

☑ Storm Drains: one or two appear to be in this street

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: HEAVY, 2 lanes ~~east~~ @ Crenshaw west, 3 lanes EAST @ Crenshaw

☐ Transportation: BUSES, BIKE ROUTES,

☐ Facilities: RETAIL / INDUSTRIAL

33

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

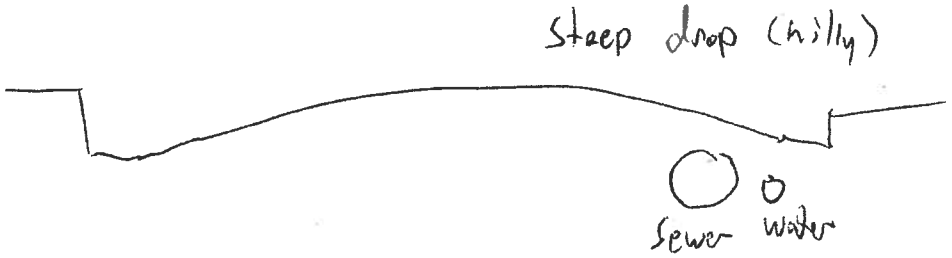
Alignment Name: _____

Street Address: Blossom

Nearest Cross Street: 190th & Grant

Picture Number, direction and Location: (~~32~~ 34, 35 ~~33~~ North ~~34~~ 36

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

34, 35, 3
34, 35, 36

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

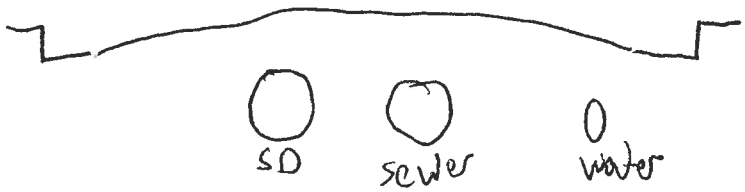
Alignment Name: Blossom

Street Address: Blossom

Nearest Cross Street: Farrel

Picture Number, direction and Location: (_____)_____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

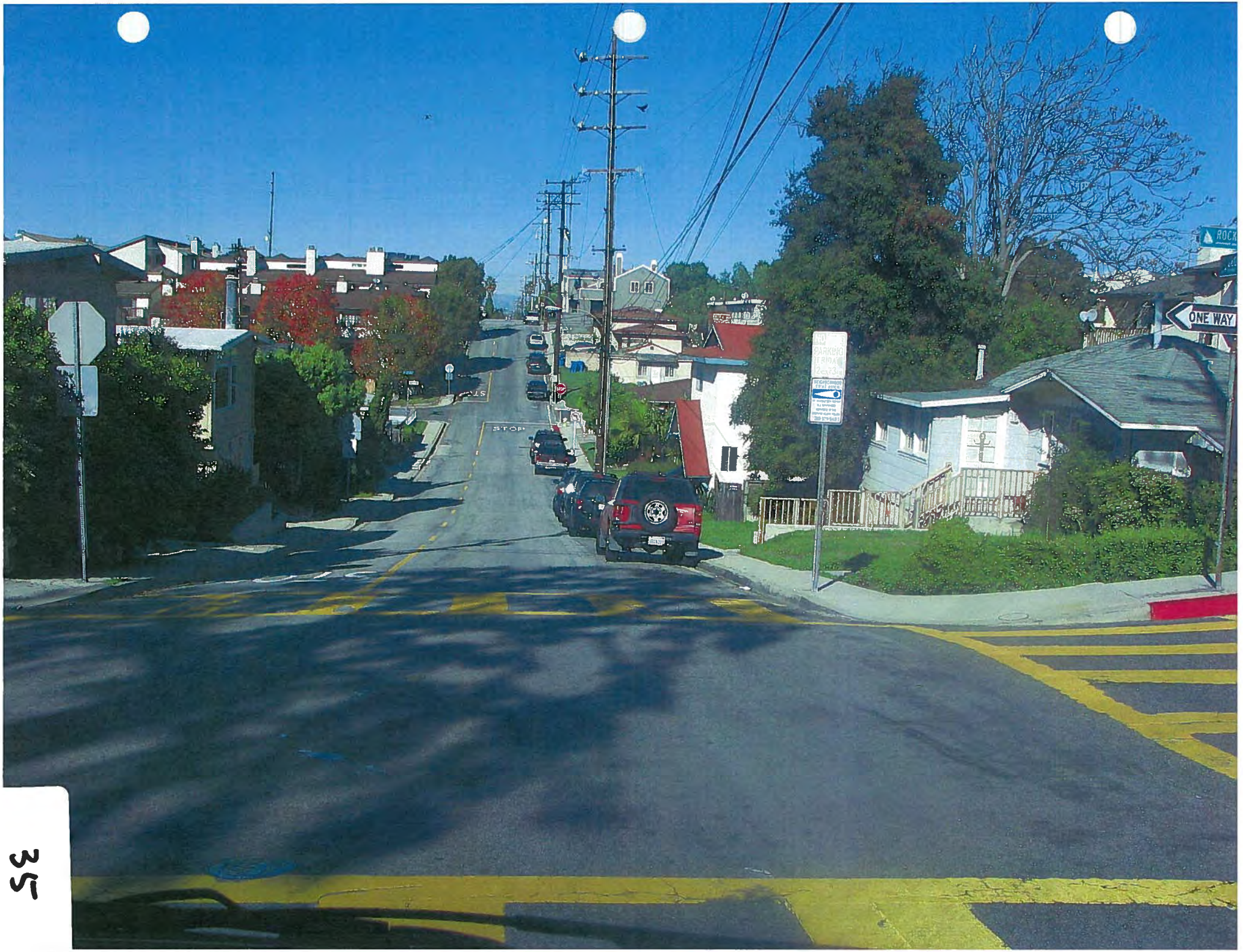
☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____


STOP
STOP



35


NO
STOPPING

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

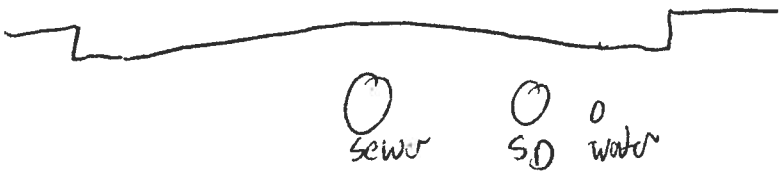
Alignment Name: _____

Street Address: Warfield, Redondo

Nearest Cross Street: Green, Manhattan Beach

Picture Number, direction and Location: (~~35~~ 36 North
37, 38

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

37,38


TURNING
TRAFFIC
MUST
YIELD TO
PEDESTRIANS

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

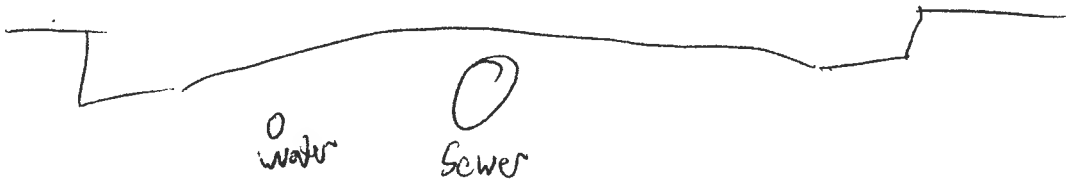
Alignment Name: _____

Street Address: Redondo 11th West

Nearest Cross Street: Manhattan Beach, South Herrin

Picture Number, direction and Location: (~~37~~, 39) ~~39~~

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

39, 40

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

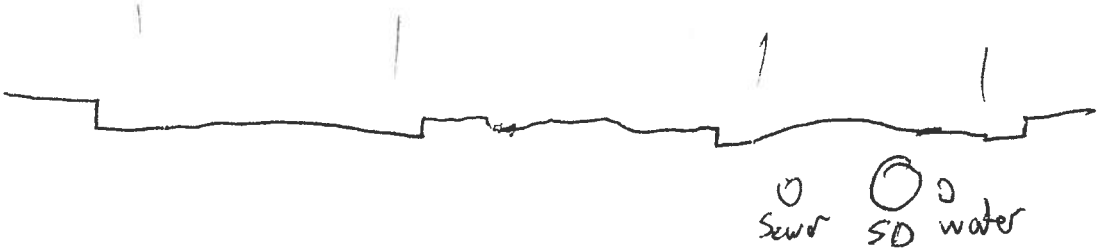
Alignment Name: _____

Street Address: Valley

Nearest Cross Street: Manhattan Beach, thirtith

Picture Number, direction and Location: (41, 42) 43

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

41, 42, 43

41

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: Valley

Nearest Cross Street: ~~Manhattan Beach~~ 2nd

Picture Number, direction and Location: (45, 44) _____

Sketch:

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

44, 45

44

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

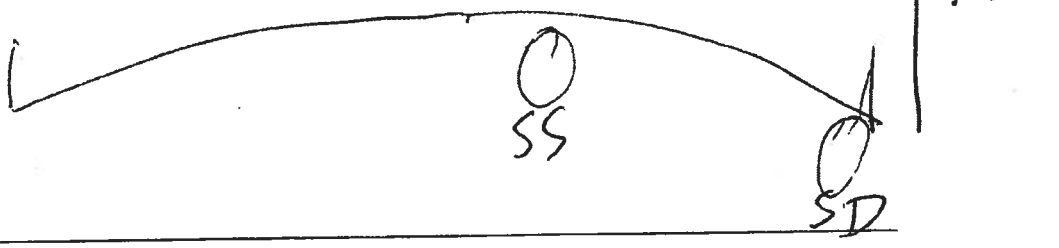
Alignment Name: _____

Street Address: Blanca St. Elena Ave.

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) , NW

Sketch: 2 Lanes wide st. (50' or more)



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

46

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

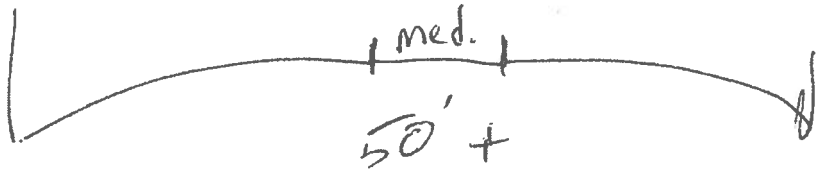
Street Address: Beryl

Nearest Cross Street: B

Picture Number, direction and Location: ( ) , N

Sketch:

wide 2 Lanes st.



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

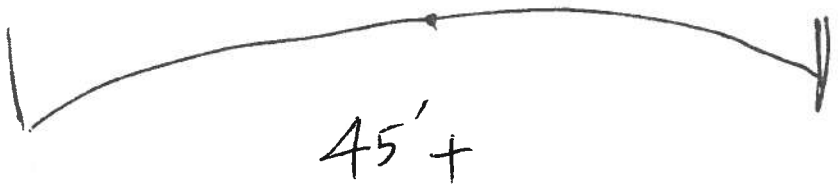
Alignment Name: _____

Street Address: Carnelian St.

Nearest Cross Street: ____ _____

Picture Number, direction and Location: (3) , downstream

Sketch: wide 2 Lane st.



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

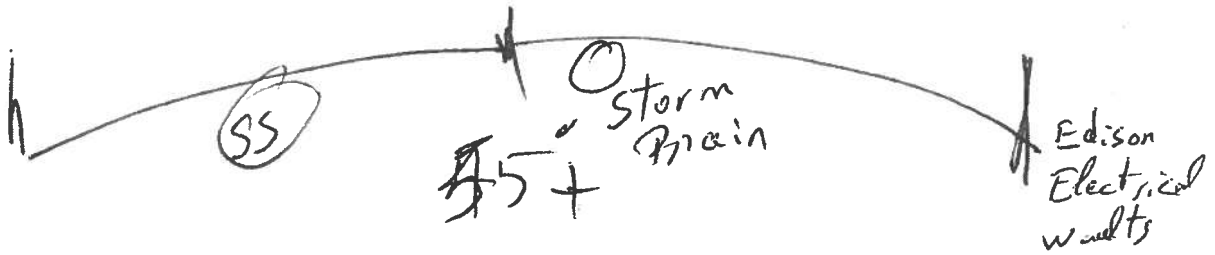
Alignment Name: _____

Street Address: Broadway

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) D stream

Sketch: 2 Lane wide Appartment Buildings



☐ Water: _____

☐ Power: Line after Diamon st. on the Right

☐ Gas: After Torrane on the left.

☒ Sewer: _____

☐ Telephone: Fire st. @ pearl (Right Hand)

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

49

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

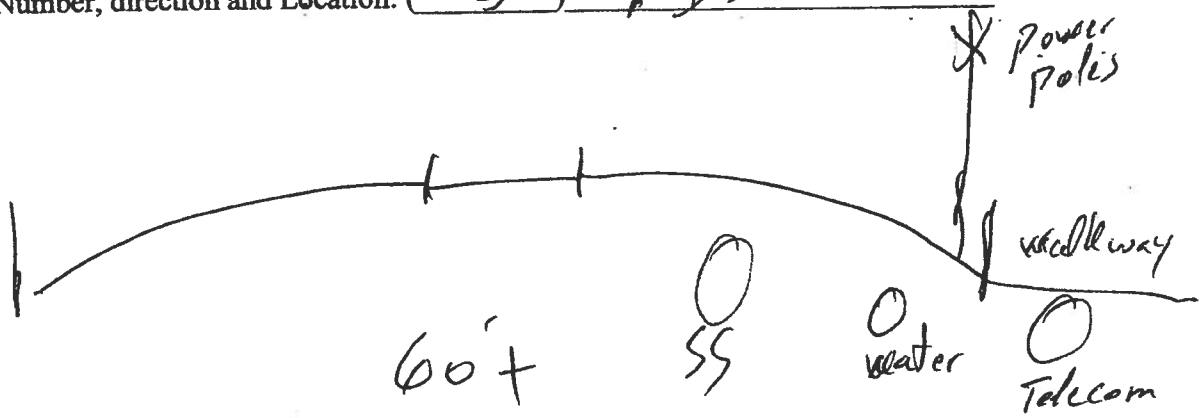
Alignment Name: _____

Street Address: Knob Hill Ave

Nearest Cross Street: _____

Picture Number, direction and Location: (~~3~~) DS

Sketch:



☒ Water: _____

☒ Power: After saphire get narrower

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

50

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

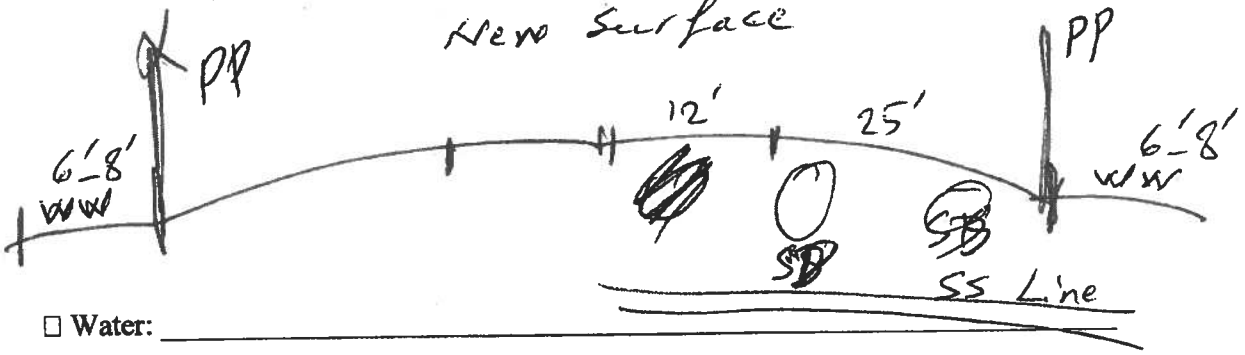
Alignment Name: _____

Street Address: Prospect

Nearest Cross Street: ____ _____

Picture Number, direction and Location: (~~6~~) , D S.

Sketch: 4 Lanes wide PP on both side
New Surface



Sub Station

☐ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

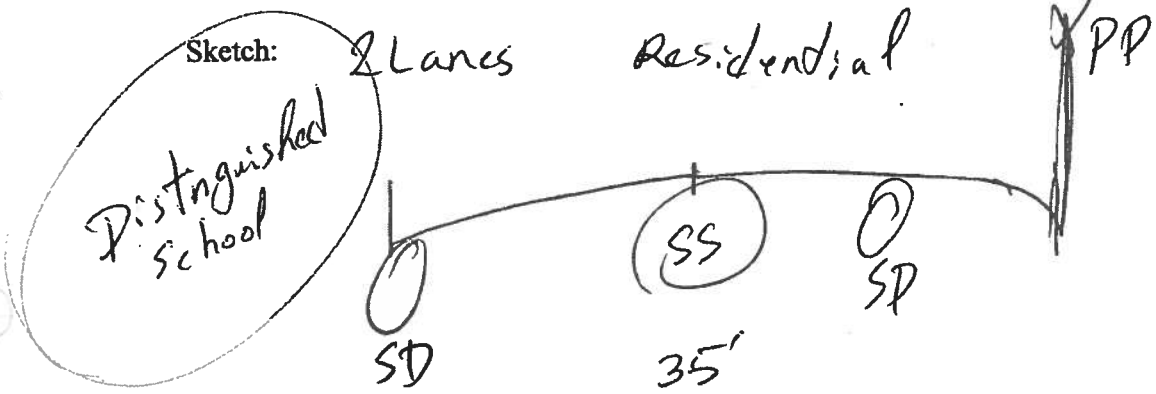
Alignment Name: _____

Street Address: _____ Ave. H _____

Nearest Cross Street: ____ _____

Picture Number, direction and Location: (7) , DS _____

Sketch:



☐ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

52

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

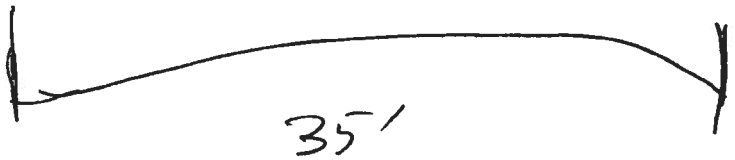
Alignment Name: _____

Street Address: Sharynne LA.

Nearest Cross Street: _____

Picture Number, direction and Location: (8) _____

Sketch: Quiet st. nice st.



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

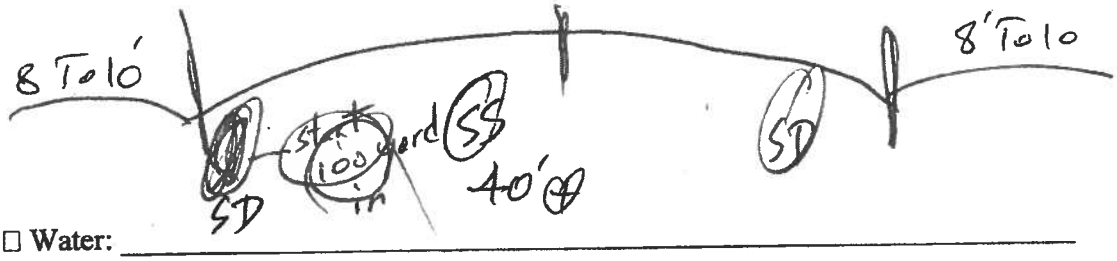
Alignment Name: _____

Street Address: Kathryn Ln

Nearest Cross Street: _____

Picture Number, direction and Location: (4) _____

Sketch: 2 Lane Quiet st. Residential



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: going across 100 yard in Big one

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

45

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

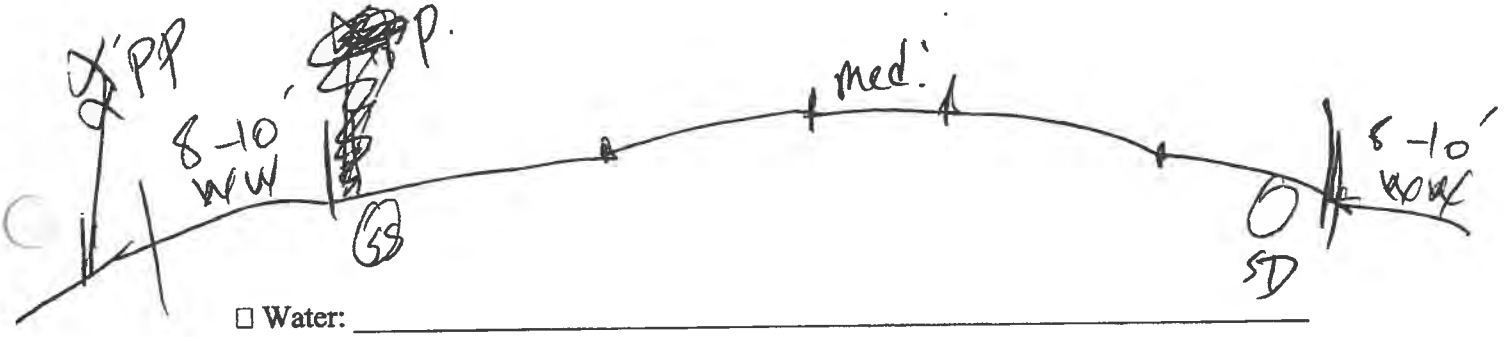
Alignment Name: _____

Street Address: Lomita Bl.

Nearest Cross Street: Anza Ave

Picture Number, direction and Location: (~~left~~), DS. & US

Sketch: 4 Lanes + Med. Not very crowded.



☐ Water: _____

☐ Power: After Hawthorne no PP

☐ Gas: & street is wider

☒ Sewer: After Crenshaw PP on the left.

☐ Telephone: & Pennsylvania No PP again

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: Business, Hosp. Rd, commerical & Industrial

Tank, Farm

55, 56

55

56

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

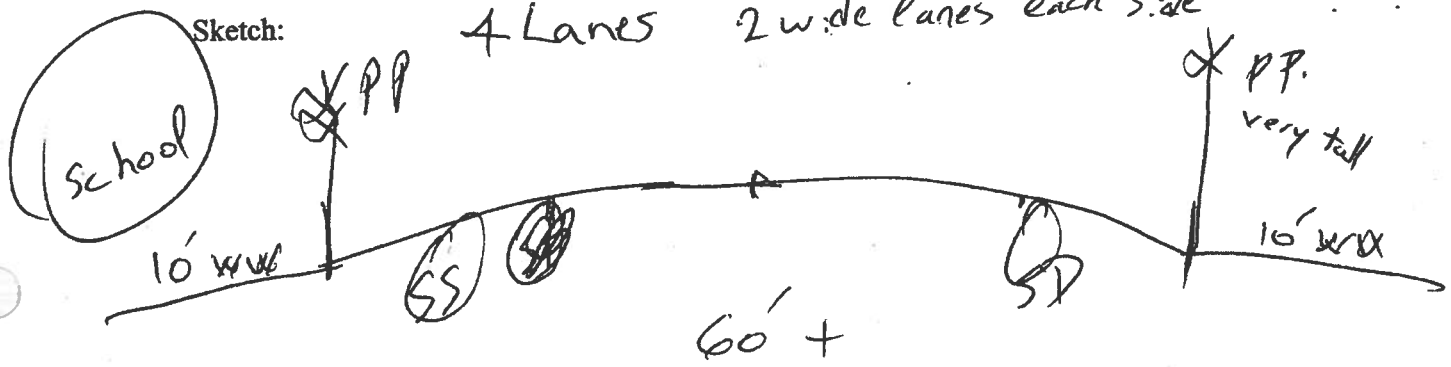
Alignment Name: _____

Street Address: Nar bonne Ave.

Nearest Cross Street: ____ _____

Picture Number, direction and Location: (~~12~~) DS.

Sketch: 4 Lanes 2 wide lanes each side



☐ Water: _____

☐ Power: PP both side

☐ Gas: No. PP after PCH

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: school & Retail stores, church

TOWNE

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

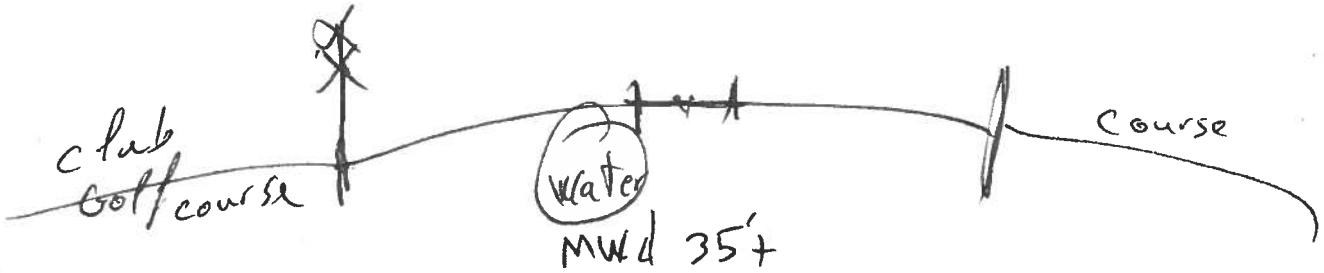
Alignment Name: _____

Street Address: Palos Verdes Dr.

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch: 2 Lanes + med.



☐ Water: _____

☐ Power: When passed Palos Verdes

☐ Gas: become 4 Lanes 10 Pp.

☐ Sewer: Then 2 Lanes

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: For No. 2

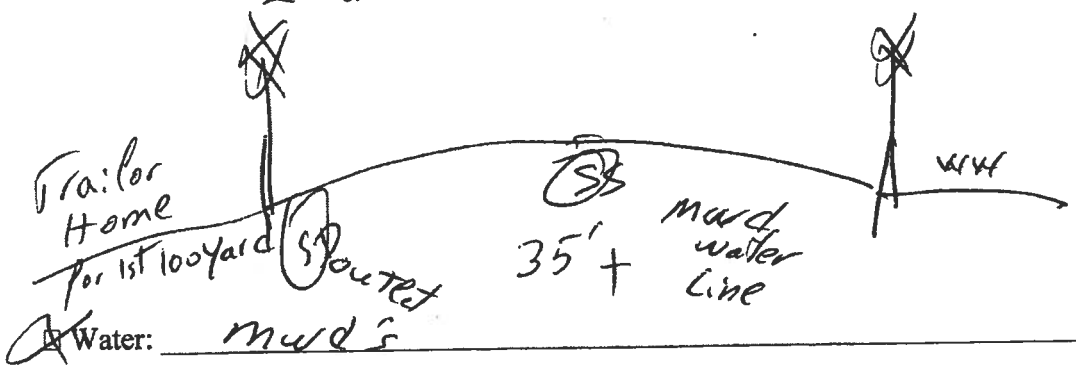
Alignment Name: _____

Street Address: Walnut St.

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch: 2 Lane quiet St. Residential



☒ Water: mud's

☐ Power: it gets wider

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

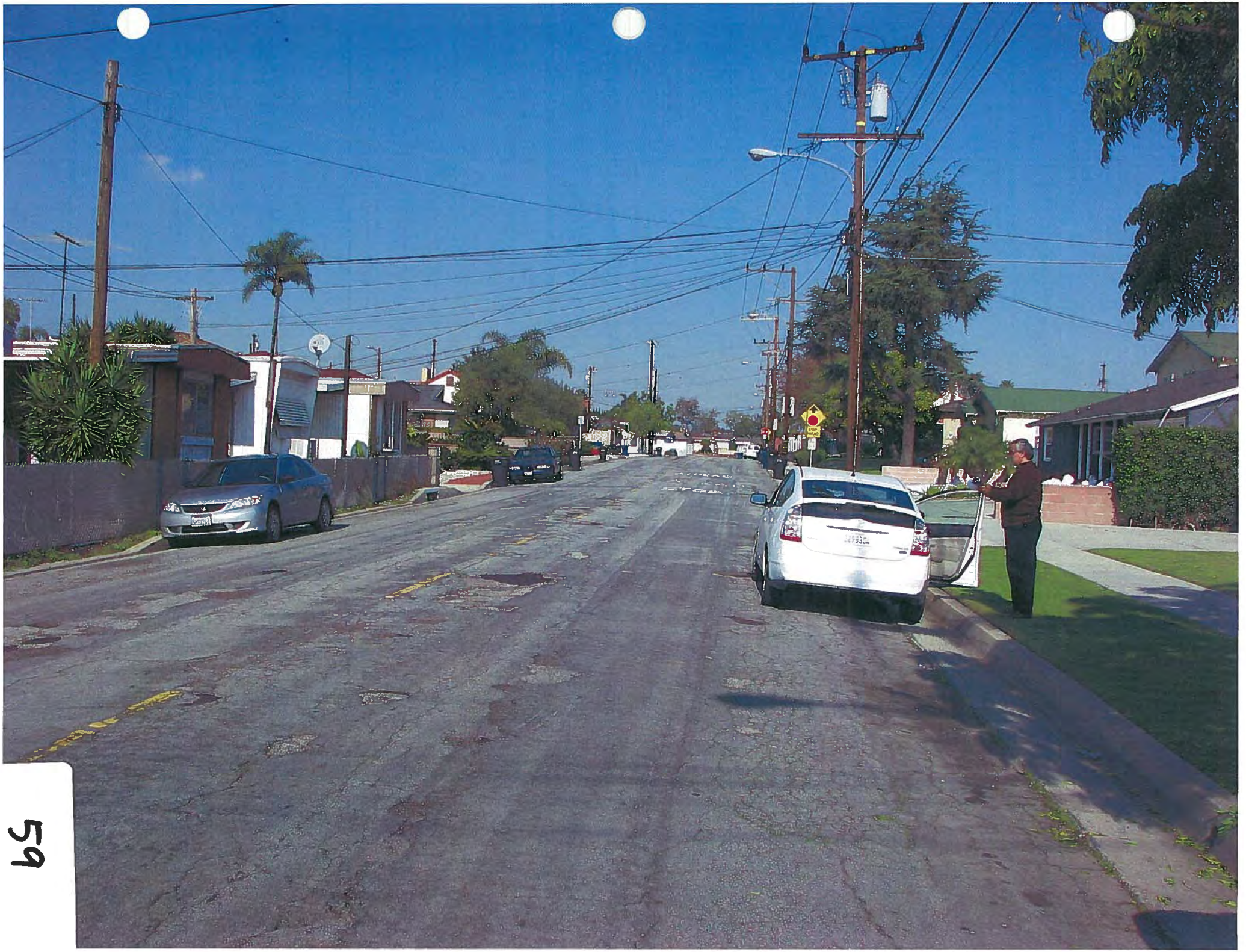
☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____



59

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

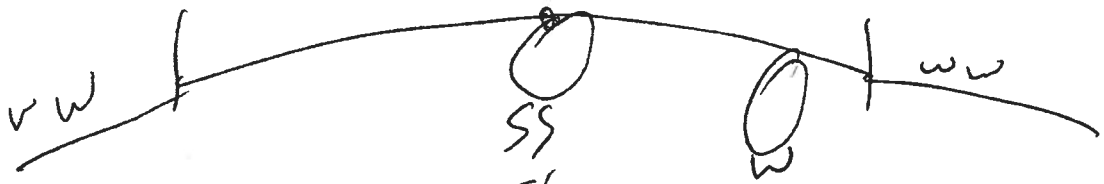
Alignment Name: _____

Street Address: 24 2nd St.

Nearest Cross Street: _____

Picture Number, direction and Location: (~~15~~) , DS.

Sketch: 2 Lane Quiet Residential



35'+

☒ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

09

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

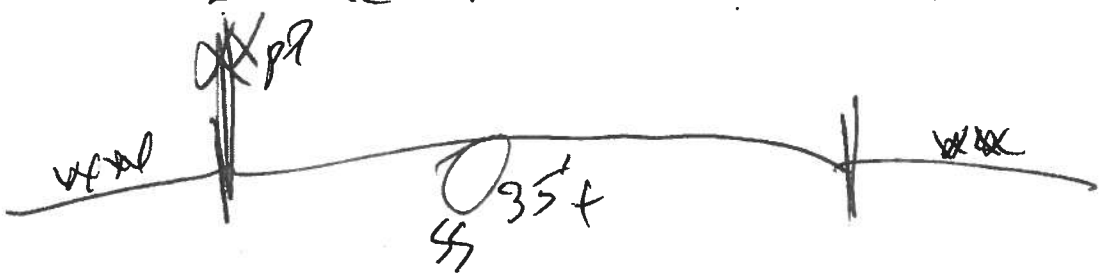
Alignment Name: _____

Street Address: Huber

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) DS

Sketch: 2 Lane Quiet Residential



☐ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

19

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: _____

Alignment Name: _____

Street Address: 242nd

Nearest Cross Street: _____

Picture Number, direction and Location: ([redacted] , DS

Sketch: 2 Lane Residential

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

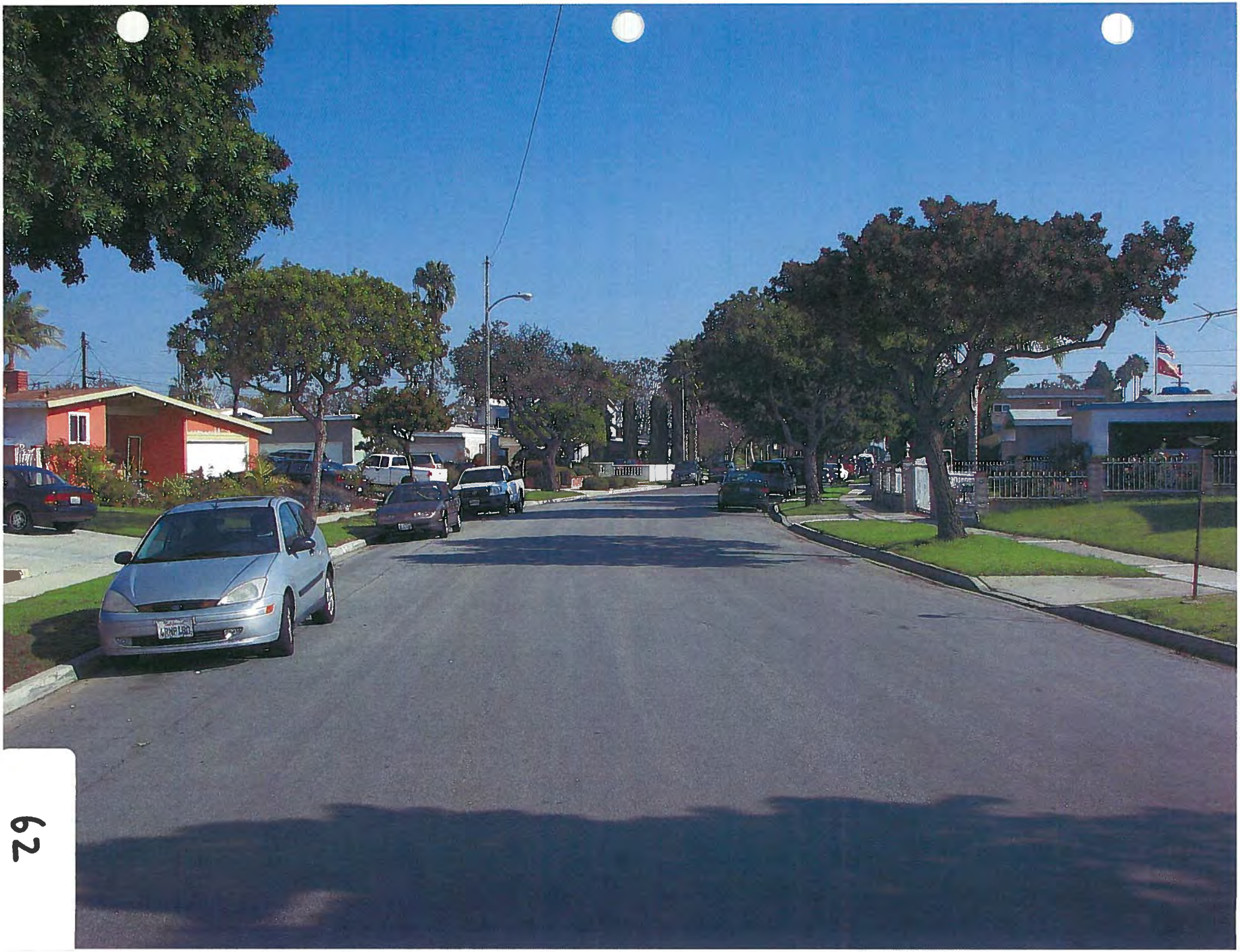
☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____



62

West Basin Desalination Project
Alignment Selection

Date of Site Visit: December 27, 2010 Team Members: _____

Alignment Number: No. 2 Tie-in

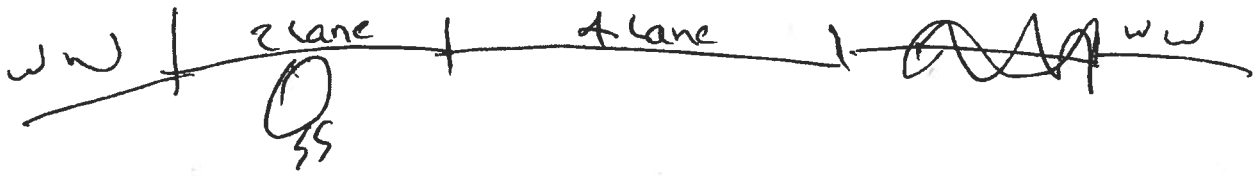
Alignment Name: _____

Street Address: Western

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) , Tie in To No. 2

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: School

63

Jan 31st 201

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: El Segundo TO No. 9

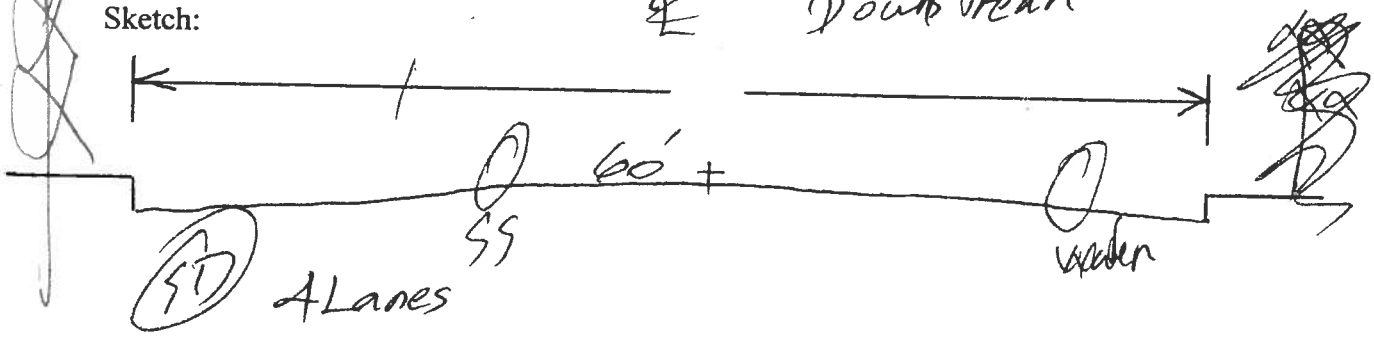
Alignment Name: _____

Street Address: Van Ness

Nearest Cross Street: El Segundo Blvd.

Picture Number, direction and Location: (E) upstream
(E) Downstream

Sketch:



☐ Water: Golf course on the left

☒ Power: Commercial on the (R)

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: Rail Crossing

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

6A.65

64

59

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

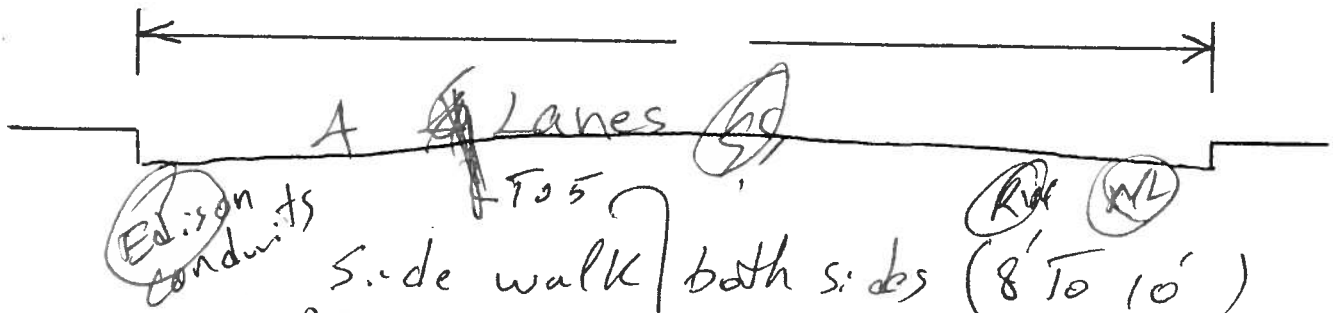
Alignment Name: _____

Street Address: 120th

Nearest Cross Street: _____

Picture Number, direction and Location: (366 DS

Sketch:



☒ Water: & Recycling

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

99

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

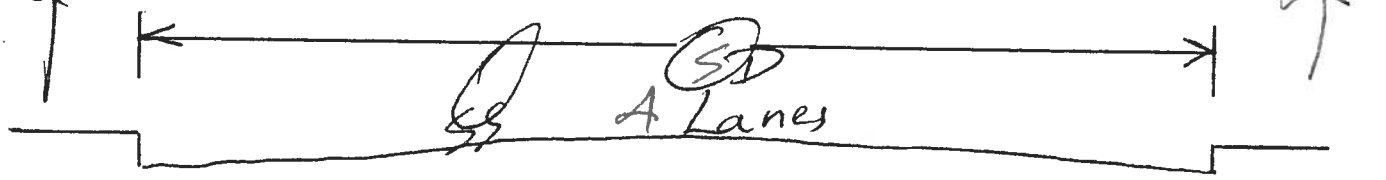
Alignment Name: _____

Street Address: 120th Pass York Ave (West)

Nearest Cross Street: Before freeway

Picture Number, direction and Location: ( ) _____

Sketch:



walkway on Both side Residential

☐ Water: _____

☒ Power: Both side

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

19

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

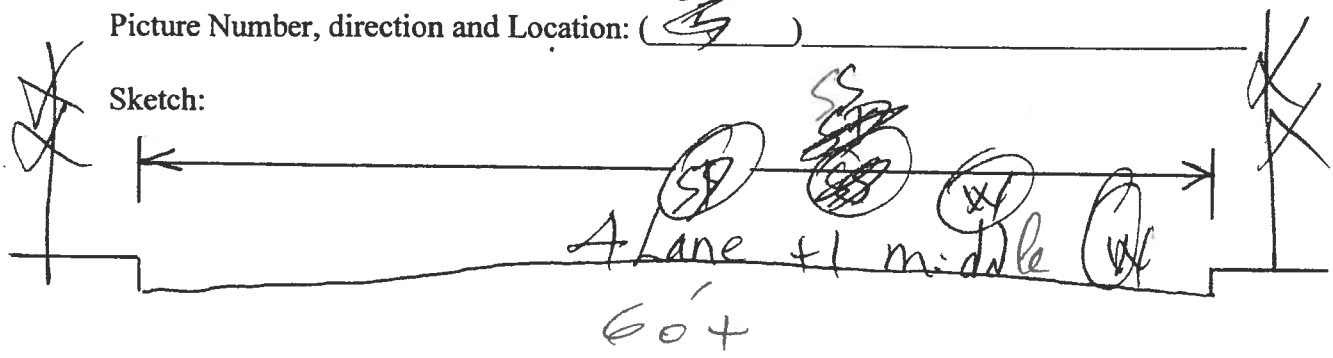
Alignment Name: _____ west of

Street Address: 120th ~~Pass~~ Hawthorne (~~West~~)

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☒ Water: mainly Residential

☐ Power: _____

☐ Gas: _____

☒ Sewer: Furth Pass under freeway

☐ Telephone: _____

☒ Storm Drains: Pass La Cienega

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

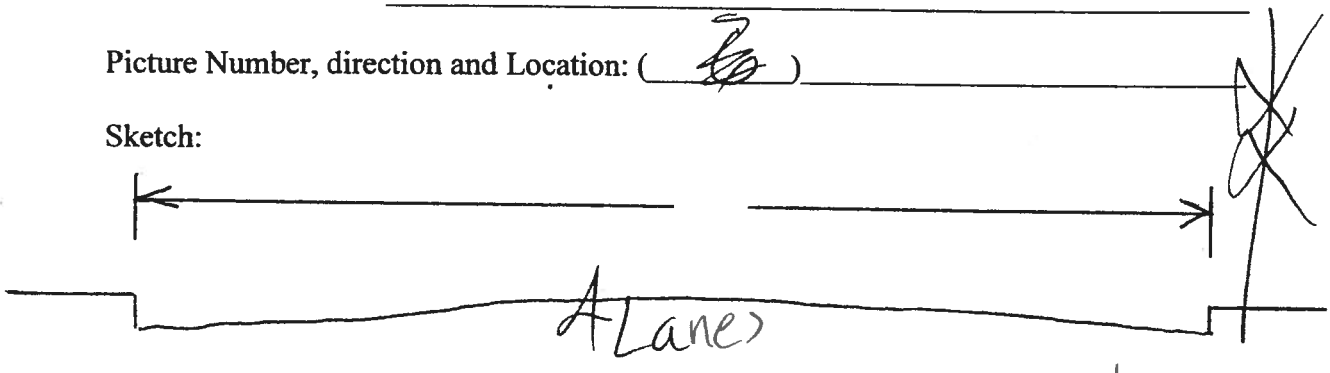
Alignment Name: _____

Street Address: 120th & ISIS Ave

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: _____

☒ Power: Fibre

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

69

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

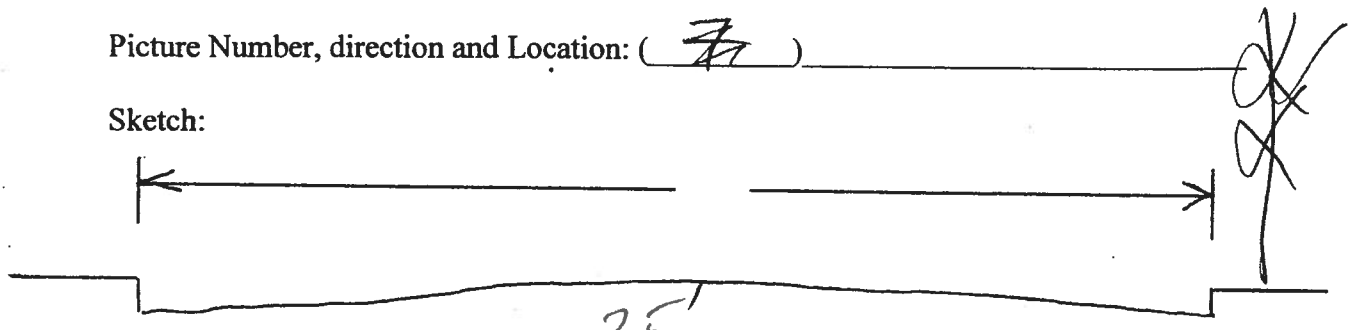
Alignment Name: _____

Street Address: 151S Ave

Nearest Cross Street: _____

Picture Number, direction and Location: (77) _____

Sketch:



☒ Water: _____

☒ Power: Telecom Res. dential

☐ Gas: on west side walk

☒ Sewer: School on the west side

☐ Telephone: _____

☒ Storm Drains: on west side

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Low

☐ Transportation: _____

☐ Facilities: _____

70

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

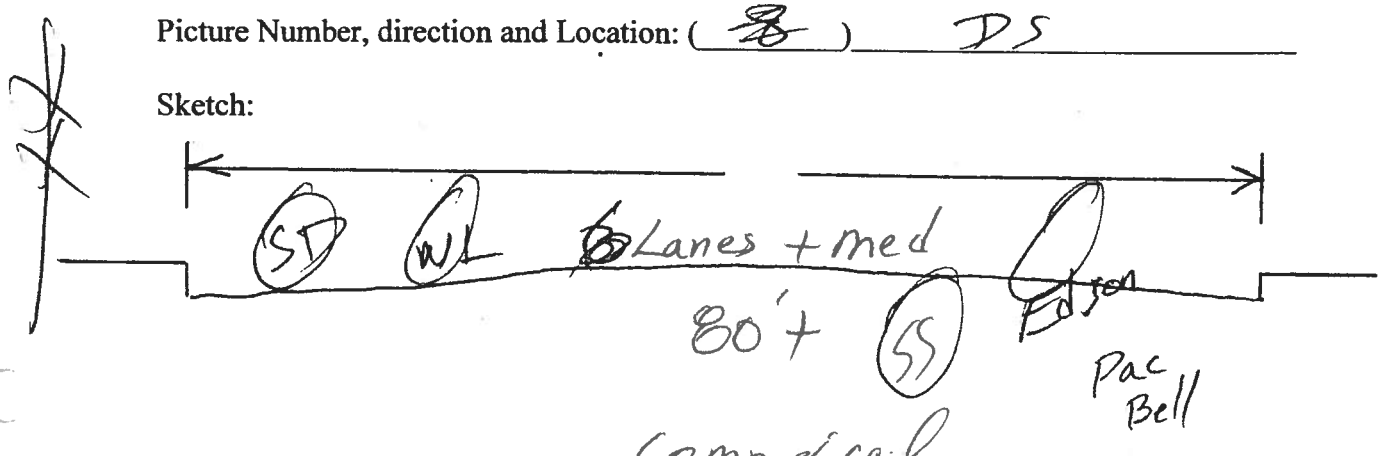
Alignment Name: _____

Street Address: El Segundo west of Aviation

Nearest Cross Street: _____

Picture Number, direction and Location: (~~8~~) DS

Sketch:



☐ Water: Commercial

☒ Power: _____

☐ Gas: Aerospace

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: High

☐ Transportation: _____

☐ Facilities: _____

17

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

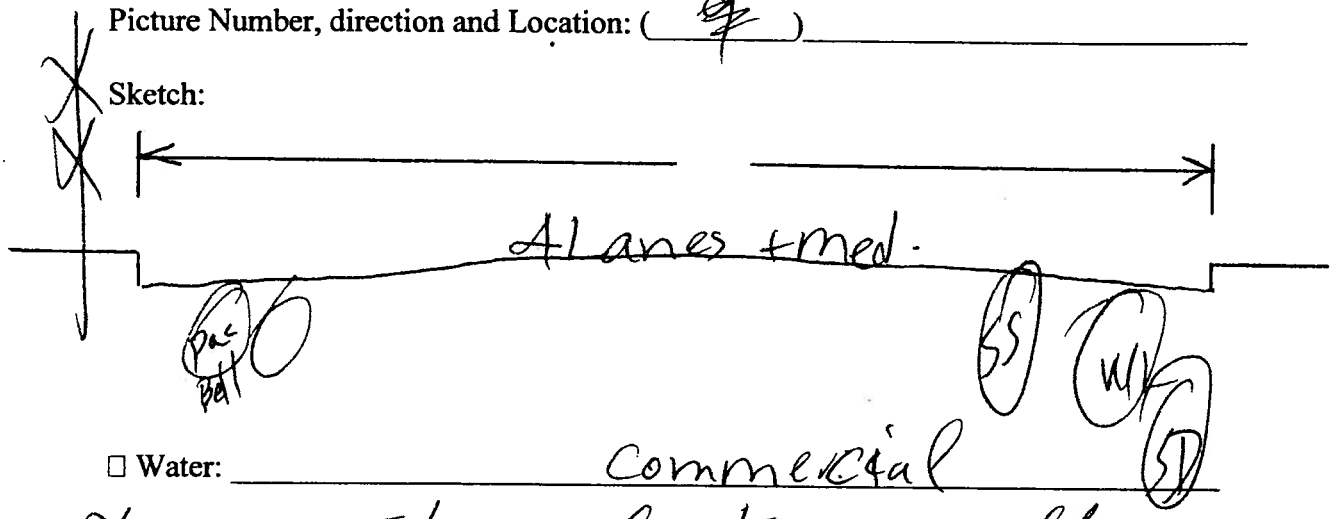
Alignment Name: _____

Street Address: Douglas

Nearest Cross Street: _____

Picture Number, direction and Location: (9) _____

Sketch:



☐ Water: commercial

☒ Power: Fibre, Qwest, Pac Bell

☐ Gas: _____

☐ Sewer: _____

☑ Telephone: ~~Pac~~ Rail crossing over (surface)

☐ Storm Drains: _____

☐ Trunk Line: L Railcrossing under pass Green Line

☐ Trunk Line: North ~~of~~ Rosecrans

☐ Traffic: med.

☐ Transportation: _____

☐ Facilities: ~~Douglas~~ Dead ends south of Rosecrans

BUS

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

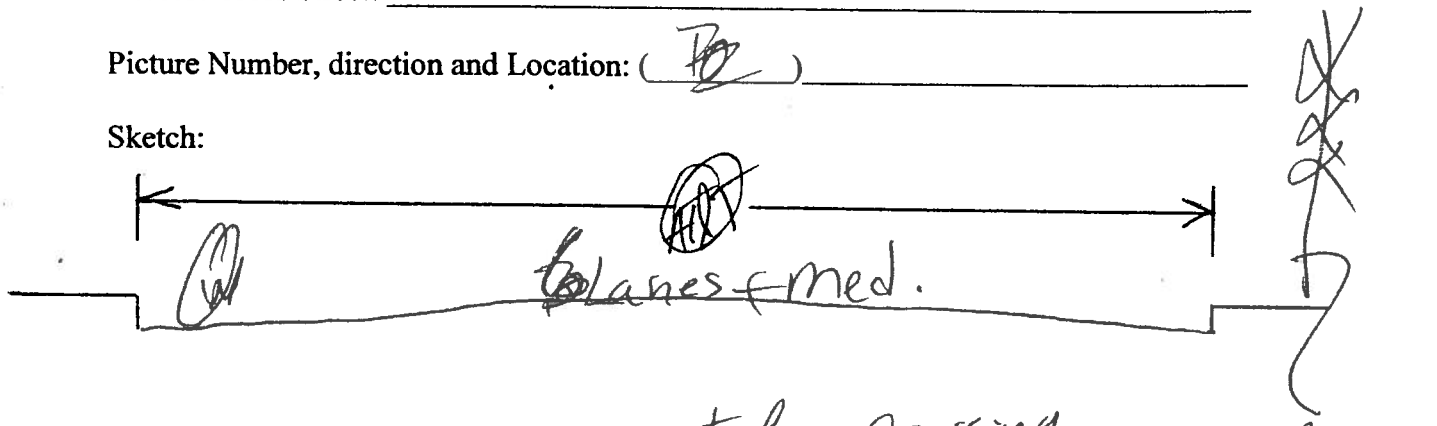
Alignment Name: _____

Street Address: Rosecranes

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: _____

☐ Power: commercial

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: High

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

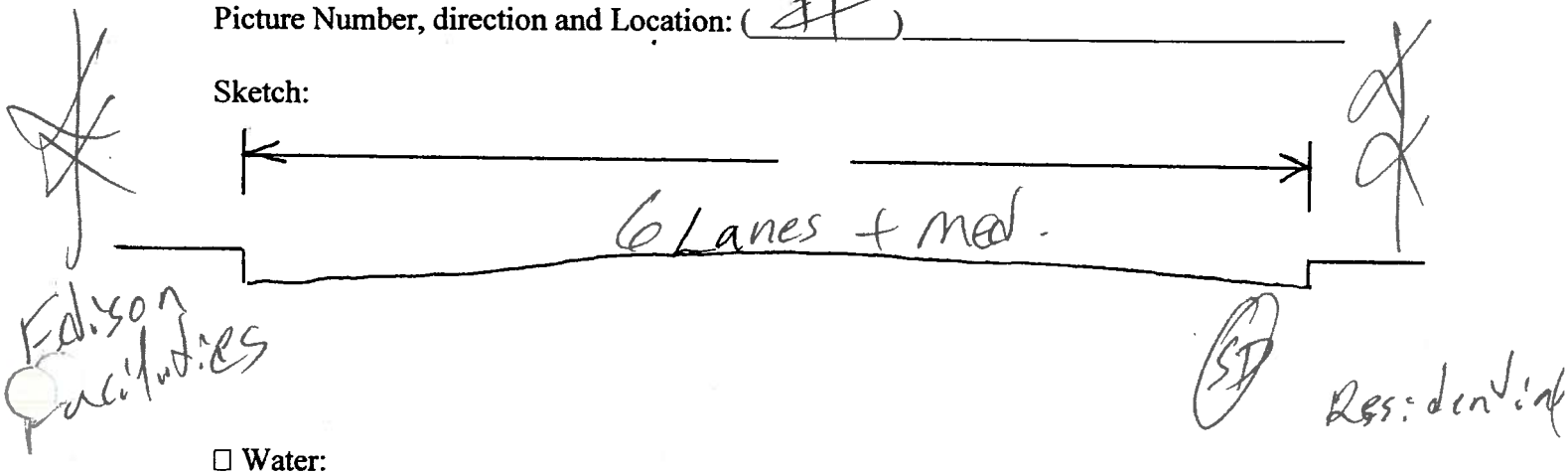
Alignment Name: _____

Street Address: Rosecrans & Pacific Ave.

Nearest Cross Street: _____

Picture Number, direction and Location: (#) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

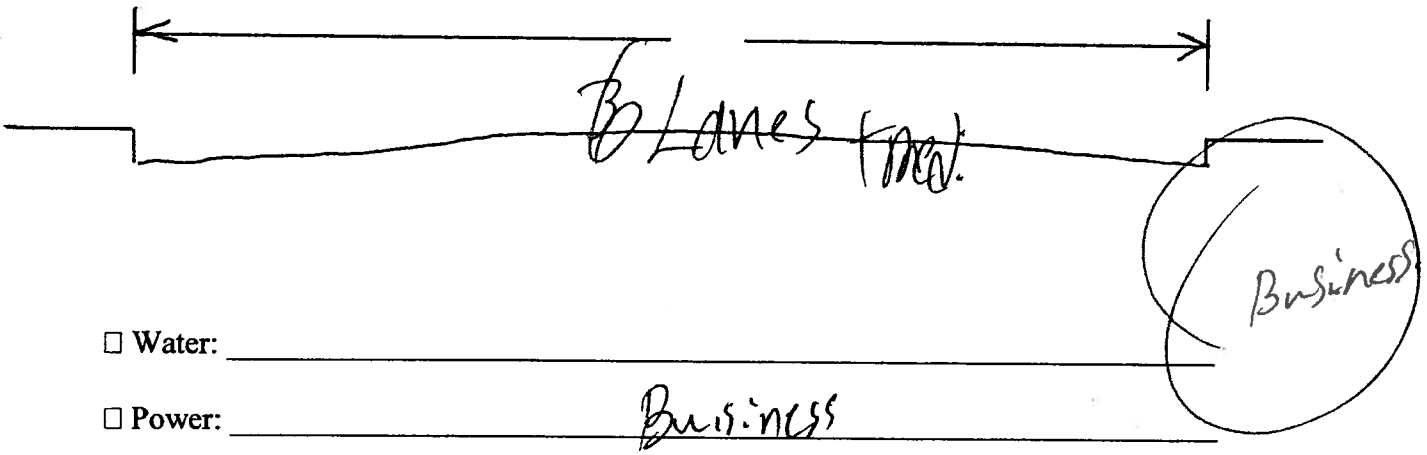
Alignment Name: _____

Street Address: Rosecrans East of Highland

Nearest Cross Street: _____

Picture Number, direction and Location: (77) _____

Sketch:



☐ Water: _____

☐ Power: Business

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

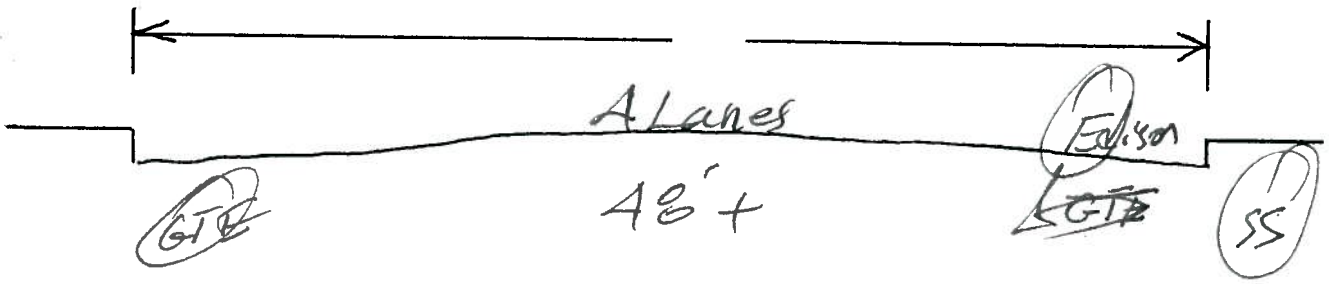
Alignment Name: _____

Street Address: High Land

Nearest Cross Street: _____

Picture Number, direction and Location: (#3) _____

Sketch:



☐ Water: Residential + commercial

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: High

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

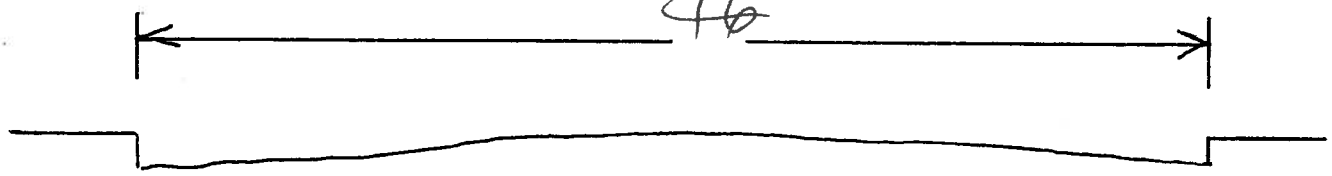
Alignment Name: _____

Street Address: El Segundo Power Plant

Nearest Cross Street: 301 Vista Del Mar

Picture Number, direction and Location: (~~1A~~) DS Vista Del Mar

Sketch:



☐ Water: Location for

☐ Power: Desal @ El

☐ Gas: Segundo

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: Power

☐ Trunk Line: Plant

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

77,78,79

77

78

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: El Seg. to 5

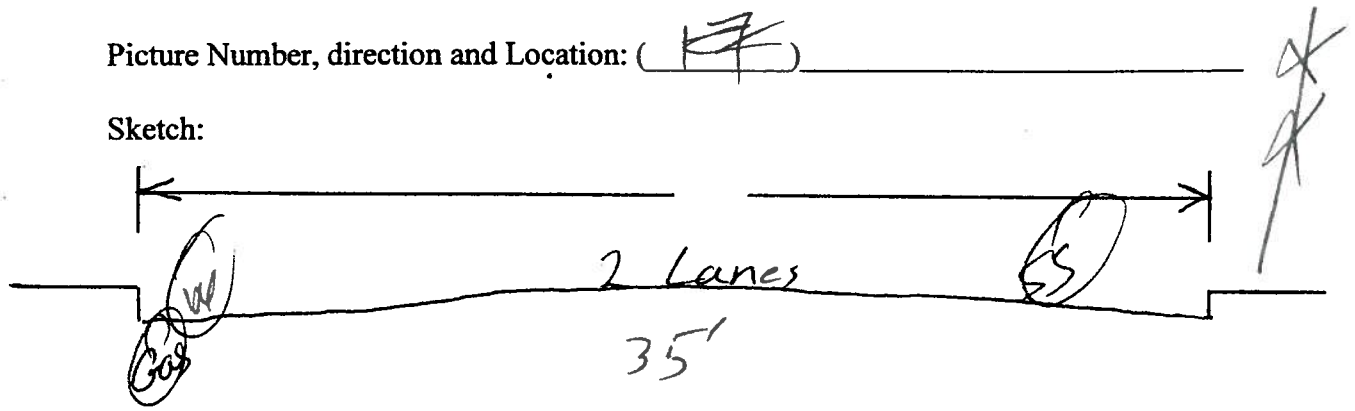
Alignment Name: Plant To Pacific similar to Plant to 7,689

Street Address: Pacific Ave

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: _____

☒ Power: Residential

☒ Gas: _____

☒ Sewer: New sewer line are putting in

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Low

☐ Transportation: _____

☐ Facilities: _____

23

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

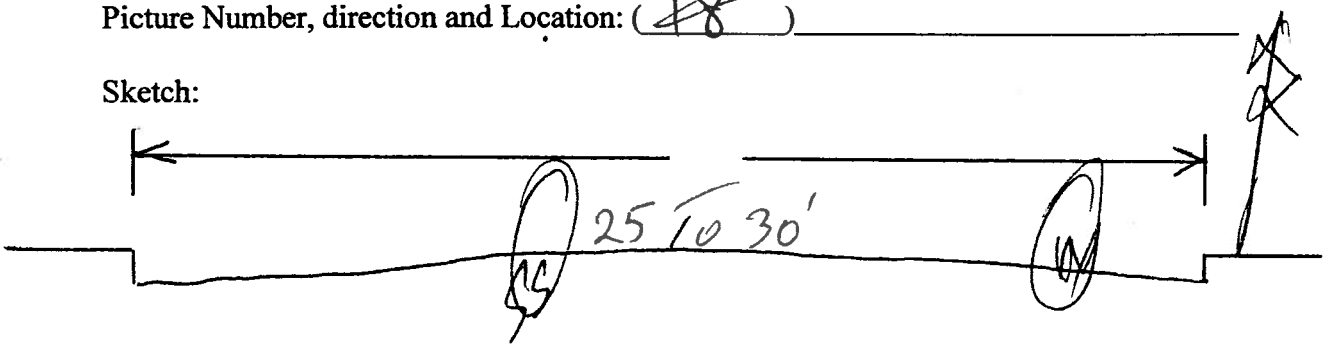
Alignment Name: _____

Street Address: Marine

Nearest Cross Street: _____

Picture Number, direction and Location: (~~E~~ 8) _____

Sketch:



☒ Water: Residential

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

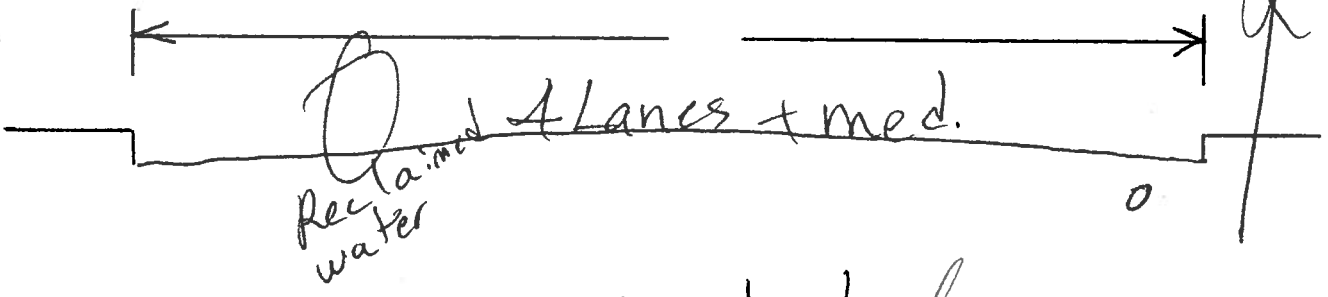
Alignment Name: _____

Street Address: Marine East Sepulveda

Nearest Cross Street: _____

Picture Number, direction and Location: (19) _____

Sketch:



☐ Water: Residential

☒ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: med. High

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: 105

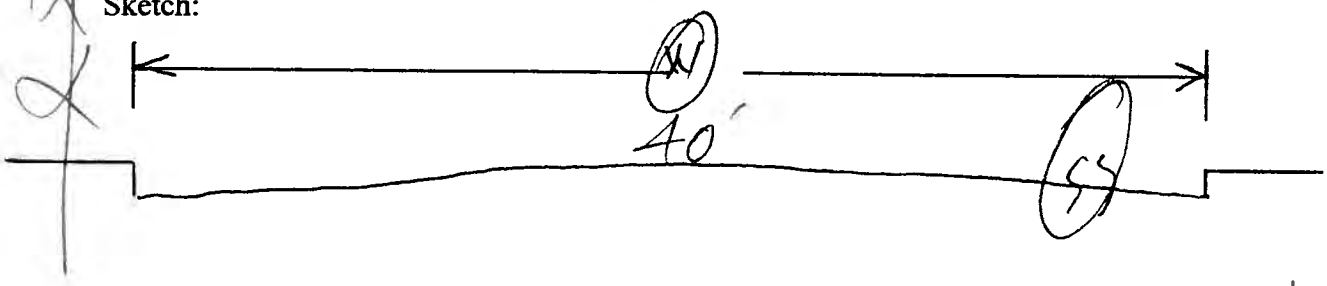
Alignment Name: Redondo going South

Street Address: South of Marina

Nearest Cross Street: _____

Picture Number, direction and Location: (20) _____

Sketch:



Schad

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: LOW

☐ Transportation: _____

☐ Facilities: _____

83

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

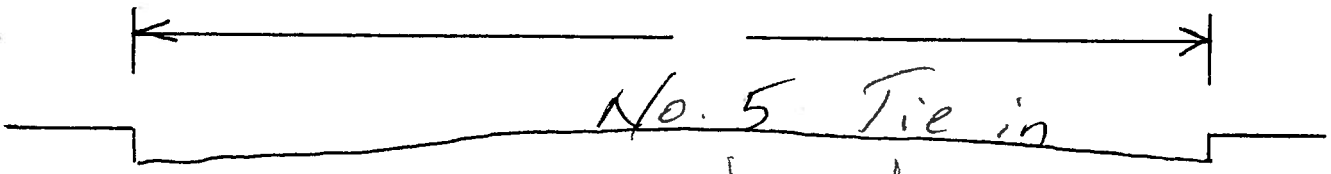
Alignment Name: Redondo Ave

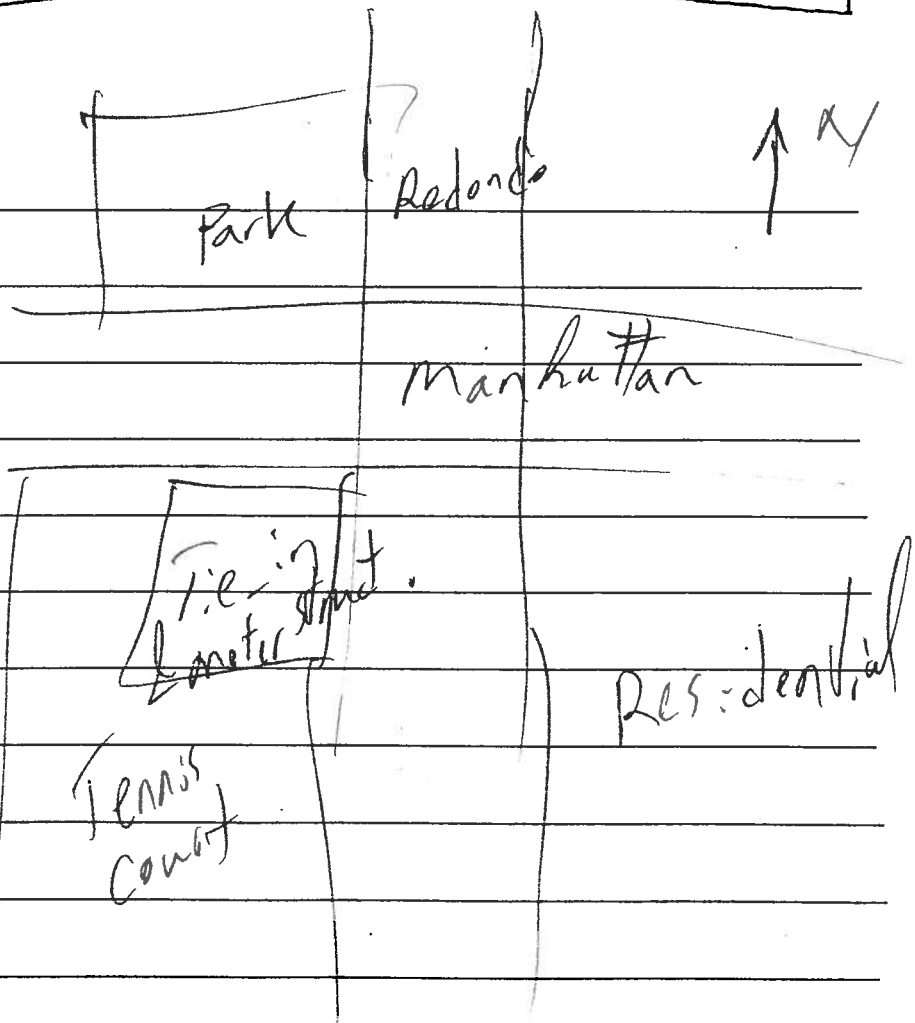
Street Address: _____

Nearest Cross Street: Manhattan Beach Blvd

Picture Number, direction and Location: ~~21, 22, 23~~ (Tie-in)

Sketch:





☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

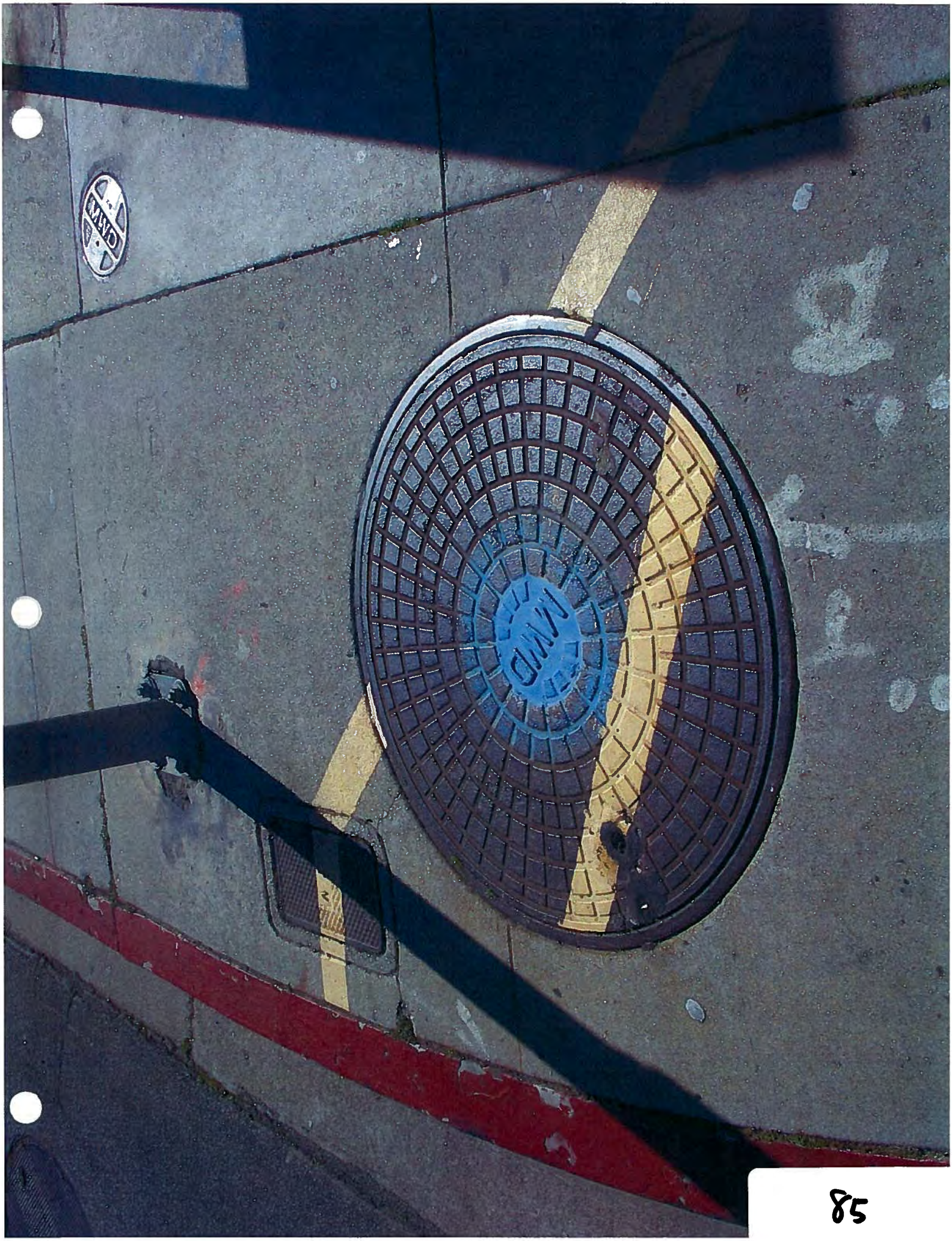
☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

84, 85, 86



West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: El Segundo P A L 8

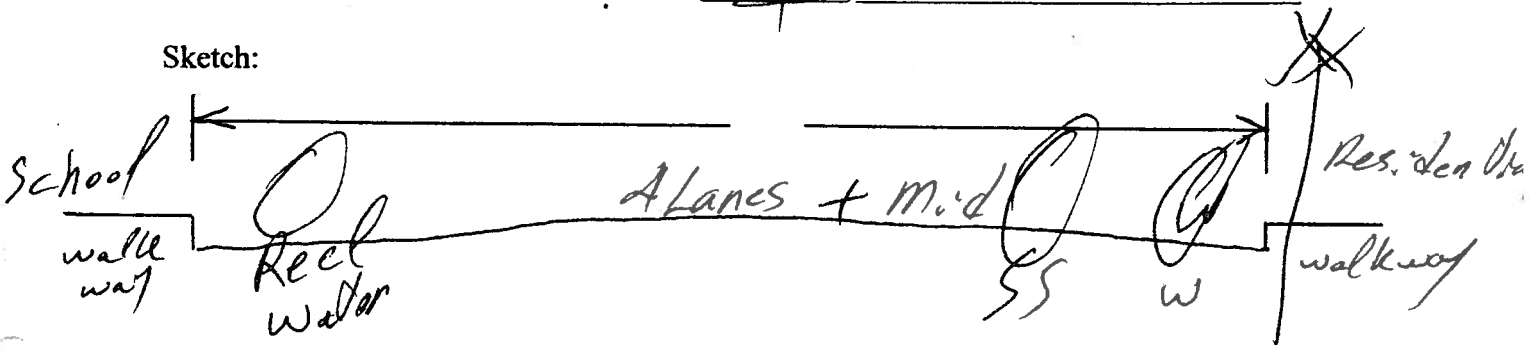
Alignment Name: _____

Street Address: Marine East of Redondo

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: Pass Aviation

☒ Sewer: Power poles on Both sides

☐ Telephone: No medium after Aviation

☐ Storm Drains: _____

☐ Trunk Line: Further East crossing under Greenline

☐ Trunk Line: _____

☐ Traffic: @ Redondo Beach Ave.

☐ Transportation: " East Rail crossing

☐ Facilities: " " Freeway

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

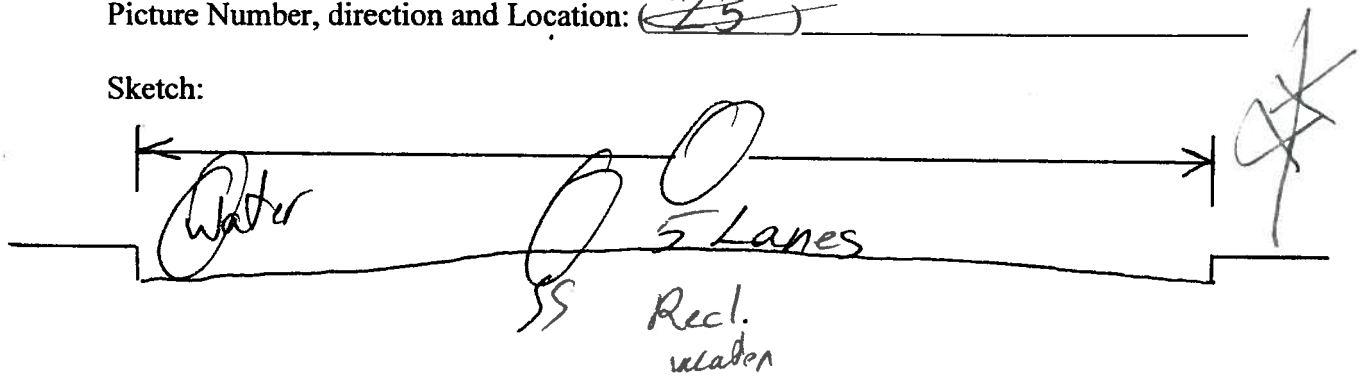
Alignment Name: Marine Ave East of Freeway

Street Address: _____

Nearest Cross Street: _____

Picture Number, direction and Location: ~~25~~ _____

Sketch:



☒ Water: _____

☒ Power: Commercial on North & South

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Med. To High

☐ Transportation: _____

☐ Facilities: Further East pass Inglewood Ave

No power poles

27

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

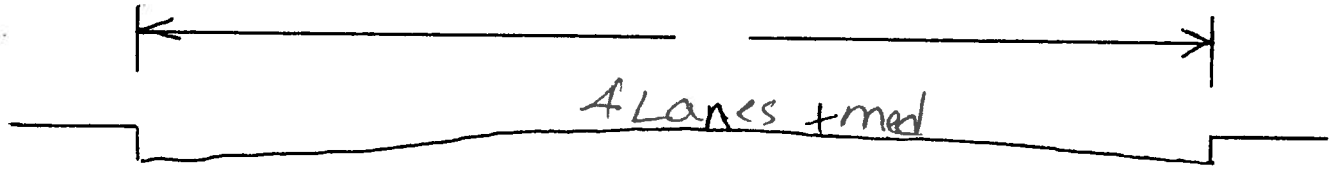
Alignment Name: _____

Street Address: Marine East of Hawthorne Ave

Nearest Cross Street: _____

Picture Number, direction and Location: (22) _____

Sketch:



☐ Water: Commercial & Res. dist.

☐ Power: No

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: Pass Crenshaw PP on

☐ Storm Drains: Both sides.

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Further East pass prairie

☐ Transportation: power poles on the northside

☐ Facilities: side Road on South side
w/ 2 Lanes
Pass Yuokan crossing wash


ALL

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

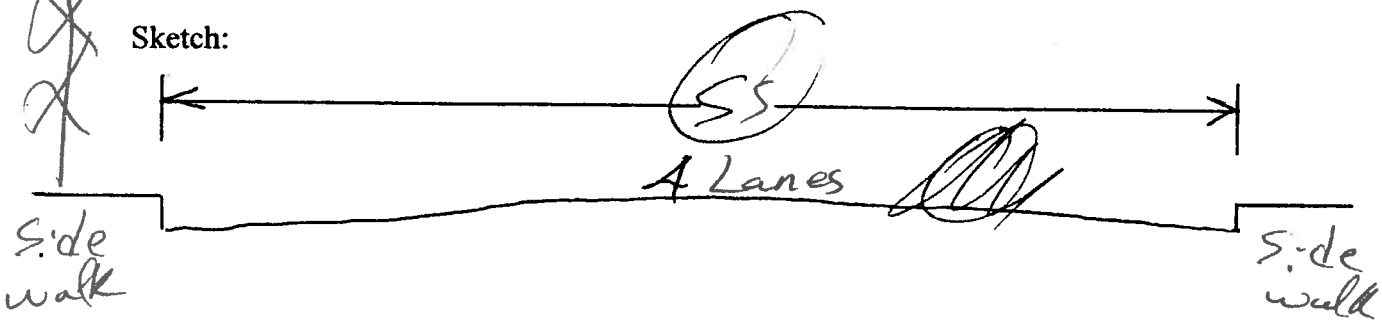
Alignment Name: _____

Street Address: San Nuss

Nearest Cross Street: Marine

Picture Number, direction and Location: (27) _____

Sketch:



☐ Water: Residential

☒ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Med.

☐ Transportation: _____

☐ Facilities: _____

90

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: No. 8 & 4 Tie-in

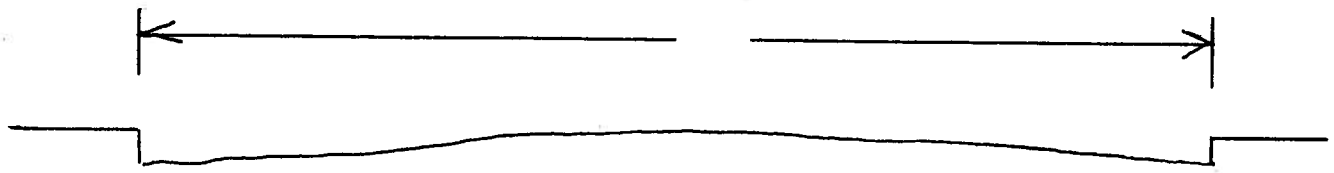
Alignment Name: _____

Street Address: Van Ness & Manhattan Beach Blvd.

Nearest Cross Street: _____

Picture Number, direction and Location: (28) 29

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

91,92


VAN NESS AV
TARGET

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: El Segundo plant To 37

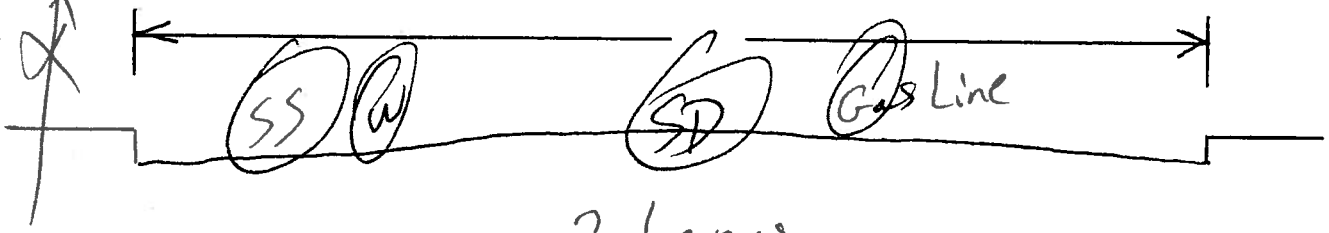
Alignment Name: El Segundo To here the same.

Street Address: Redondo Blvd. going South

Nearest Cross Street: marine

Picture Number, direction and Location: (30) _____

Sketch:



2 lanes
35'

☒ Water: _____

☐ Power: Residential

☒ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Low

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

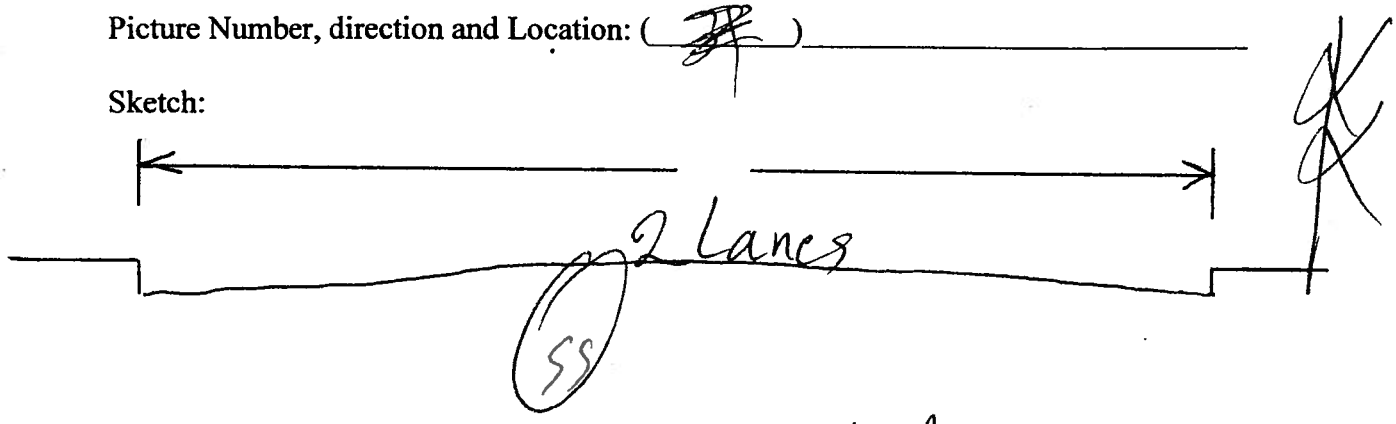
Alignment Name: Mathews

Street Address: _____

Nearest Cross Street: _____

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: Residential

☐ Power: _____

☐ Gas: _____

☐ Sewer: Further East pass Aviation

☐ Telephone: get narrower further

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

Note
Consider
Ringe for Blossom

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: El Segundo To 1 & 2

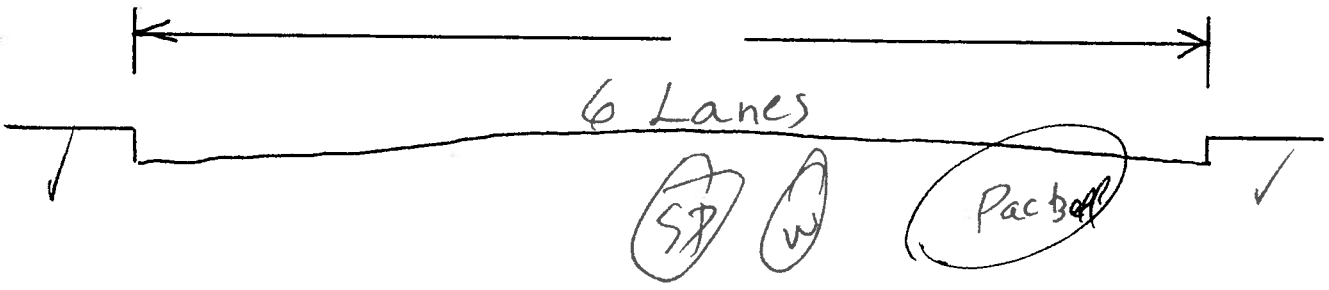
Alignment Name: ~~Blossom~~

Street Address: Anza

Nearest Cross Street: 190th

Picture Number, direction and Location: (32) _____

Sketch:



☐ Water: Residential on East & West

☐ Power: Further South Edison Crossing

☐ Gas: " " side street

☐ Sewer: Turns To 8 Lanes

☐ Telephone: Good sd. To be

☐ Storm Drains: _____

☐ Trunk Line: After Emerald PP on west.

☐ Trunk Line: " Torrance side street 8 Lanes.

☐ Traffic: medium

☐ Transportation: After Separated Turning to ~~6~~ Lanes + med.

☐ Facilities: No sides

95

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: No-3 Tie in

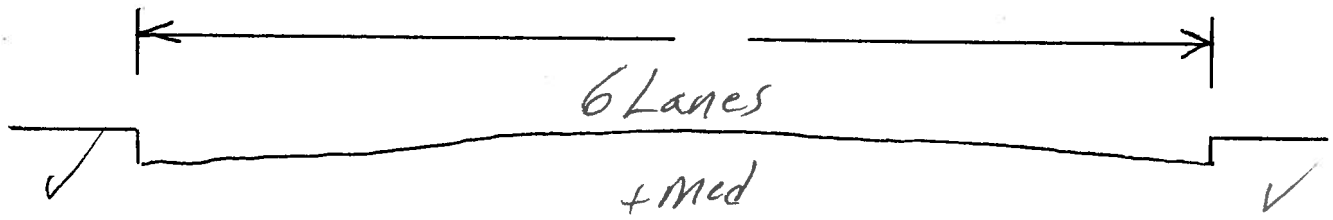
Alignment Name: _____

Street Address: Western & 220th

Nearest Cross Street: _____

Picture Number, direction and Location: (32) _____

Sketch:



☐ Water: Commercial & Resid.

☐ Power: _____

☐ Gas: Torrance between To 213 PP Both S. Je.

☐ Sewer: Del Amo Torrance PP Westside

☐ Telephone: South of Torrance wash Crossing

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Light

☐ Transportation: _____

☐ Facilities: _____


ONE
WAY

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: To No. 3

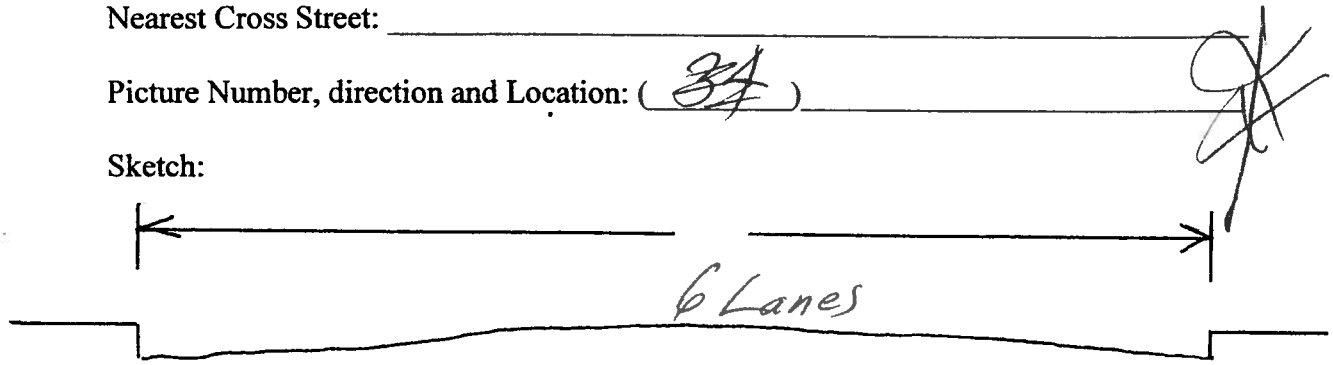
Alignment Name: _____

Street Address: Western & Del Amo

Nearest Cross Street: _____

Picture Number, direction and Location: (34) _____

Sketch:



☐ Water: Commercial

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: High

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: Alt No. 3

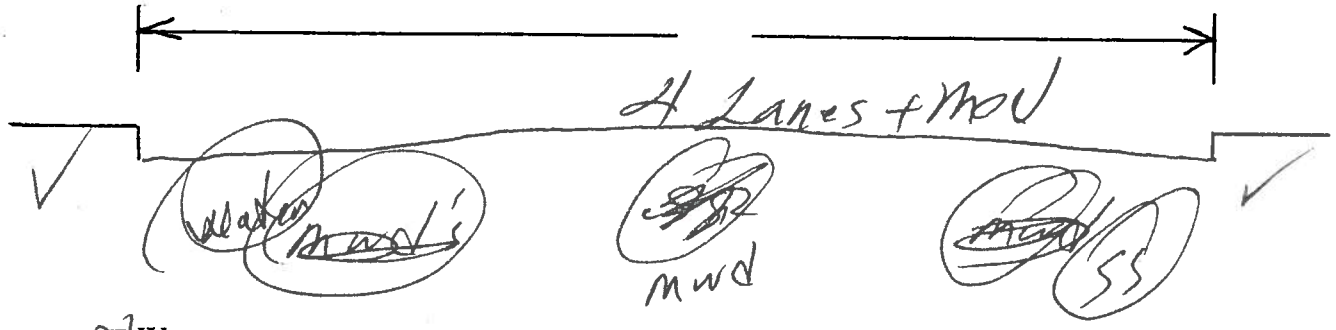
Alignment Name: _____

Street Address: Del Amo

Nearest Cross Street: _____

Picture Number, direction and Location: (35) _____

Sketch:



☒ Water: _____

☐ Power: Commercial

☐ Gas: _____

☒ Sewer: Wash Crossing East of Van Ness

☐ Telephone: _____

☐ Storm Drains: _____

☒ Trunk Line: MWD

☐ Trunk Line: _____

☐ Traffic: Light

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: To 3 & 10 & 3A

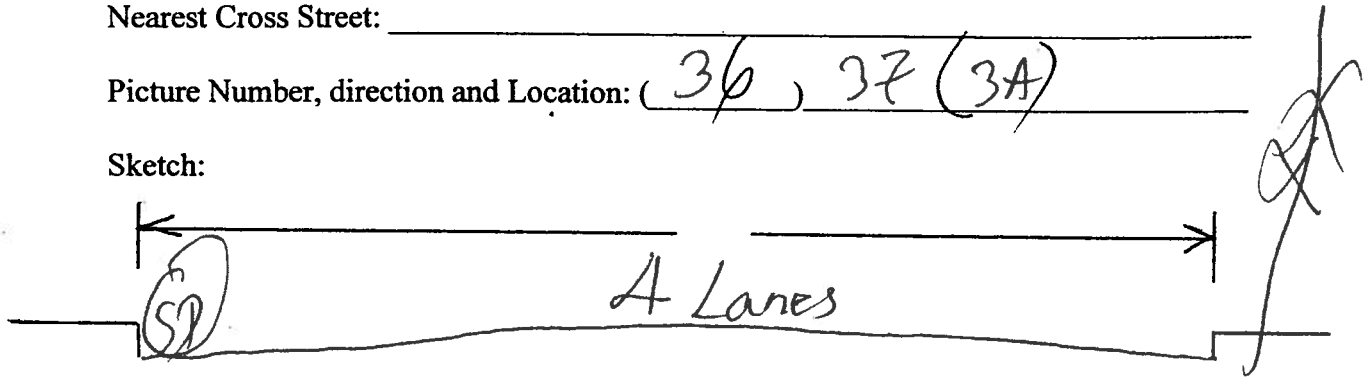
Alignment Name: _____

Street Address: Van Ness 190 Th

Nearest Cross Street: _____

Picture Number, direction and Location: (36, 37 (3A)

Sketch:



☐ Water: Commercial

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____


19110-19120
S. Van Ness
2140-2190
W. 190th St.

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 9:16 Team Members: JB, JH. BH

Alignment Number: _____

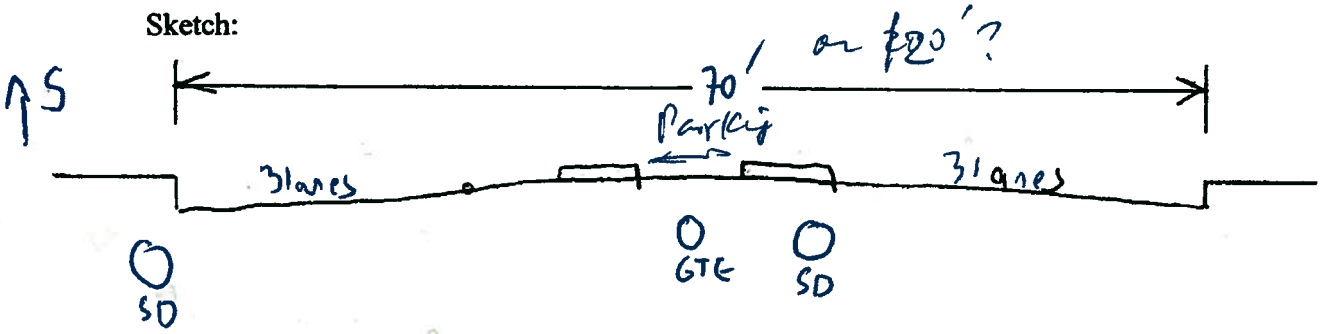
Alignment Name: _____

Street Address: Hawthorne

Nearest Cross Street: Redondo Beach Blvd / 117 St

Picture Number, direction and Location: ([redacted])

Sketch:



☐ Water: _____

☐ Power: DB under

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: Heavy, center parking

☐ Transportation: _____

☐ Facilities: Commercial

101, 102

101


Parking
EYE CARE
WINDOW TINTING
BURGERS
ROMA 2000
FRAZEE PAINT

102

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 9:38 Team Members: ____________

Alignment Number: To Tie-in No. 7

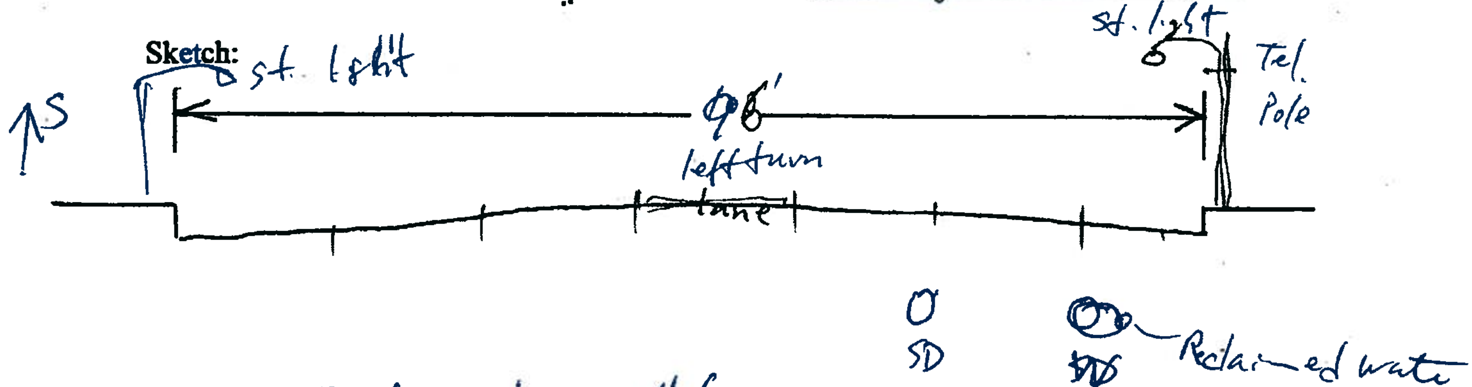
Alignment Name: ____________

Street Address: Aviation

Nearest Cross Street: El Segundo

Picture Number, direction and Location: ([illegible]) Looking S. on Aviation

Sketch:



☒ Water: Reclaimed West Basin

☒ Power: D/B, Conduit

☐ Gas: ____________

☐ Sewer: ____________ After Utah Street narrowed to 80'±

☐ Telephone: ____________

☒ Storm Drains: ____________ @ Rosecrans R/R X-ing / lights Rail Bridge

☐ Trunk Line: ____________

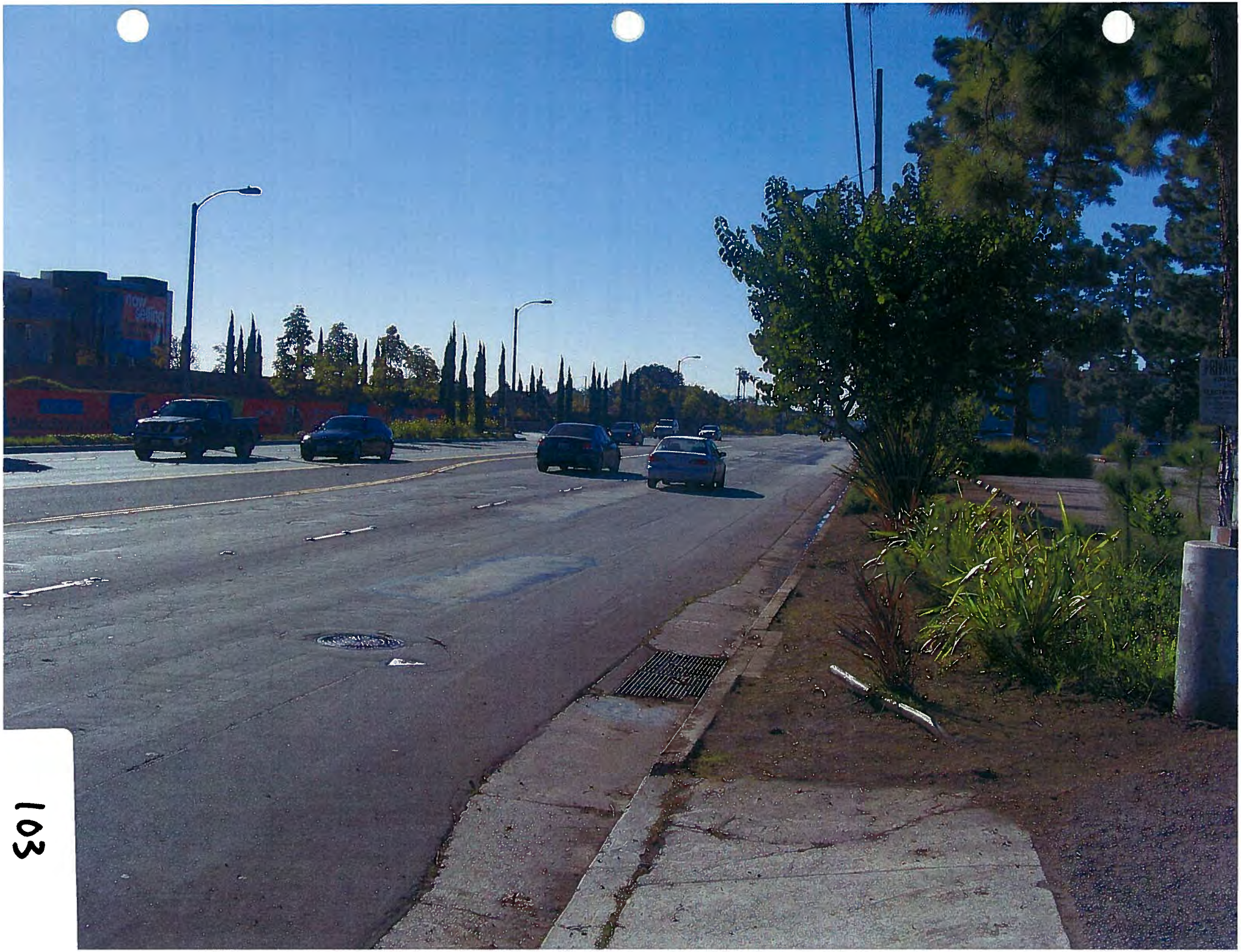
☒ Trunk Line: ~~Hea.~~ Greenline R/R X-ing

☒ Traffic: Heavy Powerline both sides at Rosecrans X-ing

☐ Transportation: ____________

☐ Facilities: Commercial Both Side. X-R/R Jacking under

103



West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 9:57 Team Members: _____

Alignment Number: _____

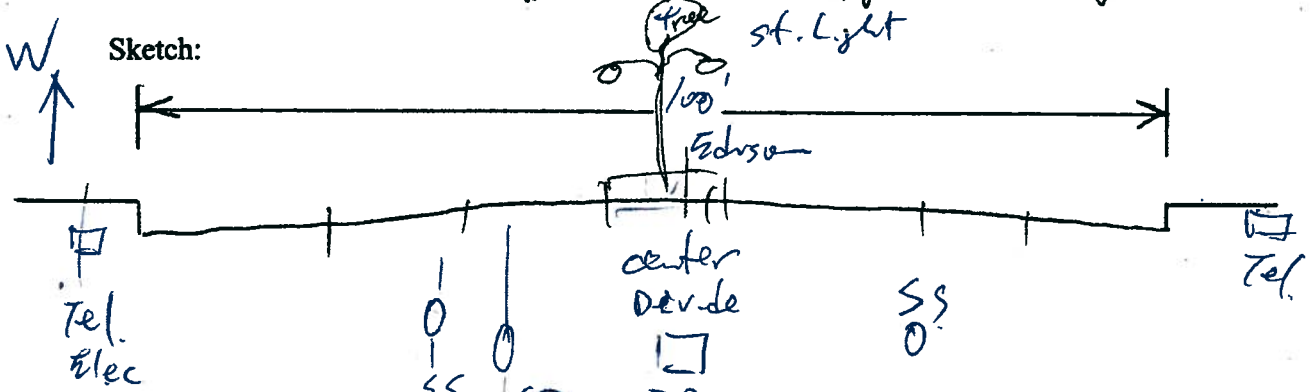
Alignment Name: _____

Street Address: Manhattan Beach Blvd.

Nearest Cross Street: ~~Aviation~~ Peck Ave. Manhattan Beach Blvd

Picture Number, direction and Location: (4) looking West along ~~Peck Ave~~

Sketch:



☐ Water: _____

☒ Power: center, Edison

☐ Gas: _____

☒ Sewer: X-ing

☒ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Heavy

☐ Transportation: _____

☐ Facilities: _____


NO PARKING
9 TO 10AM
MON. AND THURS.
STREET SWEEPING
ENFORCED
SPEED LIMIT 35
WM
WASTE MANAGEMENT

104

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 12:08 Team Members: ____________

Alignment Number: Redondo to No. 7

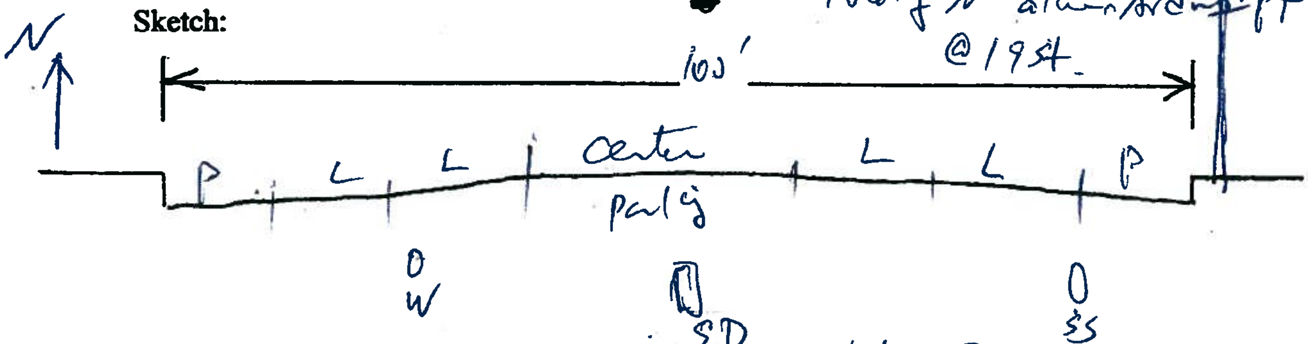
Alignment Name: ____________

Street Address: Valley / Ardmore

Nearest Cross Street: 12th / ~~Manhattan~~ Beach Blvd

Picture Number, direction and Location: ([illegible]) looking N. along Ardmore
[illegible] looking N along Ardmore @ 19 St.

Sketch:



Pumping station (?)

☒ Water: ____________

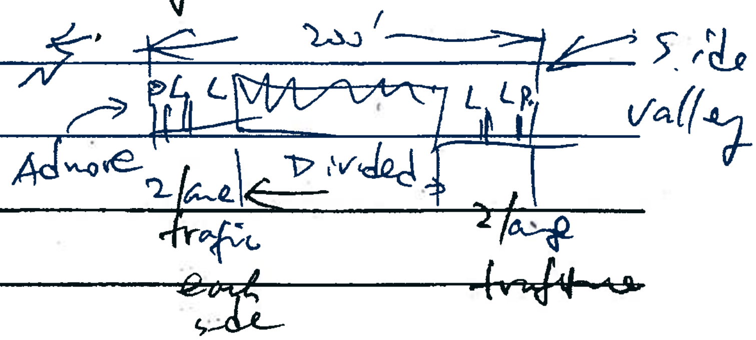
☒ Power: N of 18th street widen

☐ Gas: w/ Grade separation

☒ Sewer: Very wide center divides

☐ Telephone: ____________

☒ Storm Drains: ____________



☐ Trunk Line: ____________

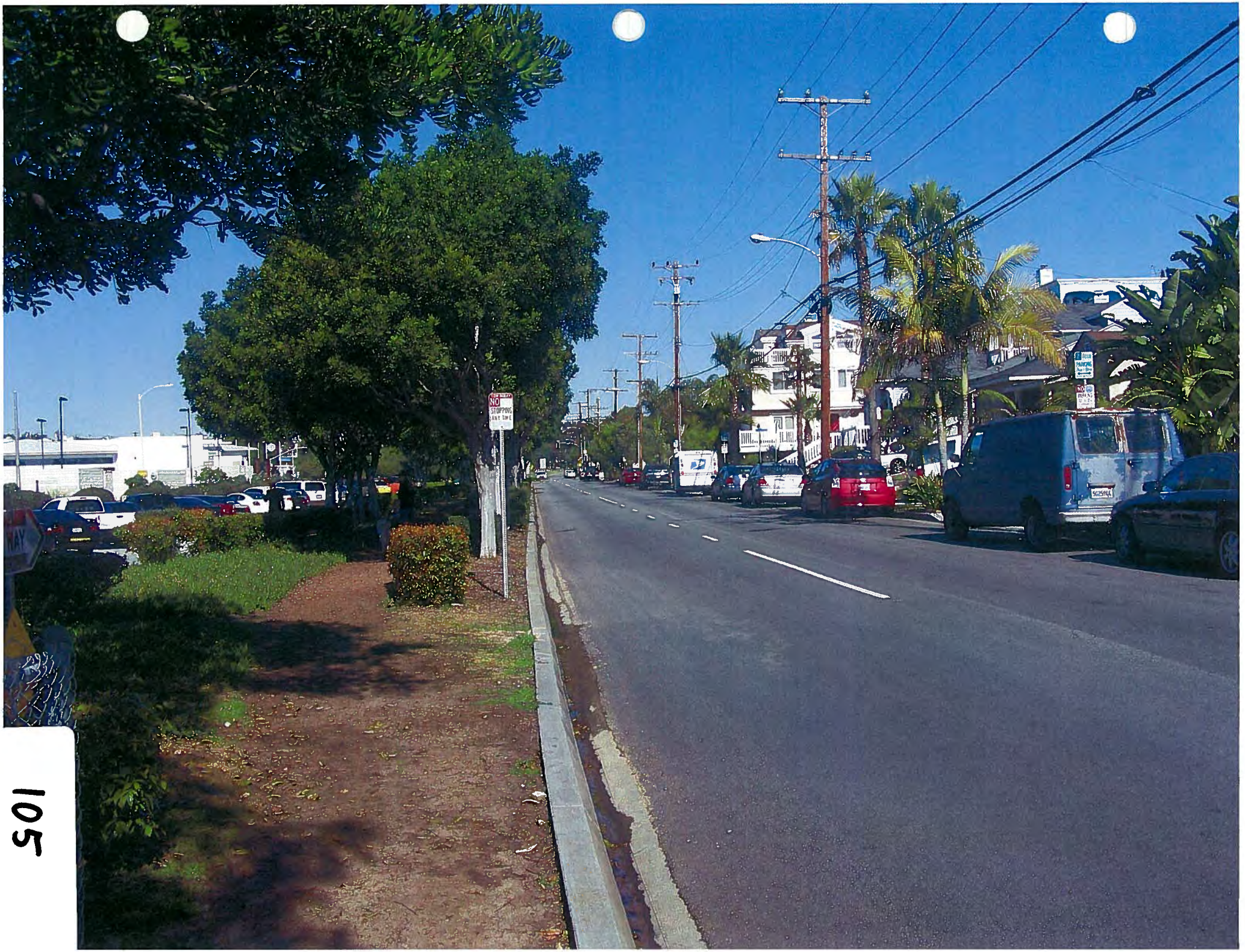
☐ Trunk Line: ____________

☒ Traffic: med. heavy

☐ Transportation: ____________

☐ Facilities: ____________

105, 106



105

106

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 4/7/11 10:44 Team Members: ____________

Alignment Number: ____________

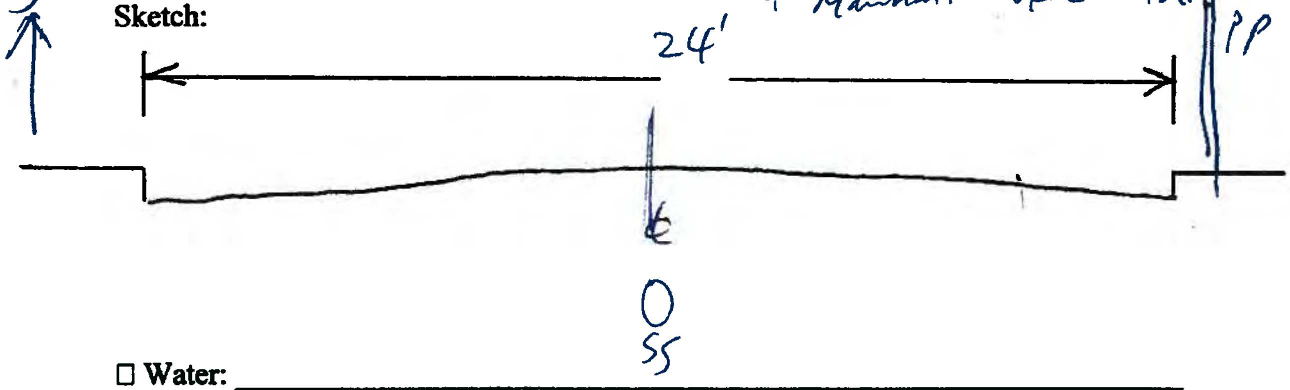
Alignment Name: ____________

Street Address: Peck Ave / change to Ford

Nearest Cross Street: ____________ looking S along Peck S. of Artesia

Picture Number, direction and Location: (3) looking S along Peck Ave & Manhattan Beach Blvd

Sketch:



☐ Water: ____________

☒ Power: ____________

☐ Gas: ____________

☒ Sewer: @ center

☐ Telephone: ____________

☐ Storm Drains: after 3rd wider road, school

☐ Trunk Line: MB unified School

☐ Trunk Line: S of Artesia Road

☐ Traffic: 2 lanes, residential, narrowed again to about 24'

☐ Transportation: ____________

☐ Facilities: Narrow

107, 108

108

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/[illegible]/11 10:54 Team Members: _____

Alignment Number: _____

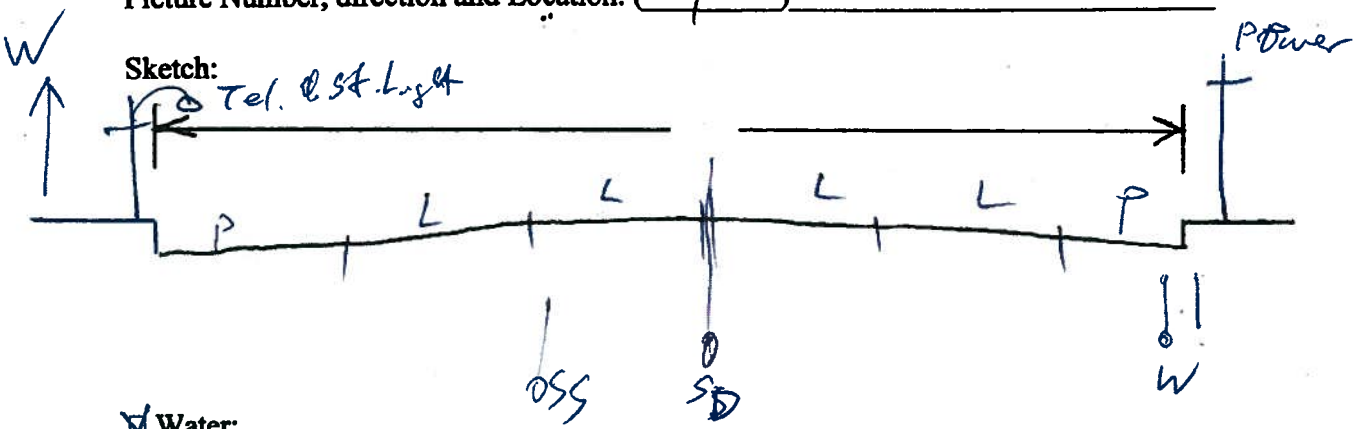
Alignment Name: Aviation

Street Address: Ford / Pack

Nearest Cross Street: _____

Picture Number, direction and Location: (9) looking West along Aviation

Sketch:



☒ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: X-ing from Ford to Ford — SS on S side

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Heavy

☐ Transportation: _____

☐ Facilities: _____


This year thousands of men will die from stubbornness.
FOR LEASE
RETAIL/AUTOMOTIVE
310.202.9008
Southern California
AUDIO
310.371.499

101

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/[illegible]/11 11:00± Team Members: _____

Alignment Number: _____

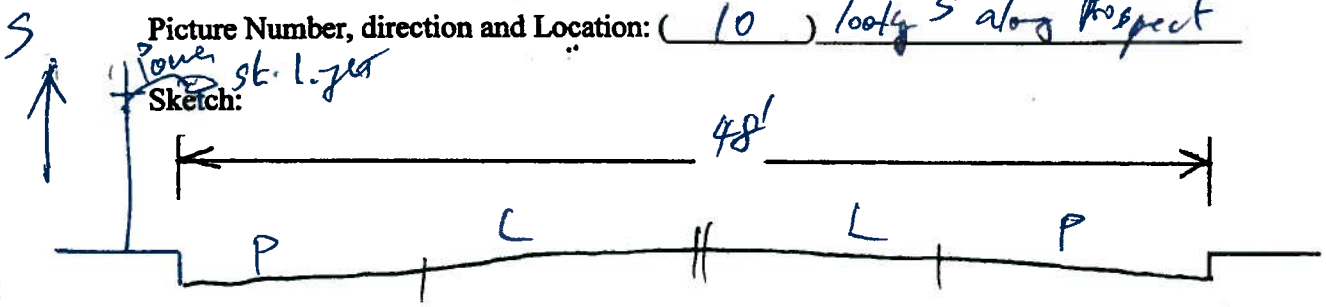
Alignment Name: _____

Street Address: Aviation

Nearest Cross Street: Prospect

Picture Number, direction and Location: (10) looking S along Prospect

Sketch:



☐ Water: _____

☒ Power: _____

☐ Gas: School @ Howell

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Busy

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/9/11 11:12 **Team Members:** _____

Alignment Number: _____

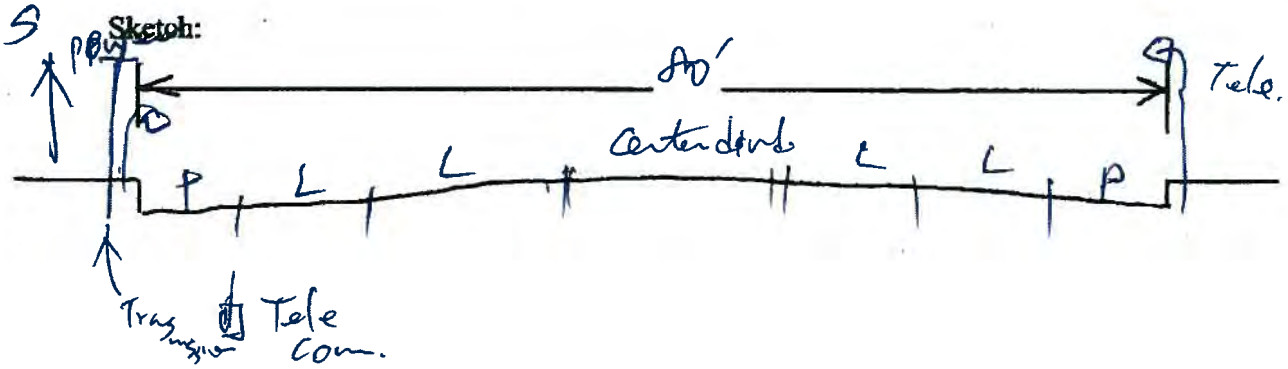
Alignment Name: ~~Prospect~~

Street Address: ~~S of Anita~~ Prospect

Nearest Cross Street: S. of Anita

Picture Number, direction and Location: (_____) _____

Sketch:



☐ **Water:** _____

☒ **Power:** Transmission @ Diamond add two side street turn pocket

☐ **Gas:** _____

☐ **Sewer:** _____

☒ **Telephone:** ~ School _____

☐ **Storm Drains:** _____

☐ **Trunk Line:** Hospital on E. _____

☐ **Trunk Line:** _____

☒ **Traffic:** S. of Anita 4 lanes Busy _____

☒ **Transportation:** Busy _____

☐ **Facilities:** _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 11:15 Team Members: _____

Alignment Number: _____

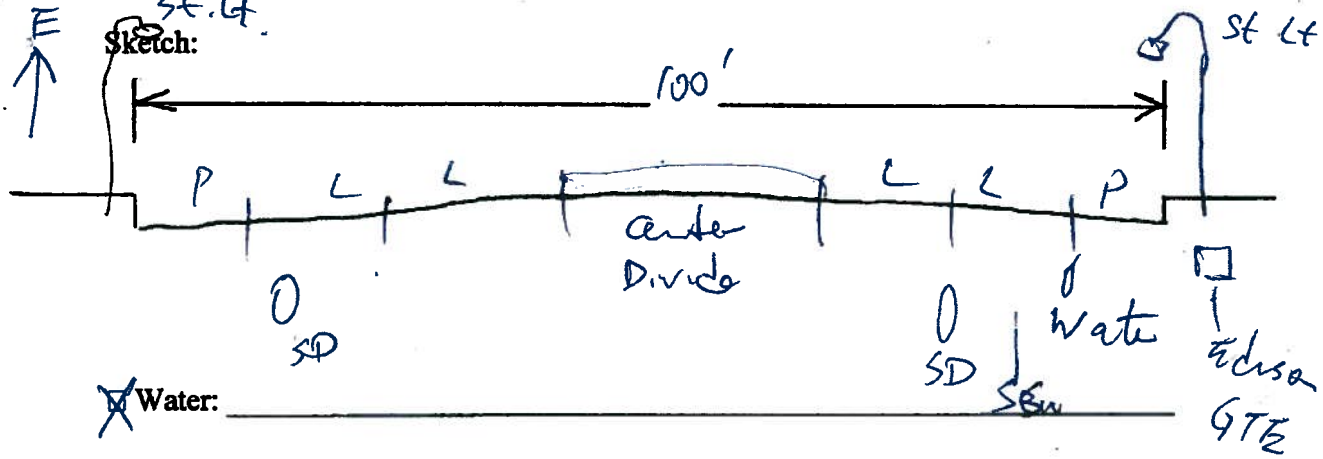
Alignment Name: _____

Street Address: Torrance

Nearest Cross Street: Prospect

Picture Number, direction and Location: ( ) looking E along Torrance

Sketch:



☒ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: school

☐ Trunk Line: _____

☐ Traffic: very busy

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 11:28 Team Members: _____

Alignment Number: _____

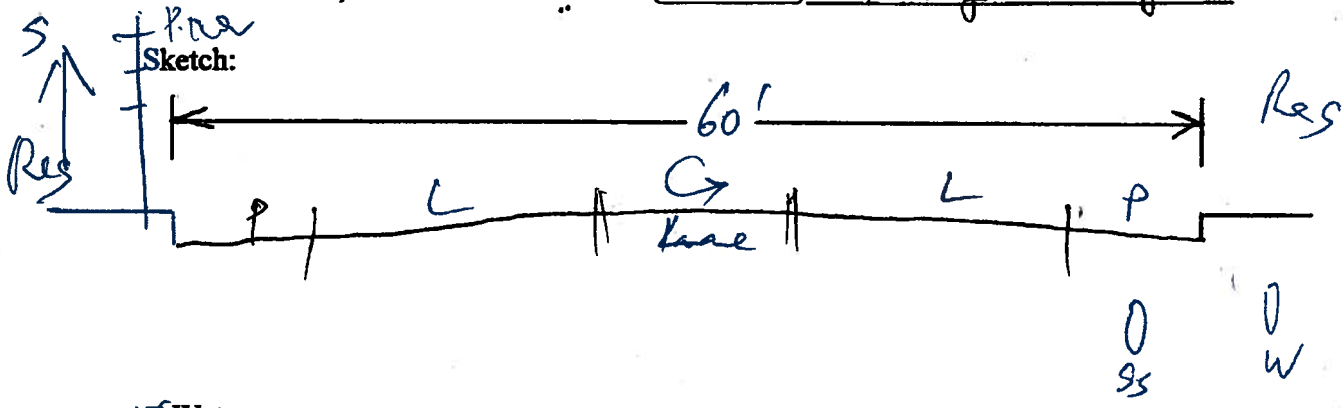
Alignment Name: _____

Street Address: Palos Verdes

Nearest Cross Street: Torrance

Picture Number, direction and Location: (12) looking S along Palos Verdes

Sketch:



☒ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☒ Transportation: media

☐ Facilities: Residential Bathrooms

112

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 11:36 Team Members: _____

Alignment Number: _____

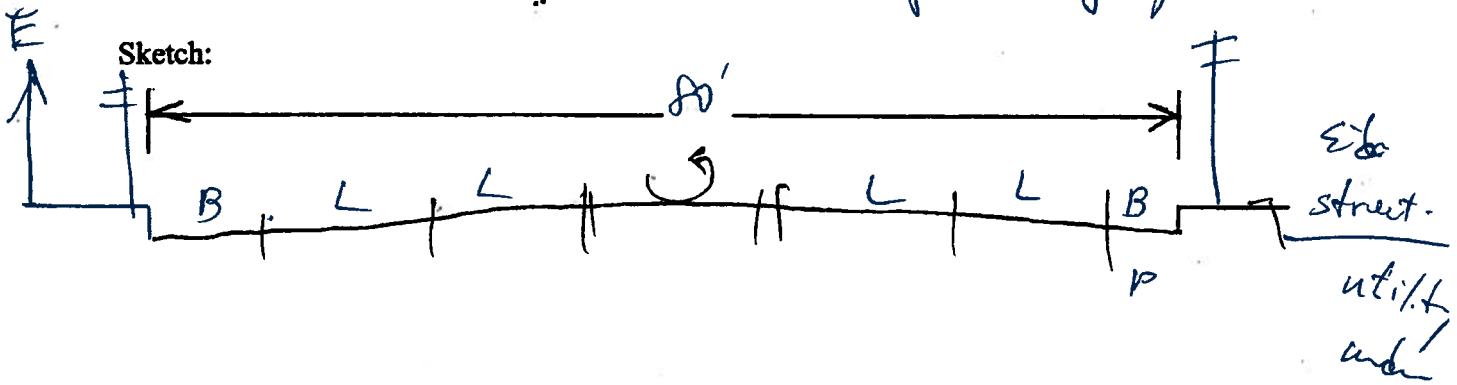
Alignment Name: _____

Street Address: Sepulveda

Nearest Cross Street: Torrance

Picture Number, direction and Location: (13) looking E along Sepulveda

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

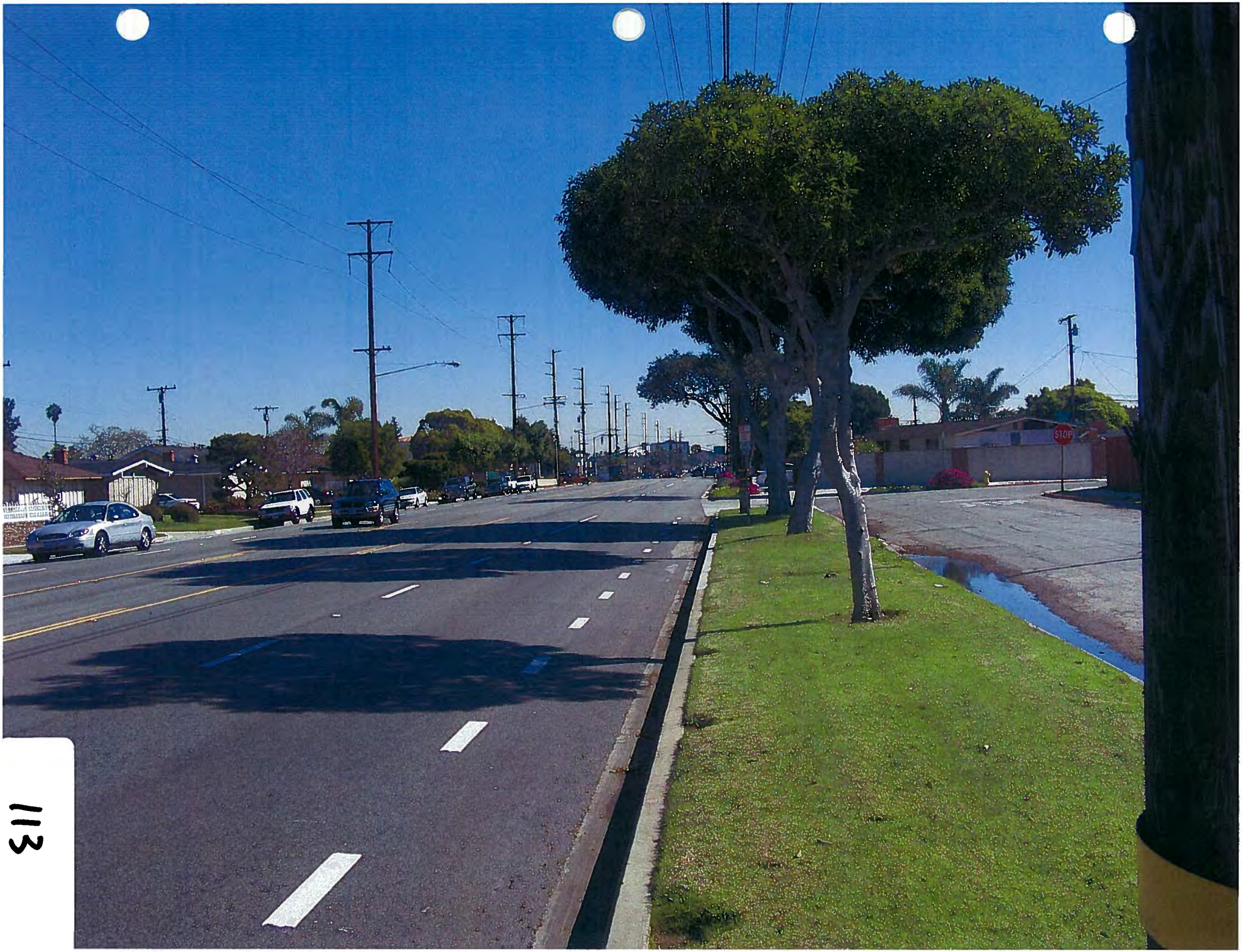
☐ Trunk Line: near bridge, no side street.

☐ Trunk Line: _____

☐ Traffic: Very busy

☐ Transportation: _____

☐ Facilities: _____



113

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 11:40 Team Members: _____

Alignment Number: _____

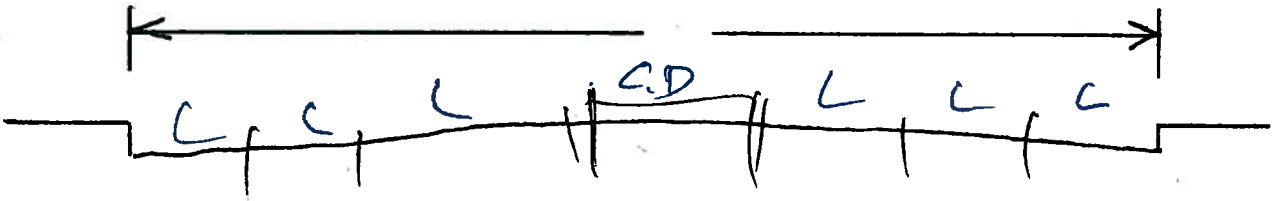
Alignment Name: _____

Street Address: Howthorne

Nearest Cross Street: Sepulveda

Picture Number, direction and Location: (~~17~~) looking S. along Howthorne

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy

☐ Transportation: _____

☐ Facilities: _____

114

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/4/11 Team Members: SM Lastone

Alignment Number: _____

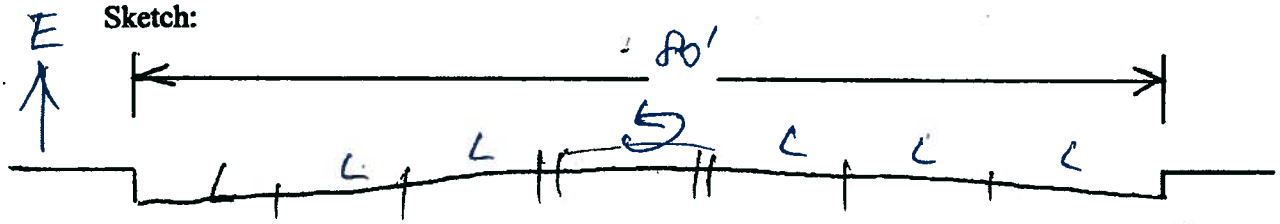
Alignment Name: _____

Street Address: Sepulveda

Nearest Cross Street: Hawthorne

Picture Number, direction and Location: (15) looking @ E along Sepulveda

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Busy

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 12:39 Team Members: _____

Alignment Number: _____

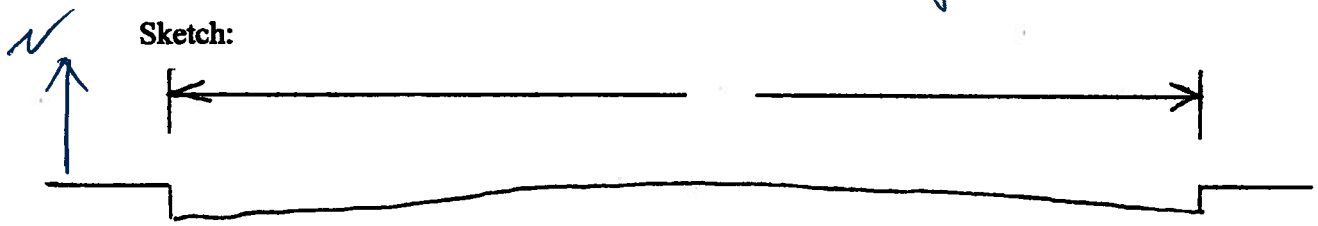
Alignment Name: _____

Street Address: ~~Madrona~~ looking S

Nearest Cross Street: Sepulveda

Picture Number, direction and Location: (16 looking S. ~~17 looking @ reserve~~

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: No way to build next to reserve

☐ Storm Drains: Substation, maybe

☐ Trunk Line: Edson's reserve.

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: Reservation 4/lanes on each side Huge mid section, environmental sensative area on east side

116.117

116


Unless Authorized There Is
NO
SMOKING
PICNICKING
FIRES
JOGGING
DOGS
CAMPING
ALCOHOL
FIREWORKS
BIKE RIDING
PAINT PISTOL GAMES
OFF ROAD VEHICLE ACTIVITY
FLYING KITES OR MODEL AIRPLANES
LEAVING UNWANTED PETS
HARASSING, HARMING, OR REMOVING ANIMALS
Enjoy and Protect
the MADRONA MARSH PRESERVE and
Make Our World A Better Place
City of Torrance Parks and Recreation Dep
3031 Torrance Boulevard

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 12:40 Team Members: _____

Alignment Number: To No. 3, & No. 10

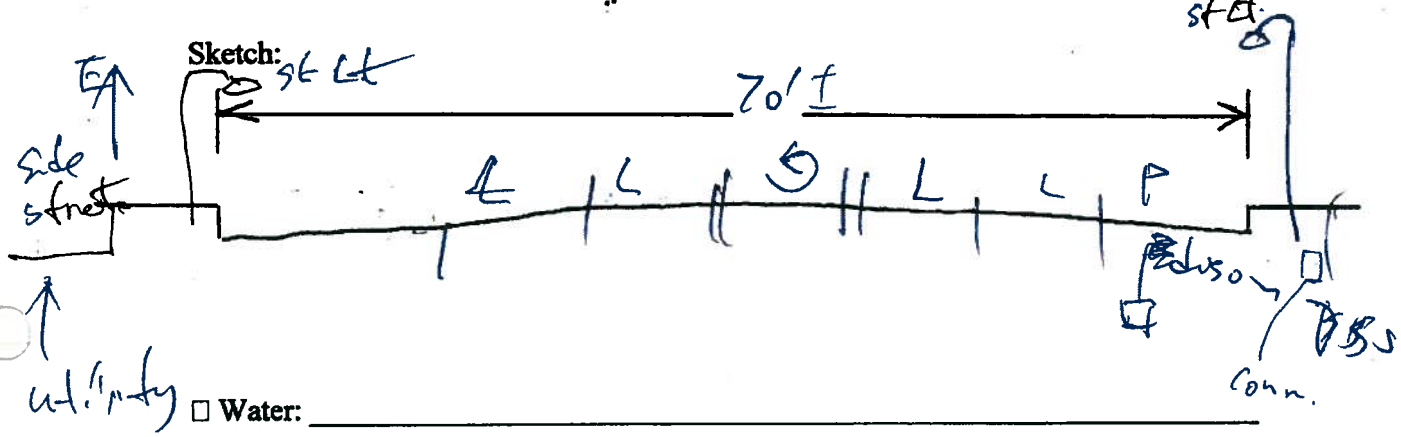
Alignment Name: _____

Street Address: Carsons

Nearest Cross Street: Madrona

Picture Number, direction and Location: (18) looking East along Carsons

Sketch:



☐ Water: _____

☒ Power: _____

☐ Gas: Torrance High School

☒ Sewer: _____

☒ Telephone: Past crossbar left side Poles

☒ Storm Drains: _____

☐ Trunk Line: R/R X-ing

☐ Trunk Line: _____

☒ Traffic: Heavy

☐ Transportation: _____

☐ Facilities: side street, residential area

811

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 1:10 Team Members: _____

Alignment Number: To. No 1 & No 2 S. Carson to Crenshaw No 1 & No.

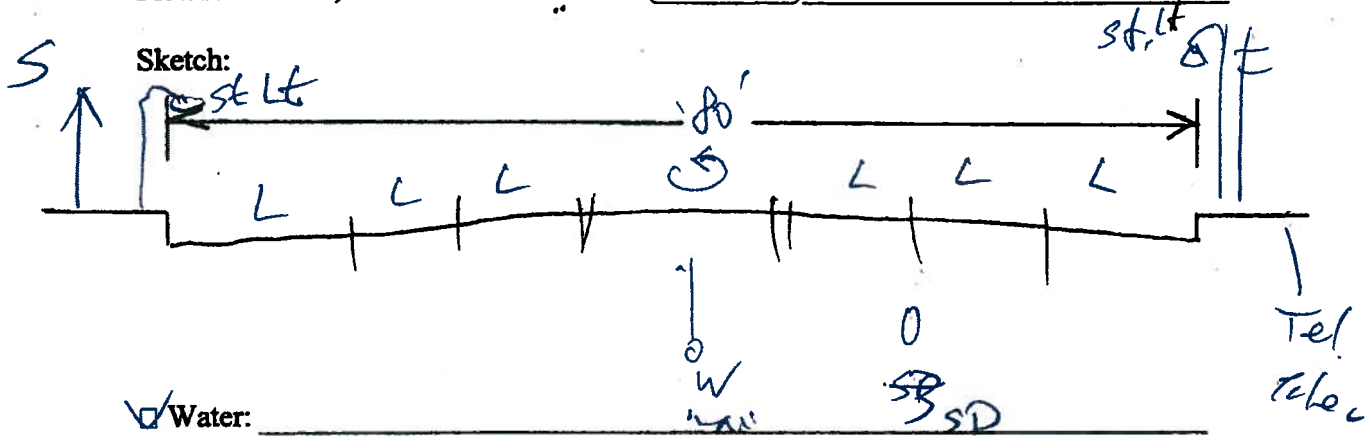
Alignment Name: _____

Street Address: Crenshaw Blvd.

Nearest Cross Street: Carson St.

Picture Number, direction and Location: (19) looking S.

Sketch:



☑ Water: _____

☐ Power: _____

☐ Gas: _____

☑ Sewer: past Lomita

☑ Telephone: Parkway

☑ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy

☐ Transportation: Fire Dept. X Carson & Crenshaw

☐ Facilities: _____


Jefferson St
SPEED LIMIT
45

120

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/9/11 1:29 Team Members: ____________

Alignment Number: ____________

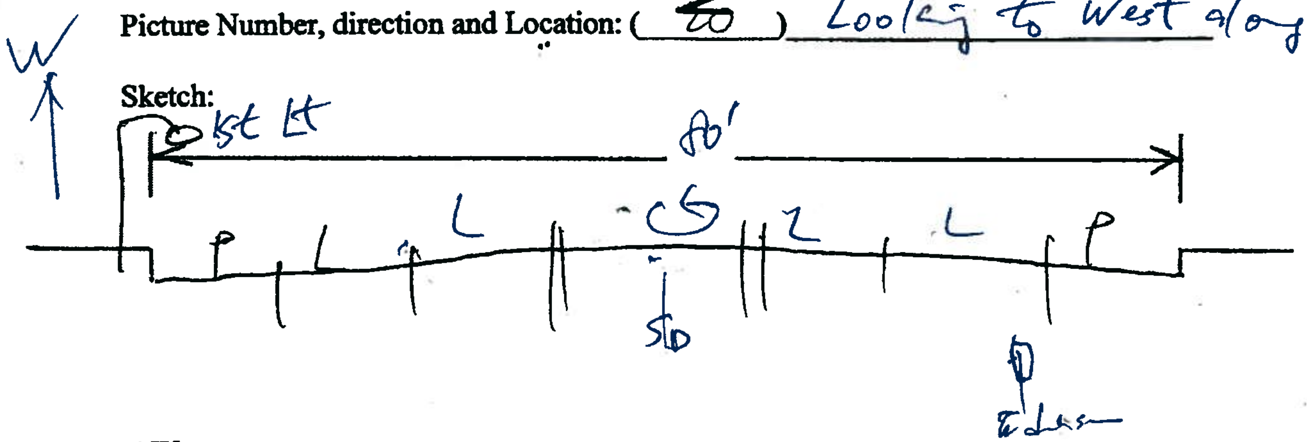
Alignment Name: ____________

Street Address: Sky Park

Nearest Cross Street: Crenshaw

Picture Number, direction and Location: (80) Looking to West along Skypark

Sketch:



☐ Water: ____________

☑ Power: ____________

☐ Gas: ____________

☐ Sewer: ____________

☐ Telephone: ____________

☑ Storm Drains: ____________

☐ Trunk Line: ____________

☐ Trunk Line: ____________

☐ Traffic: ____________

☐ Transportation: ____________

☐ Facilities: light / fountain

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 1:33 Team Members: _____

Alignment Number: _____

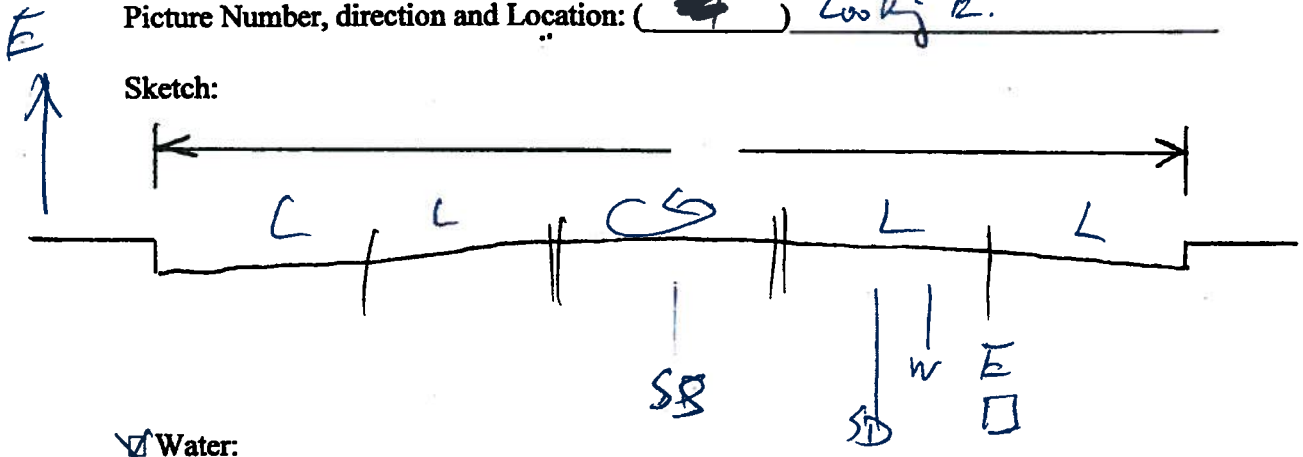
Alignment Name: _____

Street Address: Madison

Nearest Cross Street: Skypark

Picture Number, direction and Location: ([redacted]) Looking E.

Sketch:



☒ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: med traffic

☐ Transportation: _____

☐ Facilities: Industry both sides

121

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 1:42 Team Members: _____

Alignment Number: Cranshaw toward No 1

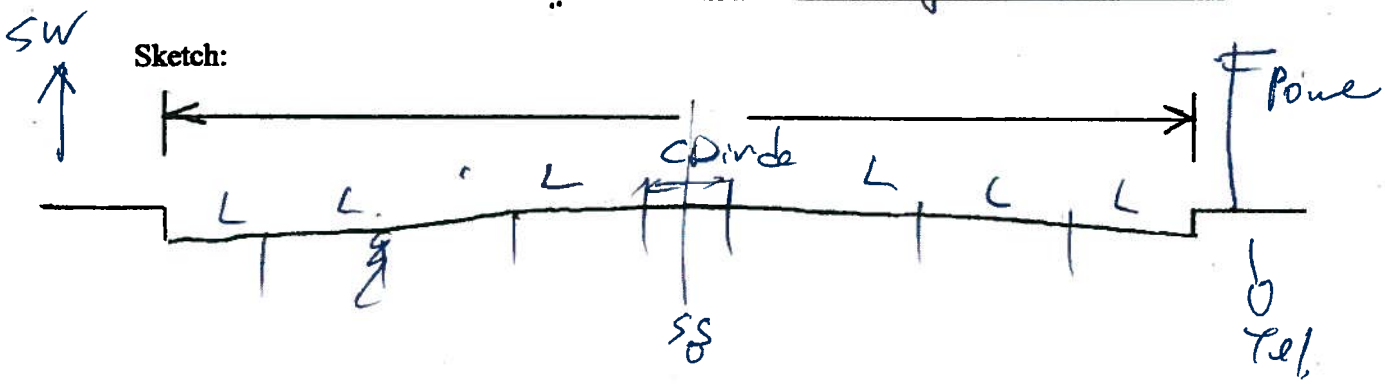
Alignment Name: _____

Street Address: Cranshaw

Nearest Cross Street: PCH

Picture Number, direction and Location: (22) looking S.

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☑ Sewer: _____

☑ Telephone: _____

☐ Storm Drains: No

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Heavy

☐ Transportation: _____

☐ Facilities: _____

122

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 1:49 Team Members: _____

Alignment Number: _____

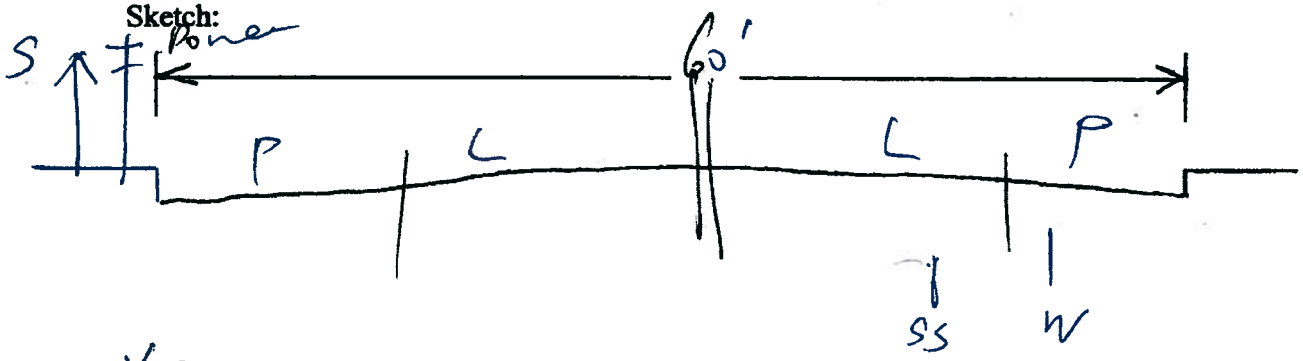
Alignment Name: _____

Street Address: Crest

Nearest Cross Street: Crenshaw

Picture Number, direction and Location: ([redacted]) looking S

Sketch:



☒ Water: _____

☒ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

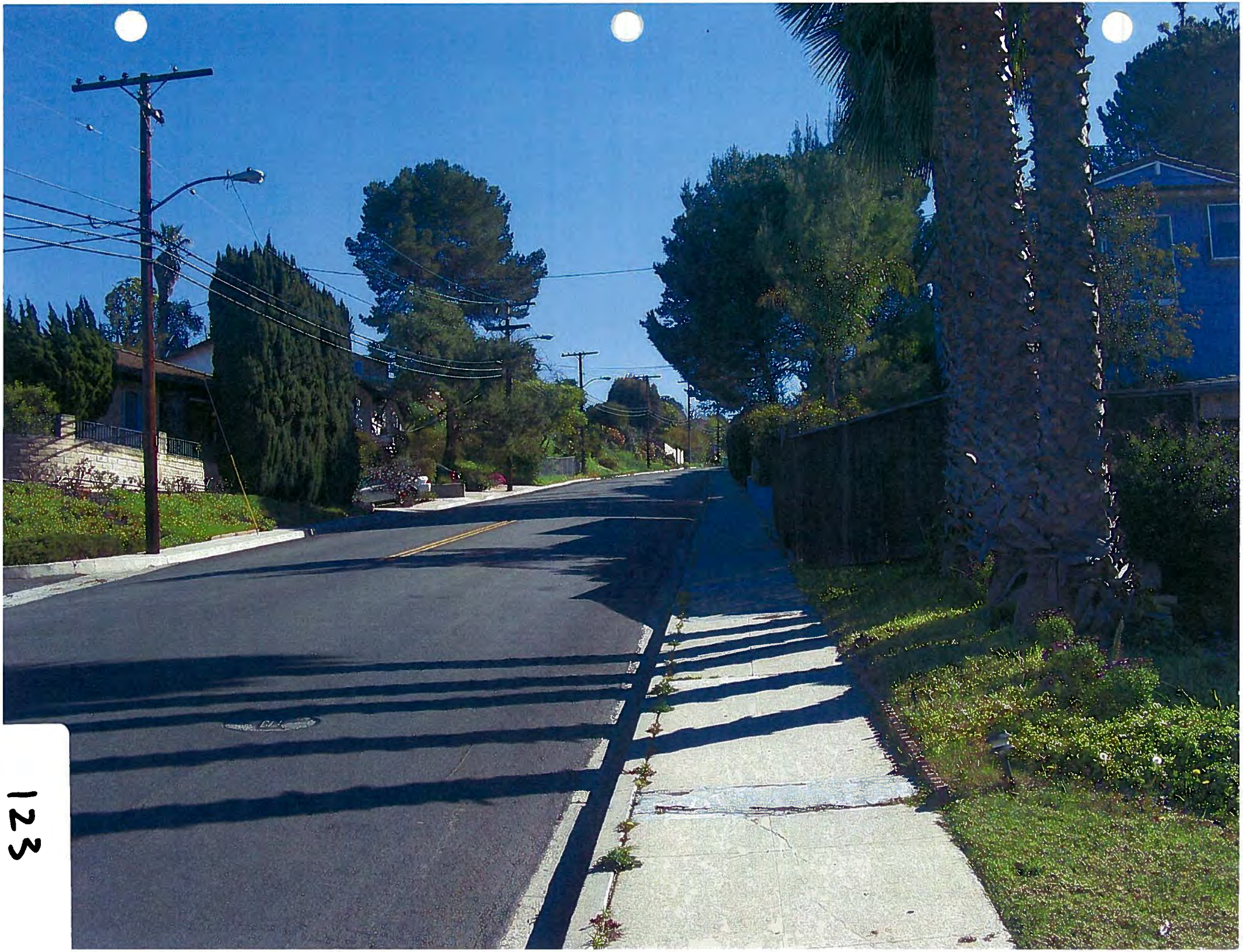
☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Med light

☐ Transportation: _____

☐ Facilities: _____



123

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 2:30 Team Members: _____

Alignment Number: _____

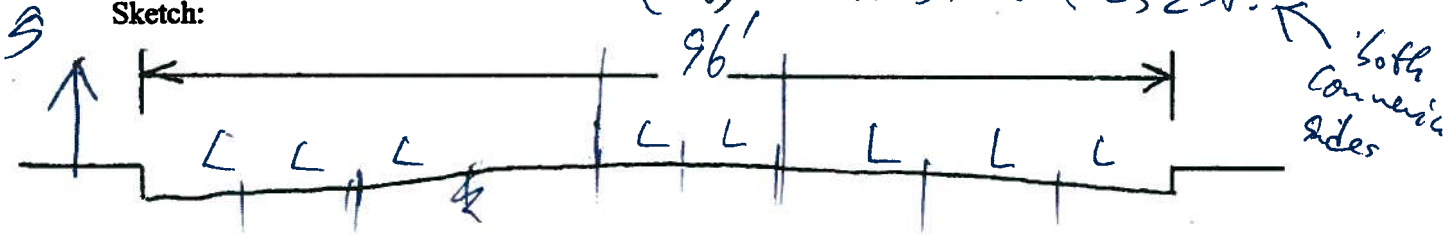
Alignment Name: _____

Street Address: Crenshaw just S. 190th

Nearest Cross Street: (26) looking South ~~Pass Gra~~

Picture Number, direction and Location: (24) Looking S along Crenshaw
(25) ~~Looking~~ Crenshaw @ 232 St.

Sketch:



☐ Water: _____

☐ Power: @ Maricopa St Xing

☐ Gas: R/R Standard Rail Xing

☐ Sewer: _____

☐ Telephone: S. of 190th. refinery E side

☐ Storm Drains: center divides

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy

☐ Transportation: _____

☐ Facilities: _____

124, 125, 126

124

125

126

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/7/11 2:40 Team Members: _____

Alignment Number: _____

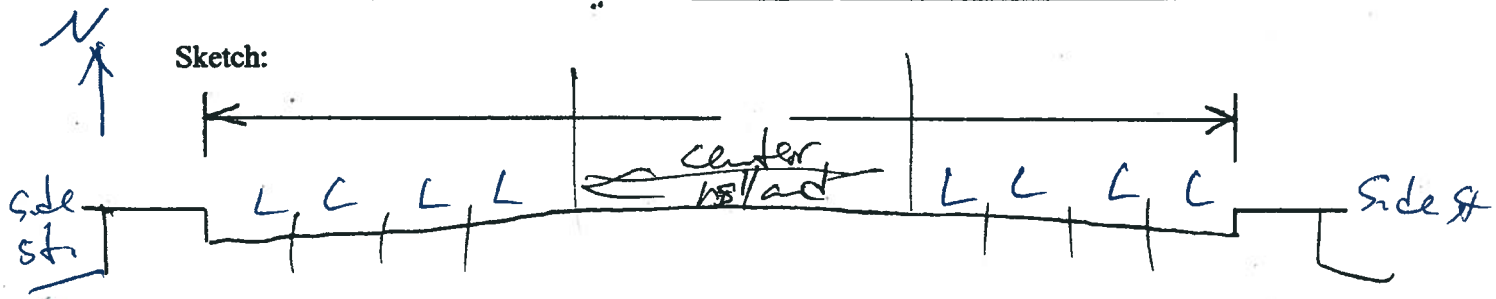
Alignment Name: _____

Street Address: Hawthone (107)

Nearest Cross Street: 177th St

Picture Number, direction and Location: (~~27~~) looking S. along Hawthone

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy St.

☐ Transportation: _____

☐ Facilities: utilities may be on side streets

127

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/11/11 2:50 Team Members: _____

Alignment Number: Toward No 4 & 8.

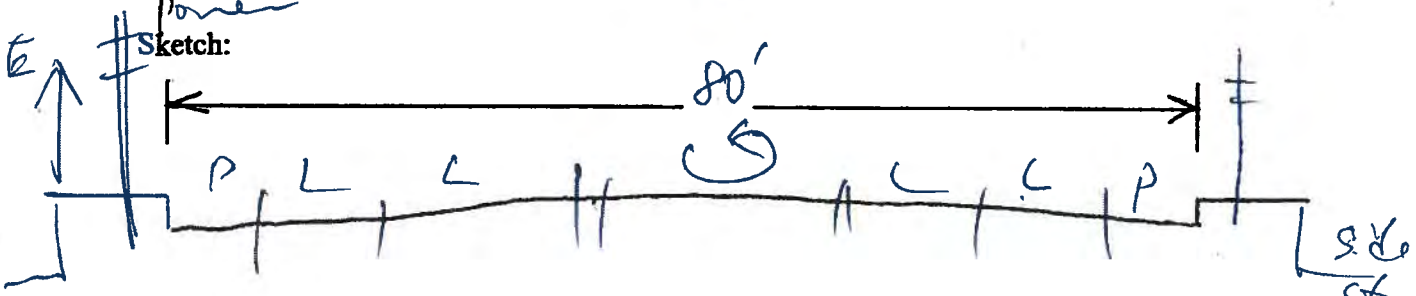
Alignment Name: _____

Street Address: Redondo Beach Blvd

Nearest Cross Street: Hawthrone looking E along Redondo Beach.

Picture Number, direction and Location: ( ) _____

Sketch:



☐ Water: X-ing 405 FWy N of Crashaw

☒ Power: Prairie. P.P

☐ Gas: _____

☐ Sewer: school

☐ Telephone: Golf Course

☐ Storm Drains: Power Pole both side.

☐ Trunk Line: Commercial both sides

☐ Trunk Line: E/ commercial alley

☒ Traffic: Heavy ~~R/R~~ underpass S/O S. of Crashaw Blvd

☐ Transportation: _____

☐ Facilities: _____

128

P. 1

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/22/11 Team Members: JB. JH

Alignment Number: ______

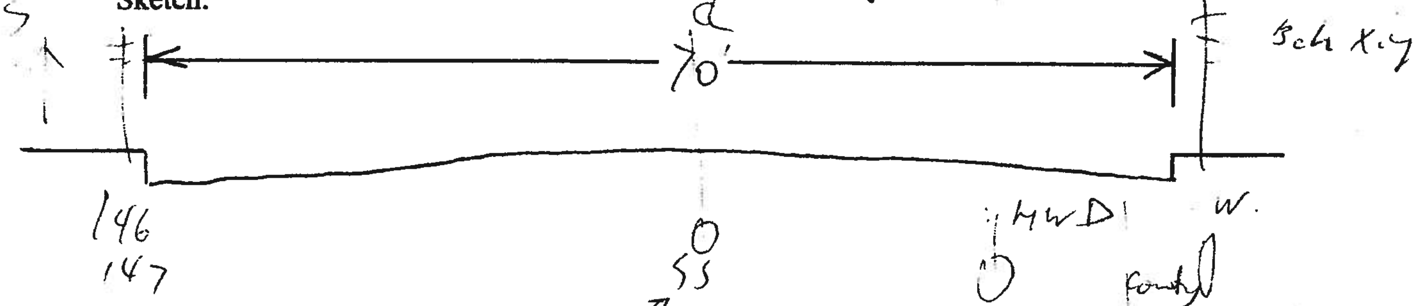
Alignment Name: Tie-in pt. No 6 to S. of Van Ness

Street Address: Van Ness

Nearest Cross Street: El Segundo Blvd.

Picture Number, direction and Location: (1) Van Ness looking S.
2 looking @ Mater St. @ Manhattan Sch Xing

Sketch:



☑ Water: MWD — S. of 139 st Trunk line

☐ Power: SD Xing @ 132 st

☐ Gas: Creek Xing N. of 135 st

☑ Sewer: 139 st S. Sewer ℄ County Sewer

☐ Telephone:

☑ Storm Drains: MH @ 144 st Xing Power line Pass Rose Crane west side ~~East~~

☐ Trunk Line: SMH (SS) @ 144 st Xing

☐ Trunk Line: 146 st Power line E side of st 147 st

☒ Traffic: Busy

☐ Transportation: School 156 st

☐ Facilities: CB 156 st

ATN Qwest Manhole West side btwn 154 st & 156 st

129. 130

129


TARGET
FedEx

West Basin Desalination Project
Alignment Selection

P2

Date of Site Visit: 2/22/11 Team Members: JB. JH

Alignment Number: _____

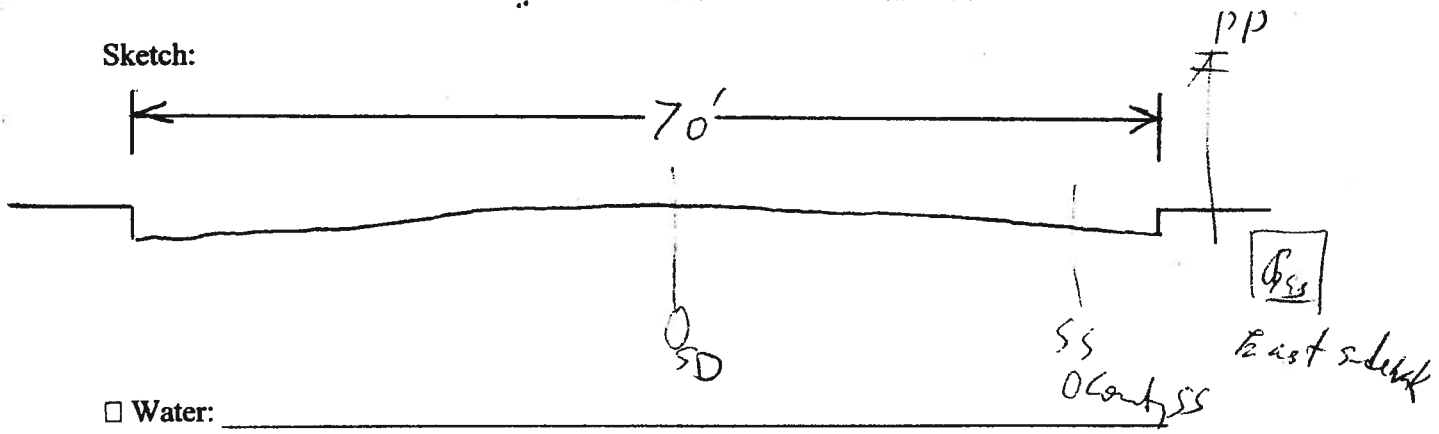
Alignment Name: _____

Street Address: Crenshaw

Nearest Cross Street: Redondo Bch

Picture Number, direction and Location: (2) looking N. from Redondo Bch.

Sketch:



☐ Water: _____

☒ Power: E s.de, Transmission line

☑ Gas: on E. s-de walk

☐ Sewer: County SS MH N of Rosecrans

☐ Telephone: _____

☒ Storm Drains: CB @ Redondo X-ing SD@ ℄ school N/ Compton College

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy

☐ Transportation: _____

☐ Facilities: _____

131

West Basin Desalination Project
Alignment Selection

P.3

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

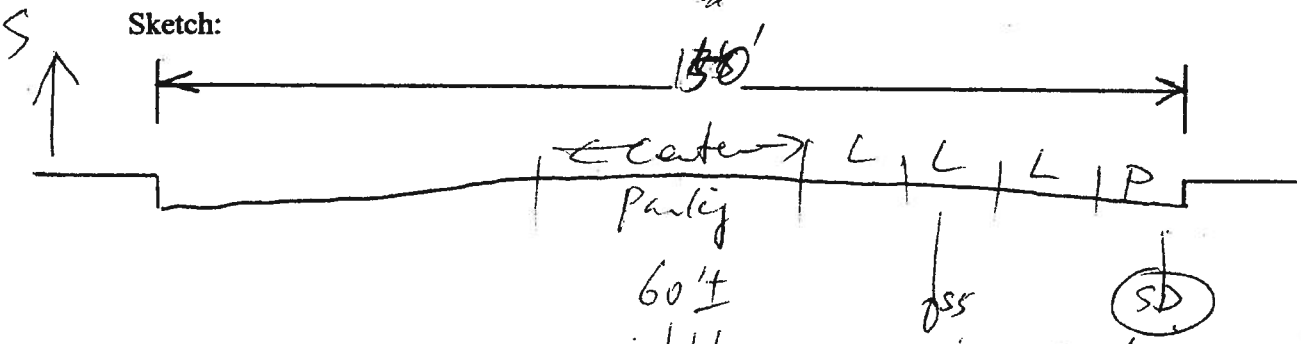
Alignment Name: _____

Street Address: Hawthorne

Nearest Cross Street: El Segundo

Picture Number, direction and Location: (4) looking S. along Hawthorne

Sketch:



☐ Water: _____

☐ Power: under center parking

☐ Gas: _____

☒ Sewer: S. of 13th St, Rosecrans

☐ Telephone: X-ing under 405

☒ Storm Drains: West of St

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy Mayor Street

☐ Transportation: _____

☐ Facilities: Business on both sides

132

P4

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

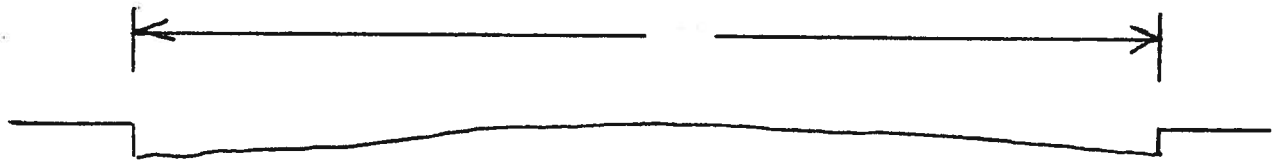
Alignment Name: _____

Street Address: Redondo Bch

Nearest Cross Street: Artesia

Picture Number, direction and Location: (~~2~~) looking @ the Mall @ Redondo Bch Blvd

Sketch:



No street - Mall

☐ Water: _____

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

133

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

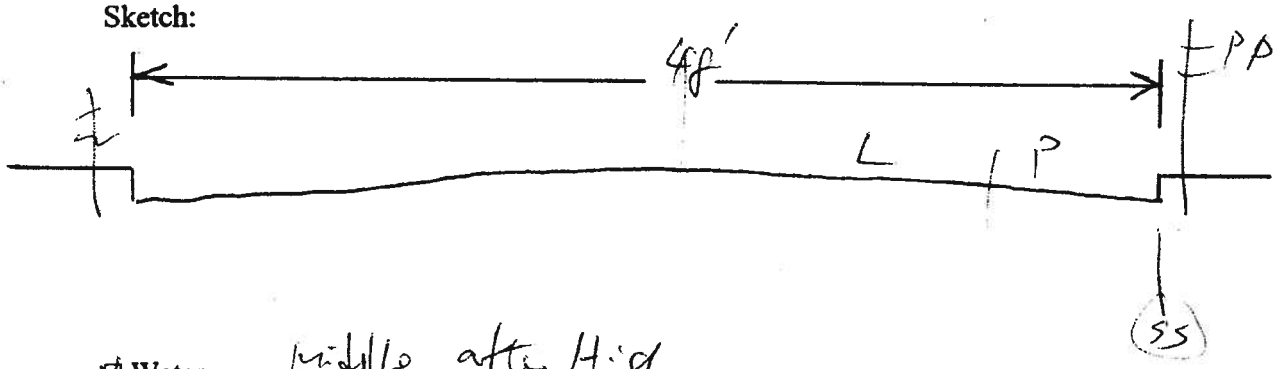
Alignment Name: _____

Street Address: Ripley Ave

Nearest Cross Street: Englewood

Picture Number, direction and Location: ( ) looking SW along Ripley

Sketch:



☒ Water: middle after High

☒ Power: W on side walk

☐ Gas: _____

☒ Sewer: under curb

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: ~~Trunk~~

☐ Trunk Line: hdbl @ High st.

☒ Traffic: light

☐ Transportation: Addams middle school

☐ Facilities: _____


SCHOOL
SPEED
LIMIT
25
WHEN
CHILDREN
ARE PRESE
NO
PARKING
MONDAY

1334

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/22/11 Team Members: JB. JH

Alignment Number: _____

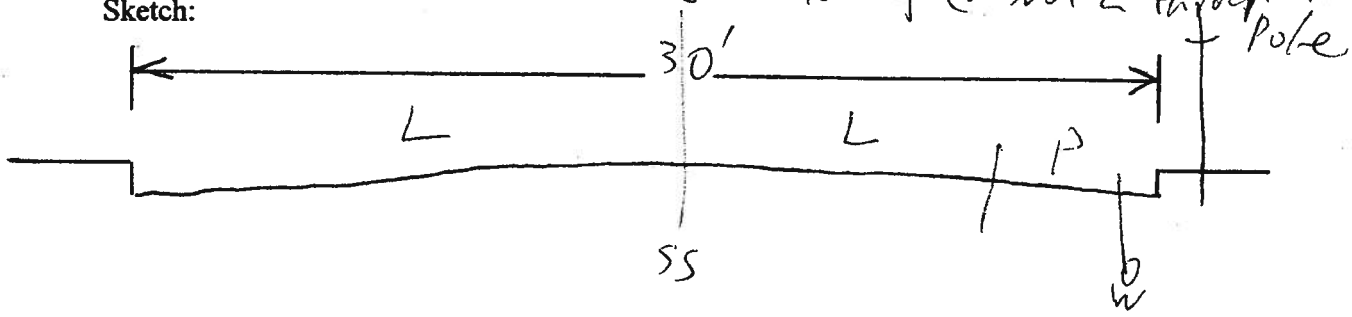
Alignment Name: _____

Street Address: Green

Nearest Cross Street: Ripley

Picture Number, direction and Location: (~~4~~ 2) looking SW along Green looking @ not a thru st

Sketch:



☒ Water: u/ N. Gutter/curb

☒ Power: N sidewalk

☐ Gas: _____

☒ Sewer: ~~at~~ TC of Clark

☒ Telephone: ind @ Artesia

☐ Storm Drains: not a thru st

☐ Trunk Line: _____

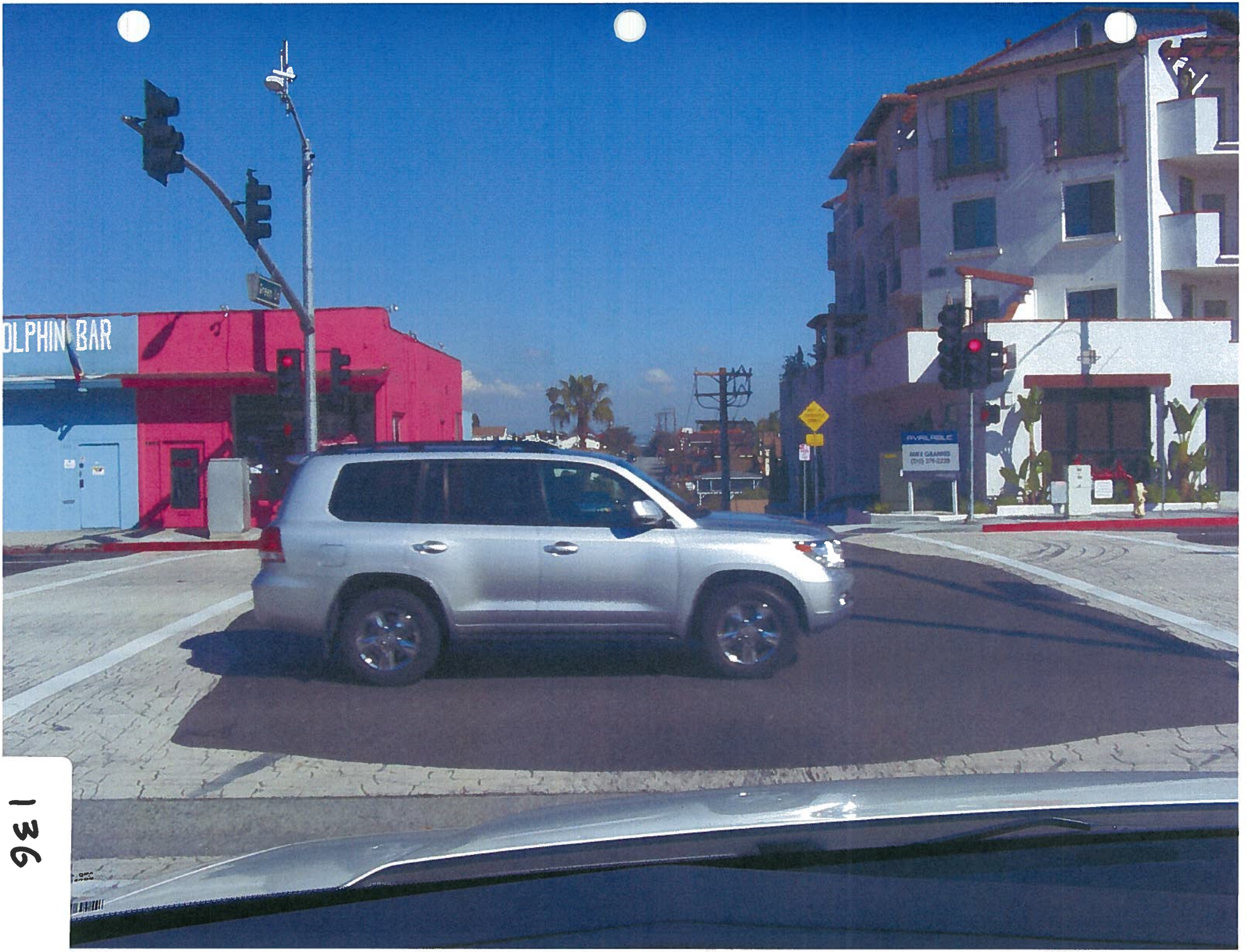
☐ Trunk Line: _____

☒ Traffic: Light Narrow St.

☐ Transportation: up/down hills

☐ Facilities: school Birney Elementary School


STOP
6MLE024



136

West Basin Desalination Project
Alignment Selection

Date of Site Visit: Team Members: _____

Alignment Number: _____

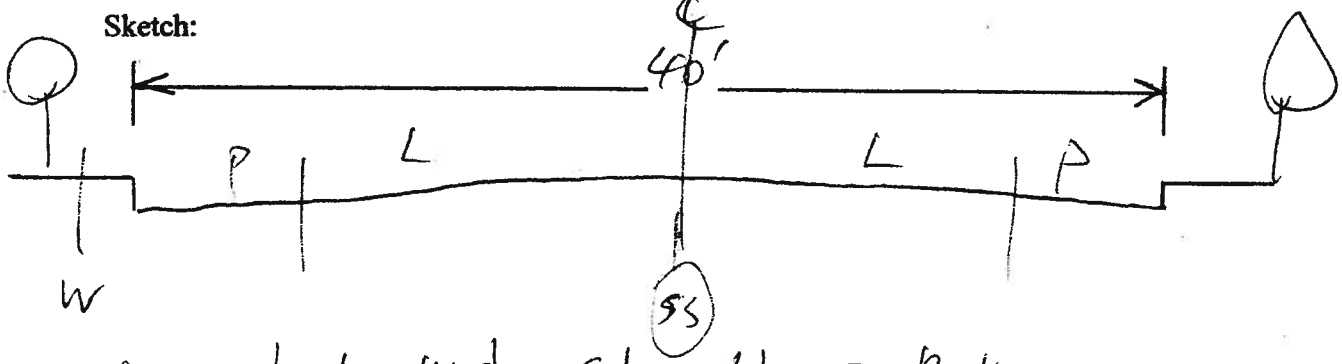
Alignment Name: _____

Street Address: Gibson

Nearest Cross Street: Manhattan Bch

Picture Number, direction and Location: ( ) looking S along Gibson

Sketch:



☒ Water: ~~back~~ under sidewalk ? Parkway

☒ Power: back of property

☐ Gas: _____

☒ Sewer: w/ ℄ Residential both sides

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: light

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

P.P

Date of Site Visit: 2/22/11 Team Members: JB. JH

Alignment Number: _____

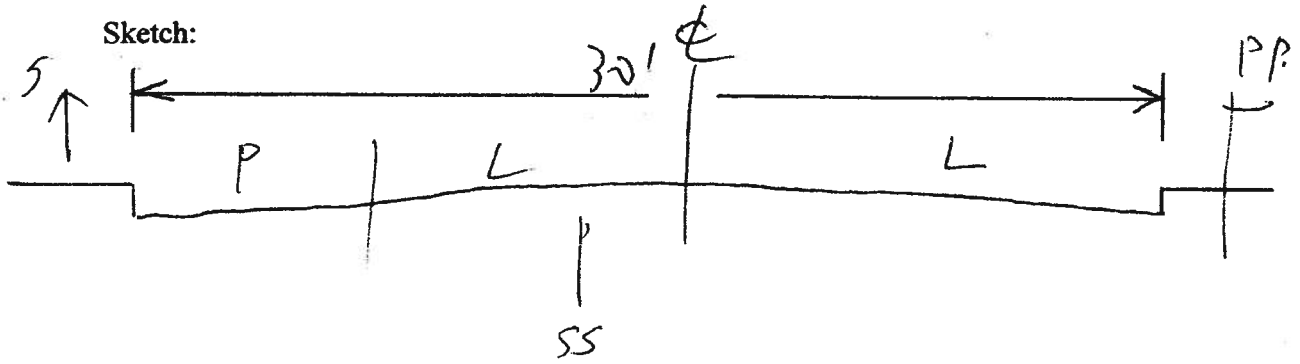
Alignment Name: _____

Street Address: phelan

Nearest Cross Street: Graham

Picture Number, direction and Location: (10) looks @ phelan

Sketch:



☐ Water: _____

☐ Power: X-g Antesia

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: light

☐ Transportation: _____

☐ Facilities: _____

STOP

West Basin Desalination Project
Alignment Selection

P 9

Date of Site Visit: 2/22/11 Team Members: JB JH

Alignment Number: _____

Alignment Name: _____

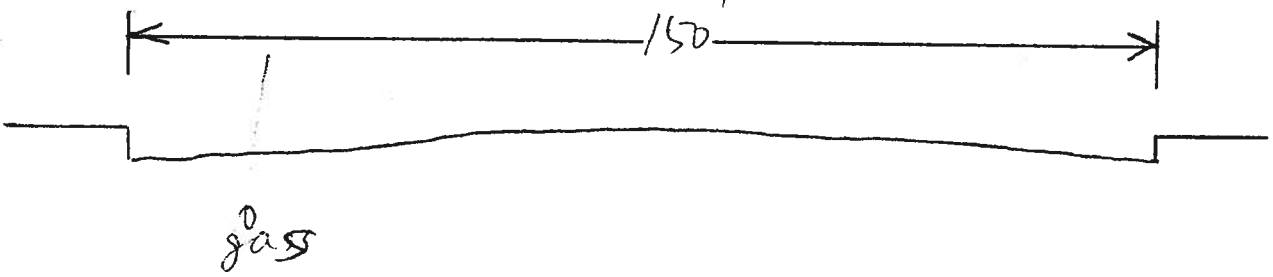
Street Address: _____

Nearest Cross Street: _____

Picture Number, direction and Location: ([redacted]) looking N along Edison N/W

[redacted] looking E along Edison N/W

Sketch:



☐ Water: _____

☐ Power: _____

☒ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

139

140

West Basin Desalination Project
Alignment Selection

R10

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

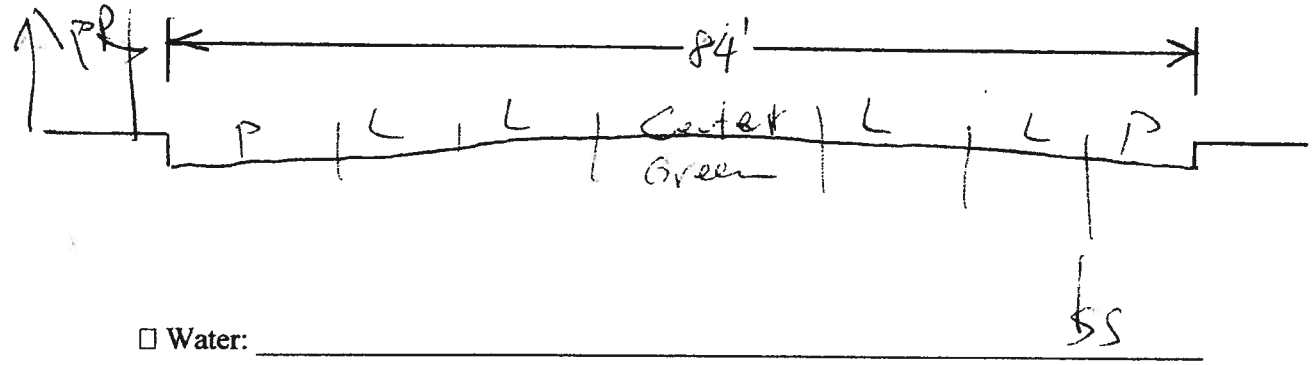
Alignment Name: _____

Street Address: E Inglewood

Nearest Cross Street: Carnegee

Picture Number, direction and Location: (B) looking Salong Inglewood

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: busy

☐ Transportation: _____

☐ Facilities: _____

141

P.11

West Basin Desalination Project
Alignment Selection

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

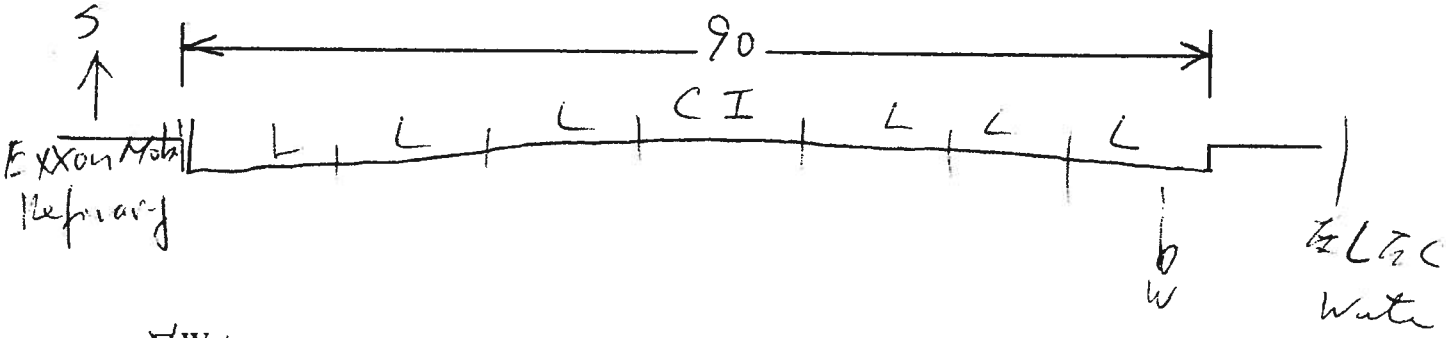
Alignment Name: _____

Street Address: Parire / Madrona

Nearest Cross Street: 190

Picture Number, direction and Location: ( ) looking S along Parire

Sketch:



☒ Water: _____

☒ Power: R/R overpass

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy

☐ Transportation: _____

☐ Facilities: _____

142

West Basin Desalination Project
Alignment Selection

P.12

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

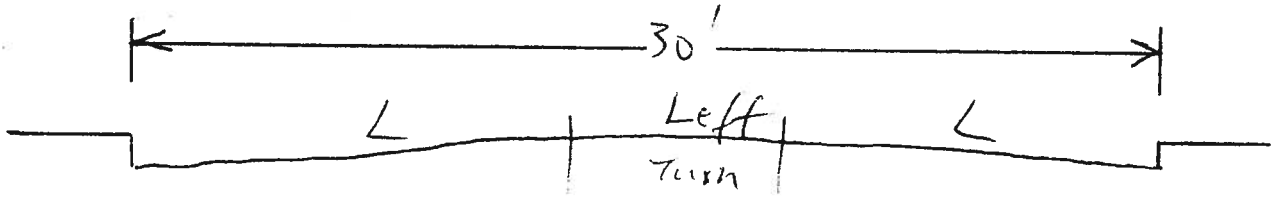
Alignment Name: _____

Street Address: Civic Center Drive

Nearest Cross Street: Madrona

Picture Number, direction and Location: ([redacted]) looking E along Civic Center Dr

Sketch:



☐ Water: _____

☐ Power: curved road

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: _____

☐ Transportation: _____

☐ Facilities: _____

West Basin Desalination Project
Alignment Selection

P.13

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

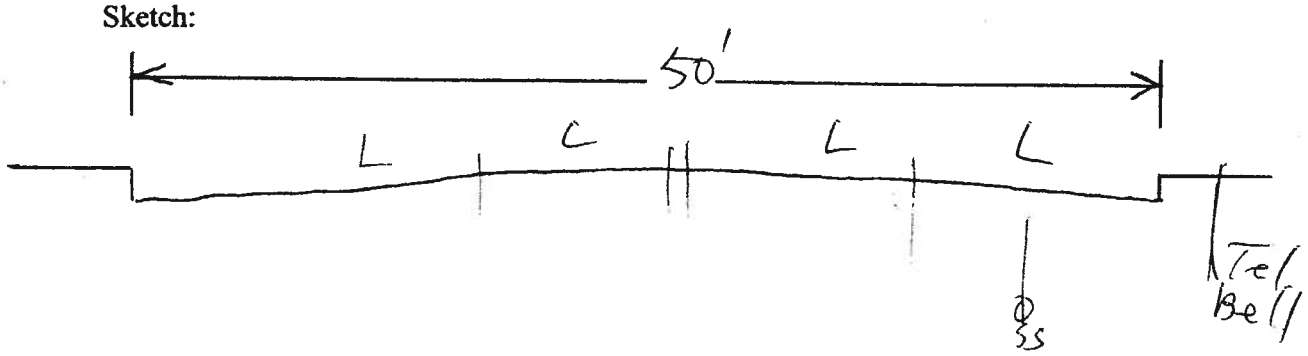
Alignment Name: _____

Street Address: Maple

Nearest Cross Street: Civic Center

Picture Number, direction and Location: ([redacted]) looking S. along Maple

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☒ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Busy

☐ Transportation: _____

☐ Facilities: _____

144

West Basin Desalination Project
Alignment Selection

Pic 4

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

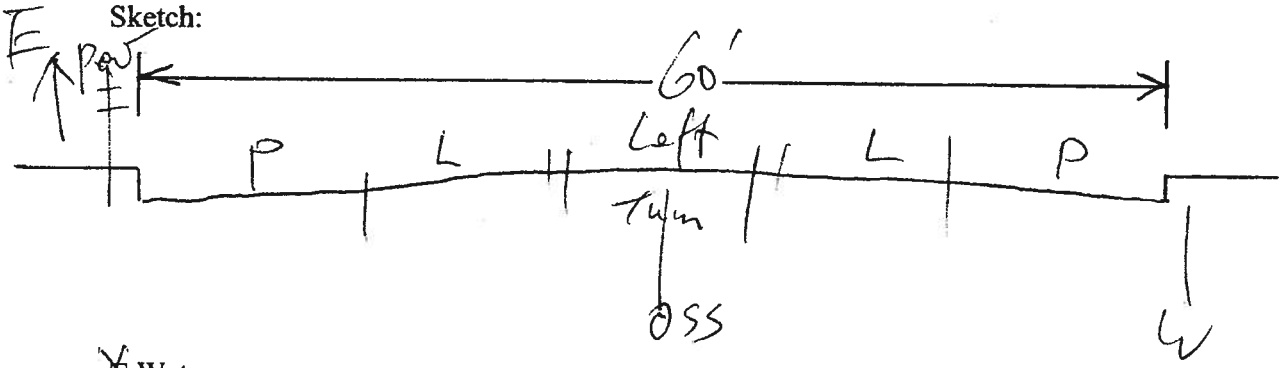
Alignment Name: _____

Street Address: Maricopa

Nearest Cross Street: Mayfle

Picture Number, direction and Location: ([redacted]) looking E city Maricopa

Sketch:



☒ Water: _____

☐ Power: _____

☐ Gas: _____

☒ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Busy

☐ Transportation: _____

☐ Facilities: _____

145

West Basin Desalination Project
Alignment Selection

P/S

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

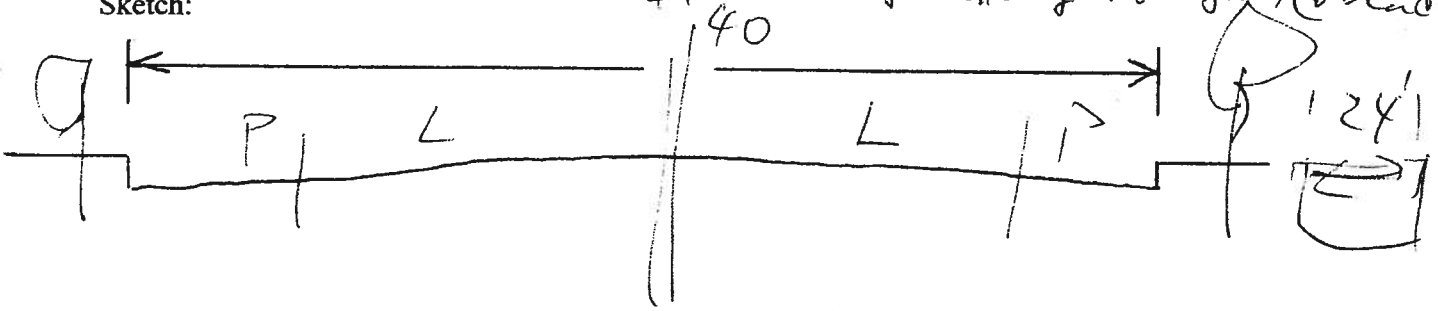
Alignment Name: _____

Street Address: Dominguez

Nearest Cross Street: Cranshaw

Picture Number, direction and Location: (~~P~~) looking E along Dominguez
~~P~~ looking S along Dominguez @ head

Sketch:



☐ Water: @ Tunr along R/R Jon

☐ Power: _____

☐ Gas: _____

☐ Sewer: _____

☐ Telephone: _____

☒ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☐ Traffic: +00 narrow along R/R for cost

☐ Transportation: _____

☐ Facilities: _____

196, 197

146

147

West Basin Desalination Project
Alignment Selection

P.16

Date of Site Visit: 2/22/11 Team Members: JB, JH

Alignment Number: _____

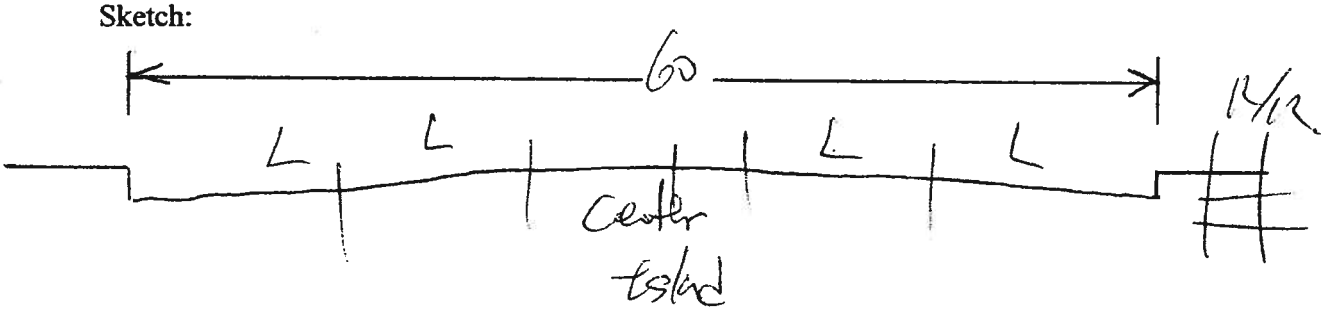
Alignment Name: _____

Street Address: Torrance

Nearest Cross Street: Dominguez

Picture Number, direction and Location: (20) _____

Sketch:



☐ Water: _____

☐ Power: _____

☐ Gas: bridge center-X-j

☐ Sewer: _____

☐ Telephone: _____

☐ Storm Drains: _____

☐ Trunk Line: _____

☐ Trunk Line: _____

☒ Traffic: Very Busy ; 12/12

☐ Transportation: _____

☐ Facilities: _____

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Appendix 1:E

Pipe and Pump Sizing Calculations

APPENDIX E

CALCULATIONS AND COST ESTIMATES

FOR

CONVEYANCE SYSTEMS

CONVEYANCE SYSTEMS

PREFERRED ALTERNATIVE ALIGNMENTS

West Basin Municipal Water District
Ocean Desalination Project

Summary of Conveyance Alternatives

Alt.	Desal Plant Site	Max. Flowrate	Pipeline, Dia. Inches					Cost	Pump Station		
			Backbone			Feeder			No. of Pumps	Cost	Total Cost
			Common	West Basin	West Coast	West Basin	West Coast				
1	NRG	30 MGD	36 "	24 "	24 "	24 " 16 " 12 "	16 "	$18.1 million	5 - 7.5 MGD @ 427' TDH	$4.7 million	$22.8 million
2	AES		36"		30 "	24 " 16 " 12 "	18 "	$20.9 million	5- 7.5 MGD @ 408' TDH	$4.7 million	$25.6 million
3	NRG	30 MGD	36 "	24 "	24 "	-	18"	$16.2 million	5 - 7.5 MGD @ 497' TDH	$5.2 million	$21.4 million
4	AES		36 "		24 "	-	18 "	$17.2 million	5 - 7.5 MGD @ 479' TDH	$5.2 million	$22.4 million
5	NRG	30 MGD	36 "	24 "	24 "	24 "	18 "	$23.0 million	5 -7.5 MGD @ 487' TDH	$5.2 million	$28.2 million
6	AES		36 "		30 "	30 "	18 "	$28.4 million	5 - 7.5 MGD @ 530' TDH	$5.8 million	$34.1 million
7	NRG	60 MGD	54 "					$56.2 million	9 - 7.5 MGD @ 725' TDH	$16.5 million	$72.7 million
8	AES		54 "					$61.7 million	9 – 7.5 MGD @ 737' TDH	$16.5 million	$78.2 million

West Basin Municipal Water District
Ocean Desalination Project

Conveyance Alternatives

Alternative		Desal Plant Site	Backbone Feeder				West Basin Feeder				West Coast Feeder				Total Cost	Comments
			Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost		
1	Local	NRG	30 MGD	From Plant to 45th to Highland to Rosecrans to Aviation. Split at Aviation	36 "	$10.4 million	15 MGD	11.2 MGD west on Manhatten Beach Blvd to WB-4; 3.8 MGD distributed to the east	24 " 16 " 12 "	$2.1 million	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	16 "	$1.5 million	$18.1 million	100 psi minimum at all service connections
				North on Aviation to E El Segundo Blvd;	24 "	$2.1 million										
				South on Aviation to Manhatten Beach Blvd	24 "	$2.0 million										
2		AES		From Plant to Herondo to PCH to Aviation Blvd to Manhattan Beach Blvd.	36"	$11.4 million	15 MGD	11.2 MGD west on Manhatten Beach Blvd to WB-4; 3.8 MGD distributed to the east	24 " 16 " 12 "	$2.1 million	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.7 million	$20.9 million	
				From Manhattan Beach Blvd to El Segundo Blvd on Aviation	30 "	$5.7 million										
3	Connect to West End of West Basin Feeder	NRG	30 MGD	From Plant to 45th to Highland to Rosecrans to Aviation.	36 "	$10.4 million	15 MGD	Tee Connection into West Basin Feeder	24" x 24"	$ -	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.7 million	$16.2 million	Connect to West End of West Basin Feeder and match Max Hydrostatic Grade El. of 415 ft. Interconnection to West Coast Connections (100 psi at connection downstream of PRV to avoid HGL 660 ft)
				North on Aviation to E El Segundo Blvd;	24 "	$2.0 million										
				South on Aviation to Manhatten Beach Blvd.	24 "	$2.1 million										
4		AES		From Plant to Herondo to PCH to Aviation to Manhattan Beach Blvd.	36 "	$11.4 million	15 MGD	Cross Connection into West Basin Feeder	36" x 24"	$ -	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.7 million	$17.2 million	
				From Manhattan Beach Blvd to El Segundo Blvd on Aviation	24 "	$4.1 million										
5	Connect to East End of West Basin Feeder	NRG	30 MGD	From Plant to 45th to Highland to Rosecrans to Aviation.	36 "	$10.4 million	15 MGD	East on Manhatten Beach Blvd.Van Ness Ave. (WB-12)	24 "	$6.8 million	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.7 million	$23.0 million	Connect to East End of Feeder and match MWD Max Hydrostatic Grade El. Of 415 ft. and Interconnection to West Coast Connections (100 psi at connection…downstream of PRV to avoid HGL 660 ft)
				North on Aviation to E El Segundo Blvd;	24 "	$2.1 million										
				South on Aviation to Manhattan Beach	24 "	$2.0 million										
6		AES		From Plant to Herondo to PCH to Aviation to Manhattan Beach Blvd.	36 "	$11.4 million	15 MGD	Manhattan Beach Blvd from Aviation to Van Ness (WB-12)	30 "	$9.5 million	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.7 million	$28.4 million	
				From Manhattan Beach Blvd to El Segundo Blvd on Aviation	30 "	$5.7 million										
7	Sepulveda Feeder	NRG	60 MGD	From Plant to 45th to Highland to Rosecrans to S. Douglas Drive to E. El Segundo Blvd. to Isis to 120th Street to Van Ness Ave.	54 "	$56.2 million									$56.2 million	Connect upstream of West Basin Feeder and Match MWD Max Hydrostatic Grade elev. = 660 ft.
8		AES		From Plant to Francisca Ave. to Beryl St. to 190th St. to Meyer Ln to Ralston to Felton Ave. to 182nd St. to Yukon Ave. to 170 St. to Van Ness Ave.	54 "	$61.7 million									$61.7 million	

West Basin Municipal Water District
Ocean Desalination Project

Pump Station Requirements for Conveyance Alternatives

Alt.	Description	Pump	Cost per pump	Total	VFD Cost@ $350 per Hp	Mat'l Cost	Installation @ 75%	OH&P @ 25%	Grand Total
1	5 Vertical Turbine Pumps 7.5 MGD @ 427' TDH	17H 4 stage 1800 rpm - 700 hp	$ 184,415	$0.9 million	$1.2 million	$2.1 million	$1.6 million	$0.9 million	$4.7 million
2	5 Vertical Turbine Pumps 7.5 MGD @ 408' TDH	17H 4 stage 1800 rpm - 700 hp	$ 184,415	$0.9 million	$1.2 million	$2.1 million	$1.6 million	$0.9 million	$4.7 million
3	5 Vertical Turbine Pumps 7.5 MGD @ 497' TDH	17H, 5 stages with 800hp motor	$ 197,669	$1.0 million	$1.4 million	$2.4 million	$1.8 million	$1.0 million	$5.2 million
4	5 Vertical Turbine Pumps 7.5 MGD @ 479' TDH	17H 5 stages with 800 hp motor	$ 197,669	$1.0 million	$1.4 million	$2.4 million	$1.8 million	$1.0 million	$5.2 million
5	5 Vertical Turbine Pumps 7.5 MGD @ 487' TDH	17H 5 stages with 800hp motor	$ 197,669	$1.0 million	$1.4 million	$2.4 million	$1.8 million	$1.0 million	$5.2 million
6	5 Vertical Turbine Pumps 7.5 MGD @ 530' TDH	21H 4stages with 900hp motor	$ 212,627	$1.1 million	$1.6 million	$2.6 million	$2.0 million	$1.2 million	$5.8 million
7	9 Vertical Turbine Pumps – 7.5 MGD @ 725' TDH	21H VTP, 5 stages 1800 rpm -1500 hp	$ 314,023	$2.8 million	$4.7 million	$7.6 million	$5.7 million	$3.3 million	$16.5 million
8	9 Vertical Turbine Pumps – 7.5 MGD @ 737' TDH	21H VTP, 5 stages 1800 rpm -1500 hp	$ 314,023	$2.8 million	$4.7 million	$7.6 million	$5.7 million	$3.3 million	$16.5 million

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 1

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-12 Connection on West Basin Feeder - Local Service

		Input Data	Units
Wet Well Water Surface Elev		10	Feet
F.G. @ WB-2B		46.0	Feet
Min. Pressure @ WB-2B		100	PSI
		230.77	Feet
Flow		7.00	mgd
		10.8304	cfs

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

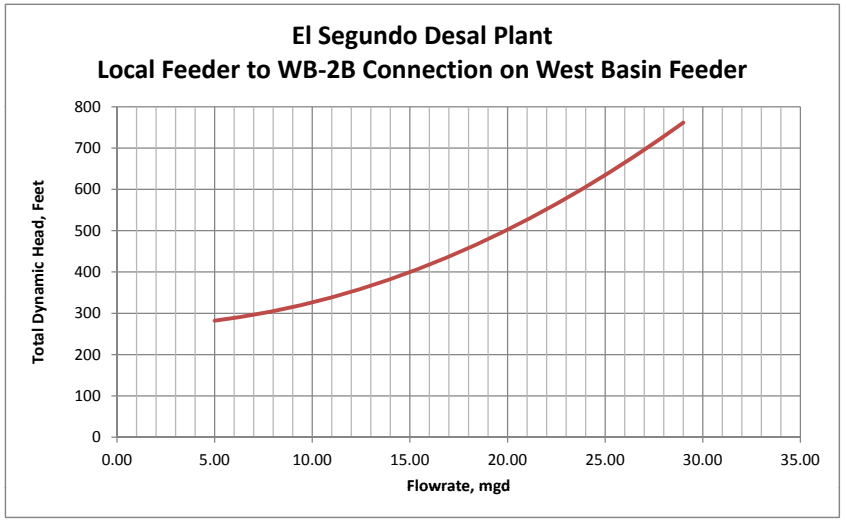
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	%		2,920 feet	2,920 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	3.8	2,320 feet	2,320 feet	East
WB-2A,2B,13	2.7 mgd	4.18 cfs	18%	18%	2.7	5,670 feet	3,350 feet	East

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-2B											
WB-2B		Pipe Exit	1	1.95	12 "	2.482			1	0.10	
Manhattan Beach Blvd	WB-2B	CMLC Steel Pipe	3,350	1.95	12 "	2.482	2.34E+05	0.0206		6.60	Decrease flow to 2.7 mgd
	WB-29	CMLC Steel Pipe	2,320	2.71	16 "	1.939	2.44E+05	0.0194		1.97	Flow in East leg is 3.8 mgd
		Tee branch	1	2.71	16 "	1.939			1.80	0.11	
Aviation		CMLC Steel Pipe	5,260	10.83	24 "	3.447	6.51E+05	0.0182		8.83	
		Tee branch	1	21.66	36 "	3.064			1.80	0.26	
Rosecrans/Highland/45th		CMLC Steel Pipe	14,610	21.66	36 "	3.064	8.68E+05	0.0158		11.22	
		Mitered 90 bend	3	21.66	36 "	3.064			1.10	0.48	
		Total Length	25,540								

Static Head 266.77 Total H/L 29.57 TDH 296.34

mgd	cfs	h/l	TDH	PSI
		29.57		
5	7.735	15.2	282	122
7	10.829	29.6	296	128
9	13.923	48.6	315	137
11	17.017	72.4	339	147
13	20.111	99.6	366	159
15	23.205	132.6	399	173
17	26.299	170.4	437	189
19	29.393	212.8	480	208
21	32.487	260.0	527	228
23	35.581	311.8	579	251
25	38.675	367.6	634	275
27	41.769	428.8	696	301
29	44.863	494.7	761	330



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-20 Connection on West Coast Feeder - Local Service

	Input Data	Units
Wet Well Water Surface Elev	45	Feet
F.G. @ WB-20	46.0	Feet
Min. Pressure @ WB-20	100	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

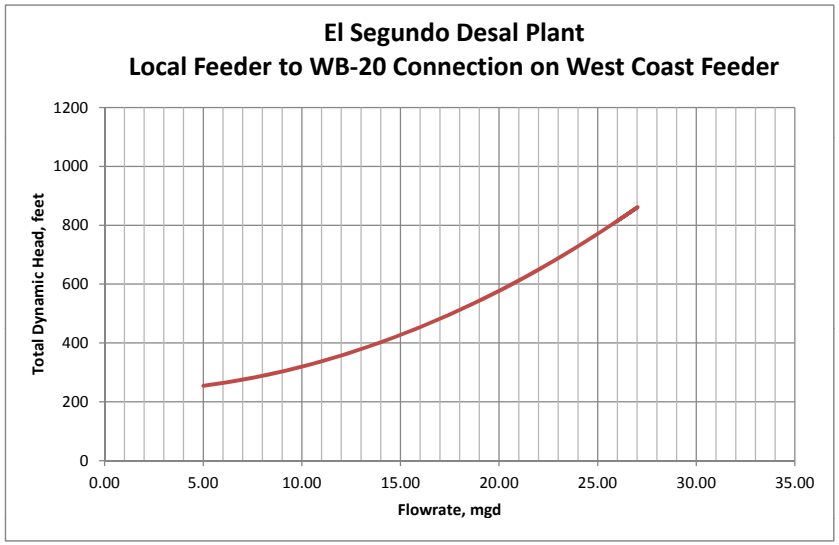
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-20										
WB-20	Pipe Exit		11.60	16 "	8.311			1	1.07	
E El Segundo Blvd	CMLC Steel Pipe	7,000	11.60	16 "	8.311	1.05E+06	0.0182		102.48	
E El Segundo Blvd	Mitered 90 bend	1	11.60	16 "	8.311			1.10	1.18	
Aviation Blvd	CMLC Steel Pipe	5,300	23.21	24 "	7.387	1.40E+06	0.0170		38.18	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	46.42	36 "	6.567	1.86E+06	0.0152		49.56	
minor	Mitered 90 bend	4	46.42	36 "	6.567			1.10	2.95	
	Total Length	21,610.00								
			Static Head	231.77				Total H/L	195.41	TDH 427.18

mgd	cfs	h/l	TDH	PSI
		195.41		
5	7.74	22.5	254	110
7	10.83	43.0	275	119
9	13.92	71.1	303	131
11	17.02	106.1	338	146
13	20.11	146.8	379	164
15	23.21	195.4	427	185
17	26.30	251.0	483	209
19	29.40	311.4	543	235
21	32.49	380.4	612	265
23	35.59	456.3	688	298
25	38.68	539.1	771	334
27	41.77	628.8	861	373
26	40.23	583.1	815	353



10416.66667 2604.166667

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to Service Connections on West Coast and West Basin Feeders - Cost

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Rosecrans/Highland/45th	14,610	36 "	$10,415,146	Backbone common to WBF and WCF
Aviation	5,300	24 "	$2,054,037	Backbone to El Segundo Blvd (WCF)
Aviation	5,260	24 "	$2,038,535	Backbone to Manhattan Beach Blvd (WBF)
Total Length	25,170 feet			
		Total Cost	$14,507,717	

Local Feeder Cost

Location		Distance	Dia	Cost	Comments
Manhattan Beach Blvd	WB-3,4,5	2,920	24 "	$1,131,658	Feeder to Service Connections on WBF (WB-3,4,5)
	WB-2A,2B,13	3,350	12 "	$458,035	Feeder to Service Connections on WBF (WB-2A,2B,13)
	WB-29	2,320	16 "	$488,807	Feeder to Service Connections on WBF (WB-29)
El Segundo Blvd.	WB-20	7,000	16 "	$1,474,849	Feeder to Service Connections on WCF (WB-20)
			Total Cost	$3,553,350	
				$18,061,067	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Study
Conveyance Alternative No. 2

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-12 Connection on West Basin Feeder - Local Service

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ WB-2B	46.0	Feet
Min. Pressure @ WB-2B	100	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

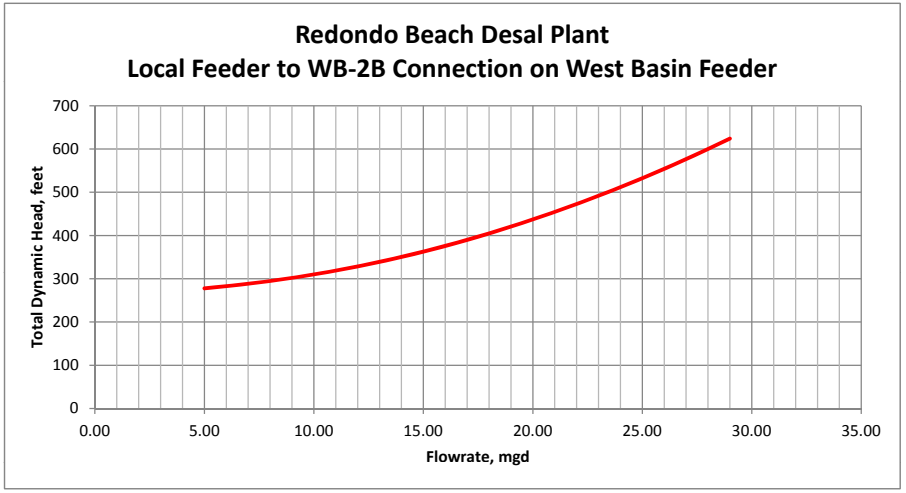
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative %	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%			2,920 feet	2,920 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	5.88	2,320 feet	2,320 feet	East
WB-2A,2B,13	2.7 mgd	4.18 cfs	18%	18%	4.18	5,670 feet	3,350 feet	East

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-2B											
WB-2B		Pipe Exit		4.18	12 "	5.319			1	0.44	
Manhattan Beach Blvd	WB-2B	CMLC Steel Pipe	3,350	4.18	12 "	5.32	5.02E+05	0.0200		29.43	
	WB-29	CMLC Steel Pipe	2,320	5.80	16 "	4.16	5.23E+05	0.0188		8.77	
		Tee branch	1	5.80	16 "	4.155			1.80	0.48	
Aviation		CMLC Steel Pipe	10,950	46.42	36 "	6.567	1.86E+06	0.0152		37.15	
PCH		CMLC Steel Pipe	2,950	46.42	36 "	6.567	1.86E+06	0.0152		10.01	
Herondo/Plant		CMLC Steel Pipe	2,100	46.42	36 "	6.567	1.86E+06	0.0152		7.12	
		Mitered 45 bend	2	46.42	36 "	6.567			0.25	0.33	
		Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
		Total Length	21,670								

Static Head 266.77 Total H/L 95.95 TDH 362.72

gpm	cfs	h/l	TDH	PSI
		95.95		
5	7.735	11.2	278	120
7	10.829	21.6	288	125
9	13.923	35.4	302	131
11	17.017	52.7	320	138
13	20.111	72.0	339	147
15	23.205	95.9	363	157
17	26.299	123.2	390	169
19	29.393	153.9	421	182
21	32.487	188.0	455	197
23	35.581	225.5	492	213
25	38.675	265.7	532	231
27	41.769	309.9	577	250
29	44.863	357.5	624	271



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ WB-12	46.0	Feet
Min. Pressure @ WB-12	100	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

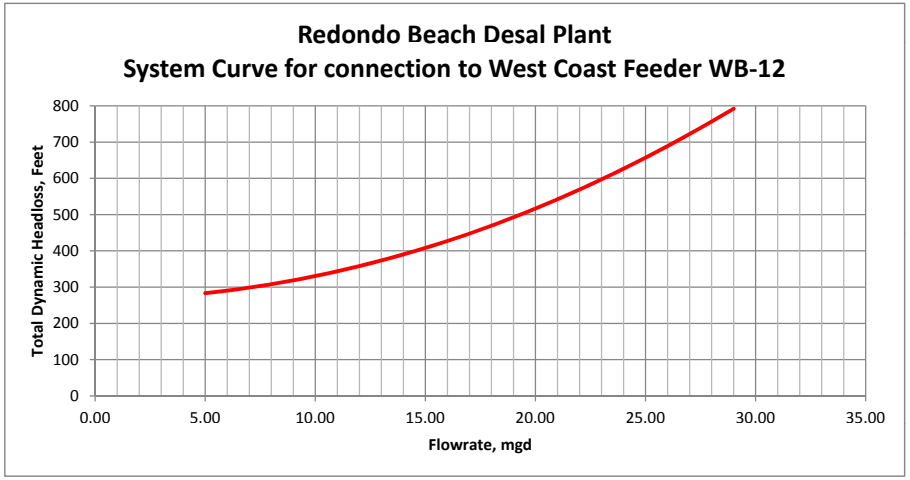
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-12										
WB-12	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd	CMLC Steel Pipe	7,000	11.60	18 "	6.567	9.30E+05	0.0182		56.87	
E El Segundo Blvd	Mitered 90 bend	1	23.21	18 "	13.133			1.10	2.95	
Aviation	CMLC Steel Pipe	10,600	23.21	30 "	4.728	1.12E+06	0.0164		24.14	
Aviation	CMLC Steel Pipe	10,950	46.42	36 "	6.567	1.86E+06	0.0152		37.15	
PCH	CMLC Steel Pipe	2,950	46.42	36 "	6.567	1.86E+06	0.0152		10.01	
Herondo/Plant	CMLC Steel Pipe	2,100	46.42	36 "	6.567	1.86E+06	0.0152		7.12	
	Mitered 45 bend	2	46.42	36 "	6.567			0.25	0.33	
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	23,000								
			Static Head	266.77				Total H/L	141.44	TDH 408.21

gpm	cfs	h/l	TDH	PSI
		141.44		
5	7.735	16.3	283	123
7	10.829	31.3	298	129
9	13.923	51.7	318	138
11	17.017	77.2	344	149
13	20.111	106.2	373	162
15	23.205	141.4	408	177
17	26.299	180.5	447	194
19	29.393	225.5	492	213
21	32.487	275.4	542	235
23	35.581	330.4	597	259
25	38.675	390.3	657	285
27	41.769	455.3	722	313
29	44.863	525.2	792	343



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service Cost

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation	10,600	30 "	$5,745,180	From Manhattan Beach Blvd to El Segundo Blvd
Aviation	10,950	36 "	$7,806,013	From PCH to Manhattan Beach Blvd
PCH	2,950	36 "	$2,102,990	From Herondo to Aviation
Herondo/Plant	2,100	36 "	$1,497,044	From Plant to PCH
Total Length	26,600 feet			
		Total Cost	$17,151,226	

Local Feeder Cost

Location		Distance	Dia	Cost	Comments
Manhattan Beach Blvd	WB-2A,2B,13	3,350	12 "	$458,035	Feeder to Service Connections on WBF (WB-2A,2B,13)
	WB-29	2,320	16 "	$488,807	Feeder to Service Connections on WBF (WB-29)
	WB-3,4,5	2,920	24 "	$1,131,658	Feeder west to Service Connection on WBF (WB-3,4,5)
West Coast Feeder	WB-20	7,000	18 "	$1,659,205	East on El Segundo to WB-20
		Total Cost		$3,737,706	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 3

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

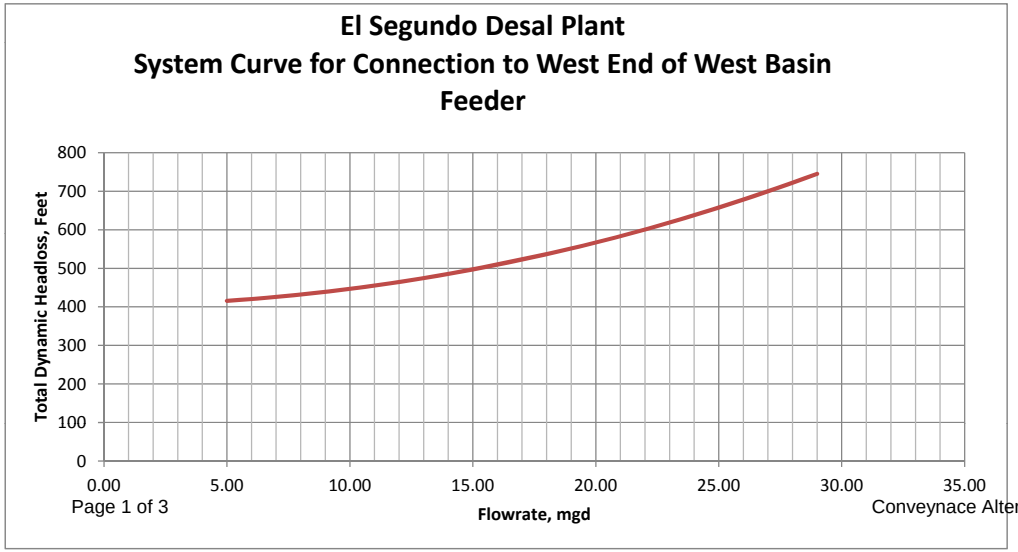
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connect at Aviation to West Basin Feeder from El Segundo Desal Site										
Aviation & Manhattan Beach B	Tee branch	1	23.21	24 "	7.387			1.80	1.53	Connect into West Basin Feeder
Aviation Blvd	CMLC Steel Pipe	5,260	23.21	24 "	7.387	1.40E+06	0.0170		37.89	
	Tee branch	1	46.42	36 "	6.567			1.80	1.21	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	46.42	36 "	6.567	1.86E+06	0.0152		49.56	
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	19,870								
			Static Head	405.00				Total H/L	92.39	TDH 497.39

mgd	cfs	h/l	TDH	PSI
		92.39		
5	7.74	10.6	416	180
7	10.83	20.5	426	184
9	13.92	34.0	439	190
11	17.02	50.7	456	197
13	20.11	69.4	474	206
15	23.21	92.4	497	216
17	26.30	118.7	524	227
19	29.40	146.1	551	239
21	32.49	178.5	583	253
23	35.59	214.1	619	268
25	38.68	252.9	658	285
27	41.77	295.0	700	303
29	44.87	340.3	745	323



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 3

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WCF	95.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

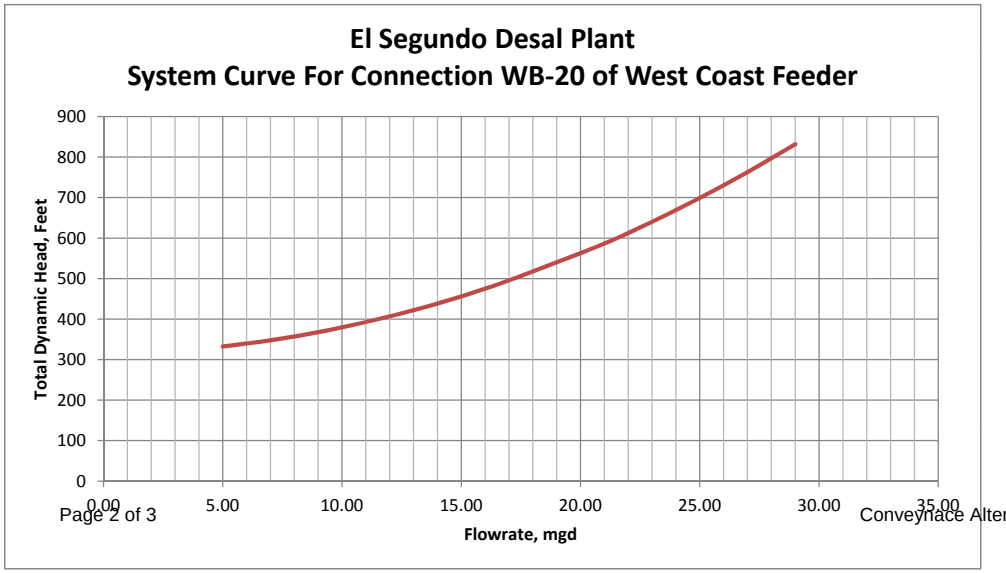
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to Service Connection WB-20 on West Coast Feeder from to El Segundo Desal Site										
Service Commection WB-20	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd	CMLC Steel Pipe	7,000	11.60	18 "	6.567	9.30E+05	0.0164		51.24	
Aviation Blvd	CMLC Steel Pipe	5,300	23.21	24 "	7.387	1.40E+06	0.0158		35.48	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	46.42	36 "	6.567	1.86E+06	0.0152		49.56	
	Mitered 90 bend	4	46.42	36 "	6.567			1.10	2.95	
	Total Length	26,910.00								
			Static Head	315.77				Total H/L	139.90	TDH 455.67

mgd	cfs	h/l	TDH	PSI
		139.90		
5	7.74	16.5	332	144
7	10.83	31.6	347	151
9	13.92	51.6	367	159
11	17.02	77.0	393	170
13	20.11	106.1	422	183
15	23.21	139.9	456	197
17	26.30	179.7	495	215
19	29.40	224.5	540	234
21	32.49	270.5	586	254
23	35.59	324.5	640	277
25	38.68	383.4	699	303
27	41.77	447.2	763	331
29	44.87	515.9	832	360



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 3

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders

Backbone Cost

Location	Distance	Dia	Cost	Comments
Rosecrans/Highland/45th	14,610	36 "	$10,415,146	Backbone to El Segundo Desal Site
Total Length	14,610 feet			
		Total Cost	$10,415,146	

Service Connection Cost

West Basin

Location	Distance	Dia	Cost	Comments
Aviation Blvd	5,260	24 "	$2,038,535	Backbone in Aviation to West Basin Feeder
		Total Cost	$2,038,535	

West Coast

Location	Distance	Dia	Cost	Comments
Aviation Blvd	5,300	24 "	$2,054,037	Backbone in Aviation to West Coast Feeder
E El Segundo Blvd	7,000	18 "	$1,659,205	Backboneto Service Connections along El Segundo Blvd
		Total Cost	$3,713,242	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 4

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/11/2011 SHEET NO. 1 of 3

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - Redondo Beach Site Site to West End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

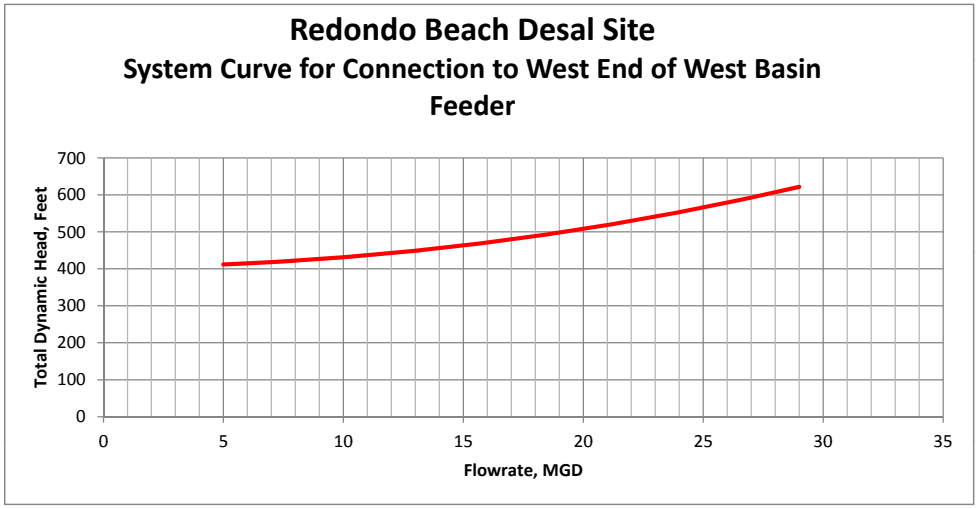
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West end connection toWest Basin Feeder from Redondo Beach Desal Site										
	Tee branch	1	23.21	24 "	7.387			1.80	1.53	
Aviation	CMLC Steel Pipe	10,950	46.42	36 "	6.567	1.86E+06	0.0152		37.15	Distance from PCH to Manhatten Beach Blvd
PCH	CMLC Steel Pipe	2,950	46.42	36 "	6.567	1.86E+06	0.0152		10.01	
Herondo/Plant	CMLC Steel Pipe	2,100	46.42	36 "	6.567	1.86E+06	0.0152		7.12	
	Mitered 45 bend	2	46.42	36 "	6.567					
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	16,000								

Static Head 405.00 Total H/L 58.01 TDH 463.01

mgd	cfs	h/l	TDH	PSI
		58.01		
5	7.735	6.7	412	178
7	10.829	13.1	418	181
9	13.923	21.7	427	185
11	17.017	32.3	437	190
13	20.111	43.6	449	194
15	23.205	58.0	463	201
17	26.299	74.5	479	208
19	29.393	93.1	498	216
21	32.487	113.7	519	225
23	35.581	136.4	541	235
25	38.675	161.1	566	245
27	41.769	187.9	593	257
29	44.863	216.8	622	269



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 4

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to West End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WCF	95.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

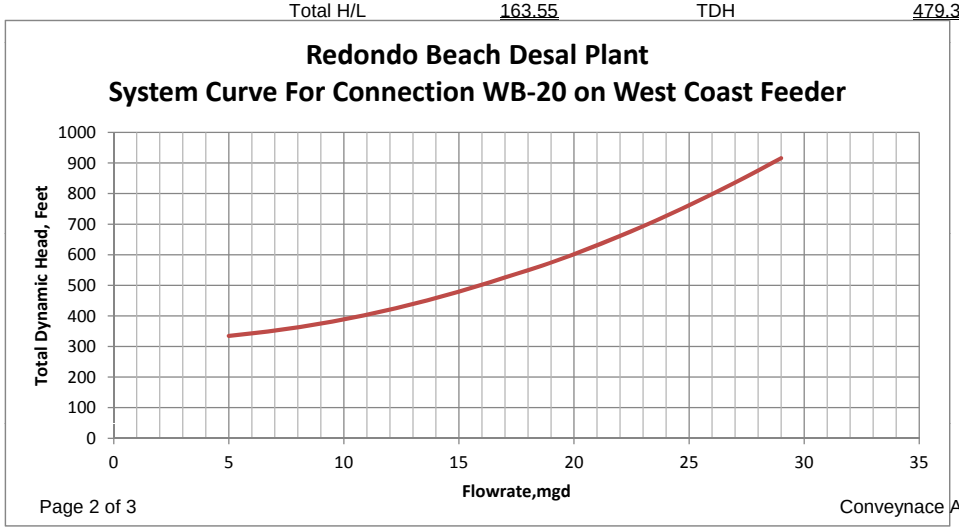
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to West Coast Service Connections from to Redondo Beach Desal Site										
Service Commection WB-20	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd	CMLC Steel Pipe	7,000	11.60	18 "	6.567	9.30E+05	0.0182		56.87	
Aviation Blvd	CMLC Steel Pipe	10,600	23.21	24 "	7.387	1.40E+06	0.0170		76.35	Distance between MBB to El Segundo Blvd
Aviation Blvd	CMLC Steel Pipe	10,950	23.21	36 "	3.283	9.30E+05	0.0158		9.65	Distance from PCH to Manhatten Beach Blvd
PCH	CMLC Steel Pipe	2,950	46.42	36 "	6.567	1.86E+06	0.0152		10.01	
Herondo/Plant	CMLC Steel Pipe	2,100	46.42	36 "	6.567	1.86E+06	0.0152		7.12	
	Mitered 60 bend	2	46.42	36 "	6.567			0.50	0.67	
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	13,050.00								

Static Head 315.77 Total H/L 163.55 TDH 479.32

mgd	cfs	h/l	TDH	PSI
		163.55		
5	7.74	18.8	335	145
7	10.83	35.9	352	152
9	13.92	59.3	375	163
11	17.02	88.3	404	175
13	20.11	122.8	439	190
15	23.21	163.6	479	208
17	26.30	210.1	526	228
19	29.40	258.1	574	249
21	32.49	315.3	631	273
23	35.59	377.3	693	300
25	38.68	445.8	762	330
27	41.77	520.0	836	362
29	44.87	599.9	916	397



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 4

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - Redondo Beach Site to West End of MWD Feeders

Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation	10,950	36 "	$7,806,013	Feeder to West Basin Feeder
PCH	2,950	36 "	$2,102,990	Feeder to West Coast Feeder
Herondo/Plant	2,100	36 "	$1,497,044	Backbone to Redondo Beach Site Desal Site
Total Length	16,000 feet			
		Total Cost	$11,406,046	

West Basin Feeder

Location	Distance	Dia	Cost	Comments
	-	tee	$ -	Local Feeder to West End of WBF
		Total Cost	$0	

WestCoast Feeder

Location	Distance	Dia	Cost	Comments
Aviation Blvd	10,600.00	24 "	$4,108,074	
E El Segundo Blvd	7,000	18 "	$1,659,205	
		Total Cost	$5,767,279	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 5

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/11/2011 SHEET NO. 1 of 3

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - El Segundo Site to East End of West Basin Feeder; Service Connections on West Coast Feeder

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

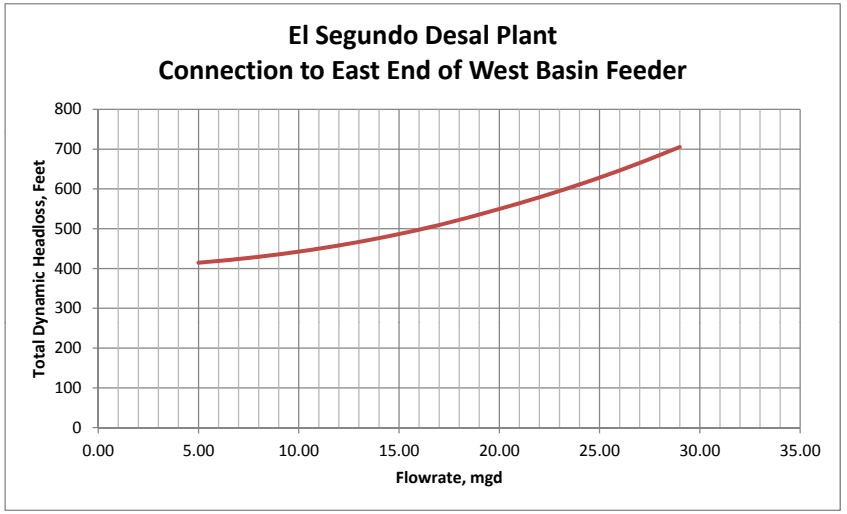
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
East end connection (WB-12) onWest Basin Feeder from El Segundo Desal Site										
East end of WBF (WB-12)	Pipe Exit		7.66	24 "	2.438			1	0.09	
Manhattan Beach Blvd	CMLC Steel Pipe	17,610	7.66	24 "	2.438	4.60E+05	0.0182		14.79	
	Tee branch	1	23.21	24 "	7.387			1.80	1.53	
Aviation	CMLC Steel Pipe	5,260	23.21	30 "	4.728	1.12E+06	0.0170		12.41	
	Tee branch	1	46.42	36 "	6.567			1.80	1.21	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	46.42	36 "	6.567	1.86E+06	0.0152		49.56	
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	37,480								

Static Head 405.00 Total H/L 81.80 TDH 486.80

mgd	cfs	h/l	TDH	PSI
		81.80		
5	7.735	9.6	415	180
7	10.829	18.6	424	184
9	13.923	30.7	436	189
11	17.017	45.0	450	195
13	20.111	61.4	466	202
15	23.205	81.8	487	211
17	26.299	104.4	509	221
19	29.393	130.4	535	232
21	32.487	159.3	564	245
23	35.581	190.0	595	258
25	38.675	223.2	628	272
27	41.769	260.4	665	288
29	44.863	300.4	705	306



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 5

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to East End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WCF (WB-20)	82.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

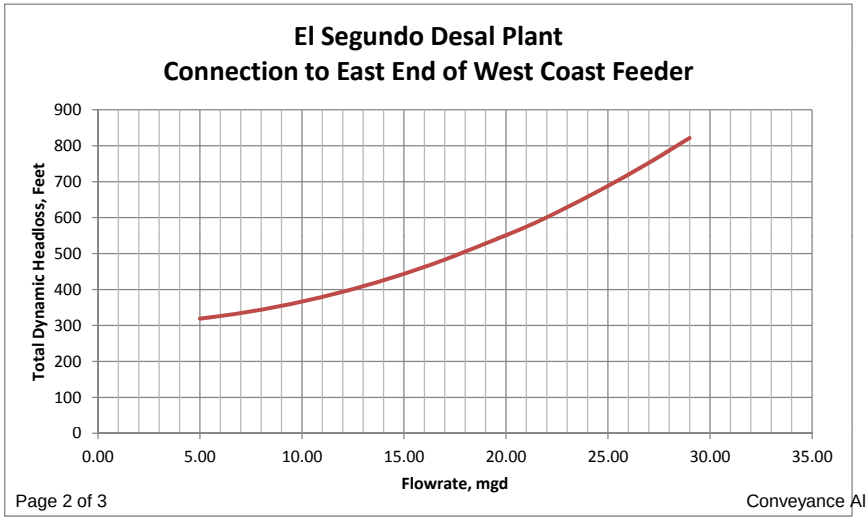
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Feeder Service Connections from to El Segundo Desal Site										
Service Commection WB-20	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd to WB-20	CMLC Steel Pipe	7,000	11.60	18 "	6.567	9.30E+05	0.0164		51.24	
Aviation Blvd	CMLC Steel Pipe	5,300	23.21	24 "	7.387	1.40E+06	0.0158		35.48	
E El Segundo Blvd	Mitered 90 bend	1	46.42	36 "	6.567			1.10	0.74	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	46.42	36 "	6.567	1.86E+06	0.0152		49.56	
minor	Mitered 90 bend	4	46.42	36 "	6.567			1.10	2.95	
	Total Length	19,910.00								

Static Head 302.77 Total H/L 140.64 TDH 443.41

mgd	cfs	h/l	TDH	PSI
		140.64		
5	7.74	16.6	319	138
7	10.83	31.8	335	145
9	13.92	51.8	355	154
11	17.02	77.4	380	165
13	20.11	106.6	409	177
15	23.21	140.6	443	192
17	26.30	180.6	483	209
19	29.40	225.6	528	229
21	32.49	272.0	575	249
23	35.59	326.2	629	273
25	38.68	385.5	688	298
27	41.77	449.6	752	326
29	44.87	518.7	821	356



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 5

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to East End of MWD Feeders

Backbone Cost from El Segundo Site

Location	Distance	Dia	Cost	Comments
Aviation	5,260	24 "	$2,038,535	Backbone Feeder to West Basin Feeder
Aviation Blvd	5,300	24 "	$2,054,037	Backbone Feeder to West Coast Feeder
Rosecrans/Highland/45th	14,610	36 "	$10,415,146	Backbone to El Segundo Desal Site
Total Length	25,170 feet			
		Total Cost	$14,507,717	

Feeder Cost from El Segundo Site

Location	Distance	Dia	Cost	Comments
Manhattan Beach Blvd	17,610	24 "	$6,824,828	Feeder to East End of WBF (WB-12)
E El Segundo Blvd to WB-20	7,000	18 "	$1,659,205	Feeder to Service Connections on WCF (WB-20)
Total Length	24,610 feet			
		Total Cost	$8,484,034	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 6

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/11/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site Site to East End of MWD Feeders

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	5.00	mgd
	7.736	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

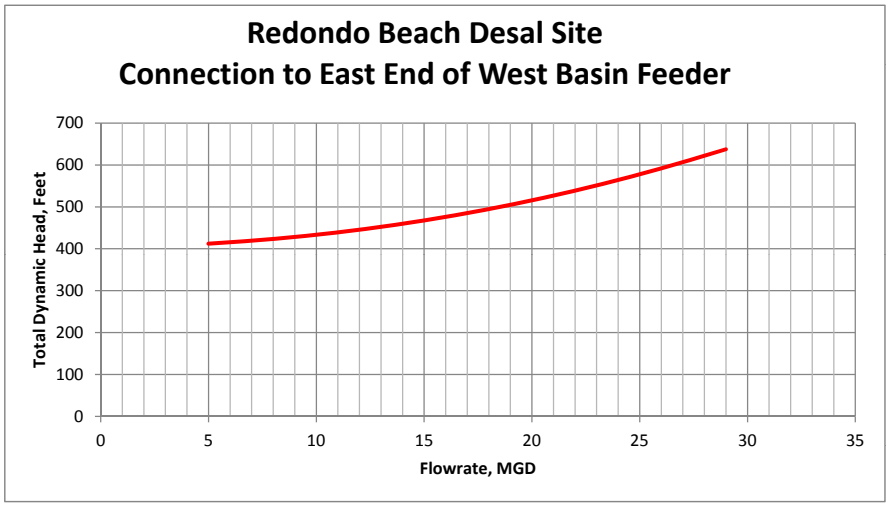
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West end connection toWest Basin Feeder from Redondo Beach Desal Site										
East end of WBF (WB-12)	Pipe Exit		2.55	30 "	0.520			1	0.00	
Manhatten Beach Blvd	CMLC Steel Pipe	17,610	2.55	30 "	0.520	1.23E+05	0.0206		0.61	
	Tee branch	1	7.74	30 "	1.576			1.80	0.07	
Aviation	CMLC Steel Pipe	10,950	15.47	36 "	2.189	6.20E+05	0.0158		4.29	
PCH	CMLC Steel Pipe	2,950	15.47	36 "	2.189	6.20E+05	0.0158		1.16	
Herondo/Plant	CMLC Steel Pipe	2,100	15.47	36 "	2.189	6.20E+05	0.0158		0.82	
	Mitered 60 bend	2	15.47	36 "	2.189			0.50	0.07	
	Mitered 90 bend	3	15.47	36 "	2.189			1.10	0.25	
	Total Length	30,660								

Static Head 405.00 Total H/L 7.27 TDH 412.27

gpm	cfs	h/l	TDH	PSI
		7.27		
5	7.735	7.3	412	179
7	10.829	14.2	419	182
9	13.923	23.6	429	186
11	17.017	34.8	440	191
13	20.111	46.9	452	196
15	23.205	62.5	467	203
17	26.299	80.1	485	210
19	29.393	100.0	505	219
21	32.487	122.2	527	228
23	35.581	146.2	551	239
25	38.675	172.7	578	250
27	41.769	201.4	606	263
29	44.863	232.4	637	276



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to East End of MWD Feeders

Input Data		Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WCF	46.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

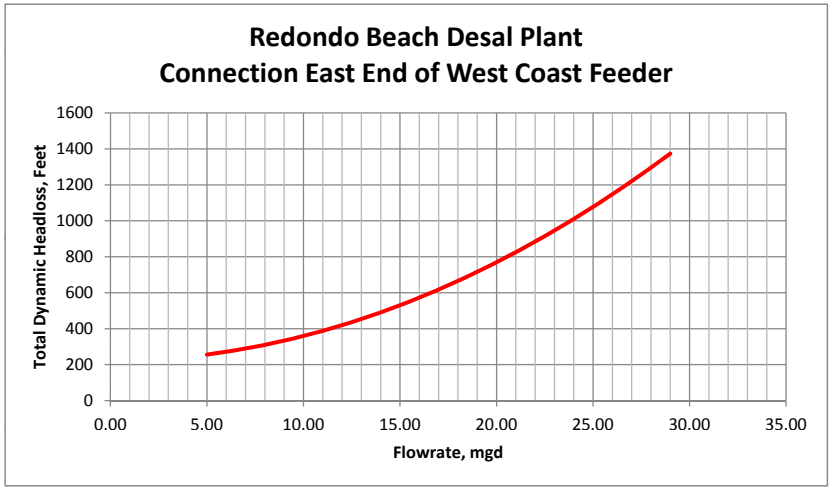
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to East end of West Coast Feeder from Redondo Beach Desal Site										
East End - WCF (WB-20)	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd.	CMLC Steel Pipe	7,000	23.21	18 "	13.133	1.86E+06	0.0182		227.47	
Aviation Blvd	CMLC Steel Pipe	10,600	23.21	30 "	4.728	1.12E+06	0.0164		24.14	Distance between WCF & WBF
Aviation Blvd	CMLC Steel Pipe	10,950	46.42	36 "	6.567	1.86E+06	0.0152		37.15	Distance from WBF to PCH
PCH	CMLC Steel Pipe	2,950	46.42	36 "	6.567	1.86E+06	0.0152		10.01	
Herondo/Plant	CMLC Steel Pipe	2,100	46.42	36 "	6.567	1.86E+06	0.0152		7.12	
	Mitered 60 bend	2	46.42	36 "	6.567			0.50	0.67	
	Mitered 90 bend	3	46.42	36 "	6.567			1.10	2.21	
	Total Length	13,050.00								
			Static Head	220.77				Total H/L	309.43	TDH 530.20

mgd	cfs	h/l	TDH	PSI
		309.43		
5	7.74	34.7	255	111
7	10.83	67.9	289	125
9	13.92	112.2	333	144
11	17.02	167.6	388	168
13	20.11	232.4	453	196
15	23.21	309.4	530	230
17	26.30	396.3	617	267
19	29.40	495.0	716	310
21	32.49	604.8	826	358
23	35.59	725.4	946	410
25	38.68	857.1	1078	467
27	41.77	999.7	1220	529
29	44.87	1153.3	1374	595



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to East End of MWD Feeders

Backbone Cost From Redondo Beach Site

Location	Distance	Dia	Cost	Comments
Aviation	10,600	30 "	$5,745,180	Feeder to West Coast Feeder from WBF Turnout
Aviation Blvd	10,950	36 "	$7,806,013	Feeder to West Basin Feeder
PCH	2,950	36 "	$2,102,990	
Herondo/Plant	2,100	36 "	$1,497,044	Backbone to El Segundo Desal Site
Total Length	26,600 feet			
		Total Cost	$17,151,226	

West Basin Feeder

Location	Distance	Dia	Cost	Comments
Manhatten Beach Blvd	17,610	30 "	$9,544,587	Local Feeder to East End of WBF(WB-12)

WestCoast Feeder

Location	Distance	Dia	Cost	Comments
E El Segundo Blvd	7,000	18 "	$1,659,205	Local Feeder to East End of WBF(WB-20)

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 7

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 2
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to Sepulveda Feeder Upstream of West Coast Feeder

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ Sepulveda Sta 1918+50	71.0	Feet
Max Hydeostatic Grade Elev. @ Sepulveda Feeder Sta 1918+50	286	PSI
	660.00	Feet
Flow	60.00	mgd
	92.832	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
El Segundo Site to Sepulveda Feeder MWD Alt. No. 1										
Sepulveda Feeder	Pipe Exit		92.83	54 "	5.84			1	0.53	Connect at Station 1918+50
Van Ness Ave.	CMLC Steel Pipe	1,600	92.83	54 "	5.84	2.48E+06	0.0140		2.63	
W 120th St.	CMLC Steel Pipe	17,200	92.83	54 "	5.84	2.48E+06	0.0140		28.31	
Isis Ave,	CMLC Steel Pipe	2,700	92.83	54 "	5.84	2.48E+06	0.0140		4.44	
E. El Segundo Blvd.	CMLC Steel Pipe	2,700	92.83	54 "	5.84	2.48E+06	0.0140		4.44	
S. Douglas St.	CMLC Steel Pipe	5,400	92.83	54 "	5.84	2.48E+06	0.0140		8.89	
Rosecrans	CMLC Steel Pipe	10,600	92.83	54 "	5.84	2.48E+06	0.0140		17.45	
Highland	CMLC Steel Pipe	1,970	92.83	54 "	5.84	2.48E+06	0.0140		3.24	
45th	CMLC Steel Pipe	310	92.83	54 "	5.84	2.48E+06	0.0140		0.51	
Plant	CMLC Steel Pipe	400	92.83	54 "	5.84	2.48E+06	0.0140		0.66	
	Mitered 90 bend	6	92.83	54 "	5.84			1.10	3.49	
	Total Length	24,080								

Static Head 650.00 Total H/L 74.60 TDH 724.60

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 7

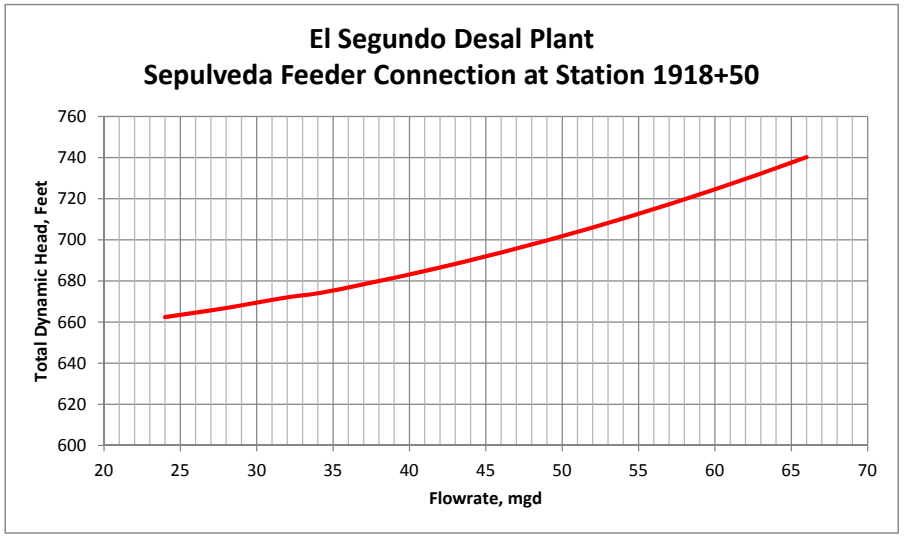
MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 2

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - El Segundo Site to Sepulveda Feeder Upstream of West Coast Feeder

MGD	cfs	h/l	TDH	PSI
		74.60		
24	37.128	12.4	662	287
26	40.222	14.6	665	288
28	43.316	16.9	667	289
30	46.41	19.4	669	290
32	49.504	22.1	672	291
34	52.598	23.9	674	292
36	55.692	26.8	677	293
38	58.786	29.9	680	295
40	61.88	33.1	683	296
42	64.974	36.5	687	298
44	68.068	40.1	690	299
46	71.162	43.8	694	301
48	74.256	47.7	698	302
50	77.35	51.8	702	304
52	80.444	56.0	706	306
54	83.538	60.4	710	308
56	86.632	65.0	715	310
58	89.726	69.7	720	312
60	92.82	74.6	725	314
62	95.914	79.6	730	316
64	99.008	84.9	735	318
66	102.102	90.2	740	321



Start	Via	Direction	End	Distance	Size	Cost
Plant	Plant	South	45th	400	54 "	$524,516
Plant	45th	East	Highland	310	54 "	$406,500
45th	Highland	South	Rosecrans	1,970	54 "	$2,583,241
Highland	Rosecrans	East	S. Douglas St.	10,600	54 "	$13,899,674
Rosecrans	S. Douglas St.	North	E. El Segundo Blvd.	5,400	54 "	$7,080,966
S. Douglas St.	E. El Segundo Blvd.	East	Isis Ave,	2,700	54 "	$3,540,483
E. El Segundo Blvd.	Isis Ave,	North	W 120th St.	2,700	54 "	$3,540,483
Isis Ave,	W 120th St.	East	Van Ness Avenue	17,200	54 "	$22,554,188
W 120th St.	Van Ness Avenue	South	Station 1918+50 - Sepulveda Feeder	1,600	54 "	$2,098,064

Total Length 42,880 feet

Total Cost $56,228,115

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 8

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 2
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to Sepulveda Feeder
Upstream of West Coast Feeder

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ Sepulveda Sta 19	71.0	Feet
Max Hydeostatic Grade	286	PSI
Elev. @ Sepulveda	660.00	Feet
Flow	60.00	mgd
	92.832	cfs

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Redondo Beach Site to Sepulveda Feeder										
Sepulveda Feeder	Pipe Exit		92.83	54 "	5.837			1	0.53	Connect at Station 1918+50
S. Van Ness Ave	CMLC Steel Pipe	15,600	92.83	54 "	5.837	2.48E+06	0.0146		26.78	
170th St.	CMLC Steel Pipe	5,300	92.83	54 "	5.837	2.48E+06	0.0146		9.10	
Yukon Ave.	CMLC Steel Pipe	4,100	92.83	54 "	5.837	2.48E+06	0.0146		7.04	
182nd St.	CMLC Steel Pipe	8,500	92.83	54 "	5.837	2.48E+06	0.0146		14.59	
Felton Ave	CMLC Steel Pipe	1,300	92.83	54 "	5.837	2.48E+06	0.0146		2.23	
Ralston	CMLC Steel Pipe	2,050	92.83	54 "	5.837	2.48E+06	0.0146		3.52	
Meyer Ln	CMLC Steel Pipe	1,350	92.83	54 "	5.837	2.48E+06	0.0146		2.32	
190th Street	CMLC Steel Pipe	1,500	92.83	54 "	5.837	2.48E+06	0.0146		2.57	
BerylStreet	CMLC Steel Pipe	6,150	92.83	54 "	5.837	2.48E+06	0.0146		10.56	
Francisca Ave	CMLC Steel Pipe	1,200	92.83	54 "	5.837	2.48E+06	0.0146		2.06	
	Mitered 45 bend	2	92.83	54 "	5.837	2.48E+06	0.0146	0.25	0.26	
	Mitered 90 bend	9	92.83	54 "	5.837			1.10	5.24	
	Total Length	24,600								

Static Head 650.00 Total H/L 86.79 TDH 736.79

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative No. 8

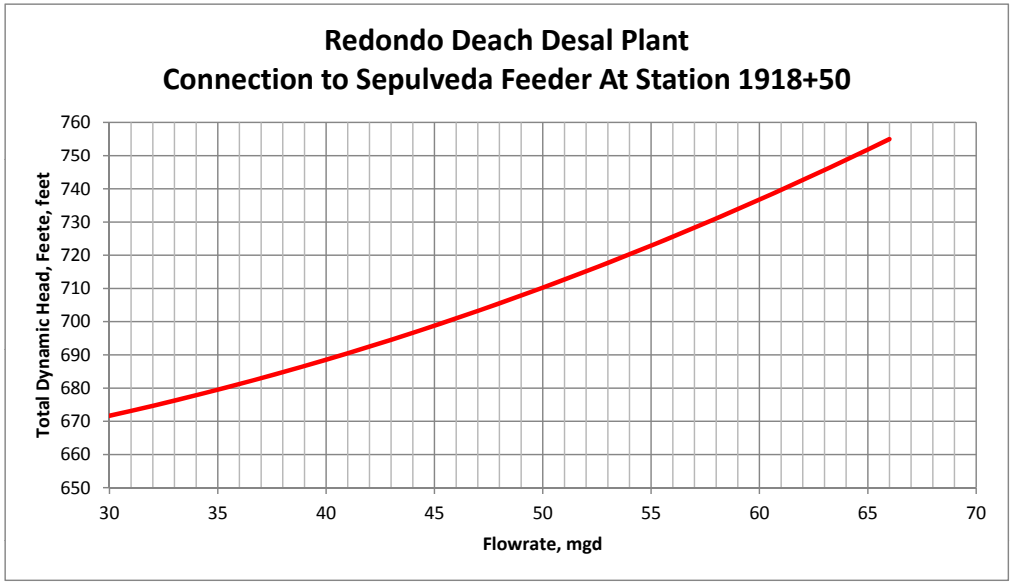
MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 2

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - Redondo Beach Site to Sepulveda Feeder Upstream of West Coast Feeder

gpm	cfs	h/l	TDH	PSI
		86.79		
24	37.128	14.4	664	288
26	40.222	16.3	666	289
28	43.316	18.9	669	290
30	46.41	21.7	672	291
32	49.504	24.7	675	292
34	52.598	27.9	678	294
36	55.692	31.2	681	295
38	58.786	34.8	685	297
40	61.88	38.6	689	298
42	64.974	42.5	693	300
44	68.068	46.7	697	302
46	71.162	51.0	701	304
48	74.256	55.5	706	306
50	77.35	60.3	710	308
52	80.444	65.2	715	310
54	83.538	70.3	720	312
56	86.632	75.6	726	314
58	89.726	81.1	731	317
60	92.82	86.8	737	319
62	95.914	92.6	743	322
64	99.008	98.7	749	324
66	102.102	105.0	755	327



Start	Via	Direction	End	Distance	Size	Cost
Plant	Francisca Ave	South	Beryl Street	1,200	54 "	$1,573,548
Francisca Ave	Beryl Street	North East	190th Street	6,150	54 "	$8,064,434
Beryl Street	190th Street	East	Meyer Ln	1,500	54 "	$1,966,935
190th Street	Meyer Ln	North	Ralston	1,350	54 "	$1,770,242
Meyer Ln	Ralston	East	Felton Ave	2,050	54 "	$2,688,145
Ralston	Felton Ave	North	182nd St.	1,300	54 "	$1,704,677
Felton Ave	182nd St.	East	Yukon Ave.	8,500	54 "	$11,145,965
182nd St.	Yukon Ave.	North	170th St.	4,100	54 "	$5,376,289
Yukon Ave.	170th St.	East	S. Van Ness Ave	5,300	54 "	$6,949,837
170th St.	S. Van Ness Ave	North	Station 1918+50 - Sepulveda Feeder	15,600	54 "	$20,456,124
			Total Length	47,050 feet		
					Total Cost	$61,696,195

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

CONVEYANCE SYSTEMS

MWD ALTERNATIVE ALIGNMENTS

West Basin Municipal Water District
Ocean Desalination Project

Summary of MWD Conveyance Alternatives

Alt.	Desal Plant Site	Max. Flowrate	Pipeline, Dia. Inches					Cost	Pump Station		
			Backbone			Feeder			No. of Pumps	Cost	Total Cost
			Common	West Basin	West Coast	West Basin	West Coast				
1A	NRG	30 MGD	36 "	24 "	24 "	16", 12"	16 "	$20.4 million	5 Vertical Turbine Pumps 7.5 MGD @ 489' TDH	$5.8 million	$26.2 million
2A	AES		36 "	-	30 "	30 " 16 " 12 "	18 "	$24.2 million	5 Vertical Turbine Pumps 7.5 MGD @ 483' TDH	$5.8 million	$30.0 million
3A	NRG	30 MGD	36 "	24 "	24 "	24"	18 "	$17.5 million	5 Vertical Turbine Pumps 7.5 MGD @ 498' TDH	$5.8 million	$23.3 million
4A	AES		36 "	-	30 "	-	18 "	$40.2 million	5 Vertical Turbine Pumps 7.5 MGD	$5.8 million	$46.0 million
5A	NRG	30 MGD	36 "	24 "	24 "	-	18 "	$25.1 million	5 Vertical Turbine Pumps 7.5 MGD @ 489' TDH	$5.8 million	$30.9 million
6A	AES		36 "	24 "	24 "	-	24", 16"	$26.8 million	5 Vertical Turbine Pumps 7.5 MGD @ 605' TDH	$7.0 million	$33.8 million

West Basin Municipal Water District
Ocean Desalination Project

MWD Conveyance Alternatives

Alternative		Desal Plant Site	Backbone Feeder				West Basin Feeder				West Coast Feeder				Total Cost	Comments
			Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost		
1A	Local	NRG	30 MGD	Plant to 45th to Highland to Rosecrans to Pacific to Marine. Split at Marine	36 "	$11.4 million	15 MGD	11.2 MGD west on Manhatten Beach Blvd to WB-4; 4.8 MGD distributed to the east	16", 12"	$3.0 million	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	16 "	$1.4 million	$20.4 million	100 psi minimum at all service connections
				Marine to Aviation, North to E El Segundo Blvd	24 "	$3.6 million										
				South on N. Redondo Ave. from Marine to Manhatten Beach Blvd.	24 "	$1.0 million										
2A		AES		From Plant to N. Francesca to Veteran's Pkwy to 11 ST. to N. Redondo Ave. to WB-3,4,5	36"	$15.1 million	15 MGD	11.2 MGD west on Manhatten Beach Blvd to WB-4; 4.8 MGD distributed to the east	30 " 16 " 12 "	$3.5 million	15 MGD	East on E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.5 million	$24.2 million	
				Aviation from Manhattan Beach Blvd.to El Segundo Blvd	24 "	$4.1 million										
3A	Connect to West End of West Basin Feeder	NRG	30 MGD	Plant to 45th to Highland to Rosecrans to Pacific to Marine. Split at Marine	36 "	$11.4 million	15 MGD	Connect to West Basin Feeder at N. Redondo Ave.	24"	$ -	15 MGD	East on E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.5 million	$17.5 million	Connect to West End of West Basin Feeder and match Max Hydrostatic Grade El. of 415 ft. Interconnection to West Coast Connections (100 psi at connection downstream of PRV to avoid HGL 660 ft)
				Marine to Aviation, North to E El Segundo Blvd	24 "	$3.6 million										
				South on N. Redondo Ave. from Marine to Manhatten Beach Blvd.	24 "	$1.0 million										
4A		AES		From Plant to N. Francesca to Veteran's Pkwy to 11 ST. to N. Redondo Ave. to WB-3,4,5	36 "	$26.3 million	15 MGD	Cross Connection into West Basin Feeder	36"	$ -	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.5 million	$40.2 million	
				On Manhattan Beach Blvd from N. Redondo Ave. to Aviation north to El Segundo Blvd	30 "	$12.3 million										
5A	Connect to East End of West Basin Feeder	NRG	30 MGD	Plant to 45th to Highland to Rosecrans to Pacific to Marine to Aviation. Split at Aviation	36 "	$12.3 million	15 MGD	Connect to West Basin Feeder at WB-12	24 "	$ -	15 MGD	East of E. El Segundo Blvd to WB-20 (Ramona St.) - 50% of Flow	18 "	$1.5 million	$25.1 million	Connect to East End of Feeder and match MWD Max Hydrostatic Grade El. Of 415 ft. and Interconnection to West Coast Connections (100 psi at connection…downstream of PRV to avoid HGL 660 ft)
				North to E El Segundo Blvd on Avaiation from Marine	24 "	$3.1 million										
				Aviation to Van Ness Blvd. to Manhatten Beach Blvd (WB-12).	24 "	$8.2 million										
6A		AES		From Plant to N. Francesca to Beryl Street to 190th St. to Meyer Ln to Ralston to Felton Ave. to 182nd St. to Hawthorne . Split at Hawthorne	36 "	$11.9 million	15 MGD	Connect into West Basin Feeder at Van Ness Ave. (WB-12)	24 "	$ -	15 MGD	West on El Segundo to Aviation (WB-28), decrease flow by 50% after WB-30	24", 16"	$2.5 million	$26.8 million	
				North on Hawthorne to El Segundo Blvd,	24 "	$7.2 million										
				East on 182nd to Yukon to 170th St. to Van Ness to Manhattan Beach Blvd (WB-12)	24 "	$5.2 million										

West Basin Municipal Water District
Ocean Desalination Project

Pump Station Requirements for MWD Conveyance Alternatives

Alt.	Description	Pump	Cost per pump	Total	VFD Cost@ $350 per Hp	Mat'l Cost	Installation @ 75%	OH&P @ 25%	Grand Total
1A	5 Vertical Turbine Pumps 7.5 MGD @ 489' TDH	17H, 5 stage 1800 rpm - 800 hp	$ 250,000	$1.3 million	$1.4 million	$2.7 million	$2.0 million	$1.2 million	$5.8 million
2A	5 Vertical Turbine Pumps 7.5 MGD @ 483' TDH	17H, 5 stage 1800 rpm - 800 hp	$ 250,000	$1.3 million	$1.4 million	$2.7 million	$2.0 million	$1.2 million	$5.8 million
3A	5 Vertical Turbine Pumps 7.5 MGD @ 498' TDH	17H, 5 stage 1800 rpm - 800 hp	$ 250,000	$1.3 million	$1.4 million	$2.7 million	$2.0 million	$1.2 million	$5.8 million
4A	5 Vertical Turbine Pumps 7.5 MGD @ 482' TDH	17H, 5 stage 1800 rpm - 800 hp	$ 250,000	$1.3 million	$1.4 million	$2.7 million	$2.0 million	$1.2 million	$5.8 million
5A	5 Vertical Turbine Pumps 7.5 MGD @ 489' TDH	17H, 5 stage 1800 rpm - 800 hp	$ 250,000	$1.3 million	$1.4 million	$2.7 million	$2.0 million	$1.2 million	$5.8 million
6A	5 Vertical Turbine Pumps 7.5 MGD @ 605' TDH	17H, 6 stage 1800 RPM - 1000 hp	$ 288,000	$1.4 million	$1.8 million	$3.2 million	$2.4 million	$1.4 million	$7.0 million

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 1A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. Wilson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-12 Connection on West Basin Feeder - Local Service - Alternative 1A

		Input Data	Units
Wet Well Water Surface Elev		10	Feet
F.G. @ WB-12		46.0	Feet
Min. Pressure @ WB-12		100	PSI
		230.77	Feet
Flow		15.00	mgd
		23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

Friction Factor

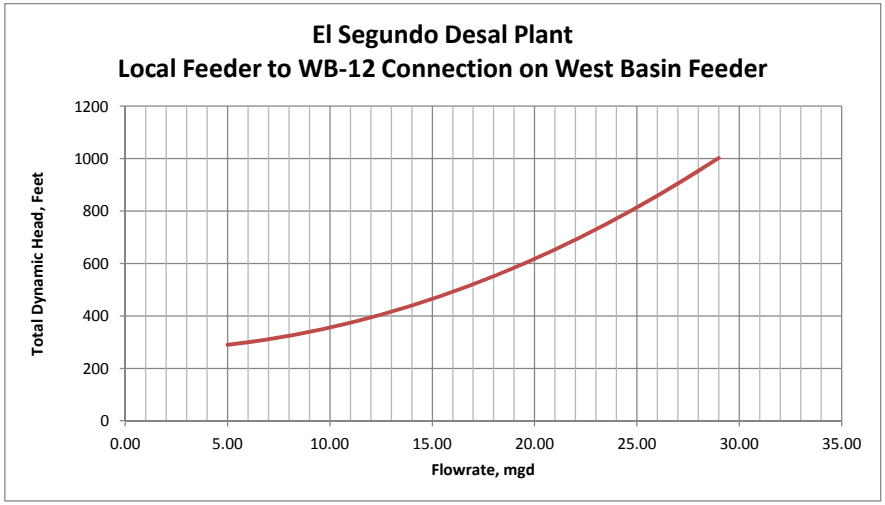
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation	
Conn. No.	Flow	% of 15 mgd				Cumulative	Direction
WB-3,4,5	11.2	75%			1,360 feet	1,360 feet	West
WB-29	1.1	7%	25%	3.8	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5	3%	18%	2.7	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2	15%	15%	2.2	18,450 feet	13,201 feet	East

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-12											
WB-12		Pipe Exit	1	3.48	12 "	4.432			1	0.31	
Manhattan Beach Blvd	WB12	CMLC Steel Pipe	13,201	3.48	12 "	4.432	4.19E+05	0.0200		80.54	Decrease flow to 2.2 mgd
	WB-2A	CMLC Steel Pipe	2,414	4.18	12 "	5.319	5.02E+05	0.0200		21.21	Decrease flow to 2.7 mgd
	WB-29	CMLC Steel Pipe	4,195	5.80	16 "	4.155	5.23E+05	0.0188		15.86	Flow in East leg is 3.8 mgd
		Tee branch	1	5.80	16 "	4.155			1.80	0.48	Split at Redondo & Manhattan Beach Blvd
		Tee branch	1	23.21	24 "	7.387			1.80	1.53	split at Marine and Redondo Beach
N. Redondo Ave.		CMLC Steel Pipe	2,600	23.21	24 "	7.387	1.40E+06	0.0170		18.73	Arrive at WB-3,4,5
Marine Ave.		CMLC Steel Pipe	6,200	46.42	36 "	6.567	1.86E+06	0.0152		21.03	
Pacific Ave.		CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Rosecrans Ave.		CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland		CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
		Mitered 90 bend	7	46.42	36 "	6.567			1.10	5.16	
		Total Length	38,410								

Static Head 266.77 Total H/L 198.09 TDH 464.86

mgd	cfs	h/l	TDH	PSI
		198.09		
5	7.74	23.1	290	126
7	10.83	44.4	311	135
9	13.92	73.1	340	147
11	17.02	107.7	374	162
13	20.11	148.7	416	180
15	23.21	198.0	465	201
17	26.30	254.4	521	226
19	29.39	316.7	583	253
21	32.49	386.9	654	283
23	35.58	464.0	731	317
25	38.68	546.9	814	353
27	41.77	637.9	905	392
29	44.86	735.8	1003	434



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. Wilson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-20 Connection on West Coast Feeder - Local Service - Alterrnative 1A

		Input Data	Units
Wet Well Water Surface Elev		10	Feet
F.G. @ WB-12		46.0	Feet
Min. Pressure @ WB-20		100	PSI
		230.77	Feet
Flow		15.00	mgd
		23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee branch	1.8
Exit	1

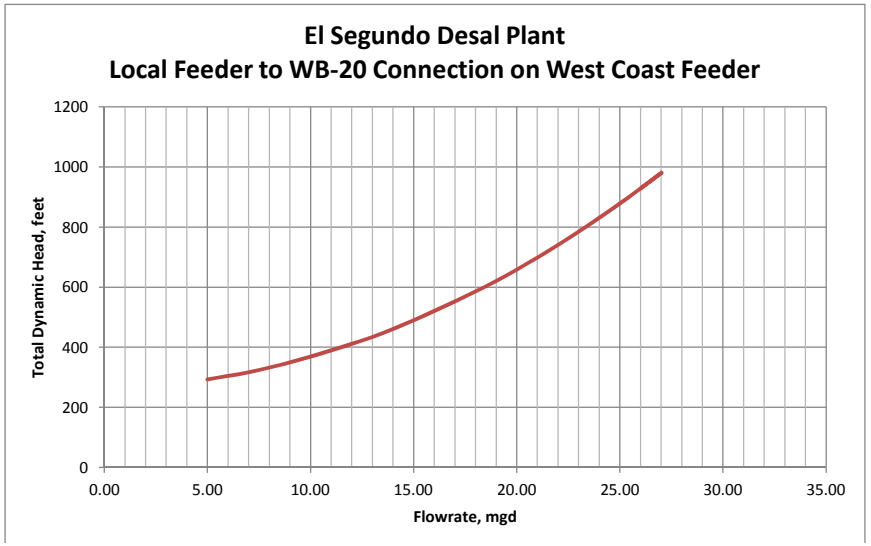
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-20										
WB-20	Pipe Exit		11.60	16 "	8.311			1	1.07	
E El Segundo Blvd	CMLC Steel Pipe	6,470	11.60	16 "	8.311	1.05E+06	0.0182		94.72	
E El Segundo Blvd	Tee branch	1	11.60	16 "	8.311			1.80	1.93	
Aviation Blvd	CMLC Steel Pipe	7,900	23.21	24 "	7.387	1.40E+06	0.0170		56.90	
Marine Ave.	CMLC Steel Pipe	1,330	23.21	24 "	7.387	1.40E+06	0.0170		9.58	
Marine Ave.	CMLC Steel Pipe	6,200	46.42	36 "	6.567	1.86E+06	0.0152		21.03	
Pacific Ave.	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Rosecrans Ave.	CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
minor	Mitered 60 bend	1	23.21	24 "	7.387			0.50	0.42	
minor	Mitered 90 bend	5	46.42	36 "	6.567			1.10	3.68	
	Total Length	31,700								

Static Head 266.77 Total H/L 222.59 TDH 489.36

mgd	cfs	h/l	TDH	PSI
		222.59		
5	7.74	25.6	292	127
7	10.83	49.6	316	137
9	13.92	82.0	349	151
11	17.02	122.5	389	169
13	20.11	167.2	434	188
15	23.21	222.6	489	212
17	26.30	285.9	553	239
19	29.40	353.4	620	269
21	32.49	431.7	698	303
23	35.59	517.8	785	340
25	38.68	611.8	879	381
27	41.77	713.6	980	425
26	40.23	661.7	928	402



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to Service Connections on West Coast and West Basin Feeders - Cost Alternative 1A

Local Backbone Cost

Location		Distance	Dia	Cost	Comments
Plant/45th/Highland		2,700	36 "	$1,924,770	Backbone common to WBF and WCF
Rosecrans Ave.		4,400	36 "	$3,136,663	
Pacific Ave.		2,700	36 "	$1,924,770	
Marine Ave.		6,200	36 "	$4,419,843	
N. Redondo Ave.		2,600	24 "	$1,007,641	Backbone to Manhattan Beach Blvd (WBF)
Marine Ave.		1,330	24 "	$515,447	Backbone to S El Segundo Blvd (WCF)
Aviation Blvd		7,900	24 "	$3,061,678	Backbone to S El Segundo Blvd (WCF)
Total Length		27,830 feet			
			Total Cost	$15,990,811	

Local Feeder Cost

Location		Distance	Dia	Cost	Comments
Manhattan Beach Blvd	WB12	13,201	12 "	$1,804,933	Feeder to Service Connections on WBF (WB-12)
	/B-2A,2B,1	2,414	12 "	$330,059	Feeder to Service Connections on WBF (WB-2A,2B,13)
	WB-29	4,195	16 "	$883,856	Feeder to Service Connections on WBF (WB-29)
El Segundo Blvd.		6,470	16 "	$1,363,182	Feeder to Service Connections on WCF (WB-20)
			Total Cost	$4,382,030	

Pumping Requirements 30.0 mgd @ 489 Ft. TDH
5 Pumps @ 7.5 MGD @ 489 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 2A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-12 Connection on West Basin Feeder - Local Service - Alternative 2A

		Input Data	Units
Wet Well Water Surface Elev		10	Feet
F.G. @ WB-12		46.0	Feet
Min. Pressure @ WB-12		100	PSI
		230.77	Feet
Flow		15.00	mgd
		23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

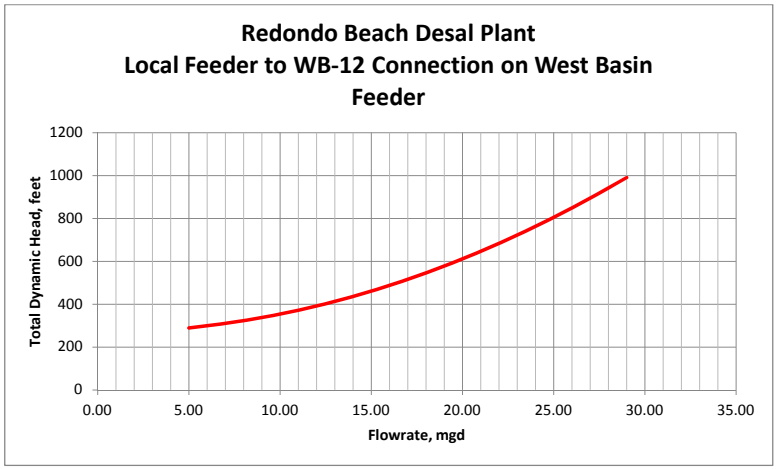
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulativ	Flow (cfs)		Cumulative	Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	e %		1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	5.88	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	4.18	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	3.40	18,450 feet	13,201 feet	East

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-12											
WB-12		Pipe Exit		3.48	12 "	4.43			1	0.31	
Manhattan Beach Blvd	WB12	CMLC Steel Pipe	13,201	3.48	12 "	4.43	4.19E+05	0.0200		80.54	
	WB-2A	CMLC Steel Pipe	2,414	4.18	12 "	5.32	5.02E+05	0.0200		21.21	
	WB-29	CMLC Steel Pipe	2,835	5.80	16 "	4.16	5.23E+05	0.0188		10.72	
		Tee flow passing	1	5.80	16 "	4.16			0.60	0.16	
		Tee branch	1	29.01	30 "	5.91			1.80	0.98	
Manhattan Beach Blvd		CMLC Steel Pipe	1,360	29.01	30 "	5.91	1.40E+06	0.0158		4.66	
N. Redondo Ave.		CMLC Steel Pipe	325	46.42	36 "	6.57	1.86E+06	0.0152		1.10	
11 St.		CMLC Steel Pipe	7,500	46.42	36 "	6.57	1.86E+06	0.0152		25.44	
N Valley Dr. (Veteran's Parkway)		CMLC Steel Pipe	12,600	46.42	36 "	6.57	1.86E+06	0.0152		42.74	
N. Francisca Ave.		CMLC Steel Pipe	800	46.42	36 "	6.57	1.86E+06	0.0152		2.71	
		Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	
		Mitered 90 bend	4	46.42	36 "	6.57			1.10	2.95	
		Total Length	23,735								

Static Head 266.77 Total H/L 193.86 TDH 460.63

gpm	cfs	h/l	TDH	PSI
		193.86		
5	7.735	22.6	289	125
7	10.829	43.6	310	134
9	13.923	71.9	339	147
11	17.017	105.8	373	161
13	20.111	145.7	412	179
15	23.205	193.8	461	200
17	26.299	248.9	516	223
19	29.393	311.0	578	250
21	32.487	379.9	647	280
23	35.581	455.7	722	313
25	38.675	537.4	804	348
27	41.769	626.8	894	387
29	44.863	723.1	990	429



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service - Alternative 2A

		Input Data	Units
Wet Well Water Surface Elev		10	Feet
F.G. @ WB-12		46.0	Feet
Min. Pressure @ WB-12		100	PSI
		230.77	Feet
Flow		15.00	mgd
		23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

Friction Factor

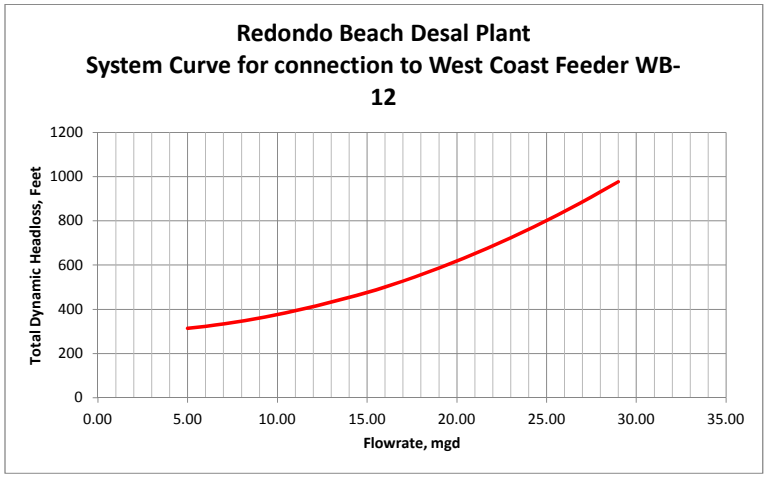
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulativ e %	Flow (cfs)		Cumulative	Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%			1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	5.88	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	4.18	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	3.40	18,450 feet	13,201 feet	East

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-12											
WB-12		Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd		CMLC Steel Pipe	6,470	11.60	18 "	6.567	9.30E+05	0.0182		52.56	
E El Segundo Blvd		Tee branch	1	23.21	18 "	13.133			1.80	4.82	
Aviation		CMLC Steel Pipe	10,480	23.21	24 "	7.387	1.40E+06	0.0158		70.16	
Manhattan Beach Blvd. & Aviation		Tee branch	1	23.21	24 "	7.387			1.80	1.53	
Manhattan Beach Blvd.		CMLC Steel Pipe	1,360	29.01	30 "	5.910	1.40E+06	0.0158		4.66	
N. Redondo Ave.		CMLC Steel Pipe	325	46.42	36 "	6.57	1.86E+06	0.0152		1.10	
11 St.		CMLC Steel Pipe	7,500.00	46.42	36 "	6.57	1.86E+06	0.0152		25.44	
N Valley Dr. (Veteran's Parkway)		CMLC Steel Pipe	12,600.00	46.42	36 "	6.57	1.86E+06	0.0152		42.74	
N. Francisca Ave.		CMLC Steel Pipe	800.00	46.42	36 "	6.57	1.86E+06	0.0152		2.71	
		Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	
		Mitered 90 bend	4	46.42	36 "	6.57			1.10	2.95	
		Total Length	29,061								

Static Head 266.77 Total H/L 209.68 TDH 476.45

mgd	cfs	h/l	TDH	PSI
		209.68		
5	7.735	48.2	315	136
7	10.829	67.7	334	145
9	13.923	94.3	361	156
11	17.017	127.7	394	171
13	20.111	166.3	433	188
15	23.205	209.6	476	206
17	26.299	261.6	528	229
19	29.393	320.1	587	254
21	32.487	385.1	652	282
23	35.581	456.6	723	313
25	38.675	534.5	801	347
27	41.769	619.0	886	384
29	44.863	710.0	977	423



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service Cost - Alternative 2A

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation	10,480	24 "	$4,061,567	North on Aviation to E. El Segundo Blvd.
Manhattan Beach Blvd	1,360	30 "	$737,117	From WB-5 to Aviation Blvd
N. Redondo Ave.	325	36 "	$231,685	From 11 St. to Manhattan Beach Blvd (WB-5)
11 St.	7,500	36 "	$5,346,584	From Veteran's Parkway to N. Redondo Ave.
N Valley Dr. (Veteran's Parkway)	12,600	36 "	$8,982,261	From Veteran's Parkway to 11St.
N. Francisca Ave.	800	36 "	$570,302	From Plant to Veteran's Parkway
Total Length	21,225 feet			
		Total Cost	$15,867,950	

Local Feeder Cost

Location	Distance	Dia	Cost	Comments
West Basin Feeder	2,835	16 "	$597,314	East on Manhatten Beach Blvd to WB-29
	15,615	12 "	$2,134,992	East on Manhattan Beach BlvdFrom WB-29 to WB-1
West Coast Feeder	6,470	18 "	$1,533,580	East on El Segundo to WB-20
		Total Cost	$4,265,885	

Pumping Requirements 30.0 mgd @ 476 Ft. TDH
5 Pumps @ 7.5 MGD @ 483 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 3A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders - Alternative 3A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

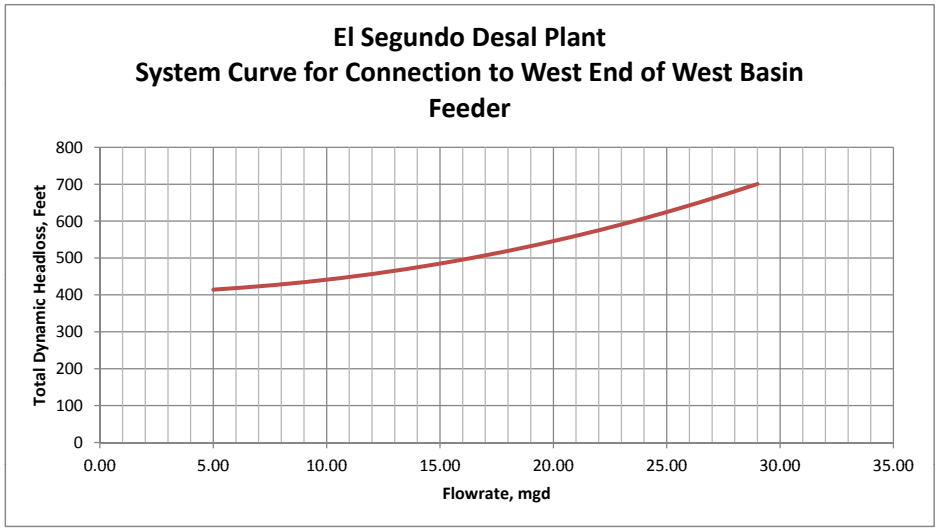
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)		Cumulative	Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	%		1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	3.8	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	2.7	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	2.2	18,450 feet	13,201 feet	East

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connect to West Basin Feeder at WB-5 from El Segundo Desal Site										
N. Redondo Ave.	CMLC Steel Pipe	2,600	23.21	24 "	7.387	1.40E+06	0.0170		18.73	Arrive at WB-3,4,5
Marine Ave.	CMLC Steel Pipe	6,200	46.42	36 "	6.567	1.86E+06	0.0152		21.03	
Pacific Ave.	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Rosecrans Ave.	CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Marine Ave. & N. Redondo Ave.	Tee branch	1	23.21	24 "	7.387			1.80	1.53	
	Mitered 90 bend	7	46.42	36 "	6.567			1.10	5.16	
	Total Length	18,600								
	Static Head	405.00						Total H/L	79.69	TDH 484.69

mgd	cfs	h/l	TDH	PSI
		79.69		
5	7.74	9.2	414	179
7	10.83	17.8	423	183
9	13.92	29.5	434	188
11	17.02	44.0	449	195
13	20.11	59.9	465	201
15	23.21	79.7	485	210
17	26.30	102.4	507	220
19	29.40	126.8	532	230
21	32.49	154.9	560	243
23	35.59	185.8	591	256
25	38.68	219.5	625	271
27	41.77	256.0	661	286
29	44.87	295.4	700	303



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders - Alternative 3A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WCF	95.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

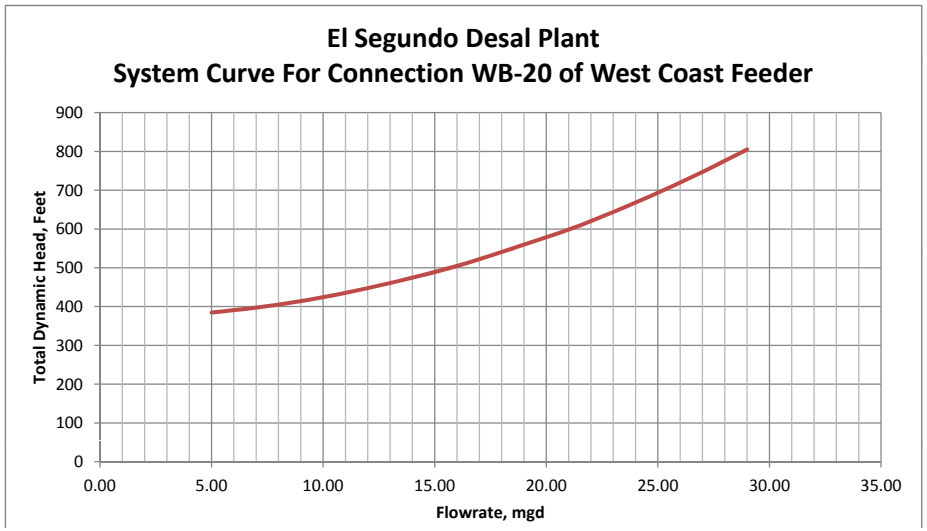
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to Service Connection WB-20 on West Coast Feeder from to El Segundo Desal Site										
Service Commection WB-20	Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd	CMLC Steel Pipe	6,470	11.60	18 "	6.567	9.30E+05	0.0164		47.36	
Aviation Blvd	CMLC Steel Pipe	7,900	23.21	24 "	7.387	1.40E+06	0.0158		52.89	
Marine Ave.	CMLC Steel Pipe	1,330	23.21	24 "	7.387	1.40E+06	0.0158		8.90	
Marine Ave.	CMLC Steel Pipe	6,200	46.42	36 "	6.567	1.86E+06	0.0152		21.03	
Pacific Ave.	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Rosecrans Ave.	CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Aviation Blvd & E. El Segundo Blvd.	Mitered 90 bend	1	23.21	18 "	13.133			1.10	2.95	
Marine Ave. & N. Redondo Ave.	Tee flow passing	1	23.21	24 "	7.387			0.60	0.51	
	Mitered 90 bend	7	46.42	36 "	6.567			1.10	5.16	
	Total Length	31,700.00								

Static Head 315.77 Total H/L 172.71 TDH 488.48

mgd	cfs	h/l	TDH	PSI
		172.71		
5	7.74	68.8	385	167
7	10.83	81.4	397	172
9	13.92	98.1	414	179
11	17.02	119.5	435	189
13	20.11	145.1	461	200
15	23.21	172.7	488	212
17	26.30	206.3	522	226
19	29.40	244.0	560	243
21	32.49	282.5	598	259
23	35.59	328.0	644	279
25	38.68	377.5	693	300
27	41.77	431.2	747	324
29	44.87	489.1	805	349



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 3A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to West End of MWD Feeders - Alternative 3A

Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation Blvd	7,900	24 "	$3,061,678	Backbone to West Coast Feeder
N. Redondo Ave.	2,600	24 "	$1,007,641	Backbone to West Basin feeder
Marine Ave.	1,330	24 "	$515,447	
Marine Ave.	6,200	36 "	$4,419,843	Backbone from El Segundo Desal Site
Pacific Ave.	2,700	36 "	$1,924,770	
Rosecrans Ave.	4,400	36 "	$3,136,663	
Plant/45th/Highland	2,700	36 "	$1,924,770	
Total Length	27,830			
		Total Cost	$15,990,811	

Service Connection Cost

West Basin

Location	Distance	Dia	Cost	Comments
Manhattan Beach Blvd & N. Redondo Blvd	-	36 "	$0	Connect Directly into Feeder
		Total Cost	$0	

West Coast

Location	Distance	Dia	Cost	Comments
E El Segundo Blvd	6,470	18 "	$1,533,580	From Aviaition to WB-5 Service Connecction
		Total Cost	$1,533,580	

Pumping Requirements 30.0 mgd @ 488 Ft. TDH
5 Pumps @ 7.5 MGD @ 488 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 4A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/11/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site Site to West End of MWD Feeders - Alternative 4A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee flow passing	0.6
Tee branch	1.8
Exit	1

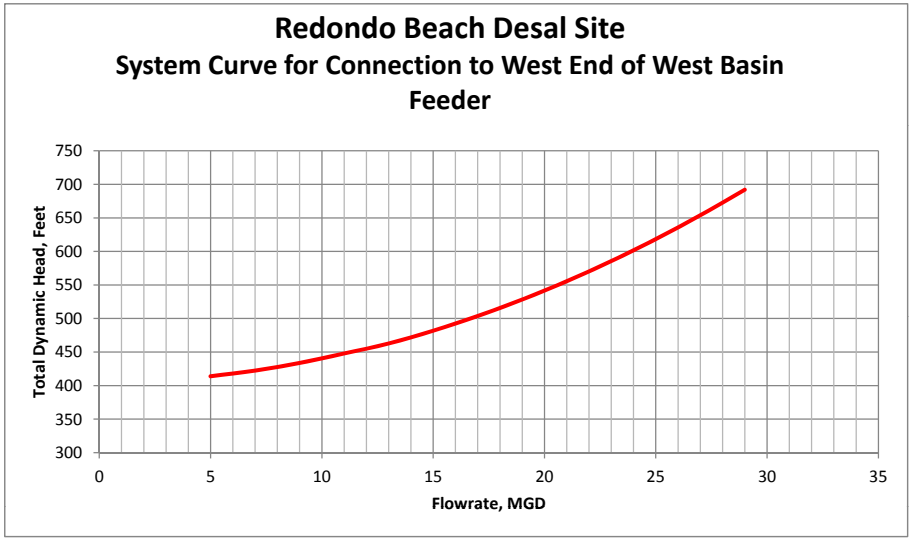
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West end connection to West Basin Feeder from Redondo Beach Desal Site											
		Tee branch	1	23.21	24 "	7.387			1.80	1.53	Connect tio west end of West Basin Feeder
N. Redondo Ave.		CMLC Steel Pipe	325	46.42	36 "	6.57	1.86E+06	0.0152		1.10	
11 St.		CMLC Steel Pipe	7,500	46.42	36 "	6.57	1.86E+06	0.0152		25.44	
N Valley Dr. (Veteran's Parkway)		CMLC Steel Pipe	12,600	46.42	36 "	6.57	1.86E+06	0.0152		42.74	
N. Francisca Ave.		CMLC Steel Pipe	800	46.42	36 "	6.57	1.86E+06	0.0152		2.71	
		Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	Out of plant
		Mitered 90 bend	4	46.42	36 "	6.57			1.10	2.95	Veteran' s Parkway
		Total Length	21,225								

Static Head 405.00 Total H/L 76.81 TDH 481.81

mgd	cfs	h/l	TDH	PSI
		76.81		
5	7.735	8.8	414	179
7	10.829	17.3	422	183
9	13.923	28.7	434	188
11	17.017	42.8	448	194
13	20.111	57.7	463	200
15	23.205	76.8	482	209
17	26.299	98.6	504	218
19	29.393	123.2	528	229
21	32.487	150.5	556	241
23	35.581	180.5	586	254
25	38.675	213.3	618	268
27	41.769	248.8	654	283
29	44.863	287.0	692	300



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 4A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to West End of MWD Feeders- Alternative 4A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ West End - WCF	95.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee flow passing	0.6
Tee branch	1.8
Exit	1

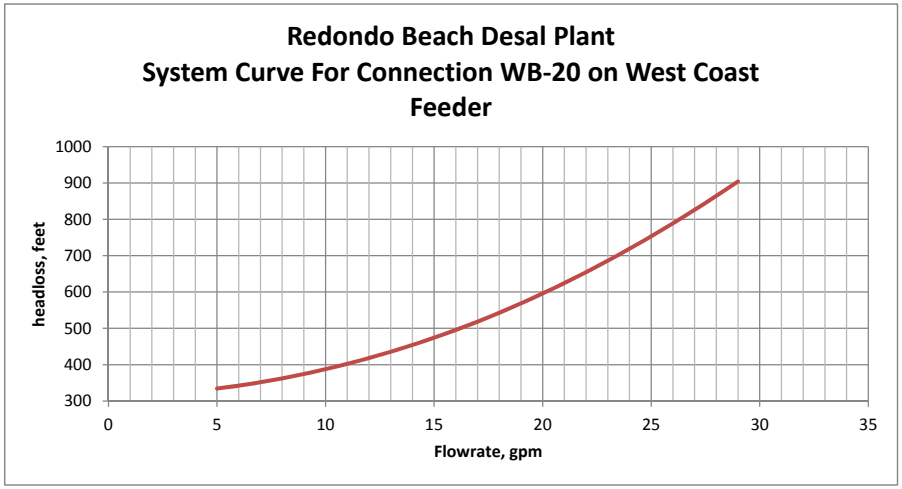
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to West Coast Service Connections from to Redondo Beach Desal Site											
Service Commection WB-20		Pipe Exit		11.60	18 "	6.567			1	0.67	
E El Segundo Blvd		CMLC Steel Pipe	6,470	11.60	18 "	6.567	9.30E+05	0.0182		52.56	
E El Segundo Blvd		Tee branch	1	11.60	18 "	6.567			1.80	1.21	
Aviation Blvd		CMLC Steel Pipe	10,600	23.21	30 "	4.728	1.12E+06	0.0164		24.14	Distance between MBB to El Segundo Blvd
Aviation Blvd & E. El Segundo Blvd.		Mitered 90 bend	1	23.21	30 "	4.728			1.10	0.38	
Manhattan Beach Blvd		CMLC Steel Pipe	1,360	23.21	30 "	4.73	1.12E+06	0.0164		3.10	
		Tee branch	1	23.21	30 "	4.73			1.80	0.62	
N. Redondo Ave.		CMLC Steel Pipe	325	46.42	36 "	6.57	1.86E+06	0.0152		1.10	
11 St.		CMLC Steel Pipe	7,500	46.42	36 "	6.57	1.86E+06	0.0152		25.44	
N Valley Dr. (Veteran's Parkway)		CMLC Steel Pipe	12,600	46.42	36 "	6.57	1.86E+06	0.0152		42.74	
N. Francisca Ave.		CMLC Steel Pipe	800	46.42	36 "	6.57	1.86E+06	0.0152		2.71	
		Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	
		Mitered 90 bend	5	46.42	36 "	6.57			1.10	3.68	
		Total Length	39,658.00								

Static Head 315.77 Total H/L 158.70 TDH 474.47

mgd	cfs	h/l	TDH	PSI
		158.70		
5	7.74	18.6	334	145
7	10.83	35.5	351	152
9	13.92	58.4	374	162
11	17.02	87.0	403	175
13	20.11	119.3	435	189
15	23.21	158.7	474	206
17	26.30	202.4	518	225
19	29.40	252.8	569	246
21	32.49	308.7	624	271
23	35.59	370.3	686	297
25	38.68	437.4	753	326
27	41.77	510.1	826	358
29	44.87	588.4	904	392



West Basin Municipal Water District - Ocean Desalination Project
Conveyance Alternative 4A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to West End of MWD Feeders- Alternative 4A

Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation Blvd	10,600	30 "	$10,944,088	Backbone from West Basin Feeder to West Coast Feeder
Manhattan Beach Blvd	1,360	30 "	$1,404,147	
N. Redondo Ave.	325	36 "	$402,660	Backbone to Redondo Beach Site Desal Site
11 St.	7,500	36 "	$9,292,150	
N Valley Dr. (Veteran's Parkway)	12,600	36 "	$15,610,812	
N. Francisca Ave.	800	36 "	$991,163	
Total Length	32,385 feet			
		Total Cost	$38,645,019	

West Basin Feeder

Location	Distance	Dia	Cost	Comments
	-	tee	0	Connect to West End of WBF at N. Redondo Ave.
		Total Cost	$0	

West Coast Feeder

Location	Distance	Dia	Cost	Comments
E El Segundo Blvd	6,470	18 "	$1,533,580	
		Total Cost	$1,533,580	

Pumping Requirements 30.0 mgd @ 482 Ft. TDH
5 Pumps @ 7.5 MGD @ 482 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 5A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/11/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to East End of West Basin Feeder; Service Connections on West Coast Feeder - Alternative 5A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow per Feeder	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

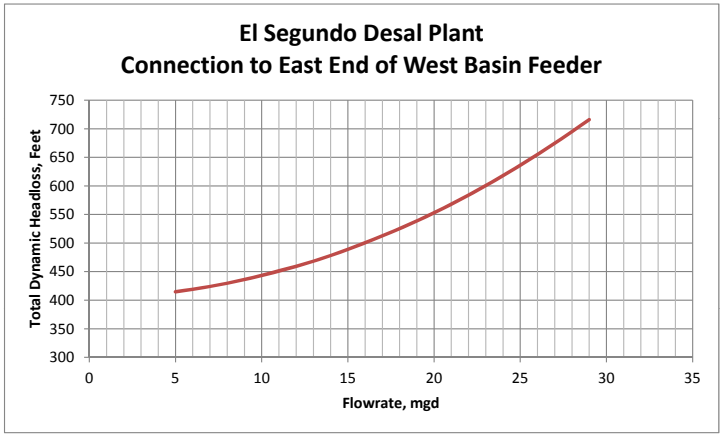
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Cumulative		Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	%		1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	3.8	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	2.7	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	2.2	18,450 feet	13,201 feet	East

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
East end connection (WB-12) on West Basin Feeder from El Segundo Desal Site										
East end of WBF (WB-12)	Pipe Exit	1	23.21	24 "	7.387			1	0.85	
	Tee flow passing	1	23.21	24 "	7.387			0.60	0.51	split at Marine and Aviation
Van Ness Ave.	CMLC Steel Pipe	2,700	23.21	24 "	7.387	1.40E+06	0.0170		19.45	Arrive at WB-12
Marine Ave.	CMLC Steel Pipe	18,500	23.21	24 "	7.387	1.40E+06	0.0170			
Marine Ave.	CMLC Steel Pipe	7,500	46.42	36 "	6.567	1.86E+06	0.0152		25.44	
Pacific Ave.	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	Backbone from El Segundo site to west Basin Feeder (MWD Alternative 4)
Rosecrans Ave.	CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
	Mitered 90 bend	6	46.42	36 "	6.567			1.10	4.42	
	Total Length	38,500								

Static Head 405.00 Total H/L 83.91 TDH 488.91

mgd	cfs	h/l	TDH	PSI
		83.91		
5	7.735	9.7	415	180
7	10.829	18.8	424	184
9	13.923	31.0	436	189
11	17.017	46.4	451	196
13	20.111	63.0	468	203
15	23.205	83.9	489	212
17	26.299	107.8	513	222
19	29.393	133.5	538	233
21	32.487	163.1	568	246
23	35.581	195.6	601	260
25	38.675	231.1	636	276
27	41.769	269.6	675	292
29	44.863	311.0	716	310



West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 5A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to East End of MWD Feeders - Alternative 5A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WCF (WB-20)	82.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

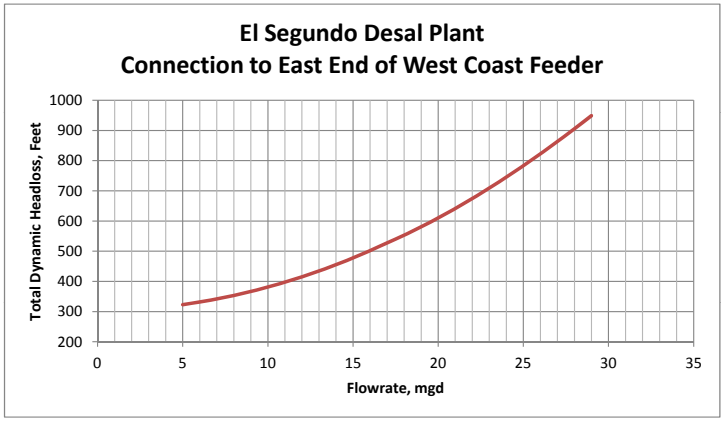
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Feeder Service Connections from to El Segundo Desal Site										
Service Commection WB-20	Pipe Exit		11.60	18 "	6.567			1	0.00	
E El Segundo Blvd	CMLC Steel Pipe	6,470	11.60	18 "	6.567	9.30E+05	0.0182		52.56	
	Mitered 90 bend	1	11.60	18 "	6.567			1.10	0.74	Turn into El Segundo
	Tee branch	1	23.21	24 "	7.387			1.80	1.53	Marine and Aviation Split
Aviation Blvd	CMLC Steel Pipe	7,900	23.21	24 "	7.387	1.40E+06	0.0170		56.90	
Marine Ave.	CMLC Steel Pipe	7,500	46.42	36 "	6.567	1.86E+06	0.0152		25.44	
Pacific Ave.	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
Rosecrans Ave.	CMLC Steel Pipe	4,400	46.42	36 "	6.567	1.86E+06	0.0152		14.93	
Plant/45th/Highland	CMLC Steel Pipe	2,700	46.42	36 "	6.567	1.86E+06	0.0152		9.16	
minor	Mitered 90 bend	6	46.42	36 "	6.567			1.10	4.42	
	Total Length	31,670.00								
			Static Head	302.77				Total H/L	174.83	TDH 477.60

mgd	cfs	h/l	TDH	PSI
		174.83		
5	7.74	20.1	323	140
7	10.83	38.6	341	148
9	13.92	63.8	367	159
11	17.02	95.3	398	172
13	20.11	131.3	434	188
15	23.21	174.8	478	207
17	26.30	224.6	527	229
19	29.40	277.3	580	251
21	32.49	338.7	642	278
23	35.59	406.3	709	307
25	38.68	480.1	783	339
27	41.77	560.0	863	374
29	44.87	646.0	949	411



West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 5A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to East End of MWD Feeders - Alternative 5A

Backbone From El Segundo Site

Location	Distance	Dia	Cost	Comments
Plant/45th/Highland	2,700	36 "	$1,924,770	Backbone common to WBF and WCF
Rosecrans Ave.	4,400	36 "	$3,136,663	
Pacific Ave.	2,700	36 "	$1,924,770	
Marine Ave.	7,500	36 "	$5,346,584	
Marine Ave.	18,500	24 "	$7,169,751	Backbone to Manhattan Beach Blvd (WB-12)
Van Ness Ave.	2,700	24 "	$1,046,396	
Manhattan Beach Blvd.				
Aviation Blvd	7,900	24 "	$3,061,678	Backbone to E. El Segundo Blvd
Total Length	46,400 feet			
		Total Cost	$23,610,612	

Feeder Cost from El Segundo Site

Location	Distance	Dia	Cost	Comments
El Segundo Blvd.	6,470	18 "	$1,533,580	Feeder to Service Connections on WCF (WB-20)
Total Length	6,470 feet			
		Total Cost	$1,533,580	

Pumping Requirements 30.0 mgd @ 489 Ft. TDH
5 Pumps @ 7.5 MGD @ 489 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 6A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY_Paul F. WIlson_ DATE_10/11/2011 SHEET NO._1_ of _3_
CHKD. BY_____DATE_____ Job No._005052016.000 Task_00160_
SUBJECT: System Hydraulics - Redondo Beach Site Site to East End of MWD Feeders - Alternative 6A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WBF	95.0	Feet
Max. Hydrosatic Grade @ West End WBF	179.8	PSI
	415.00	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

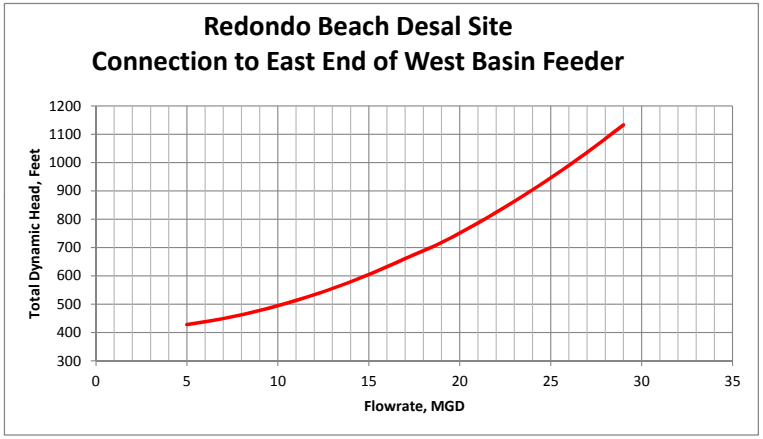
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Cumulative		Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	%		1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	3.8	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	2.7	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	2.2	18,450 feet	13,201 feet	East

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
East end connection to West Basin Feeder from Redondo Beach Desal Site										
East end of WBF (WB-12)	Exit	1	23.21	24 "	7.39			1.00	0.85	
	Mitered 90 bend	1	23.21	24 "	7.39			1.10	0.93	
	Tee flow passing	3	23.21	24 "	7.39			0.60	1.53	At 182nd and Hawthorne
S. Van Ness Ave	CMLC Steel Pipe	4,000	23.21	24 "	7.39	1.40E+06	0.0170		28.81	Arrive at WB-12
170th St.	CMLC Steel Pipe	5,300	23.21	24 "	7.39	1.40E+06	0.0170		38.18	
Yukon Ave.	CMLC Steel Pipe	4,100	23.21	24 "	7.39	1.40E+06	0.0170		29.53	
182nd St.	CMLC Steel Pipe	5,300	23.21	24 "	7.39	1.40E+06	0.0170		38.18	Split feeders
182nd St.	CMLC Steel Pipe	3,200	46.42	36 "	6.57	1.86E+06	0.0152		10.86	
Felton Ave	CMLC Steel Pipe	1,300	46.42	36 "	6.57	1.86E+06	0.0152		4.41	
Ralston	CMLC Steel Pipe	2,050	46.42	36 "	6.57	1.86E+06	0.0152		6.95	
Meyer Ln	CMLC Steel Pipe	1,350	46.42	36 "	6.57	1.86E+06	0.0152		4.58	
190th Street	CMLC Steel Pipe	1,500	46.42	36 "	6.57	1.86E+06	0.0152		5.09	
BerylStreet	CMLC Steel Pipe	6,150	46.42	36 "	6.57	1.86E+06	0.0152		20.86	
Francisca Ave	CMLC Steel Pipe	1,200	46.42	36 "	6.57	1.86E+06	0.0152		4.07	
	Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	
	Mitered 90 bend	6	46.42	36 "	6.57			1.10	4.42	
	Total Length	35,450								

Static Head 405.00 Total H/L 199.58 TDH 604.58

mgd	cfs	h/l	TDH	PSI
		199.58		
5	7.735	22.9	428	185
7	10.829	43.9	449	195
9	13.923	72.6	478	207
11	17.017	108.5	514	223
13	20.111	149.9	555	240
15	23.205	199.5	605	262
17	26.299	256.3	661	287
19	29.393	312.5	718	311
21	32.487	381.8	787	341
23	35.581	457.9	863	374
25	38.675	541.0	946	410
27	41.769	631.1	1036	449
29	44.863	728.0	1133	491



West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 6A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to East End of MWD Feeders - Alternative 6A

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ East End - WCF	46.0	Feet
Min. Pressure @ WB-20	100.0	PSI
	230.77	Feet
Flow	15.00	mgd
	23.208	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee flow passing	0.6
Tee branch	1.8
Exit	1

Friction Factor

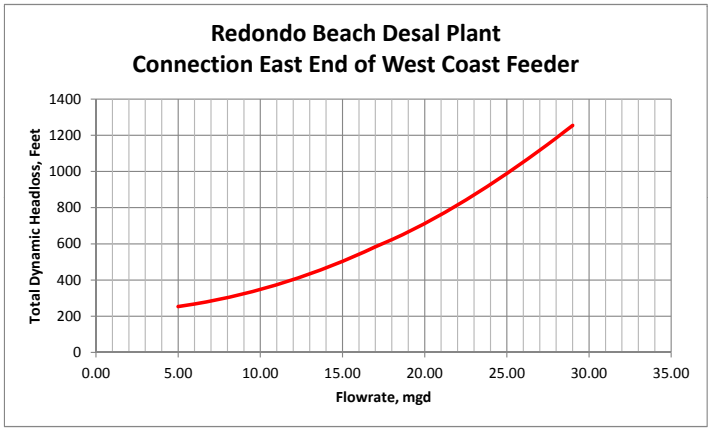
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split

Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Distance from Aviation Cumulative		Direction
WB-3,4,5	11.2 mgd	17.33 cfs	75%	%		1,360 feet	1,360 feet	West
WB-29	1.1 mgd	1.70 cfs	7%	25%	3.8	2,835 feet	2,835 feet	East
WB-2A, 2B, & 13	0.5 mgd	0.77 cfs	3%	18%	2.7	5,249 feet	2,414 feet	East
WB -11, WB-12	2.2 mgd	3.40 cfs	15%	15%	2.2	18,450 feet	13,201 feet	East

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
Connection to West Coast Feeder from Redondo Beach Desal Site at Hawthorne and E. El Segundo Blvd										
East End - WCF (WB-20)	Pipe Exit	1	11.60	16 "	8.311			1	1.07	End at WB-28
E El Segundo Blvd.	CMLC Steel Pipe	2,980	11.60	16 "	8.311	1.05E+06	0.0182		43.63	
E El Segundo Blvd.	CMLC Steel Pipe	4,870	23.21	24 "	7.387	1.40E+06	0.0170		35.08	
	Tee branch	1	23.21	24 "	7.387	1.40E+06	0.0170		0.01	Hawthorne and 182nd St.
Hawthorne	CMLC Steel Pipe	18,510	23.21	24 "	7.387	1.40E+06	0.0170		133.33	
182nd St.	CMLC Steel Pipe	3,200	46.42	36 "	6.57	1.86E+06	0.0152		4.58	Split at Hawthorne Blvd.
Felton Ave	CMLC Steel Pipe	1,300	46.42	36 "	6.57	1.86E+06	0.0152		5.09	
Ralston	CMLC Steel Pipe	2,050	46.42	36 "	6.57	1.86E+06	0.0152		20.86	
Meyer Ln	CMLC Steel Pipe	1,350	46.42	36 "	6.57	1.86E+06	0.0152		4.07	
190th Street	CMLC Steel Pipe	1,500	46.42	36 "	6.57	1.86E+06	0.0152		5.09	
BerylStreet	CMLC Steel Pipe	6,150	46.42	36 "	6.57	1.86E+06	0.0152		20.86	
Francisca Ave	CMLC Steel Pipe	1,200	46.42	36 "	6.57	1.86E+06	0.0152		4.07	
	Mitered 45 bend	2	46.42	36 "	6.57			0.25	0.33	
	Mitered 90 bend	6	46.42	36 "	6.57			1.10	4.42	
	Total Length	43,110.00								
			Static Head	220.77				Total H/L	282.49	TDH 503.26

mgd	cfs	h/l	TDH	PSI
		282.49		
5	7.74	32.5	253	110
7	10.83	62.4	283	123
9	13.92	103.1	324	140
11	17.02	154.1	375	162
13	20.11	212.2	433	188
15	23.21	282.5	503	218
17	26.30	362.8	584	253
19	29.40	443.7	664	288
21	32.49	542.0	763	331
23	35.59	650.2	871	377
25	38.68	768.2	989	429
27	41.77	896.0	1117	484
29	44.87	1033.7	1254	544



West Basin Municipal Water Distirct - Ocean Desalination Project
Conveyance Alternative 6A

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/10/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to East End of MWD Feeders - Alternative 6A

Backbone From Redondo Beach Site

Location	Distance	Dia	Cost	Comments
Hawthorne	18,510	24 "	$7,173,627	Feeder to West Coast Feeder from WBF Turnout
S. Van Ness Ave	4,000	24 "	$1,550,216	Feeder to West Basin Feeder
170th St.	5,300	24 "	$2,054,037	
Yukon Ave.	4,100	24 "	$1,588,972	
182nd St.	5,300	24 "	$2,054,037	
182nd St.	3,200	36 "	$2,281,209	Backbone from Redondo Beach Plant Site
Felton Ave	1,300	36 "	$926,741	
Ralston	2,050	36 "	$1,461,400	
Meyer Ln	1,350	36 "	$962,385	
190th Street	1,500	36 "	$1,069,317	
BerylStreet	6,150	36 "	$4,384,199	
Francisca Ave	1,200	36 "	$855,453	
Total Length	53,960 feet			
		Total Cost	$26,361,593	

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Feeder

Location	Distance	Dia	Cost	Comments
WB-12	-	24 "	$0	Connect to West Basin Feeder at WB-12
		Total Cost	$0	

WestCoast Feeder

Location	Distance	Dia	Cost	Comments
E El Segundo Blvd from Hawthorne Blvd. to WB-30	4,870	24 "	$1,887,389	Local Feeder to WB-20 and WB-30
E El Segundo Blvd from WB-30	2,980	16 "	$627,864	Local Feeder to West End of WBF(WB-28)
		Total Cost	$2,515,253	

Pumping Requirements 30.0 mgd @ 605 Ft. TDH
5 Pumps @ 7.5 MGD @ 605 Feet, TDH

CONVEYANCE SYSTEMS

ADDITIONAL ALTERNATIVE ALIGNMENTS

West Basin Municipal Water District
Ocean Desalination Project

Summary of Additional Conveyance Alternatives

Alt.	Desal Plant Site	Flowrate	Pipeline, Dia. Inches						Pump Station
			Backbone			Cost	No. of Pumps	Cost	Total Cost
			Common	West Basin	West Coast				
1	NRG	40.0 MGD	36 "	36 "	24 "	$17.4 million	7 - 8 MGD @850' TDH	$12.0 million	$29.4 million
2	AES		42 "		30 "	$20.2 million	7 - 8 MGD @830' TDH	$12.0 million	$32.2 million
3	NRG	10.0 MGD	24 "		-	$8.8 million	3 - 5.0 MGD @ 378' TDH	$4.4 million	$13.2 million
4	AES		24 "		-	$7.3 million	5 - 7.5 MGD @ 365' TDH	$4.4 million	$11.7 million

West Basin Municipal Water District
Ocean Desalination Project

Additional Conveyance Alternatives

Alternative		Desal Plant Site	Backbone Feeder				West Basin Feeder				West Coast Feeder				Total Cost	Comments
			Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost	Flowrate	Alignment Description	Dia.	Cost		
1	Local	NRG	40.0 MGD	From Plant to 45th to Highland to Rosecrans to Aviation. Split at Aviation	36 "	$10.4 million	20 MGD	West on Manhatten Beach Blvd to WB-3,4,5	24 "	$1.1 million	20 MGD	Tie in at WB-28 at Intersection of Aviation and El Segundo Bllvd	36 "	$0.0 million	$17.4 million	Connect to West End of Feeder and match MWD Max Hydraulic Grade El. Of 415 ft.on WBF and 660 ft. on WCF)
				North on Aviation to E El Segundo Blvd;	36 "	$3.8 million										
				South on Aviation to Manhatten Beach Blvd.	24 "	$2.0 million										
2		AES		From Plant to Herondo to PCH to Aviation Blvd to Manhattan Beach Blvd.	42 "	$13.3 million	20 MGD	West on Manhatten Beach Blvd to WB-3,4,5	24 "	$1.1 million	20 MGD	Tie in at WB-28 at Intersection of Aviation and El Segundo Bllvd	30 "	$0.0 million	$20.2 million	
				From Manhattan Beach Blvd to El Segundo Blvd on Aviation	30 "	$5.7 million										
3	Connect to West End of West Basin Feeder	NRG	10.0 MGD	From Plant to 45th to Highland to Rosecrans to Aviation.	24 "	$5.7 million	10 MGD	West on Manhatten Beach Blvd to WB-3,4,5	24 "	$1.1 million	0				$8.8 million	Connect to West End of West Basin Feederat minimum 100 psi
				South on Aviation to Manhatten Beach Blvd.	24 "	$2.0 million										
4		AES		From Plant to Herondo to PCH to Aviation to Manhattan Beach Blvd.	24 "	$6.2 million	10 MGD	West on Manhatten Beach Blvd to WB-3,4,5	24 "	$1.1 million	0				$7.3 million	

West Basin Municipal Water District
Ocean Desalination Project

Pump Station Requirements for Additional Conveyance Alternatives

Alt.	Description	Pump	Cost per pump	Total	VFD Cost@ $350 per Hp	Mat'l Cost	Installation @ 75%	OH&P @ 25%	Grand Total
1	7 Vertical Turbine Pumps 8.0 MGD @ 850' TDH	Goulds 20CHC, 4 stage 1800 rpm - 1500 hp	$ 365,782	$1.8 million	$3.7 million	$5.5 million	$4.1 million	$2.4 million	$12.0 million
2	7 Vertical Turbine Pumps 8.0 MGD @ 830' TDH	Goulds 20CHC, 4 stage 1800 rpm - 1500 hp	$ 365,782	$1.8 million	$3.7 million	$5.5 million	$4.1 million	$2.4 million	$12.0 million
3	3 Vertical Turbine Pumps 5 MGD @378' TDH	Goulds 16DMC 3 stage 1800 rpm - 400 hp	$ 122,943	$0.6 million	$1.4 million	$2.0 million	$1.5 million	$0.9 million	$4.4 million
4	3 Vertical Turbine Pumps 5.0 MGD @ 365' TDH	Goulds 16DMC 3 stage 1800 rpm 400 hp	$ 122,943	$0.6 million	$1.4 million	$2.0 million	$1.5 million	$0.9 million	$4.4 million

West Basin Municipal Water District - Ocean Desalination Project
Additional Conveyance Alternative No. 1

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-3,4,5 Connection on West Basin Feeder - Local Service

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ WB-3,4,5	81.0	Feet
HGL @ WB-3,4,5	144.7333333	PSI
	415.00	Feet
Flow	20.00	mgd
	30.944	cfs

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

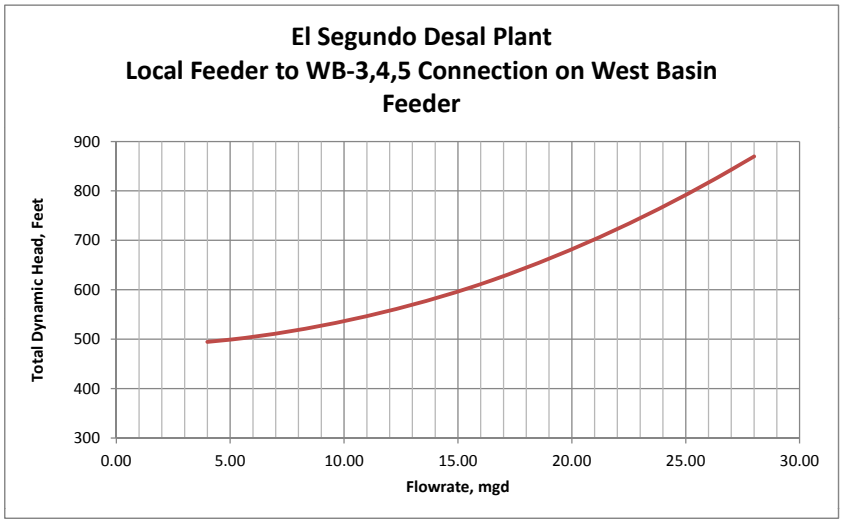
Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	20.0 mgd	30.94 cfs	100%	%		1,360 feet	1,360 feet	West

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-3,4,5											
WB-3,4,5		Pipe Exit	1	30.94	24 "	9.850			1	1.51	
Manhattan Beach Blvd	WB-3,4,5	CMLC Steel Pipe	2,920	30.94	24 "	9.850	1.86E+06	0.0158		34.75	
		Tee branch	1	30.94	24 "	9.850			1.80	2.71	
Aviation		CMLC Steel Pipe	5,260	30.94	24 "	9.850	1.86E+06	0.0158		62.60	
		Tee branch	1	61.89	36 "	8.755			1.80	2.14	
Rosecrans/Highland/45th		CMLC Steel Pipe	14,610	61.89	36 "	8.755	2.48E+06	0.0152		88.11	
		Mitered 90 bend	3	61.89	36 "	8.755			1.10	3.93	
		Total Length	22,790								
				Static Head	486.00				Total H/L	195.75	TDH 681.75

mgd	cfs	h/l	TDH	PSI
		195.75		
4	6.188	8.4	494	214
6	9.282	18.3	504	219
8	12.376	32.5	518	225
10	15.47	50.7	537	233
12	18.564	71.8	558	242
14	21.658	95.9	582	252
16	24.752	125.2	611	265
18	27.846	158.5	645	279
20	30.94	195.7	682	295
22	34.034	236.8	723	313
24	37.128	281.8	768	333
26	40.222	330.7	817	354
28	43.316	383.6	870	377



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The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-28 Connection on West Coast Feeder - Local Service

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ WB-28	94.0	Feet
HGL @ WB-28	245.27	PSI
	660.00	Feet
Flow	20.00	mgd
	30.944	cfs

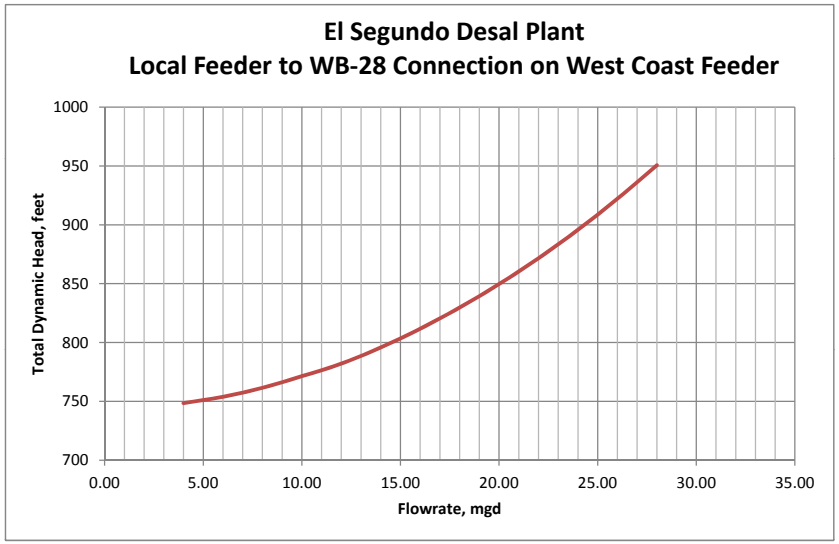
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Mitered 11 bend	0.05
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-28										
WB-28	Pipe Exit	1	30.94	36 "	4.378			1	0.30	
E El Segundo Blvd	Mitered 90 bend	1	30.94	36 "	4.378			1.10	0.33	
Aviation Blvd	CMLC Steel Pipe	5,300	30.94	36 "	4.378	1.24E+06	0.0158		8.31	
Rosecrans/Highland/45th	CMLC Steel Pipe	14,610	61.89	36 "	8.755	2.48E+06	0.0158		91.59	
minor	Mitered 90 bend	4	61.89	36 "	8.755			1.10	5.24	
	Total Length	19,910.00								
			Static Head	744.00				Total H/L	105.76	TDH 849.76

mgd	cfs	h/l	TDH	PSI
		105.76		
4	6.19	4.5	749	324
6	9.28	9.9	754	327
8	12.38	17.5	762	330
10	15.47	27.4	771	334
12	18.57	38.1	782	339
14	21.66	51.8	796	345
16	24.76	67.7	812	352
18	27.85	85.7	830	360
20	30.94	105.8	850	368
22	34.04	127.6	872	378
24	37.13	151.8	896	388
26	40.23	178.2	922	400
28	43.32	206.7	951	412



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to west end on West Coast and West Basin Feeders - Cost

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Rosecrans/Highland/45th	14,610	36 "	$10,415,146	Backbone common to WBF and WCF
South on Aviation	5,260	24 "	$2,038,535	Backbone to S El Segundo Blvd (WBF)
North on Aviation Blvd	5,300	36 "	$3,778,253	Backbone to Manhattan Beach Blvd (WBF)
Manhattan Beach Blvd	2,920	24 "	$1,131,658	Feeder to Service Connections on WBF (WB-3,4,5)
Total Length	28,090 feet			
		Total Cost	$17,363,591	

Pumping Requirements 40.0 mgd @ 850 Ft. TDH
7 Pumps @ 8 MGD @ 847 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Study
Additional Conveyance Alternative No. 2

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-3,4,5 Connection on West Basin Feeder - Local Service

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ WB-3,4,5	81.0	Feet
HGL @ WB-3,4,5	144.73	PSI
	415.00	Feet
Flow	20.00	mgd
	30.944	cfs

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

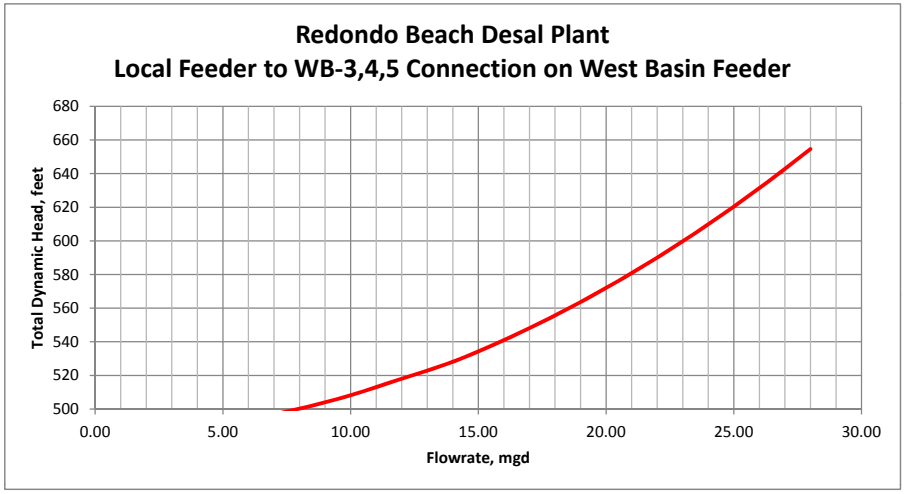
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 20 mgd	Cumulative	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	20.0 mgd	30.94 cfs	100%	%		2,920 feet	2,920 feet	West

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-3,4,5											
WB-3,4,5		Pipe Exit		30.94	24 "	9.85			1	1.51	
Manhattan Beach Blvd	WB-3,4,5	CMLC Steel Pipe	2,920	30.94	24 "	9.85	1.86E+06	0.0158		34.75	
		Tee branch	1	30.94	24 "	9.85			1.80	2.71	
Aviation		CMLC Steel Pipe	10,950.00	61.89	42 "	6.43	2.13E+06	0.0152		30.55	
PCH		CMLC Steel Pipe	2,950.00	61.89	42 "	6.43	2.13E+06	0.0152		8.23	
Herondo/Plant		CMLC Steel Pipe	2,100.00	61.89	42 "	6.43	2.13E+06	0.0152		5.86	
		Mitered 45 bend	2	61.89	42 "	6.43			0.25	0.32	
		Mitered 90 bend	3	61.89	42 "	6.43			1.10	2.12	
		Total Length	18,920								

Static Head 486.00 Total H/L 86.06 TDH 572.06

mgd	cfs	h/l	TDH	PSI
		86.06		
4	6.188	3.8	490	212
6	9.282	8.2	494	214
8	12.376	14.3	500	217
10	15.47	22.3	508	220
12	18.564	32.1	518	225
14	21.658	42.2	528	229
16	24.752	55.1	541	234
18	27.846	69.7	556	241
20	30.94	86.0	572	248
22	34.034	104.1	590	256
24	37.128	123.9	610	264
26	40.222	145.4	631	274
28	43.316	168.6	655	284



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 2 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ WB-28	91.0	Feet
Min. HGL @ WB-28	246.57	PSI
	660.00	Feet
Flow	20.00	mgd
	30.944	cfs

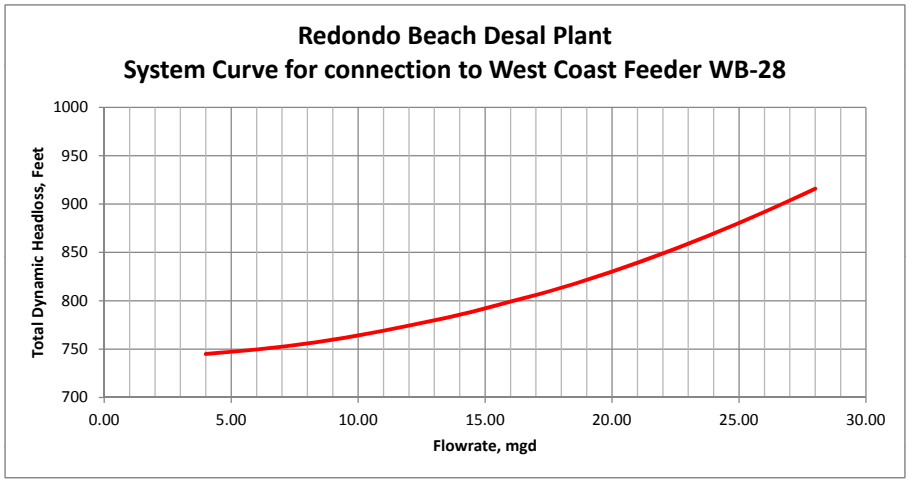
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Location	Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Coast Local Service Feeder to Service Connection WB-28										
WB-28	Pipe Exit		15.47	30 "	3.152			1	0.15	
E El Segundo Blvd	Mitered 90 bend	1	30.94	30 "	6.304			1.10	0.68	
Aviation	CMLC Steel Pipe	10,600	30.94	30 "	6.304	1.49E+06	0.0158		41.34	
Aviation	CMLC Steel Pipe	10,950	61.89	42 "	6.433	2.13E+06	0.0152		30.55	
PCH	CMLC Steel Pipe	2,950	61.89	42 "	6.433	2.13E+06	0.0152		8.23	
Herondo/Plant	CMLC Steel Pipe	2,100	61.89	42 "	6.433	2.13E+06	0.0152		5.86	
	Mitered 45 bend	2	61.89	42 "	6.433			0.25	0.32	
	Mitered 90 bend	3	61.89	42 "	6.433			1.10	2.12	
	Total Length	26,600								
			Static Head	741.00				Total H/L	89.26	TDH 830.26

gpm	cfs	h/l	TDH	PSI
		89.26		
4	6.188	4.0	745	323
6	9.282	8.6	750	325
8	12.376	14.8	756	328
10	15.47	23.1	764	331
12	18.564	33.3	774	336
14	21.658	44.5	785	340
16	24.752	58.1	799	346
18	27.846	72.3	813	352
20	30.94	89.2	830	360
22	34.034	108.0	849	368
24	37.128	128.5	869	377
26	40.222	150.8	892	386
28	43.316	174.9	916	397



MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service Cost

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Aviation	10,600	30 "	$5,745,180	From Manhattan Beach Blvd to El Segundo Blvd
Aviation	10,950	42 "	$9,107,015	From PCH to Manhattan Beach Blvd
PCH	2,950	42 "	$2,453,488	From Herondo to Aviation
Herondo/Plant	2,100	42 "	$1,746,551	From Plant to PCH
Total Length	26,600 feet			
		Total Cost	$19,052,234	

Local Feeder Cost

Location		Distance	Dia	Cost	Comments
Manhattan Beach Blvd	WB-3,4,5	2,920	24 "	$1,131,658	Feeder to Service Connections on WBF (WB-3,4,5)
West Coast Feeder					
		Total Cost		$1,131,658	

Pumping Requirements 40.0 mgd @ 830 Ft. TDH
7 Pumps @ 8 MGD @ 830 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Project
Additional Conveyance Alternative No. 3

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - El Segundo Site to WB-3,4,5 Connection on West Basin Feeder - Local Service

	Input Data	Units
Wet Well Water Surface Elev	10	Feet
F.G. @ WB-3,4,5	81.0	Feet
Minimum Pressure @ WB-3,4,5	100	PSI
	230.77	Feet
Flow	10.00	mgd
	15.472	cfs

Friction Factor

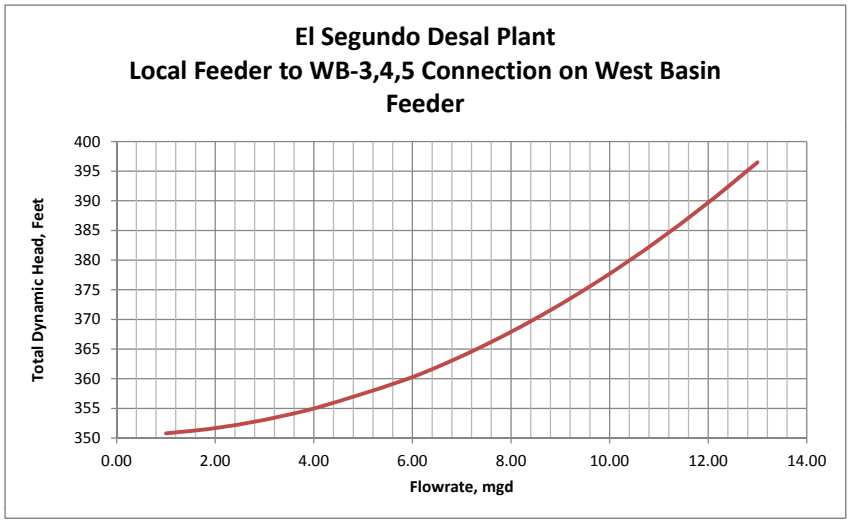
$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 15 mgd	Cumulative	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	20.0 mgd	30.94 cfs	100%	%		2,920 feet	2,920 feet	West

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-3,4,5											
WB3,4,5		Pipe Exit	1	15.47	24 "	4.925			1	0.38	
Manhattan Beach Blvd	WB-3,4,5	CMLC Steel Pipe	2,920	15.47	24 "	4.925	9.30E+05	0.0170		9.35	
		Tee branch	1	15.47	24 "	4.925			1.80	0.68	
Aviation		CMLC Steel Pipe	5,260	15.47	24 "	4.925	9.30E+05	0.0170		16.84	
		Tee branch	1	15.47	24 "	4.925			1.80	0.68	
Rosecrans/Highland/45th		CMLC Steel Pipe	14,610	15.47	24 "	4.925	9.30E+05	0.0170		46.77	
		Mitered 90 bend	3	15.47	24 "	4.925			1.10	1.24	
		Total Length	22,790								
				Static Head	301.77				Total H/L	75.93	TDH 377.70

mgd	cfs	h/l	TDH	PSI
		75.93		
1	1.547	49.0	351	152
2	3.094	49.9	352	152
3	4.641	51.3	353	153
4	6.188	53.2	355	154
5	7.735	55.7	358	155
6	9.282	58.5	360	156
7	10.829	62.0	364	158
8	12.376	66.1	368	159
9	13.923	70.8	373	161
10	15.47	75.9	378	164
11	17.017	81.6	383	166
12	18.564	87.9	390	169
13	20.111	94.7	396	172



West Basin Municipal Water District - Ocean Desalination Project
Additional Conveyance Alternative No. 3

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3

CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160

SUBJECT: System Hydraulics - El Segundo Site to west end on West Coast and West Basin Feeders - Cost

Local Backbone Cost

Location	Distance	Dia	Cost	Comments
Rosecrans/Highland/45th	14,610	24 "	$5,662,166	Backbone common to WBF and WCF
Aviation	5,260	24 "	$2,038,535	Backbone to Manhattan Beach Blvd (WBF)
Manhattan Beach Blvd	2,920	24 "	$1,131,658	Feeder to Service Connections on WBF (WB-3,4,5)
Total Length	22,790 feet			
		Total Cost	$8,832,358	

Pumping Requirements 10.0 mgd @ 378 Ft. TDH
3 Pumps @ 5 MGD @ 373 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

West Basin Municipal Water District - Ocean Desalination Study
Additional Conveyance Alternative No. 4

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 1 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-3,4,5 Connection on West Basin Feeder - Local Service

	Input Data	Units
Wet Well Water Surface	10	Feet
F.G. @ WB-3,4,5	81.0	Feet
Minimum Pressure @ WB-3,4,5	100	PSI
	230.77	Feet
Flow	10.00	mgd
	15.472	cfs

Friction Factor

$$\frac{1}{\sqrt{f}} = 1.14 - 2\log_{10}\left[\frac{\varepsilon}{D_i} + \frac{9.287}{R_e\sqrt{f}}\right]$$

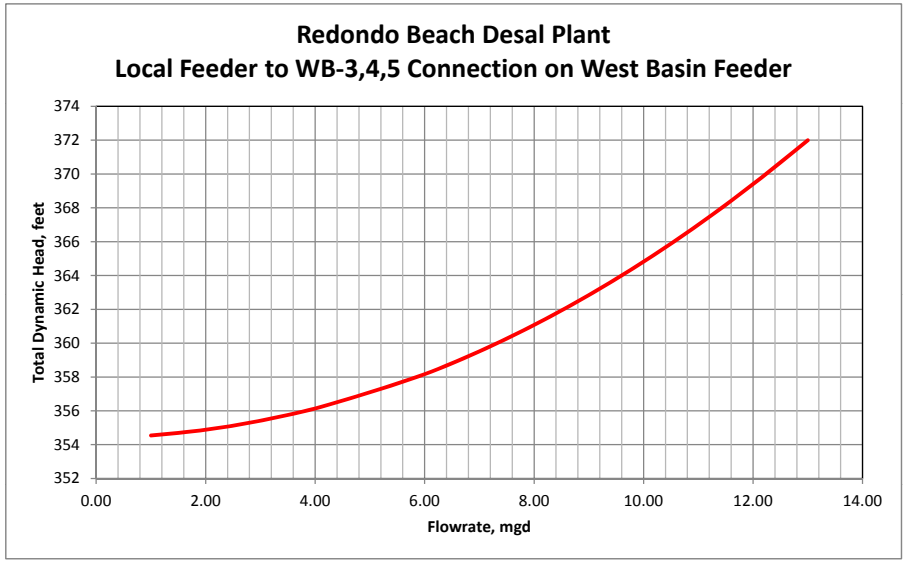
Minor Losses	K
Entrance	0.5
Mitered 90 bend	1.1
Mitered 60 bend	0.5
Mitered 45 bend	0.25
Tee branch	1.8
Exit	1

West Basin Flow Split						Distance from Aviation		
Conn. No.	Flow		% of 10 mgd	Cumulative	Flow (cfs)	Length	Cumulative	Direction
WB-3,4,5	10.0 mgd	15.47 cfs	100%	%		1,360 feet	1,360 feet	West

Location		Element	Length/No. (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/sec)	Reynolds Number	f	K	HL-f (ft)	Notes, Cav Coeff
West Basin Local Service Feeder to Service Connection WB-3,4,5											
WB-3,4,5		Pipe Exit		15.47	24 "	4.92			1	0.38	
Manhattan Beach Blvd	WB-3,4,5	CMLC Steel Pipe	2,920	15.47	24 "	4.92	9.30E+05	0.0170		9.35	
		Tee branch	1	15.47	24 "	4.92			1.80	0.68	
Aviation		CMLC Steel Pipe	10,950	15.47	24 "	4.92	9.30E+05	0.0170		35.05	
PCH		CMLC Steel Pipe	2,950	15.47	24 "	4.92	9.30E+05	0.0170		9.44	
Herondo/Plant		CMLC Steel Pipe	2,100	15.47	24 "	4.92	9.30E+05	0.0170		6.72	
		Mitered 45 bend	2	15.47	24 "	4.92			0.25	0.19	
		Mitered 90 bend	3	15.47	24 "	4.92			1.10	1.24	
		Total Length	18,920								

Static Head 301.77 Total H/L 63.05 TDH 364.82

mgd	cfs	h/l	TDH	PSI
		63.05		
1	1.547	52.8	355	154
2	3.094	53.1	355	154
3	4.641	53.6	355	154
4	6.188	54.4	356	154
5	7.735	55.3	357	155
6	9.282	56.4	358	155
7	10.829	57.7	360	156
8	12.376	59.3	361	156
9	13.923	61.1	363	157
10	15.47	63.1	365	158
11	17.017	65.2	367	159
12	18.564	67.6	369	160
13	20.111	70.2	372	161



West Basin Municipal Water District - Ocean Desalination Study
Additional Conveyance Alternative No. 4

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

BY Paul F. WIlson DATE 10/08/2011 SHEET NO. 3 of 3
CHKD. BY_____DATE_____ Job No. 005052016.000 Task 00160
SUBJECT: System Hydraulics - Redondo Beach Site to WB-20 Connection on West Coast Feeder - Local Service Cost

Local Backbone Cost

Location		Distance	Dia	Cost	Comments
Aviation		10,950	24 "	$4,243,718	From PCH to Manhattan Beach Blvd
PCH		2,950	24 "	$1,143,285	From Herondo to Aviation
Herondo/Plant		2,100	24 "	$813,864	From Plant to PCH
Total Length		16,000 feet			
			Total Cost	$6,200,866	

Local Feeder Cost

Location		Distance	Dia	Cost	Comments
Manhattan Beach Blvd	WB-3,4,5	2,920	24 "	$1,131,658	Feeder to Service Connections on WBF (WB-3,4,5)
			Total Cost	$1,131,658	

Pumping Requirements 10.0 mgd @ 365 Ft. TDH
3 Pumps @ 5 MGD @ 360 Feet, TDH

Pipe Dia	Cost, $/" Dia.-LF
12	$ 11.39
16	$ 13.17
24	$ 16.15
30	$ 18.07
36	$ 19.80
48	$ 22.89
54	$ 24.28
60	$ 25.61
66	$ 26.86
72	$ 28.06
78	$ 29.22
84	$ 30.33
90	$ 31.40
96	$ 32.44
102	$ 33.44
108	$ 34.42

Appendix 1:F

OWDDF Design and Performance Memorandum

The Membrane Technology Consultants

Separation Processes, Inc.
3156 Lionshead Ave.,Suite 2
Carlsbad, CA 92010
Tel: 760-400-3660
Fax: 760-400-3661
www.spi-engineering.com

Date: October 14, 2011

To: Phil Lauri - WBMWD

From: Gerry Filteau

Subject: OWDDF Design and Performance

Following up on our discussion with Arcadis, I've compiled the following information.

1) Membrane Filtration Design Parameters for Pall, Zenon and Siemens used in the Ocean Water Desalination Demonstration Facility (OWDDF) membrane system procurement are provided in "1-*Original Demo Membrane Filtration Procurement – 11300.pdf*", beginning on Page 10. It is important to note that the system design capacity and redundancy was subsequently revised prior to construction of the Demo.

2) The OWDDF design criteria for major treatment components are provided in "2-*West Basin Demo Design Criteria – June 2009.doc*". This consists of excerpts from the contract documents for the Arkal, Zenon and RO equipment. Likewise this document reflects the Zenon design prior to downsizing capacity and the switch to the 550 square foot module. The complete sections from the contract documents are available if more detail is desired.

3) The OWDDF Test Plan – "3-*West Basin SWRO Demo Test Plan –Rev2_111510.pdf*" is provides design and operating parameters intended at the time of the document's issuance in November 2010.

   While many aspects of the design and operation of the OWDDF were established for demonstration, some are still investigational and the focus of optimization. The following is a list of design and operation parameters that are considered investigational within the OWDDF Test Plan.

   - All aspects of the Subsurface Intake system.
   - Maintenance practices for wedgewire screen (airburst, manual, etc.)
   - Sustainable Arkal loading rate relative to water quality
   - Effectiveness of the Arkal osmotic shock backwash process
   - All aspects of the pre-formed Chloramine addition and its impacts on operation of other processes
   - Further refinement of relationship between second pass boron rejection versus pH

The OWDDF project is one year into its two year operating period. As such assessment of performance and optimization is still ongoing. However the following observations are presented in the interest of providing the Master Plan engineer with some indication of the performance seen to-date.

- The Arkal disc filter system has required operation of three on-line filter pods with one stand-by to achieve stable design output with most water quality conditions, including with the typical 1-2 NTU feedwater turbidity (non red tide event). This is different than the original design intent of two pods on-line. Backwash optimization is still ongoing in the interest of achieving two pod operation and characterize the specific water quality conditions which require derating to three pod operation. At this time, the OWDDF performance indicates the need for three on-line pods to achieve sustainable operation through the normal feedwater quality range.

- The Zenon Ultrafiltration pretreatment system has generally maintained design capacity. However, the membrane post-cleaning permeability of both the original set of membrane and a replacement set stabilized at a substantially lower value than expected from the original pilot testing in El Segundo. While the OWDDF is capable of maintaining design capacity with this performance, it would leave little room for permeability loss over time as anticipated over the life of membrane in a full-scale facility. As such, the implication for establishing full-scale design parameters with this technology could be to increase the membrane area by as much as 20-25%. Investigation of the performance, optimization of operating protocols and discussion with the manufacturer are still ongoing.

- The pre-formed chloramines addition process and related operating practices are different from that employed in the pilot operation, in an effort to demonstrate expected full-scale practices. During the first year of operation, the facility has encountered equipment performance issues and the need to refine processes and practices. Over the course of the first eight months of operation the RO system saw intermittent periods of chloramine addition and experienced some periods of higher feed ORP than targeted. The original set of RO membrane experienced a substantial increase in salt passage which may have been influenced by the chloramine addition control and post-shutdown flush practices in this period. Refinements to the process, equipment and operating practices have resulted in stable performance with a replacement set of membrane. The pre-formed chloramines addition process is an aspect of the OWDDF project which is still investigational.

- Aside from the salt rejection loss indicated above, RO performance has generally been in accordance with expectations and consistent with the manufacturer's projections. Effort is currently focused on characterizing boron rejection performance through the split-permeate two-pass system and the relationship of boron rejection to second pass pH. The OWDDF design configuration is first pass of 9 gfd, 50% recovery, with split-permeate feeding a partial second-pass at 20 gfd, 90% recovery.

Appendix 1:G

Cost Estimates

Cost Estimate Assumptions

Description			Qty.	Unit	Unit Cost	Project Cost
			AVG			
Installation	20-40%	*	30%		Cost Estimated as Percentage	
Piping	5-10%	*	7.5%		Cost Estimated as Percentage	
Electrical	5-15%	*	10%		Cost Estimated as Percentage	
Instrumentation	5-10%	*	7.5%		Cost Estimated as Percentage	
HVAC, Plumbing, & Architectural	2-5%	*	3.5%		Cost Estimated as Percentage	
Sitework	10-15%	*	12.5%		Cost Estimated as Percentage	
Geotechnical Improvements (Structural Piles)			25%		Cost Estimated as Percentage	
Subtotal						
Mobilization / Demobilization	1-2%	**	1.5%		Cost Estimated as Percentage	
Bonds & Insurance	0.5-1.5%	**	0.5%		Cost Estimated as Percentage	
Overhead & Profit	8-15%	**	12%		Cost Estimated as Percentage	
Contingency	10-50%	**	30%		Cost Estimated as Percentage	
Subtotal Construction Cost						
Professional Services (Permitting, Engineering, etc.)	15-20%	***	18%		Cost Estimated as Percentage	

* Percentage of Equipment Cost - the specific number should be selected on the application/system

** Percentage of Direct Subtotal

***Percentage of Construction Subtotal

Appendix 1:G-A

El Segundo 20 MGD Cost Estimate

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 20 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$7,580,000	4%		
2.0	PRETREATMENT	$46,050,000	25%		
3.0	REVERSE OSMOSIS	$73,240,000	40%		
4.0	POST-TREATMENT & DISINFECTION	$8,340,000	5%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$33,030,000	18%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$3,790,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,230,000	1%		
9.0	ADMIN/MAINT	$7,570,000	4%		
	SUBTOTAL	**$182,830,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,828,300	$3,656,600	$3,656,600
	BONDS & INSURANCE		$914,150	$1,828,300	$2,742,450
	OVERHEAD & PROFIT		$14,626,400	$21,939,600	$27,424,500
	UN-PRICED ALLOWANCES (CONTINGENCY)		$27,424,500	$36,566,000	$54,849,000
	SUBTOTAL CONSTRUCTION COST		**$227,623,350**	**$246,820,500**	**$271,502,550**
	PROFESSIONAL SERVICES		$34,143,503	$44,427,690	$54,300,510
	TOTAL CAPITAL COST		**$261,766,853**	**$291,248,190**	**$325,803,060**

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	30" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	42" HDPE BURIED SECTION	155	LF	$69	$41	$110	$17,112
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$138	$83	$221	$6,624
	30" 90-DEG BEND	2	EA	$750	$450	$1,200	$2,400
	42" 45-DEG BEND	4	EA	$1,500	$900	$2,400	$9,600
	42"X30" REDUCER	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X30" TEE	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X42" TEE	2	EA	$3,200	$1,920	$5,120	$10,240
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 42" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	10	EA	$1,200	$720	$1,920	$19,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,086,776**
1.2	**CONVEYANCE PIPES**						
	42" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$138	$83	$221	$569,002
	42" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$138	$83	$221	$569,002
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,638,003**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	42" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$138	$41	$179	$215,280
	42" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$138	$41	$179	$215,280
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$43,056	$43,056
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$558,336**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, VTP, 400 HP	5	EA	$325,000	$97,500	$422,500	$2,112,500
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	2,052	SF	$140	$60	$200	$410,400
	STRUCTURAL PILES	1	25%			$102,600	$102,600
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - RAW WATER PUMP STATION						**$2,753,625**
	SUBTOTAL - INTAKE /DISCHARGE						**$6,036,740**
	PIPING*		7.5%				$206,522
	ELECTRICAL*		10%				$275,363
	INSTRUMENTATION*		7.5%				$206,522
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$96,377
	SITEWORK		12.5%				$754,593
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$7,576,116**

*APPLIED TO 1.4 ONLY

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	3	EA	$600,000	$180,000	$780,000	$2,340,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	2	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	2	EA				Incl. Above
	DISK FILTER BUILDING	1,250	SF	$140	$60	$200	$250,000
	STRUCTURAL PILES	1	25%			$62,500	$62,500
	SUBTOTAL - DISK FILTERS						**$2,652,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	5	EA	$94,000	$28,200	$122,200	$611,000
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	3,600	SF	$140	$60	$200	$720,000
	STRUCTURAL PILES	1	25%			$180,000	$180,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$1,511,000**
2.1c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$17,400,000	$5,220,000	$22,620,000	$22,620,000
	MF/UF TRAINS **(5)**	12	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	2	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	2	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - MF/UF SYSTEM						**$25,807,500**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.6 MG **(7)**	1	EA	$212,100	$63,630	$275,730	$275,730
	TANK COATING	10,930	SF	$8	$3	$11	$120,230
	EQUIPMENT PAD	150	CY	$872	$392	$1,264	$189,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$585,560**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	5	EA	$500,000	$150,000	$650,000	$3,250,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$4,415,625**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$7,540	$7,540
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,498	SF	$4	$1	$5	$7,790
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,100	SF	$100	$30	$130	$143,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$342,140**
	SUBTOTAL - PRETREATMENT						**$32,661,825**
	PIPING		7.5%				$2,449,637
	ELECTRICAL		10%				$3,266,182
	INSTRUMENTATION		7.5%				$2,449,637
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,143,164
	SITEWORK		12.5%				$4,082,728
	PROJECT SUBTOTAL - PRETREATMENT						**$46,053,173**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0 REVERSE OSMOSIS							
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$35,000,000	$10,500,000	$45,500,000	$45,500,000
	CARTRIDGE FILTERS **(9)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	4	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	4	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	2	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	2	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$51,875,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$65,068**
	SUBTOTAL - REVERSE OSMOSIS						**$51,940,068**
	PIPING		7.5%				$3,895,505
	ELECTRICAL		10%				$5,194,007
	INSTRUMENTATION		7.5%				$3,895,505
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,817,902
	SITEWORK		12.5%				$6,492,509
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$73,235,496**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	5	EA	$285,000	$85,500	$370,500	$1,852,500
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - POST-TREATMENT P.S.						**$2,268,125**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$700,000	$210,000	$910,000	$910,000
	HYDRATED LIME SLURRY SYSTEM	2	EA	$325,000	$97,500	$422,500	$845,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	2	EA				Incl. Above
	SATURATOR	2	EA				Incl. Above
	LIME CONTACT TANK **(17)**	2	EA	$650,000	$195,000	$845,000	$1,690,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$3,445,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	58	CY	$260	$78	$338	$19,604
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,150	SF	$4	$1	$5	$5,980
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	810	SF	$100	$30	$130	$105,300
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$201,884**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$5,915,009**
	PIPING		7.5%				$443,626
	ELECTRICAL		10%				$591,501
	INSTRUMENTATION		7.5%				$443,626
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$207,025
	SITEWORK		12.5%				$739,376
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,340,163**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 5 MG	1	EA	$2,423,077	$726,923	$3,150,000	$3,150,000
	SUBTOTAL - CLEARWELL						**$3,150,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	5	EA	$184,415	$55,325	$239,740	$1,198,698
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SURGE TANK, 15,000 GAL	1	EA	$150,000	$45,000	$195,000	$195,000
	SUBTOTAL - PRODUCT WATER P.S.						**$2,646,823**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	14,680	LF	$548	$164	$713	$10,463,948
	24" CMLC STEEL PIPE, BACKBONE FEEDER	11,920	LF	$298	$89	$388	$4,620,132
	16" CMLC STEEL PIPE, WEST COAST FEEDER	6,470	LF	$162	$49	$211	$1,363,339
	16" CMLC STEEL PIPE, WEST BASIN FEEDER	2,835	LF	$162	$49	$211	$597,383
	12" CMLC STEEL PIPE, WEST BASIN FEEDER	2,414	LF	$105	$32	$137	$329,950
	SUBTOTAL - CONVEYANCE PIPELINE						**$17,374,752**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 8,000 GAL	2	EA	$12,000	$3,600	$16,000	$32,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 2,000 GAL	1	EA	$2,800	$840	$4,000	$4,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	53	CY	$260	$78	$338	$17,914
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,055	SF	$4	$1	$5	$5,486
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	730	SF	$100	$30	$130	$94,900
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$255,300**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$23,426,875**
	PIPING		7.5%				$1,757,016
	ELECTRICAL		10%				$2,342,688
	INSTRUMENTATION		7.5%				$1,757,016
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$819,941
	SITEWORK		12.5%				$2,928,359
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$33,031,894**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	42" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$138	$69	$207	$430,146
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$430,146**
6.2	**DIFFUSERS**						
	36" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	42" HDPE BURIED SECTION	205	LF	$138	$69	$207	$42,435
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	36" 45-DEG BEND	1	EA	$1,250	$625	$1,875	$1,875
	42" 45-DEG BEND	3	EA	$1,500	$750	$2,250	$6,750
	42"X36" REDUCER	1	EA	$3,200	$1,600	$4,800	$4,800
	36" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 42" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (36" PIPE) TO BALAST BURIED PIPES	8	EA	$900	$450	$1,350	$10,800
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	9	EA	$1,200	$600	$1,800	$16,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$659,933**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$1,430,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$50,000	$15,000	$65,000	$130,000
	PH ADJUSTMENT	1	LS	$30,000	$9,000	$39,000	$39,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$169,000**
	SUBTOTAL - RESIDUALS HANDLING						**$2,689,079**
	PIPING		7.5%				$201,681
	ELECTRICAL		10%				$268,908
	INSTRUMENTATION		7.5%				$201,681
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$94,118
	SITEWORK		12.5%				$336,135
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$3,791,601**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0	**ELECTRICAL BUILDING**						
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	5,000	SF	$120	$50	$170	$850,000
	STRUCTURAL PILES	1	25%			$212,500	$212,500
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$37,188
	SITEWORK		12.5%				$132,813
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,232,500**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	8,100	SF	$120	$50	$170	$1,377,000
	STRUCTURAL PILES	1	25%			$344,250	$344,250
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,758,250**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$5,365,750**
	PIPING		7.5%				$402,431
	ELECTRICAL		10%				$536,575
	INSTRUMENTATION		7.5%				$402,431
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$187,801
	SITEWORK		12.5%				$670,719
	PROJECT SUBTOTAL - ADMIN/MAINT						**$7,565,708**

Appendix 1:G-B

Redondo Beach 20 MGD Cost Estimate

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 20 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$6,970,000	4%		
2.0	PRETREATMENT	$46,050,000	25%		
3.0	REVERSE OSMOSIS	$73,240,000	39%		
4.0	POST-TREATMENT & DISINFECTION	$8,340,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$36,790,000	20%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$3,480,000	2%		
7.0	POWER SUPPLY (REDUNDANY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,230,000	1%		
9.0	ADMIN/MAINT	$7,570,000	4%		
	SUBTOTAL	**$185,670,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,856,700	$3,713,400	$3,713,400
	BONDS & INSURANCE		$928,350	$1,856,700	$2,785,050
	OVERHEAD & PROFIT		$14,853,600	$22,280,400	$27,850,500
	UN-PRICED ALLOWANCES (CONTINGENCY)		$27,850,500	$37,134,000	$55,701,000
	SUBTOTAL CONSTRUCTION COST		**$231,159,150**	**$250,654,500**	**$275,719,950**
	PROFESSIONAL SERVICES		$34,673,873	$45,117,810	$55,143,990
	TOTAL CAPITAL COST		**$265,833,023**	**$295,772,310**	**$330,863,940**

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	30" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	42" HDPE BURIED SECTION	130	LF	$138	$83	$221	$28,704
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	30" 90-DEG BEND	2	EA	$750	$450	$1,200	$2,400
	42" 45-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	42"X30" REDUCER	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X30" TEE	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X42" TEE	2	EA	$3,200	$1,920	$5,120	$10,240
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 42" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	8	EA	$1,200	$720	$1,920	$15,360
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,054,416**
1.2	**CONVEYANCE PIPES**						
	42" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$138	$83	$221	$454,848
	42" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$138	$83	$221	$454,848
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,409,696**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	42" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$138	$41	$179	$89,700
	42" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$138	$41	$179	$89,700
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$17,940	$17,940
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$282,060**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	5	EA	$325,000	$97,500	$422,500	$2,112,500
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	2,052	SF	$140	$60	$200	$410,400
	STRUCTURAL PILES	1	25%			$102,600	$102,600
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - RAW WATER PUMP STATION						**$2,753,625**
	SUBTOTAL - INTAKE /DISCHARGE						**$5,499,797**
	PIPING*		7.5%				$206,522
	ELECTRICAL*		10%				$275,363
	INSTRUMENTATION*		7.5%				$206,522
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$96,377
	SITEWORK		12.5%				$687,475
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$6,972,055**

*APPLIED TO 1.4 ONLY

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	3	EA	$600,000	$180,000	$780,000	$2,340,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	2	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	2	EA				Incl. Above
	DISK FILTER BUILDING	1,250	SF	$140	$60	$200	$250,000
	STRUCTURAL PILES	1	25%			$62,500	$62,500
	SUBTOTAL - DISK FILTERS						**$2,652,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	5	EA	$94,000	$28,200	$122,200	$611,000
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	3,600	SF	$140	$60	$200	$720,000
	STRUCTURAL PILES	1	25%			$180,000	$180,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$1,511,000**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$17,400,000	$5,220,000	$22,620,000	$22,620,000
	MF/UF TRAINS **(5)**	12	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	2	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	2	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - MF/UF SYSTEM						**$25,807,500**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.6 MG **(7)**	1	EA	$212,100	$63,630	$275,730	$275,730
	TANK COATING	10,930	SF	$8	$3	$11	$120,230
	EQUIPMENT PAD	150	CY	$872	$392	$1,264	$189,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$585,560**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	5	EA	$500,000	$150,000	$650,000	$3,250,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$4,415,625**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$7,540	$7,540
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,498	SF	$4	$1	$5	$7,790
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,100	SF	$100	$30	$130	$143,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$342,140**
	SUBTOTAL - PRETREATMENT						**$32,661,825**
	PIPING		7.5%				$2,449,637
	ELECTRICAL		10%				$3,266,182
	INSTRUMENTATION		7.5%				$2,449,637
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,143,164
	SITEWORK		12.5%				$4,082,728
	PROJECT SUBTOTAL - PRETREATMENT						**$46,053,173**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$35,000,000	$10,500,000	$45,500,000	$45,500,000
	CARTRIDGE FILTERS **(9)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	4	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	4	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	2	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	2	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$51,875,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$65,068**
	SUBTOTAL - REVERSE OSMOSIS						**$51,940,068**
	PIPING		7.5%				$3,895,505
	ELECTRICAL		10%				$5,194,007
	INSTRUMENTATION		7.5%				$3,895,505
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,817,902
	SITEWORK		12.5%				$6,492,509
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$73,235,496**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	5	EA	$285,000	$85,500	$370,500	$1,852,500
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - POST-TREATMENT P.S.						**$2,268,125**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$700,000	$210,000	$910,000	$910,000
	HYDRATED LIME SLURRY SYSTEM	2	EA	$325,000	$97,500	$422,500	$845,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	2	LS				Incl. Above
	SATURATOR	2	EA				Incl. Above
	LIME CONTACT TANK **(17)**	2	EA	$650,000	$195,000	$845,000	$1,690,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$3,445,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	58	CY	$260	$78	$338	$19,604
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,150	SF	$4	$1	$5	$5,980
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	810	SF	$100	$30	$130	$105,300
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$201,884**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$5,915,009**
	PIPING		7.5%				$443,626
	ELECTRICAL		10%				$591,501
	INSTRUMENTATION		7.5%				$443,626
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$207,025
	SITEWORK		12.5%				$739,376
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,340,163**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 5 MG	1	EA	$2,423,077	$726,923	$3,150,000	$3,150,000
	SUBTOTAL - CLEARWELL						**$3,150,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	5	EA	$184,415	$55,325	$239,740	$1,198,698
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SURGE TANK, 15,000 GAL	1	EA	$150,000	$45,000	$195,000	$195,000
	SUBTOTAL - PRODUCT WATER P.S.						**$2,646,823**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	15,950	LF	$548	$164	$713	$11,369,208
	30" CMLC STEEL PIPE, BACKBONE FEEDER	10,480	LF	$417	$125	$542	$5,681,208
	18" CMLC STEEL PIPE, WEST COAST FEEDER	6,470	LF	$182	$55	$237	$1,532,652
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	1,360	LF	$298	$89	$388	$527,129
	16" CMLC STEEL PIPE, WEST BASIN FEEDER	2,835	LF	$162	$49	$211	$597,383
	12" CMLC STEEL PIPE, WEST BASIN FEEDER	2,414	LF	$105	$32	$137	$329,950
	SUBTOTAL - CONVEYANCE PIPELINE						**$20,037,531**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 8,000 GAL	2	EA	$12,000	$3,600	$16,000	$32,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 2,000 GAL	1	EA	$2,800	$840	$4,000	$4,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	53	CY	$260	$78	$338	$17,914
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,055	SF	$4	$1	$5	$5,486
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	730	SF	$100	$30	$130	$94,900
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$255,300**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$26,089,653**
	PIPING		7.5%				$1,956,724
	ELECTRICAL		10%				$2,608,965
	INSTRUMENTATION		7.5%				$1,956,724
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$913,138
	SITEWORK		12.5%				$3,261,207
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$36,786,411**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	42" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$138	$69	$207	$382,950
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$382,950**
6.2	**DIFFUSERS**						
	36" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	42" HDPE BURIED SECTION	90	LF	$138	$69	$207	$18,630
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	36" 45-DEG BEND	1	EA	$1,250	$625	$1,875	$1,875
	42" 45-DEG BEND	3	EA	$1,500	$750	$2,250	$6,750
	42"X36" REDUCER	1	EA	$3,200	$1,600	$4,800	$4,800
	36" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 42" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (36" PIPE) TO BALAST BURIED PIPES	8	EA	$900	$450	$1,350	$10,800
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,200	$600	$1,800	$7,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$489,128**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$1,430,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$50,000	$15,000	$65,000	$130,000
	PH ADJUSTMENT	1	LS	$30,000	$9,000	$39,000	$39,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$169,000**
	SUBTOTAL - RESIDUALS HANDLING						**$2,471,078**
	PIPING		7.5%				$185,331
	ELECTRICAL		10%				$247,108
	INSTRUMENTATION		7.5%				$185,331
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$86,488
	SITEWORK		12.5%				$308,885
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$3,484,219**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	5,000	SF	$120	$50	$170	$850,000
	STRUCTURAL PILES	1	25%			$212,500	$212,500
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$37,188
	SITEWORK		12.5%				$132,813
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,232,500**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	8,100	SF	$120	$50	$170	$1,377,000
	STRUCTURAL PILES	1	25%			$344,250	$344,250
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,758,250**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$5,365,750**
	PIPING		7.5%				$402,431
	ELECTRICAL		10%				$536,575
	INSTRUMENTATION		7.5%				$402,431
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$187,801
	SITEWORK		12.5%				$670,719
	PROJECT SUBTOTAL - ADMIN/MAINT						**$7,565,708**

Appendix 1:G-C

El Segundo 60 MGD Cost Estimate

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 60 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$16,207,000	4%		
2.0	PRETREATMENT	$112,882,206	25%		
3.0	REVERSE OSMOSIS	$171,989,000	39%		
4.0	POST-TREATMENT & DISINFECTION	$17,579,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$102,512,000	23%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$7,654,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	0.5%		
8.0	ELECTRICAL BUILDING	$2,958,000	1%		
9.0	ADMIN/MAINT	$9,734,000	2%		
	SUBTOTAL	**$443,515,206**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$4,435,152	$8,870,304	$8,870,304
	BONDS & INSURANCE		$2,217,576	$4,435,152	$6,652,728
	OVERHEAD & PROFIT		$35,481,216	$53,221,825	$66,527,281
	UN-PRICED ALLOWANCES (CONTINGENCY)		$66,527,281	$88,703,041	$133,054,562
	SUBTOTAL CONSTRUCTION COST		**$552,176,431**	**$598,745,528**	**$658,620,081**
	PROFESSIONAL SERVICES		$82,826,465	$107,774,195	$131,724,016
	TOTAL CAPITAL COST		**$635,002,896**	**$706,519,723**	**$790,344,097**

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	48" HDPE BURIED SECTION	80	LF	$179	$107	$286	$22,912
	54" HDPE BURIED SECTION	155	LF	$228	$137	$365	$56,544
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	48" 90-DEG BEND	2	EA	$2,000	$1,200	$3,200	$6,400
	54" 45-DEG BEND	4	EA	$3,000	$1,800	$4,800	$19,200
	54"X48" REDUCER	2	EA	$4,000	$2,400	$6,400	$12,800
	54"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	54"X54" TEE	2	EA	$4,000	$2,400	$6,400	$12,800
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 54" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	10	EA	$1,900	$1,140	$3,040	$30,400
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,623,056**
1.2	**CONVEYANCE PIPES**						
	54" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$228	$137	$365	$940,090
	54" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$228	$137	$365	$940,090
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,380,179**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	54" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$228	$68	$296	$355,680
	54" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$228	$68	$296	$355,680
	MISCELLANROUS VALVES AND FITTINGS	1	LS			$71,136	$71,136
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$867,216**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	14	EA	$325,000	$97,500	$422,500	$5,915,000
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	RAW WATER PUMP STATION BUILDING	6,400	SF	$120	$50	$170	$1,088,000
	STRUCTURAL PILES	1	25%			$272,000	$272,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - RAW WATER PUMP STATION						**$7,608,650**
	SUBTOTAL - INTAKE /DISCHARGE						**$12,479,101**
	PIPING*		7.5%				$570,649
	ELECTRICAL*		10%				$760,865
	INSTRUMENTATION*		7.5%				$570,649
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$266,303
	SITEWORK		12.5%				$1,559,888
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$16,207,454**

*APPLIED TO 1.4 ONLY

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	6	EA	$600,000	$180,000	$780,000	$4,680,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	4	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	4	EA				Incl. Above
	DISK FILTER BUILDING	3,125	SF	$140	$60	$200	$625,000
	STRUCTURAL PILES	1	25%			$156,250	$156,250
	SUBTOTAL - DISK FILTERS						**$5,461,250**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	14	EA	$94,000	$28,200	$122,200	$1,710,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	10,800	SF	$120	$50	$170	$1,836,000
	STRUCTURAL PILES	1	25%			$459,000	$459,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$4,005,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$43,500,000	$13,050,000	$56,550,000	$56,550,000
	MF/UF TRAINS **(5)**	35	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	4	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	4	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - MF/UF SYSTEM						**$62,925,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.8 MG **(7)**	1	EA	$793,140	$237,942	$1,031,082	$1,031,082
	TANK COATING	25,130	SF	$8	$3	$11	$276,430
	EXCAVATION	15,000	CY	$5	$15	$20	$300,000
	EQUIPMENT PAD	400	CY	$872	$392	$1,264	$505,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$2,113,112**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	14	EA	$500,000	$150,000	$650,000	$9,100,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$10,338,750**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,220	$75,660
	COAGULENT METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	6	EA	$19,400	$5,820	$25,220	$151,320
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$15,600	$15,600
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	125	CY	$260	$78	$338	$42,250
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,425	SF	$4	$1	$5	$12,610
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,900	SF	$100	$30	$130	$247,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$675,640**
	SUBTOTAL - PRETREATMENT						**$80,058,302**
	PIPING		7.5%				$6,004,373
	ELECTRICAL		10%				$8,005,830
	INSTRUMENTATION		7.5%				$6,004,373
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,802,041
	SITEWORK		12.5%				$10,007,288
	PROJECT SUBTOTAL - PRETREATMENT						**$112,882,206**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$82,300,000	$24,690,000	$106,990,000	$106,990,000
	CARTRIDGE FILTERS **(9)**	12	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	12	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	12	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	12	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	6	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	6	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	70,000	SF	$120	$50	$170	$11,900,000
	STRUCTURAL PILES	1	25%			$2,975,000	$2,975,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$121,865,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	10	CY	$260	$78	$338	$3,380
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	235	SF	$4	$1	$5	$1,222
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	110	SF	$100	$30	$130	$14,300
	SUBTOTAL - RO CHEMICAL FACILITIES						**$112,912**
	SUBTOTAL - REVERSE OSMOSIS						**$121,977,912**
	PIPING		7.5%				$9,148,343
	ELECTRICAL		10%				$12,197,791
	INSTRUMENTATION		7.5%				$9,148,343
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$4,269,227
	SITEWORK		12.5%				$15,247,239
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$171,988,856**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	14	EA	$285,000	$85,500	$370,500	$5,187,000
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - POST-TREATMENT P.S.						**$5,675,750**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	HYDRATED LIME SLURRY SYSTEM	4	EA	$325,000	$97,500	$422,500	$1,690,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	4	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	4	LS				Incl. Above
	SATURATOR	4	EA				Incl. Above
	LIME CONTACT TANK **(17)**	4	EA	$650,000	$195,000	$845,000	$3,380,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$6,500,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$291,946**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,467,696**
	PIPING		7.5%				$935,077
	ELECTRICAL		10%				$1,246,770
	INSTRUMENTATION		7.5%				$935,077
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$436,369
	SITEWORK		12.5%				$1,558,462
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$17,579,451**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 15 MG (BURIED)	1	EA	$5,615,385	$2,559,615	$8,175,000	$8,175,000
	EXCAVATION AND BACKFILL	1	LS			$250,000	$250,000
	SUBTOTAL - CLEARWELL						**$8,425,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	9	EA	$314,023	$94,207	$408,230	$3,674,069
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	PRODUCT WATER P.S. BUILDING	11,250	SF	$120	$50	$170	$1,912,500
	STRUCTURAL PILES	1	25%			$478,125	$478,125
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SURGE TANK, 30,000 GAL	2	EA	$500,000	$150,000	$650,000	$1,300,000
	SUBTOTAL - PRODUCT WATER P.S.						**$7,657,719**
5.3	**CONVEYANCE PIPELINE**						
	54" CMLC STEEL PIPE, SEPULVEDA FEEDER	42,880	LF	$1,009	$303	$1,311	$56,220,611
	SUBTOTAL - CONVEYANCE PIPELINE						**$56,220,611**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,000	$75,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,000	$33,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$399,946**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$72,703,276**
	PIPING		7.5%				$5,452,746
	ELECTRICAL		10%				$7,270,328
	INSTRUMENTATION		7.5%				$5,452,746
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,544,615
	SITEWORK		12.5%				$9,087,910
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$102,511,620**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	54" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$228	$114	$342	$710,676
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$710,676**
6.2	**DIFFUSERS**						
	54" HDPE BURIED SECTION	355	LF	$228	$114	$342	$121,410
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	54" 45-DEG BEND	4	EA	$3,000	$1,500	$4,500	$18,000
	54" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 54" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	17	EA	$1,900	$950	$2,850	$48,450
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$765,960**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$2,700,000	$810,000	$3,510,000	$3,510,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$3,510,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$140,000	$42,000	$182,000	$364,000
	PH ADJUSTMENT	1	LS	$60,000	$18,000	$78,000	$78,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$442,000**
	SUBTOTAL - RESIDUALS HANDLING						**$5,428,636**
	PIPING		7.5%				$407,148
	ELECTRICAL		10%				$542,864
	INSTRUMENTATION		7.5%				$407,148
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$190,002
	SITEWORK		12.5%				$678,580
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$7,654,377**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0	**ELECTRICAL BUILDING**						
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	12,000	SF	$120	$50	$170	$2,040,000
	STRUCTURAL PILES	1	25%			$510,000	$510,000
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$89,250
	SITEWORK		12.5%				$318,750
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$2,958,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	15,200	SF	$120	$50	$170	$2,584,000
	STRUCTURAL PILES	1	25%			$646,000	$646,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$3,296,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,903,500**
	PIPING		7.5%				$517,763
	ELECTRICAL		10%				$690,350
	INSTRUMENTATION		7.5%				$517,763
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$241,623
	SITEWORK		12.5%				$862,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$9,733,935**

Appendix 1:G-D

Redondo Beach 60 MGD Cost Estimate

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 60 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$15,206,000	3%		
2.0	PRETREATMENT	$112,459,206	25%		
3.0	REVERSE OSMOSIS	$171,989,000	38%		
4.0	POST-TREATMENT & DISINFECTION	$17,579,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$108,634,000	24%		
6.0	RESIDUALS HANDLING	$7,262,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	0.4%		
8.0	ELECTRICAL BUILDING	$2,958,000	1%		
9.0	ADMIN/MAINT	$9,734,000	2%		
	SUBTOTAL	**$447,821,206**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$4,478,212	$8,956,424	$8,956,424
	BONDS & INSURANCE		$2,239,106	$4,478,212	$6,717,318
	OVERHEAD & PROFIT		$35,825,696	$53,738,545	$67,173,181
	UN-PRICED ALLOWANCES (CONTINGENCY)		$67,173,181	$89,564,241	$134,346,362
	SUBTOTAL CONSTRUCTION COST		**$557,537,401**	**$604,558,628**	**$665,014,491**
	PROFESSIONAL SERVICES		$83,630,610	$108,820,553	$133,002,898
	TOTAL CAPITAL COST		**$641,168,011**	**$713,379,181**	**$798,017,389**

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	48" HDPE BURIED SECTION	80	LF	$179	$107	$286	$22,912
	54" HDPE BURIED SECTION	130	LF	$228	$137	$365	$47,424
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	48" 90-DEG BEND	2	EA	$2,000	$1,200	$3,200	$6,400
	54" 45-DEG BEND	2	EA	$3,000	$1,800	$4,800	$9,600
	54"X48" REDUCER	2	EA	$4,000	$2,400	$6,400	$12,800
	54"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	54"X54" TEE	2	EA	$4,000	$2,400	$6,400	$12,800
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 54" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	8	EA	$1,900	$1,140	$3,040	$24,320
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,566,256**
1.2	**CONVEYANCE PIPES**						
	54" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$228	$137	$365	$751,488
	54" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$228	$137	$365	$751,488
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,002,976**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	54" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$228	$68	$296	$148,200
	54" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$228	$68	$296	$148,200
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$29,640	$29,640
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$410,760**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	14	EA	$325,000	$97,500	$422,500	$5,915,000
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	RAW WATER PUMP STATION AND BUILDING	6,400	SF	$120	$50	$170	$1,088,000
	STRUCTURAL PILES	1	25%			$272,000	$272,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - RAW WATER PUMP STATION						**$7,608,650**
	SUBTOTAL - INTAKE /DISCHARGE						**$11,588,642**
	PIPING*		7.5%				$570,649
	ELECTRICAL*		10%				$760,865
	INSTRUMENTATION*		7.5%				$570,649
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$266,303
	SITEWORK		12.5%				$1,448,580
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$15,205,688**

*APPLIED TO 1.4 ONLY

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	6	EA	$600,000	$180,000	$780,000	$4,680,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	4	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	4	EA				Incl. Above
	DISK FILTER BUILDING	3,125	SF	$140	$60	$200	$625,000
	STRUCTURAL PILES	1	25%			$156,250	$156,250
	SUBTOTAL - DISK FILTERS						**$5,461,250**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	14	EA	$94,000	$28,200	$122,200	$1,710,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	10,800	SF	$120	$50	$170	$1,836,000
	STRUCTURAL PILES	1	25%			$459,000	$459,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$4,005,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$43,500,000	$13,050,000	$56,550,000	$56,550,000
	MF/UF TRAINS **(5)**	35	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	4	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	4	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - MF/UF SYSTEM						**$62,925,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.8 MG **(7)**	1	EA	$793,140	$237,942	$1,031,082	$1,031,082
	TANK COATING	25,130	SF	$8	$3	$11	$276,430
	EQUIPMENT PAD	400	CY	$872	$392	$1,264	$505,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$1,813,112**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	14	EA	$500,000	$150,000	$650,000	$9,100,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$10,338,750**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,220	$75,660
	COAGULENT METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	6	EA	$19,400	$5,820	$25,220	$151,320
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$15,600	$15,600
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	125	CY	$260	$78	$338	$42,250
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,425	SF	$4	$1	$5	$12,610
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,900	SF	$100	$30	$130	$247,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$675,640**
	SUBTOTAL - PRETREATMENT						**$79,758,302**
	PIPING		7.5%				$5,981,873
	ELECTRICAL		10%				$7,975,830
	INSTRUMENTATION		7.5%				$5,981,873
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,791,541
	SITEWORK		12.5%				$9,969,788
	PROJECT SUBTOTAL - PRETREATMENT						**$112,459,206**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$82,300,000	$24,690,000	$106,990,000	$106,990,000
	CARTRIDGE FILTERS **(9)**	12	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	12	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	12	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	12	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	6	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	6	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	70,000	SF	$120	$50	$170	$11,900,000
	STRUCTURAL PILES	1	25%			$2,975,000	$2,975,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$121,865,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	10	CY	$260	$78	$338	$3,380
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	235	SF	$4	$1	$5	$1,222
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	110	SF	$100	$30	$130	$14,300
	SUBTOTAL - RO CHEMICAL FACILITIES						**$112,912**
	SUBTOTAL - REVERSE OSMOSIS						**$121,977,912**
	PIPING		7.5%				$9,148,343
	ELECTRICAL		10%				$12,197,791
	INSTRUMENTATION		7.5%				$9,148,343
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$4,269,227
	SITEWORK		12.5%				$15,247,239
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$171,988,856**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	14	EA	$285,000	$85,500	$370,500	$5,187,000
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - POST-TREATMENT P.S.						**$5,675,750**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 SYSTEM	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	HYDRATED LIME SLURRY SYSTEM	4	EA	$325,000	$97,500	$422,500	$1,690,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	3	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	4	EA	$650,000	$195,000	$845,000	$3,380,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$6,500,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$291,946**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,467,696**
	PIPING		7.5%				$935,077
	ELECTRICAL		10%				$1,246,770
	INSTRUMENTATION		7.5%				$935,077
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$436,369
	SITEWORK		12.5%				$1,558,462
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$17,579,451**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 15 MG	1	EA	$5,615,385	$1,684,615	$7,300,000	$7,300,000
	SUBTOTAL - CLEARWELL						**$7,300,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	9	EA	$314,023	$94,207	$408,230	$3,674,069
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	PRODUCT WATER P.S. BUILDING	11,250	SF	$120	$50	$170	$1,912,500
	STRUCTURAL PILES	1	25%			$478,125	$478,125
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SURGE TANK, 30,000 GAL	2	EA	$500,000	$150,000	$650,000	$1,300,000
	SUBTOTAL - PRODUCT WATER P.S.						**$7,657,719**
5.3	**CONVEYANCE PIPELINE**						
	54" CMLC STEEL PIPE, SEPULVEDA FEEDER	47,050	LF	$1,009	$303	$1,311	$61,687,961
	SUBTOTAL - CONVEYANCE PIPELINE						**$61,687,961**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,000	$75,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,000	$33,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$399,946**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$77,045,626**
	PIPING		7.5%				$5,778,422
	ELECTRICAL		10%				$7,704,563
	INSTRUMENTATION		7.5%				$5,778,422
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,696,597
	SITEWORK		12.5%				$9,630,703
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$108,634,332**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	54" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$228	$114	$342	$632,700
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$632,700**
6.2	**DIFFUSERS**						
	54" HDPE BURIED SECTION	240	LF	$228	$114	$342	$82,080
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	54" 45-DEG BEND	2	EA	$3,000	$1,500	$4,500	$9,000
	54" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 54" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	12	EA	$1,900	$950	$2,850	$34,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$565,380**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$2,700,000	$810,000	$3,510,000	$3,510,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$3,510,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$140,000	$42,000	$182,000	$364,000
	PH ADJUSTMENT	1	LS	$60,000	$18,000	$78,000	$78,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$442,000**
	SUBTOTAL - RESIDUALS HANDLING						**$5,150,080**
	PIPING		7.5%				$386,256
	ELECTRICAL		10%				$515,008
	INSTRUMENTATION		7.5%				$386,256
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$180,253
	SITEWORK		12.5%				$643,760
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$7,261,613**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	12,000	SF	$120	$50	$170	$2,040,000
	STRUCTURAL PILES	1	25%			$510,000	$510,000
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$89,250
	SITEWORK		12.5%				$318,750
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$2,958,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	15,200	SF	$120	$50	$170	$2,584,000
	STRUCTURAL PILES	1	25%			$646,000	$646,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$3,296,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,903,500**
	PIPING		7.5%				$517,763
	ELECTRICAL		10%				$690,350
	INSTRUMENTATION		7.5%				$517,763
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$241,623
	SITEWORK		12.5%				$862,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$9,733,935**

Appendix 1:H

Individual Meter Flow Data

(Note: A copy of this document has been included as a separate CD-ROM.)

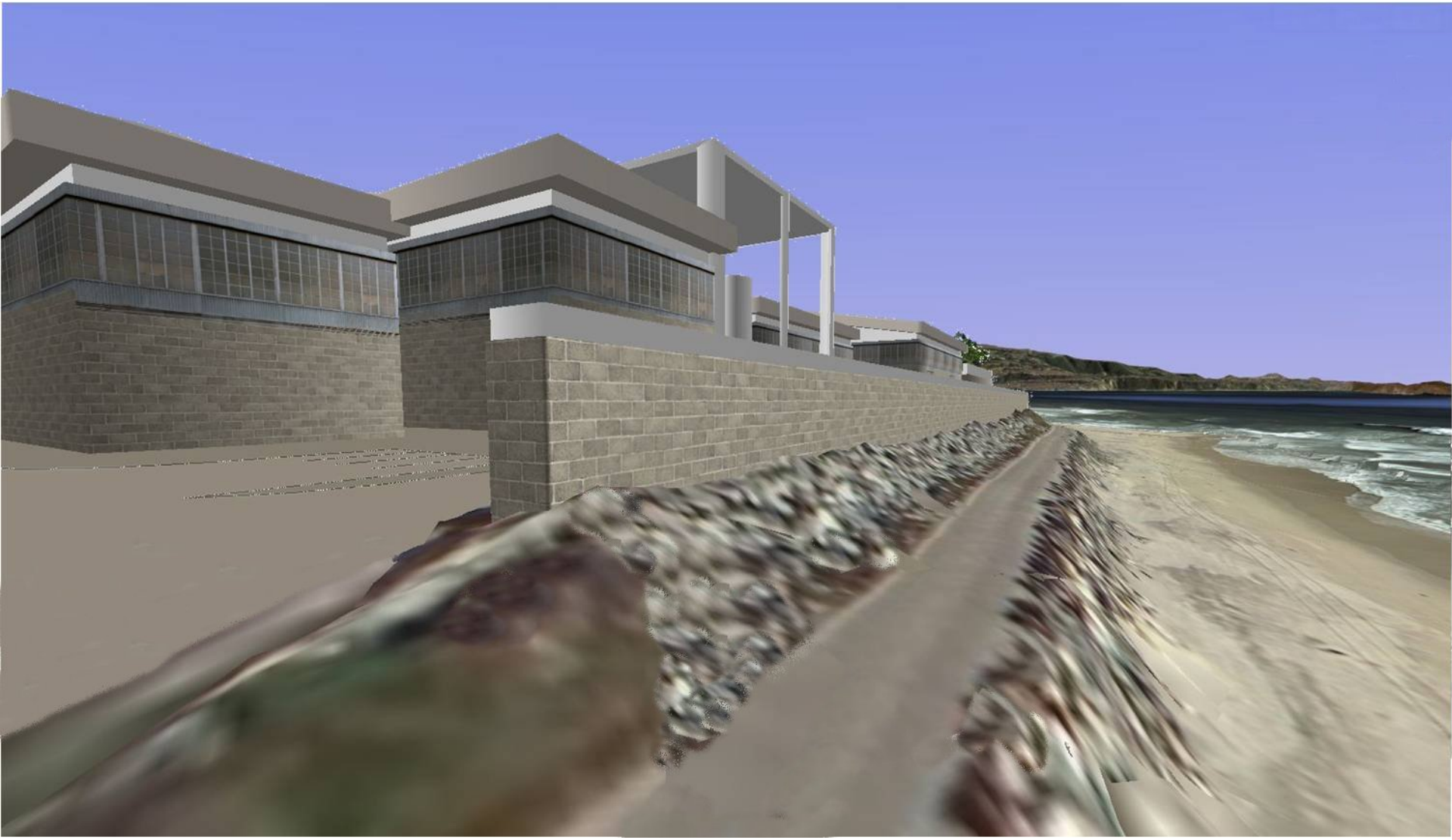
Appendix 1:I

Architectural Renderings

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Coastal Oblique



MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility Greenway

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Near Plan Level

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Ocean Oblique

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Ocean Viewer

MALCOLM PIRNIE | ARCADIS

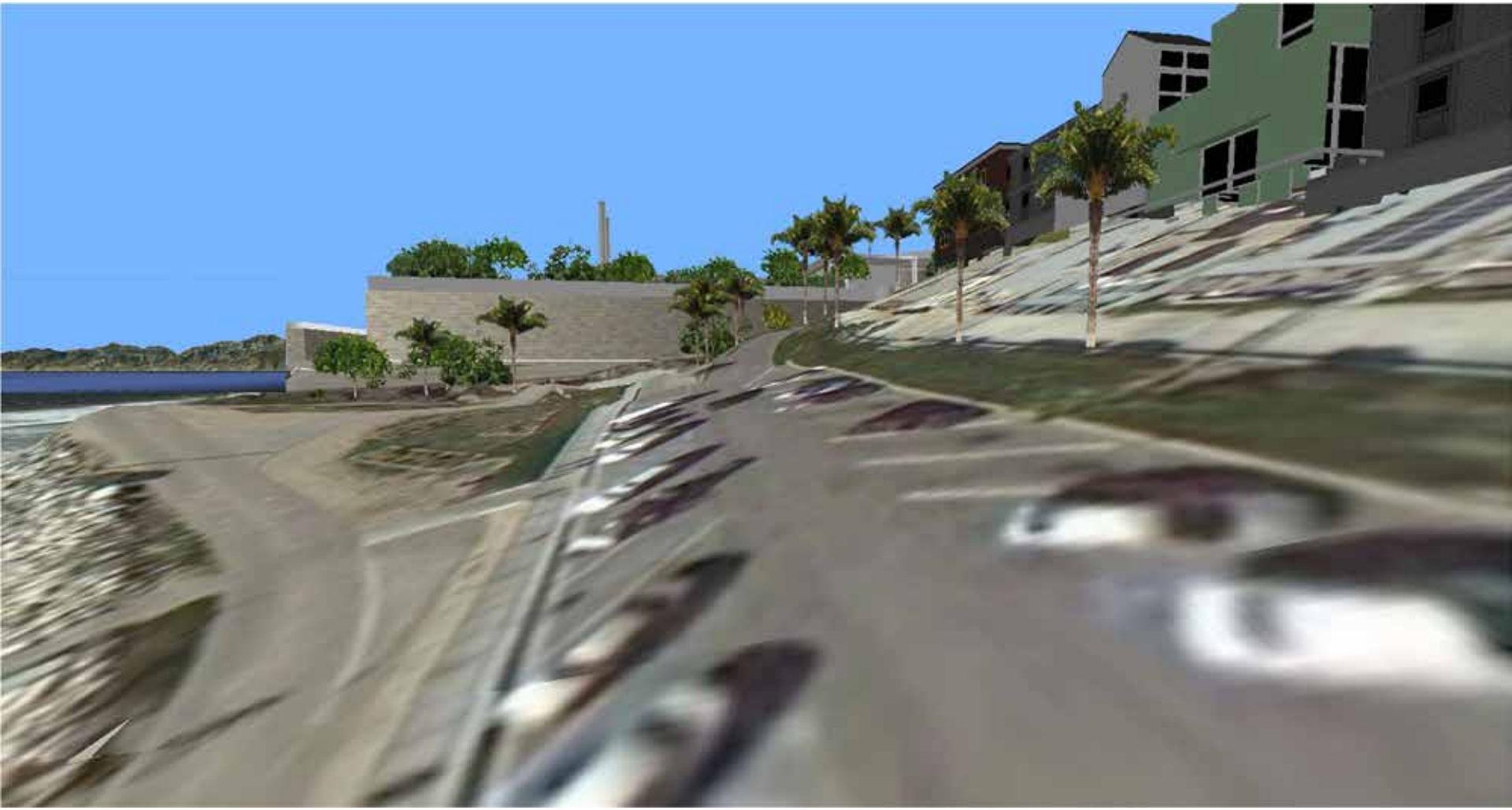
The Water Division of ARCADIS

10/40-MGD Facility
Road Viewer

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

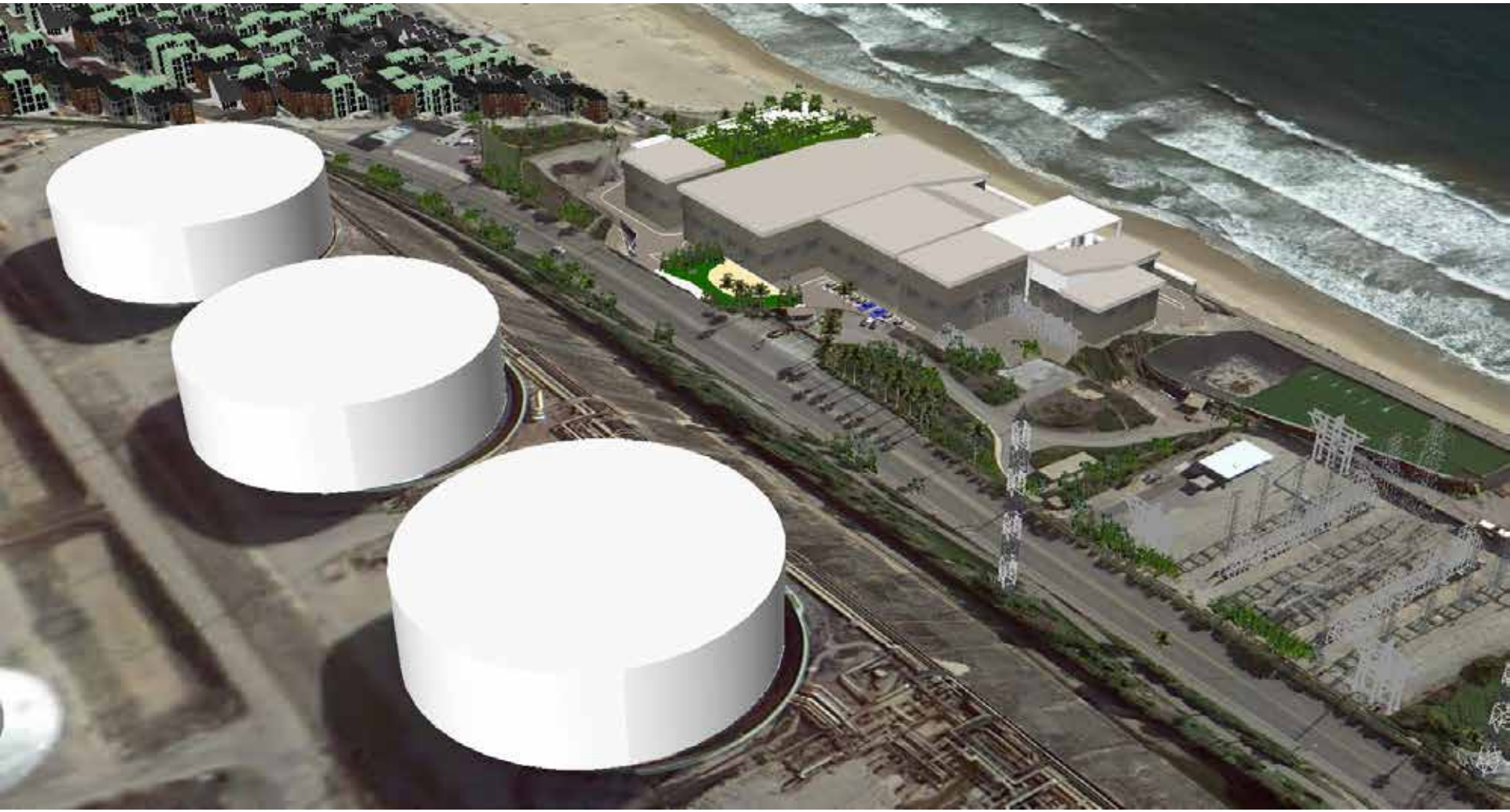
10/40-MGD Facility
Residential Oblique



MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

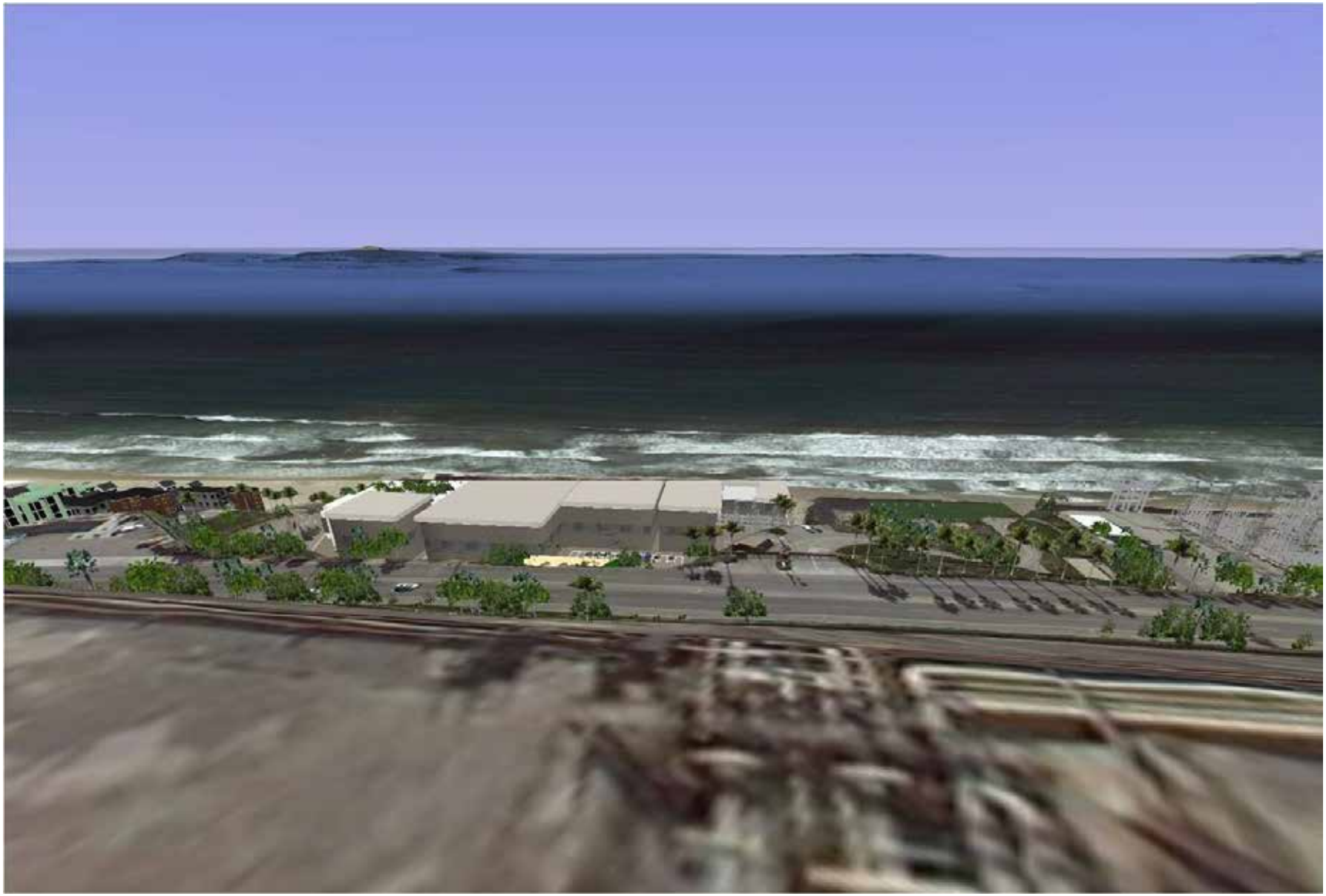
10/40-MGD Facility
Residential Parking



MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Tank Oblique



MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

10/40-MGD Facility
Tank Worker

Appendix 2:A

Desalination Plant Electrical Loads

Appendix A — Desalination Plant Electrical Load

Estimated Electrical Loads for Desalination Plant for 10, 20, 40, and 60 MGD capacity

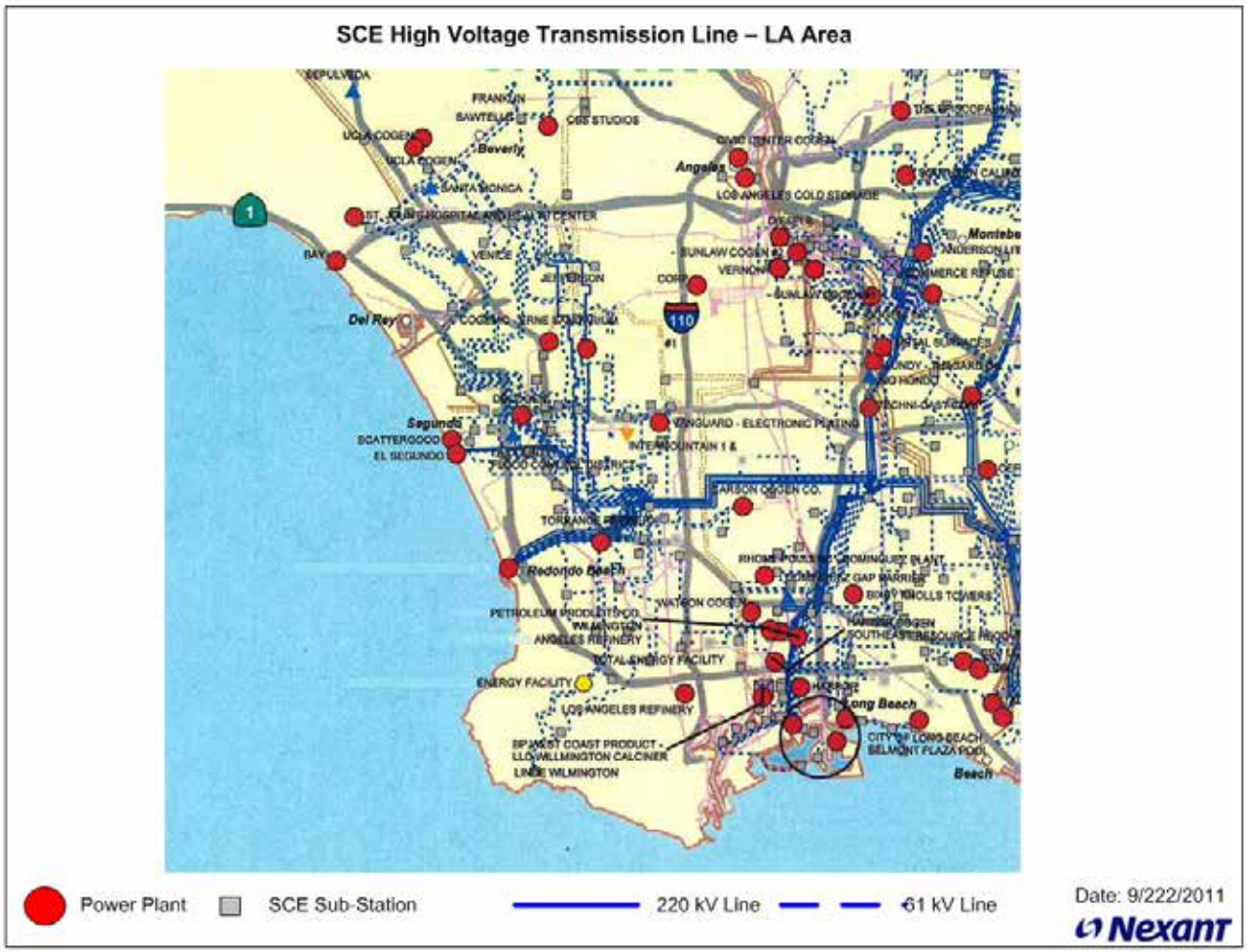
Process	Description	Type	Flow	Head	Shaft Power	Power Demand	10 MGD No. of Units		20 MGD No. of Units		40 MGD No. of Units		60 MGD No. of Units	
			gpm	ft	HP	kW	Duty	Standby	Duty	Standby	Duty	Standby	Duty	Standby
2	Feed Water Pump Station	Vertical Wet Pit Centrifugal	7825	116	350	260	2	1	4	1	8	1	12	2
3	Arkal Filter Backwash Pumps	Horizontal Centrifugal	200	150	15	10	1	1	1	1	2	1	3	1
3	Arkal Filter Shock Pumps	Horizontal Centrifugal	50	150	5	4	1	1	1	1	2	1	3	1
6	MF/UF CIP Pump	Horizontal Centrifugal	600	10	5	4	1	0	1	0	1	0	1	0
8	MF/UF Filtrate Booster P.S.	Horizontal Centrifugal	7290	116	300	220	2	1	4	1	8	1	12	2
10	RO Feed P.S. - 1st Pass	Positive Displacement	3650	2310	2000	1490	2	0	4	0	8	0	12	0
12	Energy Recovery Devices	Horizontal Centrifugal			(200)	(150)	2	0	4	0	8	0	12	0
13	RO Feed P.S. - 2nd Pass	Horizontal Centrifugal	3575	93	150	110	1	0	2	0	4	0	6	0
15	RO CIP Pump	Horizontal Centrifugal	800	140	50	40	1	0	1	0	1	0	1	0
16	Post-Treatment P.S.	Horizontal Centrifugal	3470	50	75	60	2	1	4	1	8	1	12	2
19	Product Water P.S.	Vertical Turbine	3470	373	450	340	2	1	4	1	5	1	8	1

Appendix 2:B

SCE Meeting Options

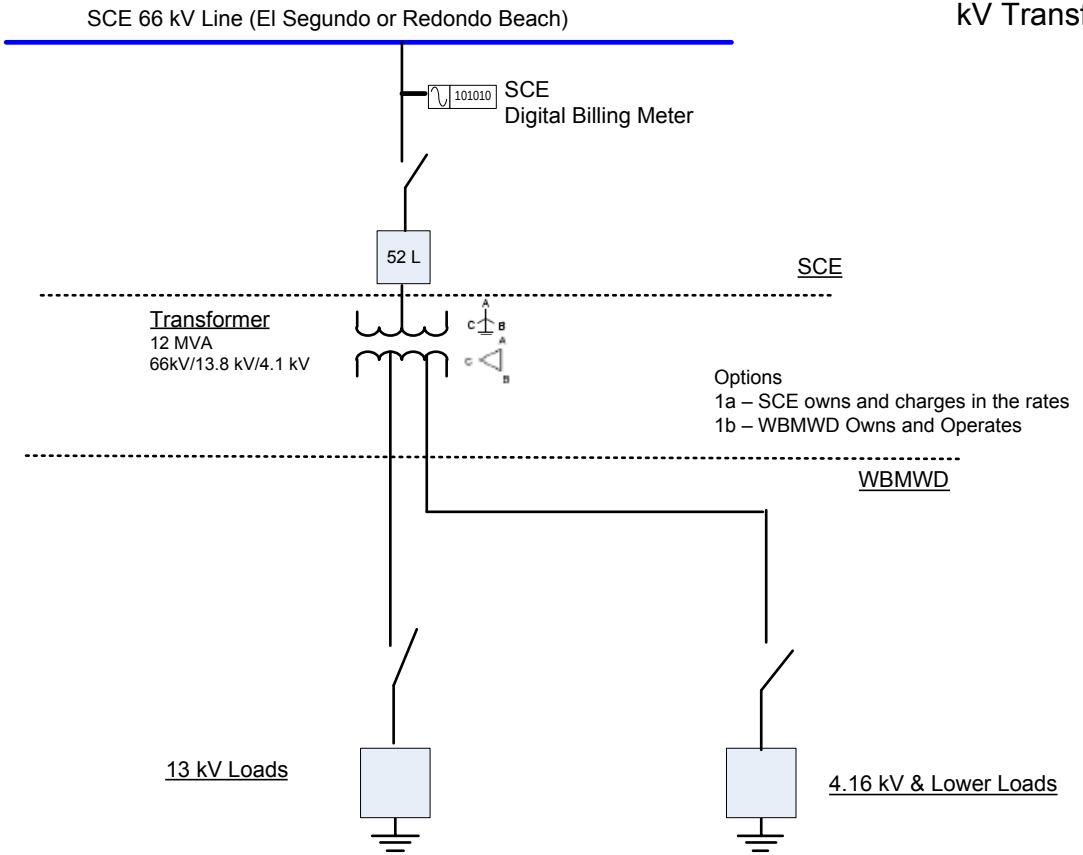
Appendix B SCE Metering Options

SCE Transmission and Distribution System in LA Area



Proposed Arrangement for Power Supply for WBMWD Desalination Plant

OPTION 1
With optional ownership of 66 kV Transformer
Alternate 1 – Dual Tap 13/ 4.1 kV Transformer



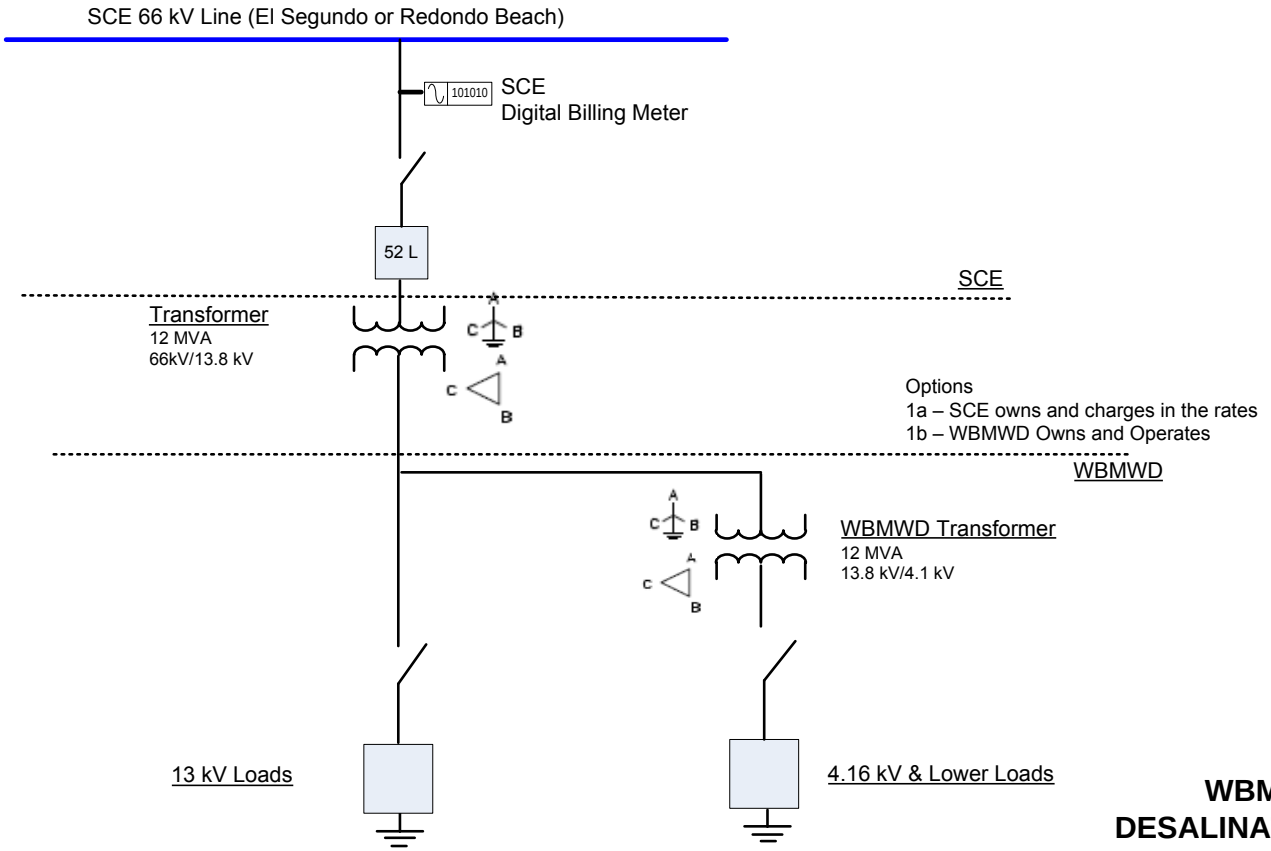
WBMWD 20 MGD DESALINATION PLANT

Date: 22/01/2012

Nexant

OPTION 1
With optional ownership of 66 kV Transformer
Alternate 2 – Single Tap 13 kV Transformer

Proposed Arrangement for Power Supply for WBMWD Desalination Plant

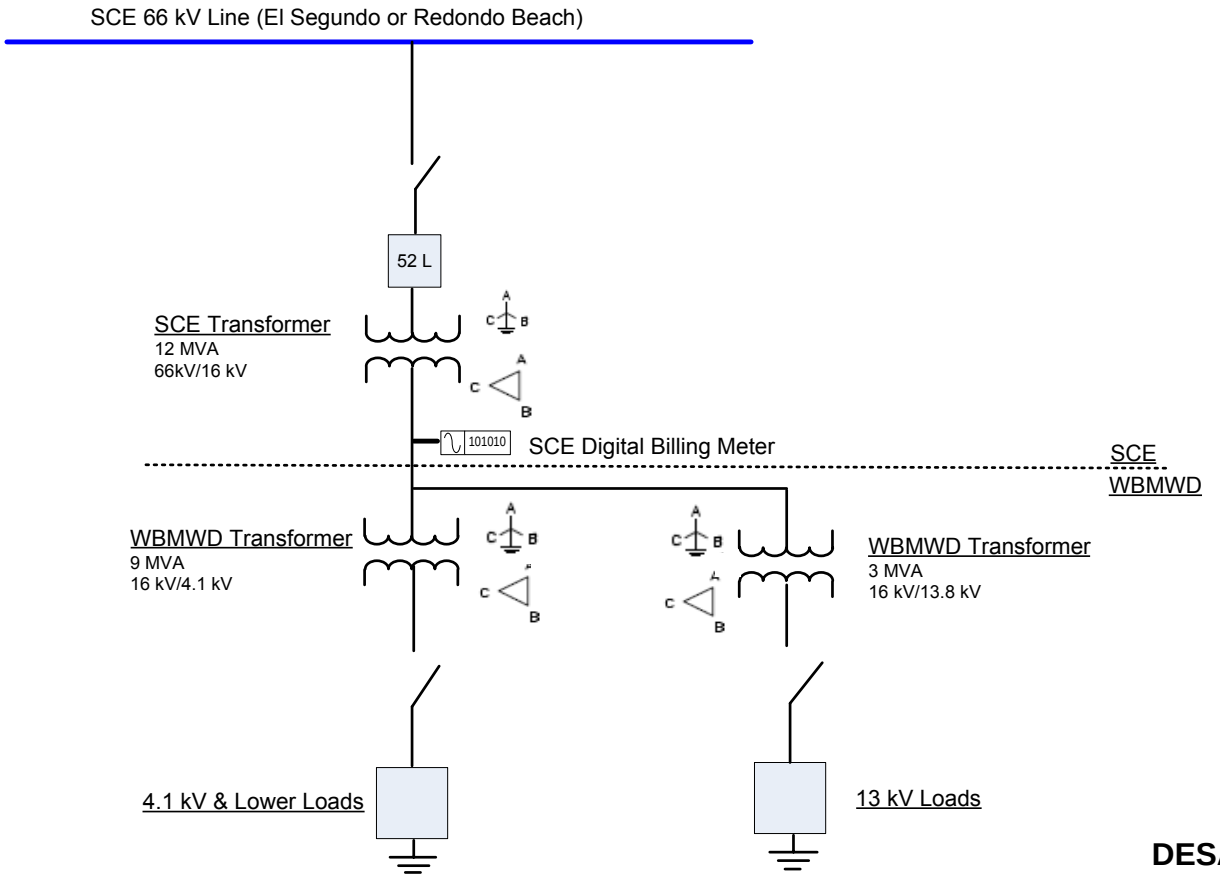


WBMWD 20 MGD DESALINATION PLANT

Date: 22/01/2012

OPTION 2

Proposed Arrangement for Power Supply for WBMWD Desalination Plant



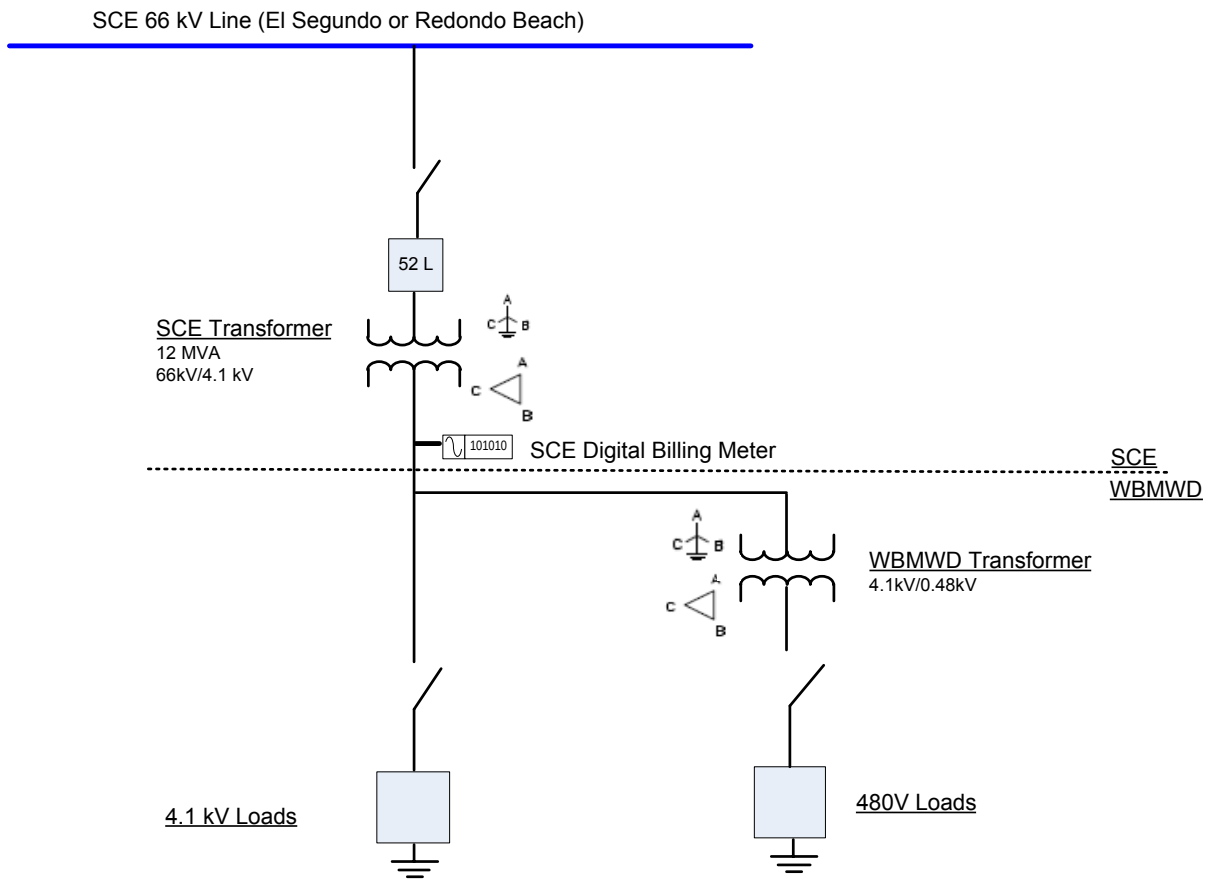
WBMWD 20 MGD DESALINATION PLANT

Date: 22/01/2012

Nexant

OPTION 3

Proposed Arrangement for Power Supply for WBMWD Desalination Plant

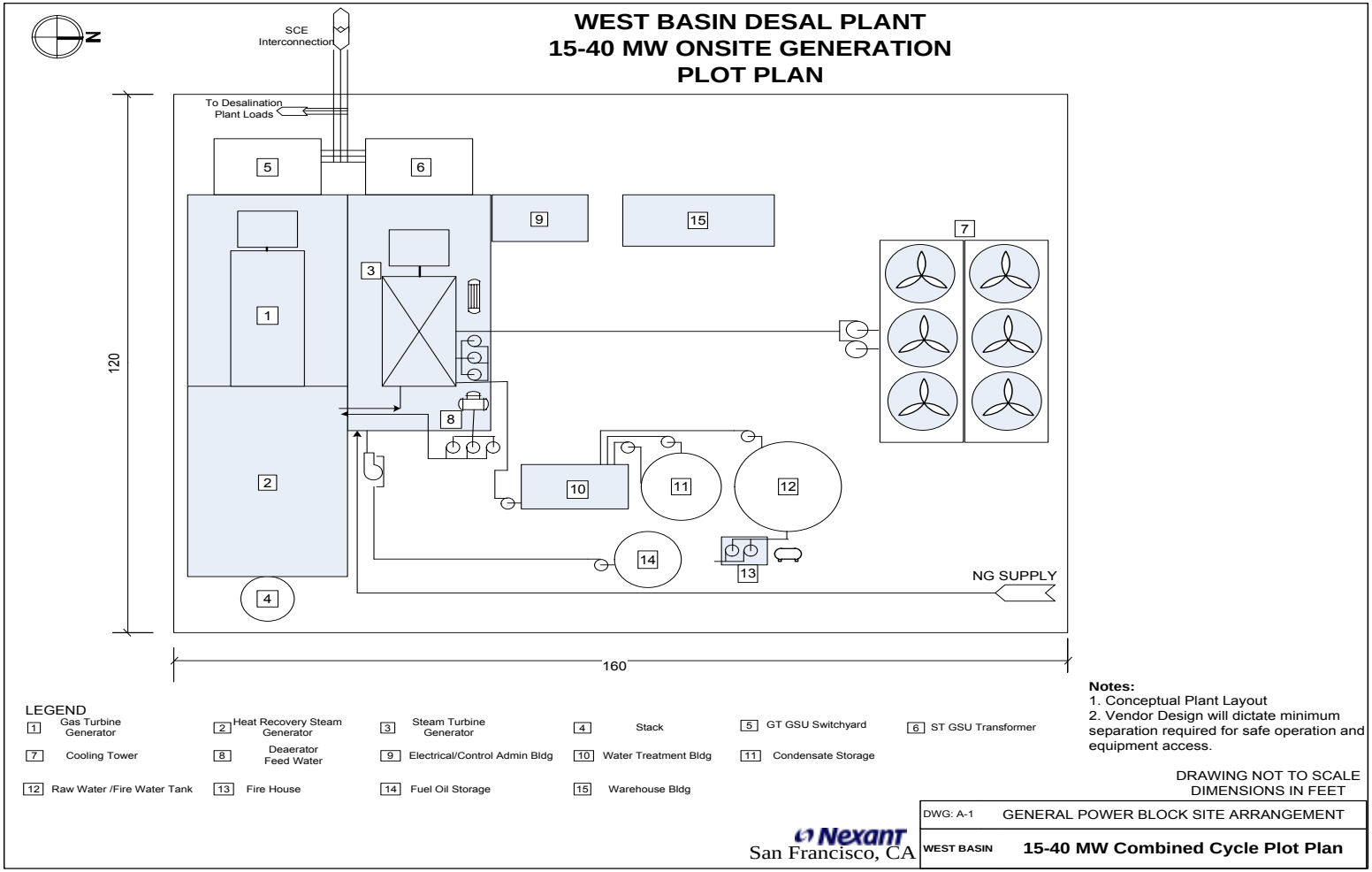


WBMWD 20 MGD DESALINATION PLANT

Date: 22/01/2012

Appendix 2:C

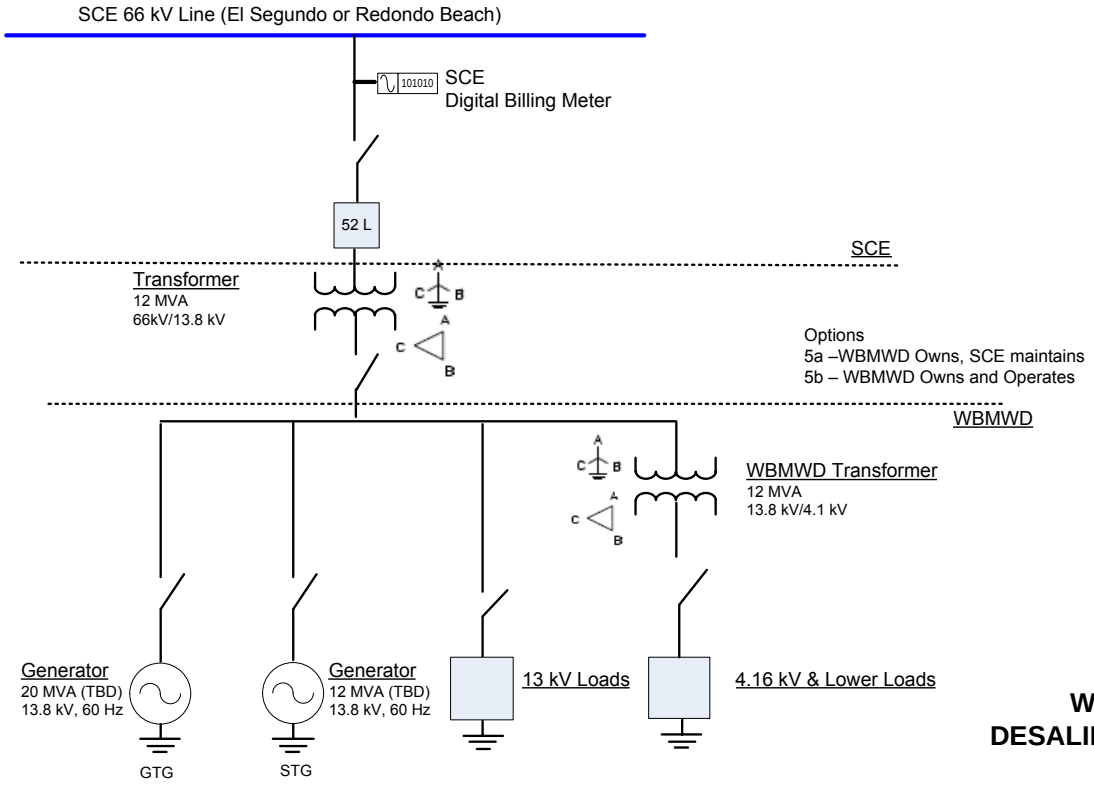
Onsite Generation Scheme


WEST BASIN DESAL PLANT
15-40 MW ONSITE GENERATION
PLOT PLAN
N
SCE Interconnection
To Desalination Plant Loads
NG SUPPLY
120
160
LEGEND
1 Gas Turbine Generator
2 Heat Recovery Steam Generator
3 Steam Turbine Generator
4 Stack
5 GT GSU Switchyard
6 ST GSU Transformer
7 Cooling Tower
8 Deaerator Feed Water
9 Electrical/Control Admin Bldg
10 Water Treatment Bldg
11 Condensate Storage
12 Raw Water /Fire Water Tank
13 Fire House
14 Fuel Oil Storage
15 Warehouse Bldg
Notes:
1. Conceptual Plant Layout
2. Vendor Design will dictate minimum separation required for safe operation and equipment access.
DRAWING NOT TO SCALE
DIMENSIONS IN FEET
Nexant
San Francisco, CA
DWG: A-1 GENERAL POWER BLOCK SITE ARRANGEMENT
WEST BASIN 15-40 MW Combined Cycle Plot Plan

OPTION 5
Onsite Generation

GTG – Gas Turbine Generator
STG – Steam Turbine Generator

Proposed Arrangement for Power Supply for WBMWD Desalination Plant



WBMWD 20 MGD DESALINATION PLANT

Date: 22/01/2012

Nexant

Appendix 2:D

SCE Rate Analysis

SCE Costs under TOU-8 Rate

Plant Size (Peak Load) / Voltage	Total Cost (c/kwhr)	Demand (c/kwhr)	Energy (c/kwhr)
15 MW at Less than 50kV	9.56	2.76	6.80
15 MW at Greater than 50kV	7.46	1.60	5.85
33 MW at Less than 50kV	9.56	2.76	6.80
33 MW at Greater than 50kV	7.45	1.60	5.84

The above rates do not include cost of transmission upgrades for service at 66 kV
Following tables provide breakdown of costs under TOU 8 rates

SCE TOU -8 and TOU BIP Program Rate Analysis 15 MW Case

Item		Capacity (MW)	Consumption Estimate (MWHs)	2- 50 kV Tariff Charges $ (x 1000)	Above 50 kV Tariff Charges $ (x 1000)
Energy Charge					
Summer Season	On-Peak	15	7,650	836	786
	Mid-Peak	15	11,475	996	876
	Off-Peak	15	24,795	1491	1193
Winter Season - On-Peak					
	Mid-Peak	15	28,875	2342	2016
	Off-Peak	15	58,605	3273	2793
Customer Charge - $/Meter/Month				4	29
Total Variable Charges				8942	7692
Demand Charge					
$/kW of Billing Demand/Meter/Month					
Facilities Related				2131	833
Time Related					
Summer Season - On-Peak				1169	1013
Mid-Peak				328	268
Winter Season Mid-Peak					
Total Fixed				3628	2114
Annual Electricity Charges			131,400	$12,570	$9,807
Yearly Savings for 50 kV Service					$2,763
Effective Rate TOU-8, c/kWh				9.57	7.46
Savings under Interruptible Service		Interruptible Program Agreed MW		SCE Program Payment	
Summer Season	On-Peak	7.5		(622)	(587)
	Mid-Peak	7.5		(184)	(167)
	Off-Peak	N/A			
Winter Season - On-Peak					
	Mid-Peak	7.5		(77)	(68)
	Off-Peak	N/A			
Annual Rebate				($883)	($821)
Total Annual Charge after Rebate				$11,687	$8,985
Effective Rate TOU-8 w BIP (c/kWh)				8.89	6.84

SCE TOU -8 and TOU BIP Program Rate Analysis 33 MW Case

		Capacity (MW)	Consumption Estimate (MWHs)	2- 50 kV Tariff Charges $ (x 1000)	Above 50 kV Tariff Charges $ (x 1000)
Energy Charge					
Summer Season	On-Peak	33	16830	1,839	1,729
	Mid-Peak	33	25245	2,192	1,927
	Off-Peak	33	54549	3,279	2,625
Winter Season - On-Peak					
	Mid-Peak	33	63525	5,152	4,435
	Off-Peak	33	128931	7,201	6,144
Customer Charge - $/Meter/Month				4	29
Total Variable Charges				19,667	16,889
Demand Charge					
$/kW of Billing Demand/Meter/Month				4,689	1,833
Facilities Related					
Time Related				2,573	2,229
Summer Season - On-Peak				721	589
Mid-Peak					
Winter Season Mid-Peak					
Total Fixed				7,982	4,652
Annual Electricity Charges			289,080	27,649	21,540
Yearly Savings for 50 kV Service					6,109
Effective Rate TOU-8, c/kWh				9.56	7.45
Savings under Interruptible Service		Interruptible Program Agreed MW		SCE-BIP Program Paymen	
Summer Season	On-Peak	16.5		(1369)	(1291)
	Mid-Peak	16.5		(404)	(367)
	Off-Peak	N/A			
Winter Season - On-Peak					
	Mid-Peak	16.5		(169)	(149)
	Off-Peak	N/A			
Annual Rebate				(1942)	(1807)
Total Annual Charge after Rebate				$25,707	$19,733
Effective Rate TOU-8 w BIP (c/kWh)				8.89	6.83

Appendix 5:A

Permit Application

California Department of Public Health (CDPH)

Domestic Water Supply Permit Amendment (DWSP)

DWSP Application Form

STATE OF CALIFORNIA
APPLICATION
FOR
DOMESTIC WATER SUPPLY PERMIT

Applicant: _____
(Enter the name of legal owner, person(s) or organization)

Address: _____

System Name: _____

System Number: _____

To: (District Engineer Name)
(Name of District) District Engineer
Drinking Water Field Operations Branch
California Department of Public Health
(Address)

Pursuant and subject to the requirements of the California Health and Safety Code, Division 104, Part 12, Chapter 4 (California Safe Drinking Water Act), Article 7, Section 116525, relating to domestic water supply permits, application is hereby made for a domestic water supply permit to operate

_____
(Applicant should state the type of system, e.g., community, transient-noncommunity, or nontransient-noncommunity,

_____
and the proposed area of services. This application will also be used for a change in ownership application.)

_____

_____

I (We) declare under penalty of perjury that the statements on this application and on the accompanying attachments are correct to my (our) knowledge and that I (we) are acting under authority and direction of the responsible legal entity under whose name this application is made.

Signed By: _____

Print Name: _____

Title: _____

Address: _____

_____

Telephone: _____

Dated: _____

Rev. 08/2007

DWSP Applicant Instructions

DOMESTIC WATER SUPPLY PERMIT

APPLICANT INSTRUCTIONS

I. BACKGROUND

One of the more significant threats to health and safety is the purity and quality of the water consumed by the public. Widespread waterborne illnesses can and have occurred whenever the public's drinking water has become contaminated. Therefore, the ownership and operation of a public water system constitutes a significant public responsibility. There are many federal and state laws and regulations that have been developed and adopted over the years to assure that public drinking water is safe for human consumption. The majority of these statutes are contained in the Safe Drinking Water Act (chapter 7 of the California Health and Safety Code). The adoption of implementing regulations and the enforcement of the drinking water laws of California are the responsibility of the California Department of Public Health (Department). Although the laws and regulations governing the operation of a public water system are quite detailed, the basic responsibilities of an owner or operator of a public water system are the following:

- Knowledge of and compliance with all drinking water regulatory requirements
- Obtaining a domestic water supply permit
- Obtaining and maintaining an adequate source and quantity of water
- Providing appropriate treatment of the water supply
- Providing a distribution system that complies with the Waterworks Standards
- Hiring certified water system operators
- Providing continuous monitoring of the quality of the water
- Keeping the consumers informed
- Responding to emergencies

A key feature of the Safe Drinking Water Act is the requirement that no person may operate a public water system without having secured a domestic water supply permit from the Department. Operating a public water system without the proper permit not only constitutes a danger to consumers, but may also subject the operator of such a system to substantial liability in the event of a consumer illness. In addition, the Department may impose significant civil penalties up to $1000 per day on the operator. Before issuing a water supply permit, the Department conducts a thorough evaluation of the system or proposed system to provide assurance that the system will be able to provide a safe and reliable supply of drinking water.

The statutes provide a clear definition of a public water system. Basically, anyone who serves drinking water to at least 25 persons for at least 60 days out of the year, or who serves domestic water to 15 or more service connections, is a public water system and

Updated to indicate Department name change to CDPH: 08/2007

must have a domestic water supply permit. In addition, there are different types of public water systems such as community water systems, transient non-community water system, and nontransient non-community water systems. There are also specified methods for determining the number of persons served, etc. If you are in doubt as to whether or not you may meet the criteria for a public water system, you should contact the local district office of the Department's drinking water program. They can provide you with guidance and assistance in making this determination. If it is determined that your system meets the criteria, the District will provide you with a permit application form and other materials. Even though a water system does not qualify as a public water system, state law has established another category of regulated water systems known as State Small Water Systems. These are community water systems serving at least 5 but less than 15 service connections and are subject to less stringent requirements. State Small Water Systems are regulated by local health departments. These agencies should be contacted regarding permits or other requirements pertaining to these systems.

The information presented in this document is to assist and guide persons that are or will be establishing a new public water system, including State Small Systems that expand beyond the 14-service connection limit. The State water supply permit is a one-time permit that is issued prior to the operation of a drinking water system. If various changes are made to the water system such as a change of ownership or a change in the treatment of the water, the initial permit must be amended to allow the change to occur.

II. OBTAINING A WATER SUPPLY PERMIT

This section outlines the various steps that an applicant for a water supply permit needs to follow. Applicants should be aware that for some counties, the Department has delegated some of its drinking water enforcement responsibilities for public water systems serving less than 200 service connections to the county. The county agencies that have received this delegation are known as Local Primacy Agencies (LPAs). Thirty-four counties have received this delegation. Included in the delegation is the authority to issue the State drinking water permit on behalf of the Department. If you are uncertain as to which agency will issue the permit in your county, you should contact the District Office for the Department's drinking water program. You should also be aware that a few counties issue an annual operating permit for water systems, which are in addition to the State drinking water permit. A permit application fee must accompany all applications for a water supply permit. Since this fee may vary depending upon the county in which the system is located or the size of the system, the District Office should be contacted to determine the appropriate amount of the fee. In general, the applicant should follow the steps as outlined below.

Step 1. Contact the agency and discuss your plans.

After determining whether the county or the State has permit jurisdiction over your water

system, you should contact the agency and set an appointment to discuss your proposed water system. The agency can provide information and advice that may help you decide on various options for your system and can help you avoid potential pitfalls. The agencies also have various guidance documents available that will be useful in doing the preliminary engineering for your system. They can also point out specific requirements that you may not have been aware of previously. For example, you may have contemplated drilling a well near a surface stream without being aware that such a well will likely be required to have complete filtration and disinfection facilities installed. At the meeting, the respective agency can also provide you with the proper forms for the type of system you plan on constructing as well as advise you on other procedural steps (such as compliance with the California Environmental Quality Act).

Step 2. Review applicable regulations and requirements.

At the meeting with the agency, you will be provided with a copy of the drinking water statutes and regulatory requirements. It is important that you review these requirements carefully. Not only will you be forewarned of the requirements and responsibilities for your system, but this knowledge may preclude the necessity of making costly repairs or modifications to your system at a later date. By reviewing the regulations and requirements, you will also be able to project more accurately, the ongoing operation and maintenance costs for your system. The Department and the LPAs have substantial enforcement authority and can issue administrative fines up to $1000 per day for violation of drinking water requirements. Ignorance of these requirements is no excuse and provides no protection.

Step 3. Consider all alternatives.

As pointed out previously, owning and operating a public water system is a substantial responsibility and involves a significant ongoing cost to maintain compliance with drinking water regulations. As discussed in Section III, State and federal laws require that a water system must be able to demonstrate that it has the technical, managerial, and financial capability to reliably operate the water system for the foreseeable future.

One of the alternatives that you will be required to evaluate is the possibility of consolidating your proposed water system with an existing public water system. Consolidation with an existing system is the preferred alternative in most cases. Assuming the existing water system is a viable water system, there are obvious economies of scale both initially and ongoing which generally results in less overall cost to consumers of the new system. In addition to cost savings, there are usually additional benefits of a reliable source of water, assured quality of water, better overall management, and more skilled technical operational capabilities. A new water system permit will only be issued if you demonstrate that connecting to an existing water system is not feasible or practical.

Step 4. Obtain an application form and supporting material.

If, at this point, you have decided to proceed you should obtain a copy of the appropriate application form and all of the supporting guidance material if you have not already done so. After reviewing the form and these instructions, you should contact the District or the LPA if you have any specific questions regarding the form. You should also determine the appropriate amount of the application fee since that amount will have to be remitted to the agency along with the completed information.

Step 5. Hire a competent engineer to prepare the permit technical report.

The heart of the application is the technical report that must accompany the permit application. The technical report is similar to a set of construction blueprints that a person submits to obtain a building permit. It sets forth all of the technical information, calculations, material descriptions, design parameters etc. that are the basis for construction of the new water system. Section IV describes in detail the information that must be included and addressed in the technical report.

While it is not absolutely mandatory that the technical report be prepared by a qualified engineer with experience in the design of water systems, it is strongly recommended that such a person be retained for this purpose. Use of this type of technical expertise greatly simplifies the process to the benefit of the applicant and the Department and reduces the possibility of rejection of the application for lack of adequate technical information. Technical information provided by persons who lack this type of technical expertise is more likely to be challenged by the Department thus requiring the applicant to expend additional funds to develop acceptable supporting documentation and information.

Step 6. Complete all of the required information.

After obtaining a copy of the application form and materials and hiring a competent engineer to design the system, the next step is to develop all of the information required to (1) fill out the application form; (2) complete the Technical, Managerial, and Financial (TMF) Assessment form; and (3) prepare the permit technical report. The Department's field engineers are available to discuss and assist your consulting engineer with respect to any of the technical aspects of the water system or the State requirements.

Step 7. Submit the application.

After all of the required information is completed, you should submit the application with the supporting information to the District Office or the respective LPA along with the application fee. Depending upon the complexity of the water system, it may take several months to complete the review of the application. During this time, Department or LPA staff may contact you with questions or a request for additional information. It is also possible that staff from one of these agencies may wish to conduct a field inspection of the proposed site or the proposed water source. If so, you will be contacted to arrange a

mutually convenient time for the inspection.

Step 8. Begin construction.

After you have received the permit from the Department or the LPA, you may initiate the construction of the project. Note that the law does not specifically preclude you from starting construction of the water system prior to receiving a water supply permit, however, it is strongly advised that you not do so since it could result in significantly higher costs. For example, some installed facilities may have to be removed because they did not comply with the Department's requirements. Similarly, a buried pipeline may have to be uncovered to allow the Department to inspect the pipeline material used etc. The Department will likely conduct one or more inspections of the water system project during construction. You should notify the Department's District Office or the LPA when construction is completed. Under no circumstances should you operate the water system and provide water to consumers prior to receiving approval to do so from the Department or the LPA.

Step 9. Hire a certified operator.

All community water systems and many of the non-community water systems are required to be operated by a State certified operator. The particular grade of operator required for your system should be specified in the permit granted for your system. If not, you should contact the District Office or the LPA and determine if this is needed. In some cases, the permit will contain a special condition specifying the grade of operator needed and a deadline for hiring such an operator. In most cases, the certified operator must be on board prior to placing the water system into operation.

Step 10. Comply with all permit conditions.

The permit issued to your water system generally includes various permit conditions with which you must comply. Some of these, such as the development of a water system operations plan, may contain a deadline by which the item must be completed and submitted to the Department or LPA. It is important that you understand and comply with these conditions since a citation and administrative fine may be assessed for failure to do so.

III. TECHNICAL, MANAGERIAL, AND FINANCIAL REQUIREMENTS

The United States Environmental Protection Agency requires that any new public water system must demonstrate that the system has, or will have, adequate technical, managerial, and financial (TMF) capability to be able to reliably operate a public water system in compliance with all drinking water requirements for the foreseeable future. Pursuant to that requirement, the Department has adopted specific criteria that set forth what constitutes adequate TMF capability. These criteria are described in detail in the TMF Assessment Form and guidelines that you received from the Department or the LPA. In order to be issued a water supply permit, you must respond to all of the items described in the form as mandatory or required for new systems.

Most of the TMF items must be completed and submitted to the Department or LPA prior to the issuance of the permit. A few items, such as the completion of a systems operation plan, may be delayed until the system has been placed into operation. For these items, a condition will be placed into the permit that requires the submission of the item by a set date.

The purpose of the TMF requirements is to assure that systems are not created that will likely have financial or technical difficulties in operating their system in the future. Many small systems have difficulty in developing and maintaining the technical expertise needed to operate their systems reliably, particularly if the source water requires treatment to meet drinking water standards. For this reason consolidation with another water system is recommended. If this is not feasible, you should consider contracting with another agency or water system for on-going operation of your water system. This is one relatively easy way to comply with the technical portions of the TMF requirements and is encouraged.

Since the TMF Assessment Form contains detailed instructions and guidance for filling out the form, that information is not repeated here. Your application for a permit, however, cannot be processed unless the TMF Assessment Form is completed and submitted along with the permit application. If you have any questions about the TMF form, you should contact the District Office for the Department or the respective LPA.

IV. PREPARATION OF THE TECHNICAL REPORT

As stated earlier, this is the heart of the application for a permit and contains all of the technical information necessary to allow the Department to evaluate the proposed water system. This report must accompany the permit application and should be prepared by a qualified engineer with drinking water system design experience. Although it is not necessary that the report follow the specific order in which the following items are presented, it must address all of the required information. If part of the information is contained in another document or report, it is not necessary to repeat that information in this report but appropriate references should be indicated and the additional reports attached.

The discussion of the various elements of the technical report as presented below are for a community water system since this is the most comprehensive type of water system. If your application is for a non-community water system, you may ignore those items (or simply indicate them as non-applicable) that do not pertain to a non-community system. Examples are the number of service connections or the map of the service area. Those elements that pertain only to a community water system or a noncommunity water system are designated as CWS or NCWS respectively.

1. General Water System Information

This section should present or describe basic information regarding the proposed water

system. These items are in addition to the managerial information that is included in the TMF Assessment. If the information is included elsewhere, it does not have to be repeated in this report. The report should describe or provide the following:

- The proposed number of service connections (CWS). This should be the number of service connections for which the proposed facilities are being designed and sized. For example, if the planned water system is being designed to serve a subdivision consisting of 250 lots, the proposed number of service connections would be 250 even though it may take a few years before that many connections are actually hooked up.

- The type of service connections anticipated (CWS). To the extent feasible you need to estimate the approximate number of residential, commercial, industrial, and agricultural connections that are expected to be served by the system. If any of the service connections will be to multiple dwelling establishments such as apartments, condominiums, or trailer parks, these should be indicated along with the numbers of each of those units.

- Type of use or users (NCWS). Describe the nature of the facility and the water system. For example will the system serve a campground, restaurant, motel, school, place of employment, etc? Also provide information on the anticipated number of persons that are or will be using the facility. Include estimates of maximum as well as average number of persons that will have access to or may use water from the water system. Also describe the basis for your estimates.

- Period of use. If the water system will be used on a seasonal basis you should indicate the periods of time that the water system will be in use. Examples of where this may be applicable are second home subdivisions that are closed in the winter, ski resorts, campgrounds etc.

- Consolidation evaluation. As indicated earlier, the feasibility of consolidating with an existing water system rather than creating a new one must be evaluated. The report should describe the results of that evaluation. If consolidation was deemed not to be feasible, a justification for that determination must be provided. Adequate justification, for example, may be based on physical separation (no nearby water system), type of terrain, excessive costs, or lack of sufficient water in the existing system.

- Map of facilities. You must provide a map that clearly shows the locations of the proposed water source(s), the location of any treatment facilities, storage facilities, and primary transmission lines. If you desire, these locations can be included on the map delineating the service area of the water system that you prepared in response to the TMF requirements.

2. Source Water Information

- Description of source. The report must describe the nature of the planned source of water for the system. For example, will the source be a surface stream, lake or reservoir; a well; or an interconnection with another water system? Also describe the location of any surface water intakes and any information on the groundwater for proposed wells (depth of water table, etc.).

- Water rights. If the planned source is from a surface water or an adjudicated groundwater basin, you need to provide adequate information to demonstrate that you have legal rights to divert or extract water in the amount indicated in your application. Demonstration can be in the form of a copy of a water right permit application submitted to the State Water Resources Control Board or a permit approval from the Watermaster for extraction from an adjudicated basin. If you are claiming a riparian right, a statement to that effect will suffice. Water extracted from a non-adjudicated groundwater does not require any demonstration of rights.

- Water quantity. In order to receive a permit for a new water system, you must demonstrate that the proposed source is sufficient to reliably serve the anticipated water demands of the system (including expected growth) for at least 10 years. Information must be presented to establish what the anticipated water demand will be for a 10-year period for the service area of the system. Make sure all water demands including required fire flows are included. If your source is a well, you need to establish the anticipated safe yield for the well and the ability of the groundwater basin to sustain that yield for the foreseeable future. The District Office can provide you with information on calculating well yield. The safe well yield, or the allowable water right, must be sufficient to meet the water demands for a period of at least 10 years.

- Assessment of vulnerability to contamination. The technical report must include a source water assessment to determine the vulnerability of the source water to contamination. Forms and guidance on conducting this assessment are available from the District Office.

- Source water quality analysis. In order to assess the suitability of the proposed source and the appropriateness of any planned treatment, it is essential that the quality of the source water be determined. Samples of the raw source water must be taken and analyzed by a State certified laboratory. All sources, whether surface or groundwater, must be sampled and analyzed for all of the organic and inorganic chemicals as well as radioactivity compounds listed in the drinking water regulations. In addition, surface water sources must be analyzed for the presence of bacteriological organisms. If the source will be a well that has not yet been constructed, the District Office or LPA may require a test well or may impose a permit condition that requires the constructed well to be sampled and

analyzed before the well can be placed into service. If an existing well will be used, you will need to submit a copy of the well driller's report.

3. Treatment and Design Information

- Description and layout. Any type of treatment that is planned to be used should be described in detail. You should be aware that all surface sources and any wells subject to surface water influence must have complete filtration treatment. Most other sources require disinfection as a minimum. If the water quality analyses indicate that any drinking water standard may be exceeded, appropriate treatment must be provided. Treatment alternatives should be discussed with the District Office or the LPA during the initial meeting discussed in Section I. You also need to provide a flow diagram showing the locations and relationships of individual treatment process units. The District Office has various treatment data forms and checklists that may assist you in preparing and presenting this information.

- Design capacities. The report should set forth the design criteria or parameters used for the treatment units as well as the planned design capacities. For wells, the anticipated yield should be estimated.

- Well construction. The report should describe the anticipated depth of the well as well as the size and type of casing to be used. Also show the planned depths of perforations and the type and depth of the sanitary seal. Please note that all wells must be constructed in accordance with the California Water Well Standards (DWR Bulletins 74-81 and 74-90) and any applicable local ordinances. Copies of these can be obtained from the District Office or the LPA. The Department also has available additional specific guidance material for the construction of drinking water wells. This can be made available upon request.

- Treatment chemicals. The type of chemicals planned to be used as well as the dosages and method of feeding those chemicals should be described. You need to be aware that all chemicals used in water treatment must be certified under the ANSI/NSF Standard 60.

- Disinfection facilities. Disinfection is one of the most important treatment processes and is required on many sources. The report should present detailed information on any proposed disinfection facilities including equipment to be used, feed rates, residuals, contact times, CT values, reliability features, etc.

4. Distribution System Information (CWS only).

- In designing and laying out the distribution system, the requirements of the Waterworks Standards should be carefully reviewed.

- Location. In addition to the overall map required under general information, you will need to prepare a scaled map showing the locations of all pumping stations, storage tanks, mains, hydrants, isolation valves, and flushing valves. If the system will have more than one pressure zone, the different zones should be delineated.

- Water mains. The report should provide the locations, sizes, lengths, depths, and type of materials to be used for all transmission and distribution mains. Special protections, such as where a water main crosses over a sewer line, should be shown and described.

- Pumping stations and storage tanks. Descriptions, specific designs, and the capacities of all pumping stations and storage tanks must be provided.

- Distribution pressure. The report should present sufficient design information to demonstrate that the system has been designed to sustain a minimum pressure of 40 psi throughout the distribution system at all times.

5. Operational Plans.

- Water Quality Monitoring Plan. As described in detail in the drinking water regulations, the water system must be monitored to assure that none of the drinking water standards are exceeded in the water delivered to consumers. The monitoring requirements are extensive and cover many different types of constituents including organic and inorganic chemicals, bacteria, radioactivity, and general minerals. It is required, therefore, that you develop and submit a water quality-monitoring plan that describes the proposed methods for compliance with these regulations. The plan, for example, must show the locations of sampling points, the frequency of sampling at each point, and the types of analyses to be run on the samples. If there will be rotational sampling for coliform bacteria, the method and locations of the rotational points should be described. The plan should also indicate who will be collecting the samples (e.g. water system personnel, certified laboratory) and the training those persons have or will receive. Once your monitoring plan has been approved, it will be incorporated into the permit and will be enforced.

- Water System Operations Plan. As described in the TMF guidance (also required by the Waterworks Standards), a comprehensive plan for operation of the water system must be prepared and submitted. The District Office or the LPA will inform you whether this plan needs to be submitted prior to or after issuance of the permit. The District Office can provide you with a separate guidance document for preparation of an operations plan.

- Disaster/Emergency Response Plan. As described in the TMF guidance, you will need to prepare a plan for responding to emergencies. This includes notification

to the appropriate regulatory agencies, notification to consumers, and actions to be taken by the water system in the event of an emergency (earthquake, water supply disruption, power outage, contamination incident, etc.). The District Office can provide you with sample plans and guidance material for preparation of the emergency plan.

6. Environmental Documentation.

Since all new water systems are “projects” requiring State approval and permits, new water systems must undergo an environmental review that complies with the California Environmental Quality Act (CEQA). As an applicant for a water supply permit, therefore, you will be required to submit documentation (Notice of Determination) demonstrating that compliance with CEQA has been obtained, whether that compliance is by means of a categorical exemption, negative declaration, or an EIR. In those rare instances where the Department may be the lead agency, you will need to fill out and submit an environmental information form that will be provided to you by the District Office. The water supply permit will not be issued until compliance with CEQA has been fulfilled.

V. AMENDMENTS TO THE PERMIT

The State of California Domestic Water Supply Permit issued to you by the Department or the LPA is issued on a “one-time” basis. It is not subject to expiration and does not have to be routinely renewed. The permit, however, may need to be amended from time to time if changes in the water system occur. You should be aware that none of the following changes can occur unless a permit amendment has been issued:

- Change in ownership of the water system
- The addition of new water sources
- Any changes in the method of treatment
- The addition of any storage reservoirs
- A major expansion of the service area
- Any change in the distribution system that does not comply with the waterworksstandards

If you are contemplating making any of these changes, you should submit a request to the District Office or LPA for a permit amendment. Making these changes without an amendment to the original permit could subject your water system to citations and administrative fines.

In addition to the above amendments, the District Office or the LPA may reissue the water supply permit if they determine the original permit is out-of-date and needs to be updated.

TMF Assessment Form

California Department of Public Health
Drinking Water Program

TMF Assessment Form

ASSESSMENT TYPE: ☐ **Funding Project** ☐ **New System** ☐ **Change of Ownership**

WATER SYSTEM CLASSIFICATION:
☐ **Community Water System**
☐ **Nontransient Noncommunity Water System**
☐ **Transient Noncommunity Water System**

WATER SYSTEM INFORMATION

Water System Name:
Water System Number:
Water System Physical Address:
County:
District Office or Local Primacy Agency:

PERSON COMPLETING THIS TMF ASSESSMENT

Name:	**Signature:**
Title :	**Date Submitted to CDPH:**
Phone Number:	**Email Address:**
Company Name and Address:	

MAIN WATER SYSTEM CONTACT PERSON INFORMATION

Name:	**Title:**
Phone Number:	**Email Address:**
Water System Mailing Address:	

TMF Assessment Instructions

In California the technical, managerial, and financial (TMF) assessment must be completed by public water systems that are applicants for California Department of Public Health (CDPH) funding programs, new water systems, and water system changes of ownership.

To complete this TMF assessment form refer to the guidance and explanations in the TMF Criteria document located on the CDPH web site at:

http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMFCommunityWaterSystems.aspx .

If requested system information has already been provided with the funding application submittal or been provided directly to the CDPH district office or the LPA, note the location of that information on the assessment form in the comments space. Update information as circumstances change. Required documentation may be submitted electronically on a compact disk (if submission is electronic indicate on assessment).

For each TMF element described below place the required information in the appendix and identify it by the attachment number that corresponds to the TMF element number. For example, the documentation required for element number seven, Water Rights, should be identified in the appendix as Attachment 7, Water Rights. In addition, in the comments section of each TMF element list the actual documents that are provided in the appendix. For example, under the Water Rights comments section of this TMF assessment indicate that in the appendix Attachment 7 copies of the deeds to Wells 1 and 2 and the State Water Resources Control Board surface water permit are provided.

Under each TMF element below check the boxes where applicable. If the item is not applicable (NA), indicate NA to show that these items have been considered.

TMF Elements

1. Consolidation Feasibility

[Funding Projects, New Systems, Change of Ownership - ***Mandatory***]

Each public water system applying for construction funding or a refinancing loan must perform an evaluation, including costs and feasibility, of physically consolidating with another public water system. Guidelines for when a consolidation is most feasible include, but are not limited to:

- when one of the water systems is located within another's established service area,
- when one of the water systems is within an existing General Plan's zone of influence of the other,
- Or when the water system is within five miles of another public water system.

If the water system applying for construction funding or a refinancing loan is a "small community water system" (which is defined as: a community water system that serves no more than 3,300 service connections or a yearlong population of no more than 10,000 persons) and the water system is considered "disadvantaged" (which is defined as: the entire

service of area of a community water system, or a community therein, in which the median household income is less than 80 percent of the statewide average), consolidation is *highly encouraged* and the water system may be allowed funding for a consolidation feasibility study and/or may be giving priority when seeking construction funding.

☐ List all large water systems and the number of connections that are within five miles of the system.
Record NA if there is no water system in the vicinity. ☐ NA

_____

_____

☐ Submit a consolidation assessment that includes the name of all water systems contacted, and the results of any consolidation discussions conducted with at least one system within the five mile radius. ☐ NA

Comments _____

_____

2. System Description

[Funding Projects - ***Necessary****;* New Systems and Change of Ownership - ***Mandatory***]

Provide a system map that illustrates the location of all of the components of the water system including the:

☐ Current service area boundary
☐ Sources ☐ NA
☐ Treatment facilities ☐ NA
☐ Pumping stations ☐ NA
☐ Pressure zones ☐ NA
☐ Storage tanks ☐ NA
☐ Potential contamination hazards ☐ NA
☐ Projected ten-year growth boundaries

Comments _____

_____

3. Certified Operators

[Funding Projects -***Necessary***; New Systems and Changes of Ownership- ***Mandatory***]

The regulating agency has determined that this water system needs a:
☐ Certified distribution operator, Grade _____ ☐ NA
☐ Certified treatment operator, Grade _____ ☐ NA

☐ Provide copies of current certificates with operator names and grades as documentation that the distribution and treatment operators are certified for the appropriate level that is required for the water system.

☐ For a contract certified operator, provide a copy of the contract that describes the: ☐ NA

- Level of certification that the operator will be required to maintain
- Specific duties for which the operator will be responsible
- Time to be spent serving the water system
- Procedures to follow for complaints, compliance discrepancies, and emergencies

Comments _____

_____

4. Source Capacity

[Funding Projects - ***Necessary***; New Systems and Changes of Ownership - ***Mandatory***]

At all times a water system must have the capacity to meet the system's maximum day demand and to ensure that it has suitably adequate sources of water supply to serve the needs of its constituents in the future. Develop and submit the following:

☐ Documentation which demonstrates that the water system has a sufficient water supply as described in California Code of Regulations, Section 64554.

☐ A water conservation plan to address potential drought conditions.

☐ A plan to install water meters on all connections as well as a master meter on each source in order to accurately measure water consumption. [Note that all water systems applying for CDPH funds must consider the feasibility of installing meters at each service connection that lacks a meter. Additionally, the funding requirements for the project must include conditions that the system will incorporate provisions into its operating procedures and expenses to read the meters and to charge rates based on usage.
☐ N/A – System is metered

☐ A map of the existing service area and surrounding locations that includes the location of all water sources as well as sources of potential contamination such as waste disposal sites, landfills, feedlots, underground storage tanks, out-of-service wells, and other potential contaminants.

☐ Documentation that demonstrates the water sources are protected from vandalism, tampering, contamination, or other threats.

☐ Ten year potential growth plans consistent with local land use plans and projected water demand. Describe how the system will ensure that potential water sources will meet all water quality standards.

☐ A plan to start the process to obtain additional water rights for new water sources if needed. ☐ NA

Comments _____

_____

5. Operations Plan

[Funding Projects-***Necessary***; New Systems and Changes of Ownership- ***Mandatory***]

An operations plan describes all of the activities needed to maintain the system in compliance with all standards. Operations plans need to be updated whenever changes occur. The date of the latest operations plan review was _____.

Provide an operations plan that describes the tasks that would enable another qualified operator to assume the operation of the system in an emergency. Include tasks that will be completed:

☐ Daily
☐ Weekly
☐ Monthly
☐ Yearly

Include non-routine activities relating to:

☐ Positive analytical results
☐ Complaints
☐ Emergency operational practices
☐ Record keeping
☐ Other duties

Templates for a number of sample operations plan can be found on the CDPH web site at:

http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMF.aspx

Comments _____

_____

6. Training

[Funding Projects, New Systems, and Changes of Ownership - ***Necessary***]

Submit a plan describing the training that will be provided to ensure that everyone associated with the water system has the knowledge to competently comply with existing requirements and to be informed about new compliance requirements, new technologies, and newly identified hazards. The plan needs to describe the training for the following:

☐ Certified operators: Contact hours needed to maintain operator certification at the required grade for the system and other related training.
☐ Governing board and managers: Training that covers board and management roles and responsibilities including ethics and financial management.
☐ Other staff: Pertinent training to enable all staff to competently perform activities necessary to the operation and maintenance of the system.

Comments _____

_____

7. Ownership
[Funding Projects; New Systems, and Changes of Ownership - ***Mandatory***]

Ownership must be clearly identified for all components of the water system. Check the type of water system ownership:

☐ Sole proprietorship
☐ Partnership
☐ Corporation
☐ Mutual
☐ Governmental agency
☐ Other formation type

A copy of the deed for any well locations may document both ownership and water rights. Provide the following ownership documentation as hard copies or in electronic format:

☐ Formation papers such as incorporation articles, partnership documentation, by-laws, and governing ordinances. ☐ NA

☐ Deeds and other ownership documentation of all system property including land, buildings, wells, storage tanks, treatment facilities, and other system components. ☐ NA

☐ Easements, leases, or agreements for long term use regarding land or system components that are not owned by the water system. Specify the duration of the authorization. ☐ NA

☐ Encumbrances, trust indentures, bankruptcies, decrees, legal orders, or other items that may affect the owner's control of the water system. ☐ NA

☐ If the water system is under temporary ownership such as a developer, describe the timing for the change in ownership and the contact information for the eventual owner. ☐ NA

☐ If the owner of the water system has owned or managed any other public water system within the last ten years, list these systems by name and number. ☐ NA

☐ For a sole proprietor submit a plan that describes how the system will continue to be operated in the event the owner becomes incapable of carrying out this responsibility.
☐ NA

Comments _____

_____

8. **Water Rights**
[Funding Projects; New Systems, and Changes of Ownership - ***Mandatory***]

Provide the following documentation as hard copies or electronic format:

☐ List the current and emergency water sources that will be used to operate the system including groundwater, surface water, purchased water, and any other sources.
_____

☐ Describe the long-term availability of the sources used by the water system to meet a projected 10-year water demand._____
_____

Groundwater: ☐ Yes ☐ No

- Unadjudicated Basin: Provide the following: ☐ NA

  ☐ A statement that the groundwater is extracted from a basin that is not adjudicated.

  ☐ Copies of the deeds for the parcels of each unadjudicated groundwater source used by the system.

- Adjudicated Basin: Attach the deed for the parcels of each adjudicated groundwater source that notes the adjudication or provide documentation of the Basin Water Master's terms of the adjudication as they relate to the water system's right to extract water from the adjudicated basin. ☐ NA

Surface Water: ☐ Yes ☐ No

Circle the type of water rights the water system holds for surface water from the list below:

a. Appropriative
   1) Pre-1914
   2) State Water Resources Control Board (SWRCB) Permit or License

b. Riparian

Appropriative

☐ If Pre-1914, provide a statement that water rights were established prior to 1914. ☐ NA

☐ If after 1914, provide a copy of the SWRCB water rights permit or license. Note that an application to the SWRCB does not document water rights. ☐ NA

Riparian

☐ Provide a statement that water is derived from a surface source pursuant to a riparian right. ☐ NA

Purchased Water: ☐ Yes ☐ No

☐ Provide a copy of the water service agreement for purchased water that specifies the duration of the authorization. Note that for funding projects the long term use agreements must extend for the life of the loan or a minimum of 20 years for grant funded projects. ☐ NA

Comments _____

_____

9. Organization

[Funding Projects – ***Necessary***; New Systems, and Changes of Ownership - ***Mandatory***]

In order to establish the lines of authority and communication between employees and management including the governing board, managers, certified operators, and clerical staff, provide a:

☐ Structural organizational chart for positions associated with the water system that indicates the lines of authority. Specify the frequency of board meetings where appropriate.

☐ Separate chart that lists the names and phone numbers of the specific people who fill those positions. Update this information as needed.

☐ List on the organization charts information on any contract certified operators the system may utilize. Indicate the level of certification and the number of hours for which the services of a certified operator are contracted. ☐ NA

Comments _____

_____

10. Emergency Response Plan

Water System Number _____

[Funding Projects – ***Necessary***; New Systems, and Changes of Ownership - ***Mandatory***]

A sample emergency response plan template is located on the CDPH website at:

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/TMFplanningandreports/EmergencyResponsePlan_revised.doc

Ensure that the emergency response plan for the water system includes:

☐ A list of all disasters and emergencies that is likely to occur in the water system's service area. Include earthquakes, fires, and disinfection failure at minimum as well as flooding, water outages, water contamination, power outages, and other potential local emergencies.

☐ The names and contact information of water system personnel including the decision makers. Identify responsibilities, and provide a clear chain of command.

☐ An inventory of system resources used for normal operations and available for emergencies including maps and schematic diagrams, lists of emergency equipment and suppliers, emergency contract agreements, and emergency water interconnections or sources.

☐ A communication network that describes a designated location for an emergency operations center, emergency contact information for equipment suppliers, emergency phone and radio communication capabilities, coordination procedures with governmental agencies for health and safety protection, technical and financial assistance, and public notification procedures.

☐ Emergency procedures to quickly assess damage to water system facilities including logistics for emergency source activation and repairs, procedures for monitoring progress of repairs and restoration, and procedures for documenting damage and repairs.

☐ Describe steps that will be taken to resume normal operations and to submit reports to appropriate agencies.

Comments _____

_____

11. Policies

[Funding Projects; New Systems, and Changes of Ownership - ***Necessary***]

☐ A policy manual has been adopted that describes procedures pertinent to the management of the water system. At a minimum the policies described should cover:

a. Nonpayment of water charges
b. Unauthorized use of water
c. Hours worked and overtime

d. Complaint responses
e. Contract operators, if applicable
f. Governing board activities such as regulatory responsibilities, expenditure allowances, meeting notifications, resolution adoptions, and other issues as applicable

Comments _____

_____

12. Budget Projection / Capital Improvement Plan
[Funding Projects; New Systems, and Changes of Ownership - ***Mandatory***]

Use the sample 5-year budget projection/capital improvement plan (CIP) template, or an equivalent alternative, that is located on the CDPH website at http://www.cdph.ca.gov/certlic/drinkingwater/Documents/TMFplanningandreports/swsbudgetcalculator-CIPandMinRateGen.xls . This file consists of guidelines for completing this spreadsheet on the first Excel tab, the 5-year budget projection on the second tab, and the CIP on the third tab.

Submit the following:

☐ 5-Year budget projection/CIP template

☐ Documentation that reserve funds have been created for the CIP, operations and maintenance expenses, potential emergency needs, and any other reserve accounts necessary for the management of the system.

☐ Documentation of the current rate structure. ☐ NA

☐ Documentation of the average annual cost of water per connection for the last calendar year. ☐ NA

☐ Documentation that revenues cover expenses including the CIP reserve, or describe the plan to increase revenues to cover these expenditures? ☐ NA

☐ Where appropriate, include the Proposition 218 voter approval process that will be followed if a rate increase is planned. ☐ NA

☐ For investor owned systems documentation from the California Public Utilities Commission of an approved budget, CIP, and rate schedule. ☐ NA

☐ NEW SYSTEMS OR FUNDING PROJECTS ONLY: Proposed rate structure. ☐ NA

☐ NEW SYSTEMS OR FUNDING PROJECTS ONLY: Estimated average annual cost of water per connection based on the proposed new funding amount. ☐ NA

Comments _____

13. Budget Control

[Funding Projects - ***Necessary;*** New Systems, and Changes of Ownership - ***Mandatory***]

A financial policy that includes:

☐ Budget control procedures in which one person records a transaction and a manager review and approves it. Describe budget controls for:
   a. Cash receipts and disbursements
   b. Bank accounts
   c. Payroll

☐ Financial reports prepared for review by governing board such as:
   a. Customer Receivables Report
   b. Check Register Review
   c. Bank Reconciliation Report
   d. Budget Comparison Report
   e. Quarterly Comparative Balance Sheet
   f. Tax Returns

☐ Criteria and withdrawal guidelines for the maintenance of reserve accounts including:
   a. CIP Reserve
   b. Operations and Maintenance Reserve
   c. Contingency or Emergency Reserve
   d. Other Reserves

☐ Reporting procedures to appropriate levels of authority to ensure that there is no commingling of revenue sources. ☐ NA

☐ Periodic reviews of the budget status by a Certified Public Accountant or appropriately qualified financial officer of the water system to ensure continuing financial viability. Three years of the most current audited financial reports must be submitted for all CDPH funding projects. ☐ NA

Comments _____

_____

TMF Criteria

California Department of Public Health (CDPH)
Drinking Water Program

Technical, Managerial, and Financial (TMF)

Criteria

For Public Water Systems

CDPH Funding Applicants
New Water Systems
Changes of Ownership

Revised April 2010

TABLE OF CONTENTS

Introduction

The 1996 federal Safe Drinking Water Act (SDWA) required states to incorporate technical, managerial, and financial (TMF) capacity into public water system operations. This requirement helps ensure that public water systems with TMF capacity have long term sustainability and are able to maintain compliance with all applicable drinking water laws and regulations.

In response to the federal TMF requirements, California enacted Section 116540 of the Health and Safety Code (CHSC) which states:

> *No public water system that was not in existence on January 1, 1998, shall be granted a permit unless the system demonstrates to the department that the water supplier possesses adequate financial, managerial, and technical capability to assure the delivery of pure, wholesome, and potable drinking water. This section shall also apply to any change of ownership of a public water system that occurs after January 1, 1998.*

It should be noted that the California SDWA goes beyond the federal requirements by applying the TMF criteria and requiring TMF assessments for not only community water systems but also transient noncommunity water systems, water systems changing ownership, and water systems seeking funding from the State.

Use this TMF criteria document as a reference when completing the TMF assessment form located on the CDPH web site at:

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/TMFcommunity/TMFCapAssessFrmCommSDWSRF.pdf

All of the Mandatory TMF elements must be completed prior to the issuance of funding for a CDPH funded project or prior to obtaining a new system or change of ownership water supply permit. The Necessary TMF elements must be addressed satisfactorily within a timeframe determined by the regulatory agency which typically would be six months after funding project completion or permit issuance. A TMF elements chart is provided below to illustrate the Mandatory and Necessary TMF elements needed for CDPH funding projects, new water systems, and changes of ownership.

Submit the completed TMF assessment form and attachments to the CDPH district office or the Local Primacy Agency (LPA) that regulates the water system. These regulators then will complete an evaluation to determine whether or not the system has adequate TMF capacity.

We recommend that the TMF documents be assembled in a three ring binder with the attachments kept as appendices in the back. Because particular information about water systems changes over time, this will allow documents to be updated easily. In order to maintain complete records of your system, keep copies of all of the documents

in this binder. Required documentation may be submitted electronically on a compact disk and attached to the TMF assessment in the appendix.

If system information has already been provided on the funding application or to the CDPH district office or the LPA, note the location of that information on the assessment form in the comments space. Update information as circumstances change.

CDPH is committed to helping systems qualify for funding. Upon request CDPH will provide assistance to small water systems for completing a funding application and the TMF assessment forms. The funding applicant should complete as much of the information on the forms as possible. All information needs to be supplied in a timely manner. In addition, small water systems that cannot demonstrate adequate capacity can be provided with direct technical assistance if requested.

TMF Elements Chart

M - Mandatory: Compliance with the element must be completed prior to the issuance of funding or a new system or change of ownership water supply permit.

N - Necessary: Compliance with the element must be addressed satisfactorily within a timeframe determined by the regulatory agency which typically would be six months after funding project completion or permit issuance.

	TMF ELEMENTS	CDPH FUNDING PROJECT	NEW WATER SYSTEM	CHANGE OF OWNERSHIP
TECHNICAL	1. Consolidation Feasibility	Mandatory	Mandatory	Mandatory
	2. System Description	Necessary	Mandatory	Mandatory
	3. Certified Operators	Necessary	Mandatory	Mandatory
	4. Source Capacity	Necessary	Mandatory	Mandatory
	5. Operations Plan	Necessary	Mandatory	Mandatory
	6. Training	Necessary	Necessary	Necessary
MANAGERIAL	7. Ownership	Mandatory	Mandatory	Mandatory
	8. Water Rights	Mandatory	Mandatory	Mandatory
	9. Organization	Necessary	Mandatory	Mandatory
	10. Emergency Response Plan	Necessary	Mandatory	Mandatory
	11. Policies	Necessary	Necessary	Necessary
FINANCIAL	12. Budget/Capital Improvement Plan	Mandatory	Mandatory	Mandatory
	13. Budget Control	Necessary	Mandatory	Mandatory

TMF Elements

1. Consolidation Feasibility
   [Funding Projects, New Systems, Change of Ownership - ***Mandatory***]

   Many operational and economic benefits are realized by water systems when they consolidate. Each public water system applying for construction funding or a refinancing loan must perform an evaluation, including costs and feasibility, of physically consolidating with another public water system. Guidelines for when a consolidation is most feasible include, but are not limited to:
   - when one of the water systems is located within another's established service area,

- when one of the water systems is within an existing General Plan's zone of influence of the other,
- Or when the water system is within five miles of another public water system.

If the water system applying for construction funding or a refinancing loan is a "small community water system" (which is defined as: a community water system that serves no more than 3,300 service connections or a yearlong population of no more than 10,000 persons) and the water system is considered "disadvantaged" (which is defined as: the entire service of area of a community water system, or a community therein, in which the median household income is less than 80 percent of the statewide average), consolidation is *highly encouraged* and the water system may be allowed funding for a consolidation feasibility study and/or may be giving priority when seeking construction funding.

In order to determine the feasibility of consolidating into another public water system, submit a consolidation assessment that includes the following:

a. List of all, or at least one large water system within five miles of the system.

b. A description of the feasibility of consolidating into another system on the list that includes the results of any consolidation discussions conducted with at least one system within the five mile radius.

2. System Description
[Funding Projects - ***Necessary***, New Systems, Change of Ownership - ***Mandatory***]

Provide a system map that illustrates the location of all of the components of the water system including the:

a. Current service area
b. Sources
c. Treatment facilities
d. Pumping stations
e. Pressure zones
f. Storage tanks
g. Piping with valves and hydrants noted
h. Potential contamination hazards
i. Projected ten-year growth boundaries

3. Certified Operators
[Funding Projects – ***Necessary*****;** New Systems and Change of Ownership - ***Mandatory***]

CDPH or the Local Primacy Agency (LPA) will identify the grade of certified distribution and treatment operators that will be required for the system. Provide copies of current certificates with names and grades as documentation that the

distribution and treatment operators are certified for the appropriate level that is required for the water system.

If a contract operator is hired to perform the duties of a certified operator, provide a copy of the operator's treatment and /or distribution operator certifications and a copy of the contract that describes the specific duties for which the operator will be responsible, the time to be spent serving the water system, and the procedures to be followed in the event of complaints, compliance discrepancies, or emergencies.

4. Source Capacity

[Funding Projects – ***Necessary*****;** New Systems and Change of Ownership - ***Mandatory***]

At all times a water system must have the capacity to meet the system's maximum day demand as described in California Code of Regulations, Section 64554. Additionally, it must ensure that it has suitably adequate sources of water to serve the needs of its constituents in the future. The water system must submit documentation which demonstrates that it has and will have a sufficient water supply.

The possibility of drought conditions impacting the water supply must be addressed. The system needs to develop a water conservation plan to address potential drought conditions.

In order to accurately measure the system's actual water usage, a meter needs to be placed on each service connection. The system needs to develop a plan to install water meters on all connections as well as a master meter on each source in order to accurately measure water production and consumption. Additionally, a CDPH funded project must include conditions that the system will incorporate provisions into its operating procedures and expenses to read the meters and to charge rates based on usage.

All sources and surrounding areas need to be protected from potential contamination hazards or threats. Provide a map of the existing service area and surrounding locations. Include the location of all water sources as well as sources of potential contamination such as waste disposal sites, landfills, feedlots, underground storage tanks, out-of-service wells, and other potential contaminants. Additionally, provide documentation that demonstrates the water sources are protected from vandalism, tampering, contamination, and other threats.

In order to ensure that a sufficient source of water will be available for existing and potential water consumers, the system needs to develop a ten year potential growth plan consistent with local land use plans a projected water demand for that period of time, and start the process to obtain additional water rights for new water sources if needed.

5. Operations Plan

[Funding Projects – ***Necessary*****;** New Systems and Change of Ownership - ***Mandatory***]

Provide an operations plan that describes all of the activities needed to maintain the system in compliance with all standards. This plan should describe the daily, weekly, monthly, and yearly tasks that would enable another qualified operator to assume the operation of the system in an emergency. The plan should also describe non-routine activities such as positive analytical results, responses to complaints, emergency operational practices, record keeping, and other duties.

Operations plans need to be updated whenever changes occur. Templates for a number of sample operations plan can be found on the CDPH web site at

http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMF.aspx

6. Training

[Funding Projects; New Systems, and Changes of Ownership – ***Necessary****]*

Competent management and operation of a water system is critical to providing a safe and reliable water supply to system customers. Training needs to be provided to all water system staff including the governing board in order to ensure that everyone associated with the water system has the knowledge to competently comply with existing requirements and to be informed about new compliance requirements, new technologies, and newly identified hazards.

Submit a plan describing the training that will be provided for:

a. Certified operators: Contact hours needed to maintain operator certification at the required grade for the system and other related training.
b. Governing board: Training that covers board roles and responsibilities including ethics and financial management.
c. Other staff: Pertinent training to enable all staff to competently perform activities necessary to the operation and maintenance of the system.

7. Ownership

[Funding Projects; New Systems, and Changes of Ownership – ***Mandatory****]*

Ownership of a water system must be clearly identified. Documentation may be submitted as hard copies or electronically on a compact disk. Indicate the type of system ownership such as sole proprietorship, partnership, corporation, mutual, governmental agency, or other formation type.

Include copies of legal papers for corporations, districts, partnerships, mutual's, and other organizational entities such as incorporation articles, by-laws, and governing ordinances.

Provide documentation of ownership for all components of the water system. This includes deeds and other documentation for system owned property including land, buildings, wells, storage tanks, treatment facilities, and other components needed for

the operation of the system. A copy of the deed for the well location will help document both ownership and water rights.

If land or system components are not owned by the water system, provide a copy of the easement or long term use agreement use that specifies the duration of the authorization in order to demonstrate that the system will provide a reliable source of water to its customers. Note that for loan projects the long term use agreements for easements, purchased water, system facilities, land, and any other water system component must extend for the term of the loan.

If the water system is under temporary ownership such as a developer, describe the timing for the change in ownership and the contact information for the eventual owner.

If the owner of the water system has owned or managed any other public water system within the last ten years, list these systems by name and number.

For a sole proprietor submit a plan that describes how the system will continue to be operated in the event the owner becomes incapable of carrying out this responsibility.

Disclose any encumbrances, trust indentures, bankruptcies, decrees, legal orders, or other items that may affect the owner's control of the water system.

8. Water Rights

[Funding Projects; New Systems, and Changes of Ownership – ***Mandatory****]*

A water system must have a legal right to the quantity of water necessary to assure an adequate and reliable drinking water supply. Provide information that describes the legal basis and authority for the diversion, extraction, or purchase of water. This may include documents such as permits, licenses, letters of authority, or other agreements showing all water rights owned or controlled by the system.

Note that for water systems designated as groundwater under the direct influence of surface water the water rights could be described as either groundwater or surface water depending upon the surface water designation by the State Water Resources Control Board (SWRCB).

Be aware that for CDPH funded projects the long term use agreements for purchased water must extend for the life of the loan or a minimum of 20 years for grant funded projects

To document water rights, provide the following:

a. List the current and emergency water sources that will be used to operate the system including groundwater, surface water, groundwater under the influence of surface water, purchased water, and any other sources.

b. Describe the long-term availability of the sources used by the water system to meet a projected 10-year water demand.

Groundwater

a. Unadjudicated Basin:

- Provide a statement that the groundwater is extracted from a basin that is not adjudicated.

- Provide copies of the deeds for the parcels of each unadjudicated groundwater source used by the system. Electronic format is acceptable.

b. Adjudicated Basin: Attach the deed for the parcels of each adjudicated groundwater source that notes the adjudication or provide documentation of the Basin Water Master's terms of the adjudication as they relate to the water system's right to extract water from the adjudicated basin.

Surface Water

Indicate the type of water rights the water system holds for surface water. Note that an application to the SWRCB does not document water rights.

a. Appropriative
   1) Pre-1914
   2) SWRCB Permit or License
b. Riparian

Appropriative

- If Pre-1914, provide a statement that water rights were established prior to 1914.
- If after 1914, provide a copy of the SWRCB water rights permit or license.

Riparian

Provide a statement that water is derived from a surface source pursuant to a riparian right and include a map showing location relative to extraction point.

Purchased Water

- Provide a copy of the water service agreement for purchased water that specifies the duration of the authorization.

9. Organization

[Funding Projects - ***Necessary***; New Systems and Changes of Ownership- ***Mandatory***]

In order to establish the lines of authority and communication between employees and management including the governing board, managers, certified operators, and clerical staff, provide a:

a. Structural organizational chart for positions associated with the water system. Specify the frequency of board meetings where appropriate.

b. Provide another chart that lists the names and phone numbers of the specific people who fill those positions.

c. Include on the organization chart any contract certified operators the system may utilize. Indicate the level of certification and the number of hours for which the services of a certified operator are contracted.

10. Emergency Response Plan

[Funding Projects – ***Necessary*****;** New Systems and Change of Ownership - ***Mandatory***]

In order to provide reliable water service and minimize public health risks from unsafe drinking water during emergencies, submit an emergency response plan with clearly defined response procedures. A sample emergency response plan template is located on the CDPH website at:

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/TMFplanningandreports/EmergencyResponsePlan_revised.doc

Ensure that the emergency response plan includes:

a. A list of all disasters and emergencies that is likely to occur in the water system's service area. Include earthquakes, fires, and disinfection failure at minimum as well as flooding, water outages, water contamination, power outages, and other potential local emergencies.

b. The names and contact information of water system personnel including the decision makers. Identify responsibilities, and provide a clear chain of command.

c. An inventory of system resources used for normal operations and available for emergencies including maps and schematic diagrams, lists of emergency equipment and suppliers, emergency contract agreements, and emergency water interconnections or sources.

d. A communication network that describes a designated location for an emergency operations center, emergency contact information for equipment suppliers, emergency phone and radio communication capabilities, coordination procedures

with governmental agencies for health and safety protection, technical and financial assistance, and public notification procedures.

e. Emergency procedures to quickly assess damage to water system facilities, including logistics for emergency source activation and repairs, procedures for monitoring progress of repairs and restoration, and procedures for documenting damage and repairs.

f. A description of the steps that will be taken to resume normal operations and to submit reports to appropriate agencies.

11. Policies

[Funding Projects, New Systems, and Changes of Ownership- ***Necessary***]

Water systems need to have written policies that describe procedures to be followed for given circumstances. While written policies can describe a broad spectrum of topics, at a minimum an adopted policy manual should include prescribed procedures for:

a. Nonpayment of water charges
b. Unauthorized use of water
c. Hours worked and overtime
d. Complaint responses
e. Contract operators, if applicable
f. Governing board activities such as regulatory responsibilities, expenditure allowances, meeting notifications, resolution adoptions, and other issues as applicable
g. Documentation of water systems maintenance, repairs, new construction.

12. Budget Projection / Capital Improvement Plan

[Funding Projects, New Systems, and Changes of Ownership - ***Mandatory***]

Develop a 5-year budget projection that lists all of the expenses and revenues of the water system. The total expenses include the operations and maintenance (O&M) expenses of the system such as salaries, power, chemicals, monitoring, and other costs. Expenses also include the administrative expenses such as insurance and debt service as well as funded reserve accounts. These reserve accounts are the capital improvement plan (CIP), operations and maintenance reserve, contingency reserve, and other reserve accounts needed to manage the system. Revenues are all of the sources of funds the system receives including income from billing, assessments, hookup charges, reserve fund withdrawals, grants and loans, and other income.

Use the sample 5-year budget projection/CIP template, or an equivalent alternative, that is located on the CDPH website at

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/TMFplanningandreports/swsbudgetcalculator-CIPandMinRateGen.xls . This file consists of guidelines for completing this spreadsheet on the first Excel tab, the 5-year budget projection on the second tab, and the CIP on the third tab.

To develop a CIP using the above template: on the CIP tab, list all of the water system components. Use the Typical Equipment Life Expectancy list at http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMF.aspx to view sample average life expectancies of the system components that can be used on the CIP template. This life expectancy chart lists only recommendations. If available, use figures appropriate for your location. The average annual cost to replace all system components as they age is linked to the tab for the 5-year budget projection so that the costs to replace the system components will be funded in the budget projection.

Note: On the 5-year budget projection/CIP template that the areas shaded in lighter yellow on both tabs concern the costs projected for new CDPH funded projects. New project operations and maintenance costs must be listed since they will not be included in the new funding. Also, a percentage of the CIP cost for the new project may be included in the debt service for a new CDPH loan.

If the water system expenses and revenues are included in the overall budget for a facility such as a mobile home park or a school, separate the water system expenses from the total facility budget. Estimate if exact figures are not available. For example, if the facility receives one overall power bill, estimate perhaps 10% of the overall bill for the water system. As actual figures become available, readjust the budget.

13. Budget Control

[Funding Projects - ***Necessary***; New Systems and Changes of Ownership -***Mandatory***]

A financial policy that includes, but is not limited to:

a. Budget control procedures in which one person records a transaction and a manager review and approves it. Describe budget controls for:
   1) Cash receipts and disbursements
   2) Bank accounts
   3) Payroll

b. Financial reports prepared for review at board meetings such as:
   1) Customer Receivables Report
   2) Check Register Review
   3) Bank Reconciliation Report
   4) Budget Comparison Report
   5) Quarterly Comparative Balance Sheet
   6) Tax Returns

c. Criteria and withdrawal guidelines for the maintenance of reserve accounts including:
   1) CIP Reserve
   2) Operations and Maintenance Reserve
   3) Contingency or Emergency Reserve
   4) Other Reserves

d. Reporting procedures to appropriate levels of authority to ensure that there is no commingling of revenue sources.

e. Periodic reviews of the budget status by a Certified Public Accountant or appropriately qualified financial officer of the water system to ensure continuing financial viability. Three years of the most current audited financial reports must be submitted for all CDPH funding projects.

Acronyms

ARRA	American Recovery and Reinvestment Act
ASDWA	Association of State Drinking Water Administrators
AWWA	American Water Works Association
CCR	California Code of Regulations
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CHSC	California Health and Safety Code
CIP	Capital Improvement Plan
CRWA	California Rural Water Association
CWS	Community Water System
EPA	Environmental Protection Agency
LPA	Local Primacy Agency
NEPA	National Environmental Protection Act
NTNCWS	Nontransient Noncommunity Water System
RCAC	Rural Community Assistance Corporation
SDWA	Safe Drinking Water Act
SRF	State Revolving Fund
SWAP	Source Water Assessment and Protection Program
SWRCB	State Water Resources Control Board
TMF	Technical, Managerial, and Financial Capacity
TNCWS	Transient Noncommunity Water System
WWS	Water Works Standards

Water Quality Emergency Notification Plan Form

State of California—Health and Human Services Agency

Department of Public Health

ARNOLD SCHWARZENEGGER
Governor

WATER QUALITY EMERGENCY NOTIFICATION PLAN

Name of Utility: _____

Physical Location/Address: _____

The following persons have been designated to implement the plan upon notification by the State Department of Public Health that an imminent danger to the health of the water users exists:

Water Utility: Contact Name & Title	Email Address	Telephone Day	Evening	Cell
1.				
2.				
3.				

The implementation of the plan will be carried out with the following State and County Health Department personnel:

State & County Health Departments: Contact Name & Title	Telephone Day	Evening
1. DE Name, District Engineer California Department of Public Health	(XXX) XXX-XXXX	(XXX) XXX-XXXX
2. Alternative CDPH Staff California Department of Public Health	(XXX) XXX-XXXX	(XXX) XXX-XXXX
3. County Environmental Health Department Local Primacy Agency	(XXX) XXX-XXXX	(XXX) XXX-XXXX

4. If the above personnel cannot be reached, contact:

Office of Emergency Services Warning Center (24 hrs) (800) 852-7550 or (916) 845-8911
When reporting a water quality emergency to the Warning Center, please ask for the California Department of Public Health – Drinking Water Program Duty Officer.

NOTIFICATION PLAN

Attach a written description of the method or combination of methods to be used (radio, television, door-to-door, sound truck, etc.) **to notify customers in an emergency.** For each section of your plan give an estimate of the time required, necessary personnel, estimated coverage, etc. Consideration must be given to special organizations (such as schools), non-English speaking groups, and outlying water users. Ensure that the notification procedures you describe are practical and that you will be able to actually implement them in the vent of an emergency. Examples of notification plans are attached for large, medium and small communities.

Report prepared by:

_____ _____
Signature and Title Date

PLAN I (Medium Community)

During regular working hours our people will contact the news media at television station KXYZ to broadcast the necessary warning. The local radio stations will also be contacted. The television and radio personnel are available at all hours. As a follow-up measure, we will also contact the Daily Bee, a local newspaper that serves both Ourtown and Hometown.

The warnings will be issued in both English and Spanish to cover all members of the community. Outlying areas of the water service area (such as Isolated Canyon and Lonesome Mountain subdivisions) will also be notified by sound truck and/or handbill distributed to their respective areas. Both of these areas are very small and this can be done quite quickly.

A special telephone answering service can also be quickly set up at the utility headquarters (using the regular company numbers) to answer questions that will come in from consumers. Questions are anticipated, especially from the Hometown area, because that area is served by three different water companies. A map will be available to the telephone answering personnel to determine the water company serving the caller.

It is anticipated that the time for notification to the television and radio audiences will be very short. The areas served by handbill and sound truck will also be notified within an hour. For notification to be issued in other than normal hours, the same media will be contacted and an announcement will be scheduled for as long as is necessary. A sound truck(s) will be used in the early morning hours to quickly alert the people not listening to their radio or television.

PLAN II (Small Community)

Our community is very small and the most efficient means of notification will be both sound truck and handbill. It is estimated that the entire service area can be covered in less than three hours.

PLAN III (Large Community)

The same plan as implemented in Plan I should be used here with the exceptions noted. All the news media will be contacted in the entire metropolitan area. This includes all television and radio stations and all local and general area newspapers. Maps have been prepared to be distributed to the media to locate the boundaries of the water company. This system is large enough that it may only be necessary to notify some of the water users. This information will be transmitted to the media and an answering service at the water company will respond to consumers' calls. Unless the problems are limited to isolated areas it is unreasonable to assume that contact can be made through sound truck or handbill.

DWSAP Program Overview and guidance document

Drinking Water Source Assessment and Protection (DWSAP) Program

JANUARY 1999

Revision 1: Pages 13 and 15, April 1999
Revision 2: Pages 114, 155, and 193, January 2000

Division of Drinking Water and Environmental Management

California Department of Health Services

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Part Four: Voluntary Drinking Water Source Protection Programs

APPENDICES TO BE USED FOR A GROUND WATER SOURCE

List of Tables

List of Figures

Glossary of Terms

Abandoned Well: A well (1) the use of which has been permanently discontinued, or (2) that is in such a state of disrepair that no water can be produced. Because abandonment is a state that also involves intent on the part of the well owner, a definition that prescribes a set of conditions and a time limit for use in applying standards appears in California Well Standards, California Department of Water Resources (DWR) Bulletin 74-90, Section and DWR Bulletin 74-81, Section 21.

Assessment: An evaluation of a drinking water source that includes delineation of the boundaries of the source area and protection zones, as applicable, identification of possible contaminating activities (PCAs) within the delineated areas, a determination of the PCAs to which the source is most vulnerable, and a summary of the vulnerability of the source to contamination.

Assessment Map: A map that shows the location of the drinking water source, the source area and protection zones (if applicable), and an indication of the types of possible contaminating activities (PCAs) that exist within the source area and zones. The assessment map is part of a complete source water assessment. The recommended base map for the DWSAP program is a USGS quadrangle map (7.5 minute series).

Buffer Zone: A zone delineated to provide added protection to drinking water sources. The buffer zone is generally upgradient from the protection zones for a ground water source and may include the entire zone of contribution for the well, indirect recharge areas, or locations where the aquifer may be exposed at the surface.

Community Water System: A public water system which serves at least 15 service connections used by yearlong residents or regularly serves at least 25 yearlong residents.

Contaminants of concern: Microorganisms of drinking water importance, including fecal coliform bacteria, *Escherichia coli*, viruses, *Giardia lambia*, and *Cryptospordium*; chemicals for which maximum contaminant levels (MCLs) or California drinking water action levels have been established, and unregulated chemicals in drinking water for which monitoring is required (Table 7-1); turbidity and total organic carbon (TOC).

Detection: Detection of a contaminant at or above the "Detection limit for purposes of reporting" (DLR), pursuant to California Code of Regulations, Chapter 15, Title 22, Section 64400.45. DLRs have been established in regulation for inorganic chemicals and organic chemicals with MCLs. In addition, DHS has established DLRs for unregulated chemicals for which monitoring is required.

Drinking Water System: See Public Water System.

Improperly Destroyed Well: An abandoned well that has not been destroyed in accordance with California Well Standards, DWR Bulletin 74-90, Section 23 and DWR Bulletin 74-81, Section 23.

Local Primacy Agency: A county health authority which has received primacy delegation for the administration and enforcement of public water system requirements for community water systems serving less than 200 service connections, and noncommunity water systems.

Noncommunity Water System: A public water system that is not a community water system.

Nontransient-noncommunity water system: a public water system that is not a community water system and that regularly serves at least the same 25 persons over 6 months per year. Typically, a noncommunity water system serves a predominantly stable population (e.g., a school or factory).

Physical Barrier Effectiveness: A determination of the effectiveness of the physical barriers in preventing contaminants from reaching the drinking water source.

Physical Barrier Effectiveness Evaluation: A review of a drinking water source and its site characteristics to determine physical barrier effectiveness. As a minimum, the review considers the natural geologic materials and/or hydraulic conditions and the construction features of the well or intake. These characteristics are generally independent of land use, PCAs, or contaminant characteristics.

Possible Contaminating Activity (PCA): Human activities that are actual or potential origins of contamination for a drinking water source. PCAs include sources of both microbiological and chemical contaminants that could have adverse effects upon human health.

Protection: The process of managing the activities within a delineated source area or protection zone to prevent drinking water source contamination.

Protection Zone: A delineated area within the source area of a drinking water source. Zones differentiate areas of varying significance in terms of threat to the water source from contamination.

Public Water System (also Drinking Water System): A system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. A public water system includes the following: (1) Any collection,

treatment, storage, and distributions facilities under control of the operator of the system which are used primarily in connection with the system, (2) Any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system, (3) Any water system that treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

Service Connection: The point of connection between the customer's piping or constructed conveyance, and the water system's meter, service pipe, or constructed conveyance.

Source Area: The capture area for a drinking water source. For a surface water source, the source area is the watershed. For a groundwater source, the source area is the recharge area and the area within delineated protection zones.

Source Water: Water drawn to supply drinking water from an aquifer by a well or from a surface water body (e.g., reservoir, lake, river) by an intake. Such water may or may not be treated before being distributed by a drinking water system for consumption.

Susceptibility: see Vulnerability.

Transient-noncommunity water system: a public water system that is not a community water system or a nontransient-noncommunity water system. Typically, a noncommunity water system that serves a predominantly changing population (e.g., a restaurant or campground).

Vulnerability: A determination of the most significant threats to the quality of the water supply that takes into account the physical barrier effectiveness of the drinking water source. The vulnerability evaluation also considers the type and proximity to the water supply of activities that could release contaminants. Vulnerability, as defined in the DWSAP Program, is consistent with existing California regulations (see Section 8.4). Vulnerability is equivalent to "susceptibility," as the latter is used in US EPA source water assessment and protection guidance.

Acronyms

ARB	Air Resources Board
AWWA	American Water Works Association
BMP	Best Management Practice
Cal/EPA	California Environmental Protection Agency
CDF	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Calculated Fixed Radius
CSFM	California State Fire Marshal
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendment
DDWEM	Division of Drinking Water and Environmental Management
DFA	Department of Food and Agriculture
DHS	Department of Health Services
DOC	Department of Conservation
DOGGR	Division of Oil, Gas, and Geothermal Resources
DPR	Department of Pesticide Regulation
DTSC	Department of Toxic Substances Control
DWFOB	Drinking Water Field Operations Branch
DWR	Department of Water Resources
DWTPB	Drinking Water Technical Program Branch
DWSAP	Drinking Water Source Assessment and Protection
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GIS	Geographical Information System
GPS	Global Positioning System
GWR	Ground Water Rule
IWMB	Integrated Waste Management Board
LPA	Local Primacy Agency
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	National Resources Conservation Service
OEHHA	Office of Environmental Health Hazard Assessment
PCA	Possible Contaminating Activity
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SDWA	Safe Drinking Water Act
SWAP	Source Water Assessment Program
SWP	Source Water Protection

SWRCB	State Water Resource Control Board
USDA	US Department of Agriculture
USGS	US Geological Survey
US EPA	U.S. Environmental Protection Agency
WHPP	Well Head Protection Program
ZOC	Zone of Contribution

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PART ONE

Introduction

An introduction to the California Drinking Water Source Assessment and Protection Program document, and a summary of the minimum components for an assessment

Section 1—California's process of developing the DWSAP Program and information on State contacts

Section 2—The DWSAP Program's background, goals and schedule

Section 3—The minimum components of a drinking water source assessment under the DWSAP Program

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1.0 Introduction

This document presents California's Drinking Water Source Assessment and Protection (DWSAP) Program. The Department of Health Services' (DHS') Division of Drinking Water and Environmental Management is the lead agency for development of the DWSAP Program and its implementation.

The DWSAP Program has been prepared in response to the 1996 reauthorization of the federal Safe Drinking Water Act (SDWA), which included an amendment requiring states to develop a program to assess sources of drinking water and encouraging states to establish protection programs. A drinking water source protection program envisions a partnership between local, state, and federal agencies to ensure that the quality of drinking water sources is maintained and protected.

The drinking water source assessment is the first step in the development of a complete drinking water source protection program. The assessment includes a delineation of the area around a drinking water source through which contaminants might move and reach that drinking water supply. In addition, it includes an inventory of activities that might lead to the release of microbiological or chemical contaminants within the delineated area. This enables a determination to be made as to whether the drinking water source might be vulnerable to contamination.

California's DWSAP Program will address both ground water and surface water sources, drawing upon US Environmental Protection Agency (EPA) guidance, DHS' experiences from other related programs, and advice from advisory committees and the public. The EPA has indicated in its drinking water source assessment guidance (US EPA, 1997) that delineation and contaminant inventory elements for ground water sources are to be consistent with wellhead protection program approaches. Since California has not developed a wellhead protection program, the ground water portion of the DWSAP will serve as the State's wellhead protection program. For surface water sources, DHS' experience with other activities, such as watershed sanitary surveys, will be helpful in developing the surface water components of the DWSAP.

The California DWSAP Program will be submitted to EPA by early 1999. DHS anticipates that the submitted document will clearly convey to the public and to drinking water systems the goals and objectives that DHS and EPA seek to accomplish with the DWSAP program, along with methods that are technically appropriate and easily understood.

This document describes California's DWSAP Program and presents the DHS procedures for conducting drinking water source assessments. Although DHS is responsible for performing these assessments, the Department recognizes that some public water systems may wish to perform their own assessments. In such cases, the systems will need to conduct assessments in conformance with the DHS procedures.

Public water systems may also choose to perform more complex drinking water source assessments. The water purveyor should contact DHS prior to conducting an assessment in order to receive the latest program documentation.

When a public water system has completed an evaluation through another program that is the functional equivalent of a portion or all of the drinking water source assessment, that information may be submitted for purposes of the drinking water source assessment.

For example, drinking water systems that utilize surface water sources are required under California law to perform watershed sanitary surveys on a 5-year cycle. Many of the watershed sanitary surveys done prior to the DWSAP Program will most likely adequately satisfy most of the components of the assessment process, other than the vulnerability ranking. Where watershed sanitary surveys may not be adequate for the DWSAP assessment, the cyclic nature of these surveys offers opportunities to incorporate the components of the DWSAP Program.

Groundwater evaluations done for purposes of an Assembly Bill 3030 Groundwater Management Plan (Water Code §10750 et.seq.) may contain information pertinent to DWSAP Program components.

This document also contains DHS' recommendations for voluntary protection activities for public water systems and communities.

1.1 Description of the DWSAP Program Document

The development of the DWSAP Program is summarized below and discussed in greater detail in Parts One and Two of this document. The "Source Water Assessment" portion of the program, for which DHS is responsible, is presented in Part Three. The "Source Water Protection" aspects of the program, which are optional and may be enacted voluntarily by drinking water systems or communities, are presented in Part Four.

Fundamental to the assessment and protection elements are issues related to technical data, which will be addressed in appropriate sections of this document.

The DWSAP Program document describes the following:

- The background of the State's DWSAP Program and its goals.
- The minimum acceptable components of a drinking water source assessment under the DWSAP Program.
- The State's efforts to ensure public participation, including meeting with other state agencies, the formation of both Technical and Policy Advisory Committees, and public workshops.

- The roles and duties of government agencies with respect to drinking water source assessment and protection.

- Procedures for performing assessments.

- Guidance for protection programs.

1.1.1 Assessments

The DWSAP Program describes DHS' procedures for conducting drinking water source assessments, including:

- Location of the drinking water source

- Delineation of source area and protection zones for both surface water and ground water sources. The surface water source areas are defined by the boundaries of the watershed; zones, if delineated, are closer to the drinking water supply. The ground water source areas and protection zones are delineated based on readily available hydrogeologic information on ground water flow, recharge and discharge, and other information deemed appropriate by the State.

- Identification of possible contaminating activities (PCAs) that are considered potential origins of contamination within each drinking water source area and its protection zones. PCAs include activities associated with both microbiological and chemical contaminants that could have adverse effects upon human health.

- Determination of the PCAs to which the drinking water source is most vulnerable. The vulnerability determination considers the characteristics of the source and site, the risk ranking of PCAs identified in the inventory, and the proximity of the PCAs to the source.

- Assessments for new drinking water sources by public water systems.

1.1.2 Protection

The DWSAP Program includes California's recommendations to encourage voluntary drinking water source protection:

- Descriptions of state actions to support local entities in developing local protection programs. These include technical assistance, financial assistance, training and demonstration projects.

- Identification of management approaches that can be used to protect the water supply from contaminants associated with PCAs. These approaches may include, as appropriate, implementation of regulatory and non-regulatory control measures and public education.

- Criteria for developing contingency plans indicating the location and provision of alternate drinking water supplies for each public water system in the event of loss of one or more of the normal sources of supply.

1.1.3 Implementation of Assessment and Protection Programs

The DWSAP Program includes California's approach for implementing assessment and protection activities, including

- Description of the methods DHS will use for assessing California's nearly 16,000 active drinking water sources. These methods comprise the minimum components of drinking water assessments.

- Guidance for larger public water systems and others that may choose to perform their own assessments. This guidance states that watershed sanitary surveys already completed satisfactorily for compliance with DHS regulations fulfill most of the assessment components for surface water supplies.

- Guidance for implementing successful drinking water source protection programs at the local level.

1.2 State Contacts

To find out more information about the California DWSAP Program, please contact:

Alexis Milea
Department of Health Services
Drinking Water Program Technical Unit
2151 Berkeley Way, Room 461
Berkeley, CA 94704
(510) 540-2177

Leah Walker
Department of Health Services
Drinking Water Program Technical Unit
50 D Street, Suite 200
Santa Rosa, CA 95404
(707) 576-2295

The Division of Drinking Water and Environmental Management's Web site, accessible via "Prevention Services" on the DHS Web site at http://www.dhs.ca.gov, also contains information on the DWSAP. The site includes a schedule of DWSAP-related events, advisory committee meeting notes, and updates of draft documents related to the program, as well as other material pertinent to California's drinking water.

2.0 DWSAP Program Background, Goals, and Schedule

2.1 Background

2.1.1 Requirement and Authority for DWSAP Program Development

The 1986 Amendments to the SDWA established a new Wellhead Protection Program to protect ground waters that supply drinking water wells of public water systems. Under SDWA Section 1428, each State was required to prepare a Wellhead Protection Program and submit it to EPA by June 19, 1989.

The 1996 Amendments to the SDWA established a related program for states, called the Source Water Assessment Program (SWAP). The key elements of this program—protection area and zone delineation, inventory of possible contaminating activities (PCAs), and vulnerability analysis—are also elements of a Wellhead Protection Program.

EPA's guidance indicates that the intent of the 1996 SDWA amendments was to promote source water protection, with assessments being the initial step.

Section 116762.60 of the California Health and Safety Code requires DHS to develop and implement a program to protect sources of drinking water. The program is to include a source water assessment program and a wellhead protection program.

2.1.2 Coordination of the State Source Water Assessment Program

In California, the source water assessment program is being called the Drinking Water Source Assessment and Protection (DWSAP) Program, and it will satisfy the mandates of both the 1986 and 1996 SDWA amendments. The DWSAP Program is intended to address assessments, and also to facilitate the development of protection programs for both ground and surface waters.

The DHS Drinking Water Program is coordinating the effort with technical support from the State Water Resources Control Board (SWRCB). Members of the DHS DWSAP Program Task Force are:

Bob Hultquist (Chair)	DHS Drinking Water, Technical Programs
Alexis Milea	DHS Drinking Water, Technical Programs
Leah Walker	DHS Drinking Water, Technical Programs
Steve Book	DHS Drinking Water Program Headquarters
Jeff Stone	DHS Drinking Water, Technical Programs
Rich Haberman	DHS Drinking Water, Field Operations Visalia District
Cliff Bowen	DHS Drinking Water, Field Operations San Francisco District
Toby Roy	DHS Drinking Water, Field Operations San Diego District
Gunther Sturm	DHS Drinking Water, Field Operations Lassen District
Burt Ellsworth	DHS Drinking Water, Field Operations Northern California Region
Ken Harris	State Water Resources Control Board, Water Quality Division

Judy Bloom USEPA Region IX, Ground Water Office

2.1.3 Existing Drinking Water Source Protection Programs

Since Congress passed the Wellhead Protection Program requirement in 1986, wellhead protection has been an active program on the national level. As of 1996, 44 states had wellhead protection programs approved by EPA. The remaining states (California, Alaska, Pennsylvania, Iowa, Florida and Virginia) have some elements of wellhead protection or source water protection in place. The groundwater elements of this DWSAP Program constitute California's Wellhead Protection Program.

In California, a number of communities and counties have wellhead protection or watershed protection programs under development or already implemented.

2.1.4 Drinking Water-Related Efforts in California

Under California's surface water treatment regulations, water systems that use surface water for a drinking water supply were required to complete a watershed sanitary survey. This survey included the determination of watershed boundaries and identification of PCAs. January 1, 1996, was the deadline for survey completion and updates are required every five years. As of June 1997, almost all the larger water systems (greater than 1,000 service connections) had completed their surveys. Some small systems have not completed the required surveys, but they will be completed as part of this program.

A number of government agencies, ground water management districts and others have already mapped ground water basins and water supplies within those basins. Some water suppliers, Regional Water Quality Control Boards, and the DHS Drinking Water Program have done a preliminary identification of activities of concern to drinking water sources.
The Groundwater Management Act (Assembly Bill 3030) took effect in January 1993. Under this act, local water agencies or groups of agencies can create their own ground water management plans according to their own requirements and may raise money to run them. A Wellhead Protection Program is an allowable element of an Assembly Bill 3030 (AB 3030) Groundwater Management Plan. As of June 1997, 88 AB 3030 Groundwater Management Plans had been adopted throughout the state. In addition, there are 42 resolutions of intention to adopt plans, and another 55 agencies considering plan adoption.

2.2 Goals of the DWSAP Program

The goals of the DWSAP Program are listed below (not in order of priority):

- **Protection and benefit of public water systems of the State.**

  The focus of the program is information gathering and attention to activities that may affect drinking water quality to enable communities and public water systems to better protect and manage the surface water and ground water resources of the state

- **Improve drinking water quality and support effective management of water resources.**

  The assessments can be used to develop protection strategies that are more economical and desirable than monitoring and treatment of drinking water supplies.

- **Inform communities and drinking water systems of contaminants and possible contaminating activities that may affect drinking water quality or the ability to permit new drinking water sources.**

  As communities and public water systems gather information about activities that have contaminated or may contaminate drinking water sources, they will be able to make better decisions about how to protect and manage existing and future drinking water sources.

- **Encourage a proactive approach to protecting drinking water sources and enable protection activities by communities and drinking water systems.**

  Water suppliers, communities, planners and the public at large are encouraged to actively manage and plan activities around drinking water sources and within their delineated protection areas and zones to reduce or eliminate the threat of contamination.

- **Refine and target the monitoring requirements for drinking water sources.**

  State and federal regulations require water suppliers to monitor for a long list of inorganic and organic chemicals. With proper identification of PCAs, monitoring requirements can be targeted to the needs of the drinking water source. The result is enhanced public health protection with a potential saving in monitoring costs.

  Similarly, regulations require monitoring for microbiological contaminants, some of which may be targeted to specific PCAs. Regulatory limits on other parameters such as turbidity must also be met by drinking water systems. To the extent that these "non-chemical" constituents can be controlled by effective assessment and protection programs, they may bring about monitoring and/or treatment relief. Reductions in organic matter in a drinking water source may also result in lower concentrations of disinfection byproducts.

- **Focus cleanup and pollution prevention efforts on serious threats to surface and ground water sources of drinking water.**

By identifying activities that may pose greater health risks than others to drinking water sources, communities and agencies may be able to prioritize their environmental activities. For example, hazardous waste cleanup, pollution prevention efforts, and other activities of environmental and public health significance that directly improve or protect drinking water supplies may be addressed earlier or allocated more resources than others that are not related to drinking water supplies.

- **Meet federal requirements for establishing wellhead protection and drinking water source assessment programs.**

  Compliance with requirements ensures that the California program meets the minimum national standard for source water protection, and is necessary in order to receive future federal source water protection funds.

- **Assist in meeting other regulatory requirements.**

  Information that is obtained in the DSWAP Program will be of assistance to state and local agencies, communities and public water systems in meeting various regulatory requirements. Examples include the requirements of the California Environmental Quality Act (CEQA), and upcoming federal regulatory requirements, such as the Ground Water Rule and the Enhanced Surface Water Treatment Rule.

2.3 Statutory Schedule and Timeline

States are required to submit a program to EPA within 18 months of EPA's publication of guidance, which occurred on August 6, 1997. Therefore, California must submit its Program to EPA no later than February 1999. California's submittal to EPA for approval will be for both its DWSAP Program and for its Wellhead Protection Program, which is incorporated into the DWSAP.

EPA has nine months to approve California's program. This would occur no later than November 1999.

Thereafter, the State will have two years to complete the assessment for all drinking water sources (November 2001), though an 18-month extension may be obtained (May 2003). US EPA has indicated that it will grant the 18-month extension to states, if requested.

California's time line for completion of assessments for its 16,000 active drinking water sources includes the 18-month extension, so that assessments will be completed by May 2003.

3.0. Minimum Components of Drinking Water Source Assessments

This section includes a brief listing of the minimum components of a drinking water source assessment, with references to pertinent sections and appendices of the document.

An overall review of the implementation of a drinking water source assessment is presented in Section 9.0, and comprehensive checklists for the submission of the assessment are presented in Appendix G for surface water sources and in Appendix N for ground water sources.

DHS recommends using information that is the functional equivalent of all or some components of the source water assessment to fulfill the DWSAP when such information exists. In other words, if a watershed sanitary survey for a surface water source has been prepared, that information should be used for the DWSAP Program. Similarly, when an evaluation of a ground water basin, as done for example for a Groundwater Management Plan, provides information applicable to a ground water source, that information should also be used.

A public water system that is conducting its own drinking water source assessment and intends to use information that it believes is the functional equivalent of a component of the DWSAP Program, should work with DHS to assure that the intended approach satisfies components of the DWSAP Program.

3.1 Surface Water Source of Drinking Water

✓**Location of the Drinking Water Source.** Section 9.1 and Appendix A.

The location (latitude, longitude) of the intake or well shall be determined by a global positioning system (GPS) with accuracy of 25 meters, or by another method with equivalent accuracy. An interim location may be obtained through use of a USGS quad map (7.5 minute series)., or another method with similar accuracy.

✓**Delineation of Source Area and Protection Zones.** Section 6.1, and Appendix B.

Identify watershed boundaries.

Zones are not required, but if they are established, the distances listed below may be used. For large water bodies, the zones may be limited to the area within an appropriate travel time distance from the intake.

400 feet from banks of reservoir, or primary stream
200 feet from tributaries
2,500 feet from intakes

✓**Drinking Water Physical Barrier Effectiveness Checklist.** Section 8.2.1 and Appendix C.

Evaluate the drinking water source and its site characteristics in terms of the effectiveness of the physical barriers in preventing contaminants from reaching the source:

> Complete form and make determination of the effectiveness of the source's physical barriers to contamination, based on geology and hydrogeologic considerations: Low, Moderate, or High.

✓**Inventory of Possible Contaminating Activities (PCAs).** Section 7.0 and Appendix D.

Use checklists to identify the types of PCAs that occur in the source area (watershed) and in zones, if zones are established.

> Attach a list to the assessment map of the types of PCAs identified in the inventory and the area or zone(s) in which they occur (see Vulnerability Ranking).

✓**Vulnerability Ranking.** Sections 8.0 and Appendix F.

Evaluate each PCA in terms of its risk ranking, location (on watershed or in zones), and the Physical Barrier Effectiveness of the source. Prioritize PCAs to identify those to which the source is most vulnerable. Prepare prioritized listing of PCAs and attach to the assessment map.

✓**Assessment Map.** Section 9.0 and Appendix G.

Prepare an assessment map (based on a USGS quadrangle map, 7.5 minutes series) that shows:

1. Location of the drinking water source (surface water intake)

2. Source area (watershed for surface water source)

3. Zones (optional for surface water sources)

4. Attached prioritized listing of PCAs with the area or zone(s) in which they occur, and indicating to which the source is most vulnerable.

✓**Completion of Assessment and Summary.** Section 9.5 and Appendix G.

Complete the assessment and prepare a summary. Submit to the DHS Drinking Water Program district office.

The completed assessment should include the assessment map, delineation calculations, physical barrier effectiveness checklists, PCA inventory forms, vulnerability ranking, and other information presented on the checklist in Appendix G.

✓**Public Notification.** Section 9.6 and Appendix G.

The following information on the assessment must be included in the water system's annual consumer confidence report:

- A statement that a drinking water source assessment has been conducted.
- The date of the assessment.
- Location where assessment is available for review (local DHS district office and, when feasible, at the public water system's office).
- A statement that a summary of the assessment can be mailed upon request.
- A vulnerability summary of the assessment identifying the PCAs to which the system is most vulnerable.
- A contact phone number.

3.2 Ground Water Source of Drinking Water

✓**Location of the Drinking Water Source.** Section 9.1 and Appendix H.

The location (latitude, longitude) of the intake or well shall be determined by a global positioning system (GPS) with accuracy of 25 meters, or by another method with equivalent accuracy. An interim location may be obtained through use of a USGS quad map (7.5 minute series) or another method with similar accuracy.

✓**Delineation of Source Area and Protection Zones.** Section 6.2 and Appendix I.

Identify recharge area boundaries (if known) and indicate on the assessment map.

Zones are required.

<u>Minimum acceptable method for determining zones</u>

Calculated fixed radius (CFR) method.

Modified CFR, if direction of groundwater flow is known.

[DHS and LPAs may use arbitrary fixed radius, at minimum distances specified in Table 6-2, for non-community systems.]

Minimum distances of zones

The minimum radii of zones, determined from CFR equation, except for wells in fractured rock aquifers, are:

600 feet for Zone A (microbiological)
1,000 feet for Zone B5 (chemical)
1,500 feet for Zone B10 (chemical)

For fractured rock aquifers, the minimum radii are:

900 feet for Zone A (microbiological)
1,500 feet for Zone B5 (chemical)
2,250 feet for Zone B10 (chemical)

Delineation methods more sophisticated than CFR or modified CFR are not subject to minimum distances.

Maximum distances of zones

Zones for a drinking water source need not extend beyond a known hydrogeologic boundary.

✓**Drinking Water Physical Barrier Effectiveness Checklist.** Section 8.2.1 and Appendix J.

Evaluate the drinking water source and its site characteristics in terms of the effectiveness of the physical barriers in preventing contaminants from reaching the source:

Complete form and make determination of the effectiveness of the source's physical barriers to contamination, based on geology and hydrogeologic considerations: Low, Moderate, or High.

✓**Inventory of Possible Contaminating Activities (PCAs).** Section 7.0 and Appendix K.

Use checklists to identify the types of PCAs in the protection zones (and in the source area, if information is readily available).

Attach a list to the assessment map of the types of PCAs identified in the inventory and the area or zone(s) in which they occur (see Vulnerability Ranking).

✓**Vulnerability Ranking.** Sections 8.2.1 and Appendix M.

Evaluate each PCA in terms of its risk ranking, location (zone), and the Physical Barrier Effectiveness of the source. Prioritize PCAs to identify those to which the source is most vulnerable. Prepare prioritized listing of PCAs and attach to the assessment map.

✓**Assessment Map.** Section 9.0 and Appendix N.

Prepare an assessment map (based on USGS quadrangle map, 7.5 minute series) that shows:

1. Location of the drinking water source (well).

2. Source area (zones plus recharge area, if known, for groundwater source)

3. Zones (required for ground water sources)

4. Attached prioritized listing of PCAs with the area or zone(s) in which they occur, and indicating to which the source is most vulnerable.

✓**Completion of Assessment and Summary.** Section 9.5 and Appendix N.

Complete the assessment and prepare a summary. Submit to the DHS Drinking Water Program district office.

The completed assessment should include the assessment map, delineation calculations, physical barrier effectiveness checklists, PCA inventory forms, vulnerability ranking, and other information presented on the checklist in Appendix N.

✓**Public Notification.** Section 9.6 and Appendix N.

The following information on the assessment must be included in the water system's annual consumer confidence report:

- A statement that a drinking water source assessment has been conducted.
- The date of the assessment.
- Location where assessment is available for review (local DHS district office and, when feasible, at the public water system's office).
- A statement that a summary of the assessment can be mailed upon request.
- A vulnerability summary of the assessment identifying the PCAs to which the system is most vulnerable.
- A contact phone number.

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PART TWO

Roles of the Public and Government Agencies in the Development of California's DWSAP Program

A description of the public participation in the development of the DWSAP, and the activities of government agencies that are related to drinking water assessment and protection

Section 4—Public participation in the DWSAP Program

Section 5—Roles and responsibilities of government agencies

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4.0 Public Participation in the DWSAP Program

Public participation in developing the DWSAP Program is crucial to the success of the program, because it:

(1) ensures that interested parties understand the proposed program
(2) provides technical review of the program elements
(3) helps forge consensus among parties affected by the program
(4) ensures that concerns of the public are fully addressed, and
(5) fosters a closer working relationship between government agencies and the public.

Public involvement in the program itself is required at three different levels. The first level is during the development of the statewide DWSAP Program. The second level is the availability or distribution of drinking water source assessments for public review after they are completed (Part Three of this document). The third level is during development of voluntary local drinking water source protection programs (Part Four).

Listed below are the public involvement steps in the development of the California DWSAP Program.

4.1 Stakeholders in the Process

Agency stakeholders. In April 1997 the Department of Health Services convened an interagency group of federal, state and local agencies including: the US Environmental Protection Agency, the US Geologic Survey, the US Bureau of Land Management, the US Bureau of Reclamation, the US Forest Service, the CalFed Program (which deals with issues of San Francisco Bay and the Sacramento River/San Joaquin River Delta), the Department of Water Resources, the State Water Resources Control Board, Regional Water Quality Control Boards (North Coast, Colorado River Basin, Lahontan, Central Valley), the Department of Pesticide Regulation, the Department of Food and Agriculture, the Department of Forestry and Fire Protection, the California Council of Directors of Environmental Health, and local environmental health departments (Riverside County and Contra Costa County).

The purpose of the meeting was to explain the DWSAP Program, identify key players in related programs, and discuss program implementation. The principal issues discussed were standardized mapping to facilitate integration of information, protection areas and zones for delineation purposes, PCA inventories, drinking water source and site characteristics, vulnerability analyses, and public participation.

Other stakeholders. A list of approximately 120 individuals or representatives from various organizations interested in or potentially affected by the DWSAP program has been developed for California. This list, which represents a broad spectrum of the general public, was used to develop the Public Policy Advisory Committee, described below. Additional people or organizations were added during development of the program.

Stakeholder groups are presented in Table 4-1.

4.2 Technical and Policy Advisory Committees

A Technical Advisory Committee was developed to review and comment on the technical elements of the program. This committee was comprised of technical experts in ground water and surface water and protection (Table 4-2). The Technical Advisory Committee met in August and November 1997 and February, April, June, August and November 1998 to review and comment on proposed program elements. A subcommittee of the Technical Advisory Committee met six times by telephone during February to June 1998.

The Public Policy Advisory Committee included stakeholders who wanted to be actively involved in the program development. DHS sent invitations for the first meeting of the advisory committee to over 120 individuals representing stakeholder business, industry, agriculture, environmental groups, medical and public health advocacy organizations, and others. The committee also met in August and November 1997 and February, April, May, August and October 1998 to review and comment on drafts of the DWSAP program, and on the schedule, format, and agenda for the public workshops.

Members of both committees were invited to comment on any aspect of the program, and to attend each other's meetings. Meetings were also open to any interested parties.

4.3 Mailing List of Interested Parties

A DWSAP Program mailing list of approximately 300 was developed, comprised of interested parties, including members of the various advisory committees and the interagency group. Notifications of meetings of the technical and public policy advisory committees and public workshops, along with drafts of the DWSAP Program, were sent to those on the mailing list.

4.4 Development and Availability of Draft DWSAP Program Documents for Comment

Drafts of the DWSAP Program were submitted to the advisory committees for review and comment. Additionally, drafts were sent to local, state and federal agencies, the American

Waterworks Association, Association of California Water Agencies, and other organizations. These groups were requested to submit comments. As mentioned above, drafts were also provided to those on the DWSAP Program mailing list.

DHS also made drafts of the DWSAP Program available by posting them on the Internet (accessible via "Prevention Services" and "Division of Drinking Water and Environmental Management" at the DHS Web site, http://www.dhs.cahwnet.gov), with a request for comments. DHS is responding to comments submitted by the public during development of the DWSAP program, and intends to indicate its response in its submittal to US EPA. Comments received by e-mail are read and incorporated into revised documents as appropriate, but only those comments received as hard copy are addressed in the more formal response mechanism.

4.5 Public Outreach

Materials on the Internet

Since October 1997, DHS has used its Web site to present information related to the DWSAP Program. The information includes the schedule of advisory committee meetings, workshops, and other activities, notes from those meetings, and other information that provides updates on the program and invites public participation. Copies of this information have been provided to the DWSAP mailing list, and on request to those without Internet access.

Staff presentations

Presentations on the DWSAP Program were made in 1997 and 1998 by DHS staff from headquarters and field offices staff. Information on the programs was presented to professional organizations, water supplier organizations, watershed management groups, and other interest groups and organizations. A list of presentations will accompany the program submittal to US EPA.

Public workshops

Nine informational workshops were held at five locations around the state (Chino, Fresno, Redding, San Francisco Bay Area, Thousand Oaks) in April and May 1998. These workshops explained the DWSAP Program and invited comments from the general public.

4.6 Revisions of the DWSAP Program Document

Comments and suggestions for improvements from members of the advisory committees, and other comments that DHS staff received from the public (for example, during presentations or workshops) have been incorporated into the DWSAP Program document. The first draft

DWSAP was released in October 1997. Revised drafts were made available to the public in January, April, and August 1998.

4.7 Final Public Comment Period

A public comment period on the final review draft occurred in August-September 1998. Written comments were received from eighteen agencies, organizations and individuals. DHS has prepared a response to the comments and has addressed many of the concerns in the final draft of the DWSAP program.

Table 4.1 Potential Stakeholders

Public Agencies
Counties
Cities
Regional Water Quality Control Boards
Water Districts
Sewage Districts
Sanitation Districts
Flood Control Districts
Ground Water Management Districts
Resource Conservation Districts
Department of Fish and Game
Department of Toxic Substances Control
Department of Pesticide Regulation
Integrated Waste Management Board
Office of Environmental Health Hazard Assessment
Department of Water Resources
Department of Food and Agriculture
State Water Resources Control Board
Teale Data Center
National Resources Conservation Service
US Bureau of Reclamation
US Environmental Protection Agency
US Fish and Wildlife Service
US Forest Service
US Geological Survey

Private Companies
Agriculture
Mining
Gravel Production
Private Water Companies
Well Drillers
Manufacturing, Petroleum, and other Industries
Landfill Operators

Private Organizations
Farm Bureau
Chambers of Commerce
Construction/Real Estate Organizations
Well Drillers' Groups
Mutual Water Companies
Agricultural Groups
Environmental Groups
Recreational Groups
Watershed Conservancies
Consumer Groups
Rate-payer Groups
Water-Oriented Associations
Planning Associations

Individuals
Pumpers
Farmers
Rate-payers
Consumers
Educators

Others
UC Agricultural Extension
Public Health Groups
Vulnerable Population Groups
Business Groups representing Chemical Manufacturing
Tribes

Table 4.2 Technical Advisory Committee

Elaine Archibald	Water Industry Consultant
Norm Brown	Integrated Water Technologies
Neil Dubrovsky	US Geological Survey
Pat Dunn	California Department of Pesticide Regulation
Terry Fleming	US Environmental Protection Agency
Carl Hauge	California Department of Water Resources
John Letey	University of California Center for Water & Wildland Resources
Bruce Macler	US Environmental Protection Agency
Mary Ann Mann	Metropolitan Water District of Southern California
Jon Marshack	Central Valley Regional Water Quality Control Board
Sue Murphy	California Rural Water Association
Richard Nagel	San Fernando Valley Water Master
Harrison Phipps	Groundwater Resources Association of California
Anthony Saracino	Groundwater Resources Association of California
Paul Veisze	California Department of Fish and Game
Nira Yamachika	Orange County Water District

5.0 Roles and Responsibilities of Government Agencies

A variety of state, local and federal agencies have responsibilities and authority for protection of ground water and surface water supplies. Drinking water source protection does not transfer authority for potential pollution control away from existing agencies. Information developed during source water assessments (delineation, PCA inventory and vulnerability analysis) may be used by agencies with existing authority in setting priorities for technical assistance, outreach, field inspections, enforcement actions and other activities.

Private water purveyors also administer some water-related activities, especially in regard to water importation, recharge, reclamation, pumping, and reuse.

This section will describe the roles and responsibilities of various governmental agencies with respect to the drinking water source assessment and protection program. Information generated and maintained by a number of these agencies is accessible through DHS' directory of source water protection-related activities.

A number of government agencies were contacted to determine their existing activities that may have application in carrying out a drinking water source assessment or in providing information for a voluntary source water protection program. A survey form was sent out and responses were received from the agencies listed below. A compilation of the information received is shown in Table 5-1.

Local Agencies

City of Benicia

Contra Costa County, Environmental Health Division
Sonoma County, Permit and Resource Management Department
Placer County Environmental Health Department
Riverside County, Department of Environmental Health

State Agencies

Air Resources Board, Stationary Source Division
Department of Water Resources
Department of Forestry and Fire Protection (CDF)
State Fire Marshall/ Pipeline Safety and Enforcement Division (Part of CDF)
Integrated Waste Management Board

Department of Toxic Substances Control
Department of Pesticide Regulation
Department of Health Services, Division of Drinking Water and Environmental Management
State Water Resources Control Board, Clean Water Programs
State Water Resources Control Board, Division of Water Quality
State Water Resources Control Board, Division of Water Rights
Regional Water Quality Control Board, North Coast Region 1
Regional Water Quality Control Board, Central Coast Region 3
Regional Water Quality Control Board, Los Angeles Region 4
Regional Water Quality Control Board, Central Valley Region 5
Regional Water Quality Control Board, Lahontan Region 6
Regional Water Quality Control Board, San Diego Region 9

Federal Agencies

U.S. Department of Agriculture, Forest Service
U.S. Department of Agriculture, Natural Resources Conservation Service
Department of the Interior, Bureau of Land Management
U.S. Environmental Protection Agency, Region 9

State/Federal Agency

CalFed Bay Delta Program

5.1 Local Agencies

5.1.1 Counties and Cities

California has fifty-eight (58) counties. Various county departments, such as planning, building, permitting, public works and environmental health, have jurisdiction over many activities that are related to the protection of water supplies. Thirty-four (34) of the counties have been designated Local Primacy Agencies (LPAs) to carry out the regulation of small public water systems.

Besides its counties, California also has more than 450 incorporated cities and many other municipalities. These local governments are often concerned with ensuring the availability of high-quality water supplies to residents. State enabling legislation gives local governments variable powers and duties, depending on how they were formed, to protect water supplies.

A variety of water-related activities are undertaken by county and city governments. These include:

Ground Water Recharge
Hazardous Materials Spills Emergency Response
Hazardous Waste Management Planning
Land Use Planning and Zoning
Large and Small Water Supply Systems Monitoring
Pesticide Regulation by County Agricultural Commissioners
Regulation of Individual Waste Disposal (Septic) Systems
Regulation of Underground Storage Tanks
Sanitary Landfill Ground Water Monitoring
Solid Waste Management Planning
Water Well Permitting
Watermaster for an Adjudicated Basin

5.1.2 Special Districts

California has thousands of special districts that undertake or have authority for activities related to drinking water source assessment and protection. The types of districts include:

Flood Control and Water Conservation Districts
Public Utility Districts
Community Services Districts
Sewer and Sewer Maintenance Districts
Storm Water Drainage and Maintenance Districts
Water Replenishment Districts
Reclamation Districts
Irrigation Districts
Levee Districts
Local Drainage Districts
Resource Conservation Districts and Water Conservation Districts

The drinking water protection related activities that these districts undertake may overlap those of cities and counties. The activities include:

Ground Water Management
Control/Correction of Saline Water Intrusion
Ground Water Recharge
Land Reclamation
Watershed Protection
Water Conservation

Irrigation Water Supply
Sewer Construction and Maintenance
Drinking Water Supply
Sewage Collection, Treatment and Disposal
Power Supply
Refuse Disposal
Soil Conservation
Wet, Swamp and Overflowed Land Drainage

Local governments sometimes expand and coordinate activities through "Joint Powers Authorities" pursuant to §6500 et seq. of the California Government Code, which includes the formation of separate agencies or entities.

5.2 State Agencies

A number of State agencies, boards, departments, and offices share responsibility with federal and local agencies for ground and surface water protection in California (see Table 5-1). They are identified and their roles briefly described below:

The **Health and Welfare Agency** houses the **Department of Health Services (DHS)**:

Division of Drinking Water and Environmental Management (DDWEM)

The DDWEM, within DHS, promotes public health through the regulation and monitoring of public water systems, wastewater reclamation projects, disposal of low level radioactive waste, shellfish production and harvesting operations, and medical waste generators.

DDWEM is responsible for carrying out the federal Safe Drinking Water Act (SDWA) in California. Activities of DDWEM related to drinking water source assessment and protection are primarily conducted by the Drinking Water Field Operations Branch (DWFOB) and the Drinking Water Technical Programs Branch (DWTPB).

The DWFOB is responsible for the inspection and regulatory oversight of approximately 8500 public water systems to assure delivery of safe drinking water to all California consumers. There are 15 district offices distributed widely throughout the state. Activities involved in the oversight of public water systems include issuing permits, performing inspections of existing facilities, reviewing plans for new facilities, issuing administrative orders and citations to public water systems for violations of laws and regulations, and ensuring that public water systems comply with water quality standards and monitoring requirements.

The DWTPB is responsible for providing technical support for the drinking water program and carrying out its administrative functions. The branch is composed of the Technical Operations Section and the Technical Programs Section. The Technical Operations Section administers its programs through several units: Certification Unit (certification of water treatment operators and water treatment devices), the Standards and Technology Unit (development of monitoring and water quality regulations and conduct special studies and programs), and the Recycled Water Unit (development of recycled water criteria and regulations, proposal evaluation and recommendations). The Technical Programs Section includes the Data Management Unit, which collects, compiles, evaluates and reports drinking water quality data from large and small drinking water systems in the State.

The **California Environmental Protection Agency (Cal/EPA)** serves as the point of accountability for the management of the State's environmental protection programs, bringing together functions that cut across various programs designed to address environmental pollution. Organizations in Cal/EPA are:

State Water Resources Control Board (SWRCB)

The SWRCB formulates and adopts the State's policy for water quality control, assisting and overseeing the Regional Water Boards, and in conjunction with the courts, administers California's system of water rights.

Regional Water Quality Control Boards (Regional Water Boards)

The nine Regional Water Boards formulate, adopt, and implement (with State Water Board approval) water quality control policies and plans within their jurisdiction. Collectively, the nine Regions cover all of California. Each Regional Water Board designates beneficial uses of surface and ground water resources, and establishes water quality objectives to reasonably protect existing and potential beneficial uses of water resources in its region, as well as implements programs to achieve compliance with the water quality objectives. Beneficial uses, water quality objectives, and the implementation program are specified in each region's Water Quality Control Plan, as called for in the California Water Code, §13240.

Regional Board activities related to drinking water source assessment and protection include:

Basin Planning

Each Regional Water Board has adopted one or more Water Quality Control Plans (Basin Plans) for their jurisdiction, which is based upon surface water hydrologic basin boundaries. The Basin Plans identify existing and potential beneficial uses of marine, ground, and surface waters; establish water quality objectives to protect the beneficial uses; specify implementation programs to achieve these objectives; and describe surveillance and monitoring activities to evaluate the effectiveness of the water quality program.

Basin Plans contain standards for surface water and ground water quality that are independently established by each Regional Water Board as water quality objectives necessary to protect the identified beneficial uses. Thus, there are differences both among and within Regions, depending upon the particular ground water basin and the assigned beneficial uses.

National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirements

Under the authority of the federal Clean Water Act, the NPDES program regulates point source discharges to surface waters such as wetlands, lakes, rivers, estuaries, bays and oceans. In California, the Porter-Cologne Water Quality Control Act regulates any discharge of waste that may affect water quality in California. Waste discharges are declared to be a privilege, not a right, and require permission from the applicable Regional Water Board.

Waste Discharges to Land

The State Water Board has adopted regulations (California Code of Regulations, Title 23, Chapter 15, and Title 27) which implement provisions in the Porter-Cologne Act. These regulations apply to all hazardous and non-hazardous wastes discharged to land, including surface impoundments. The Chapter 15 regulations prescribe siting standards, construction standards, ground water and vadose zone monitoring requirements, and closure and post-closure procedures and requirements.

Protecting ground and surface water from the migration of contaminants from solid waste disposal facilities is the responsibility of the State and Regional Water Boards. This responsibility is executed by requiring all solid waste disposal facilities to conform to waste discharge requirements adopted by a Regional Water Board.

Hazardous Waste Facility Monitoring

Under a Memorandum of Agreement with DTSC, the State and Regional Water Boards carry out a ground water monitoring and surveillance program, perform water quality-related review work, and develop regulations, standards, and

guidelines pursuant to the federal Resource Conservation and Recovery Act (RCRA).

Underground Storage Tanks

In 1983, the California Legislature enacted underground tank legislation requiring an inventory of underground storage tanks along with a program to permit their continued use. The State Water Board, the nine Regional Water Boards, and local agencies share responsibility for enforcement and cleanup. The State Water Board compiled the inventory of underground containers in California and provided this information to the appropriate Regional Water Boards, cities, and counties. The container inventory, as directed by the legislation, also included pits, ponds, sumps, and lagoons, each storing a wide variety of substances.

The State Water Board established standards for the monitoring of existing tanks and the construction of new ones. These, along with requirements for repair and closure, are described in the California Code of Regulations, §2610 et seq.

Non-Point Source Pollution

The federal Clean Water Act was amended in 1987 to include Section 319, which required the states to develop and implement non-point source management programs. The State Water Board subsequently adopted a "Non-point Source Management Plan" in 1988, and by early 1990, had organized a multi-faceted, surface and ground water, non-point source program which focused on agriculture, mining, urban runoff, construction, and pesticides. The non-point source program seeks to reduce or eliminate surface and ground water pollution through the implementation of management measures to control non-point source pollution at its source.

Remediation

The Regional Water Boards, in responding to a surface or ground water pollution problem or nuisance, may issue a "cleanup and abatement" order to any responsible party to require corrective action. Their authority covers all discharges of waste, hazardous or otherwise, which enter or threaten to enter surface or ground water.

Coastal Zone Act Reauthorization Amendment (CZARA) of 1990

The two primary federal statutes that establish a framework for address nonpoint source (NPS) pollution are Section 319 of the Clean Water Act (1987) and Section 6217 of the CZARA. Together, they encourage states to assess water quality problems associated with NPS and to develop programs to control NPS sources of pollution. CWA §319 requires that states develop an assessment report and a management program specifying NPS controls. CZARA §6217(a) requires states to establish coastal NPS programs to develop and implement management

measures for NPS pollution to restore and protect coastal waters. California received $5.4 million of federal funding under the CWA in 1997 to carry out its NPS program.

In 1988, the SWRCB adopted the California NPS Management Plan that outline a three-tiered approach for address polluted runoff: (1) voluntary implementation of Best Management Practices (BMPs), (2) regulatory-based encouragement of BMPs, and (3) effluent limitations. In response to CZARA §6217, the SWRCB, the RWQCBs, and the California Coastal Commission initiated a joint effort to improve the state-wide NPS program and comply with CZARA requirements. As a result, California is working to enhance its state-wide NPS program by better utilizing existing state authorities and programs, pursuing watershed approaches, and encouraging voluntary cooperation.

Other Activities Conducted by the State and Regional Boards

Other activities related to source water protection include: Water quality assessments (Clean Water Act Section 303d updates), routine aerial surveillance, AB2021 report to legislature (Pesticide Contamination Prevention), and the Above Ground Storage Tank program.

Department of Toxic Substances Control (DTSC)

The DTSC protects public health and the environment from the improper handling storage, transport, and disposal of hazardous substances.

DTSC's primary activities related to drinking water source assessment and protection are included in two programs mandated by federal law:

Resource Conservation and Recovery Act (RCRA)

Under the federal Toxic Substances Control Act, the USEPA regulates the treatment, disposal (including incineration, landfill, alternative technology), and storage of hazardous chemical substances. The federal RCRA Program has been delegated to DTSC. This program regulates the treatment, transportation, storage and disposal of hazardous waste.

DTSC, under Health and Safety Code §25100, issues permits that govern the general operation of hazardous waste management facilities. They specify conditions on the way hazardous materials may be transported, handled, treated, stored, or disposed. The permits also impose conditions for waste analysis, record keeping, site monitoring, containment procedures, site improvements, closure procedures, and financial responsibility.

California Superfund Program

DTSC is authorized by California's Hazardous Waste Control Law and Hazardous Substance Account Act (California Superfund) with enforcement powers for the cleanup of hazardous substances. Their program complements the federal "Superfund" program and provides for: (1) cleanup or impact reduction at hazardous waste sites, (2) response capability to State and local agencies in hazardous substance emergencies, and (3) compensation to persons who suffer loss or injury caused by the release of a hazardous substance.

DTSC specifies their approach in their *Preliminary Endangerment Assessment Guidance Manual*. The DTSC cleanup strategy is based on a health risk assessment approach.

Department of Pesticide Regulation (DPR)

DPR regulates the use and management of pesticides to prevent pollution of surface water bodies and ground water aquifers that may be used for drinking water supplies, as mandated in the State Pesticide Contamination Prevention Act (1986).

DPR is responsible for regulating the sale and use of pesticides, evaluating and mitigating environmental and human health impacts of pesticide use, and promoting alternative pest control strategies. The DPR program relies on authorities in the California Food and Agriculture Code (§13141 et seq.).

Additional authorities in the California Pesticide Contamination Prevention Act require the DPR to carry out specific activities to prevent ground water from being contaminated. Prevention is the preferred goal, because once ground water has become contaminated, cleanup activities are very difficult, expensive, and time consuming. This Act requires: (1) Pesticide registrants to submit specific information to the DPR regarding the impacts of their products on ground water; (2) DPR to identify pesticides that have the potential to pollute ground water to be put on a Ground Water Protection List; and (3) DPR to conduct a monitoring program for pesticides in soil and ground water.

As specified in a Memorandum of Understanding between DPR and the State Water Board, DPR is the first agency to respond to any detection of a pesticide in surface water or ground water with voluntary measures and/or regulatory action.

DPR is currently developing a program to identify areas in the state where ground water is potentially vulnerable to pesticide contamination.

Integrated Waste Management Board (IWMB)

The IWMB oversees the safe treatment, storage, recycling, disposal of solid waste by local agencies.

Air Resources Board (ARB)

The ARB regulates emissions of air pollutants than can effect the quality of surface and ground water.

Office of Environmental Health Hazard Assessment (OEHHA)

OEHHA provides information to environmental regulators and the public about adverse health effects that result from environmental exposures to noninfectious agents.

OEHHA's mission is to protect and enhance public health and the environment by objective scientific evaluation of risks posed by hazardous substances.

OEHHA's functions and responsibilities related to drinking water source assessment and protection include developing health-protective exposure standards for different media (air, water, land) to recommend to regulatory agencies, including drinking water chemical contaminant standards for DHS. OEHHA's Water Toxicology Unit performs major risk assessment and hazard evaluations relating to chemical contaminants in drinking water. These activities include developing health advisories, action levels, proposed maximum contaminant levels, and public health goals for chemical substances, additives, and pollutants in drinking water and on chemical monitoring activities for the drinking water supply. The program also provides education to the public and other governmental agencies on drinking water contamination and regulatory standards development.

OEHHA is responsible for implementing the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). This initiative statute prohibits businesses from discharging into drinking water sources chemicals identified by the State to cause cancer or reproductive toxicity. It also requires warnings to be provided whenever exposures to those chemicals are anticipated to occur.

The **Resources Agency** includes several pertinent departments:

Department of Water Resources (DWR)

The DWR develops, conserves, and manages the water resources of the State.

The mission of the Department of Water Resources is to manage the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.

Major responsibilities of the Department include preparing and updating the California Water Plan to guide development and management of the State's water resources. The State and Regional Water Boards must consider this Plan in their decisions. In addition, the Porter-Dolwig Ground Water Basin Protection Law (California Water Code §12920 et seq.) gives the DWR authority to initiate or participate in investigations, studies, plans and design criteria for projects to prevent degradation of ground water throughout the State.

The Department also administers increasingly complex programs involving flood control for the Central Valley, dam safety for more than 1,200 dams statewide, local assistance projects, water management strategies, water quality improvement, and water supply data collection and studies. DWR staff provides technical and financial assistance to local water communities; works with a number of governmental and wildlife agencies on environmental issues and projects; manages State Water Project and Reclamation Board lands; educates the public about California's water resources; and operates and maintains the State Water Project.

DWR provides support for the use of ground water though the distribution of hydrogeologic studies and other technical information. In addition, well drillers are required to file a report to DWR on each well drilled.

Department of Conservation (DOC)

Among other functions, the Division of Oil, Gas, and Geothermal Resources (DOGGR) within the DOC acts to prevent contamination of ground water due to the drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells. This includes both extraction and injection wells.

The State Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) issues permits for the approximately 21,000 Class II (oil/gas production) injection wells in California. These are accepted by the USEPA for the Underground Injection Control program under one Memorandum of Understanding with DOGGR and accepted by the Regional Water Boards under another Memorandum of Understanding.

California Department of Forestry and Fire Protection (CDF)

The Department of Forestry and Fire Protection protects the people of California from fires, responds to emergencies, and protects and enhances forest, range and watershed value providing social, economic and environmental benefits to the citizens of the State. Managing California's natural resources is an important part of the Department's mission. CDF oversees enforcement of California's forest practice regulations. This includes review of Timber Harvest Plans submitted by private landowners and logging companies who want to harvest trees on their property. CDF also operates six Demonstration State Forests where research and experiments in forest management are conducted.

State Fire Marshal, Pipeline Safety Division (CSFM)

Within CDF, the California State Fire Marshal has the exclusive responsibility of regulating and enforcing safety on all intrastate hazardous liquid pipelines within the state, including some of the pipelines coming from offshore platforms located within three miles of the California coast.

CSFM is also recognized as an interstate agent of the United States Department of Transportation's Office of Pipeline Safety (OPS). As such, CSFM is responsible for inspection, investigation and emergency response concerning interstate pipelines.

The **Department of Food and Agriculture (DFA)** is a cabinet level agency.

Among other functions, DFA inventories agricultural operations, dairies, and animal feedlots. DFA also investigates water quality issues involving the accumulation of nitrate in ground water.

5.3 Federal Agencies

Federal water programs are administered primarily by the U.S. Environmental Protection Agency. The U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, the U.S. Department of Agriculture (USDA) and other federal agencies play complementary roles. The U.S. Geological Survey (USGS) principally compiles information that assists others in their water protection efforts.

National Resources Conservation Service (NRCS)

NRCS (previously known as the Soil Conservation Service) has a long history of addressing non-point source pollutants by working with farmers and communities

through voluntary implementation programs. NRCS assistance has primarily focused on nutrients, pesticides, sediment, animal wastes, and salinity issues in surface and ground waters. Assistance encompasses planning and preventive measures to small scale monitoring and suggestions of conservation practices to help solve non-point source pollution problems. NRCS also offers point, field and watershed models to predict the transport and fate of these parameters in surface and subsurface waters.

US Geological Survey (USGS)

The role of the USGS is to serve as the primary earth sciences research agency in the United States. The Survey has no regulatory or management responsibilities, and is focused entirely on the need to provide sound scientific data, information, and assessments in support of those agencies that have regulatory and management responsibilities for geologic, hydrologic and, now, biologic resources.

U.S. Environmental Protection Agency (US EPA)

Several federal programs related to drinking water source assessment and protection are administered by the U.S. Environmental Protection Agency. The primary purpose of the Safe Drinking Water Act (SDWA) is to ensure the safety of drinking water served to the public. The SDWA includes the Wellhead Protection Program, the Sole Source Aquifer Program, and the Underground Injection Control Program.

Other federal environmental laws to protect water supplies include, but are not necessarily limited to, the Clean Water Act (CWA) which ensures protection of surface waters designated, in part, for use as drinking water; the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, otherwise known as “Superfund”), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). These laws provide authorities, financial support, and technical assistance to protect sources of drinking water, especially ground water.

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Table 5-1. Matrix of Drinking Water Source Water Assessment and Protection Roles.

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PART THREE

Source Water Assessments

A description of the procedures DHS will use in conducting source water assessments for ~16,000 active drinking water sources in California

Section 6—Delineation of source areas and protection zones

Section 7—Inventory of activities within source areas and protection zones

Section 8—Vulnerability of drinking water sources to contamination

Section 9—Implementation of the Drinking Water Source Assessment Program

Section 10—New drinking water sources

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6.0 Delineation of Source Areas and Protection Zones

The delineation step in the assessment defines the boundaries of the areas to be evaluated. Appendices A and B should be used for source location and delineation of surface water sources, and Appendices H and I, for ground water sources.

6.1 Delineation for Surface Water Sources

The source area for surface water sources in the DWSAP Program is the area within the boundaries of the watershed that is tributary to the surface water intake. This is consistent with California Code of Regulations, Title 22, Chapter 17, Section 64665, which requires each public water system with a surface water source to conduct a watershed sanitary survey. In December 1993, a Watershed Sanitary Survey Guidance Manual was prepared by the American Waterworks Association (AWWA), California/Nevada Section, Source Water Quality Committee, in conjunction with the DHS Division of Drinking Water and Environmental Management. The guidance specifies that the area to be surveyed should include the entire watershed boundary.

As an option, in addition to the source area, a public water system may desire to establish zones closer to the surface water intake. The purpose of these zones is to define portions of the watershed where activities have a higher risk of contaminating the water supply. Within the zones, there could be a more thorough evaluation of activities that occur. The zones would aid in establishing both the appropriate levels of surveillance, and management (or voluntary protection) approaches.

Zones can potentially reduce the effort involved in conducting source water assessments. California surface water treatment regulations require water purveyors to survey the entire watershed. If zones are established, DHS may allow a less detailed review on portions of the watershed outside the zones. In addition, in the vulnerability analysis (Section 8.0), surface water sources that have zones defined will be able to assign less risk to possible contaminating activities (PCAs) located on the watershed, but outside of the zones. If zones have not been defined, PCAs are considered to be of equal risk, regardless of their location on the watershed.

To establish zones for surface water sources of drinking water, a variety of methods may be used. These include:

1. **Fixed Distance:** In this method, an example of which is shown in Figure 6-1, setbacks from reservoir boundaries, tributaries and/or the intake may be established by using fixed distances. This method, while not technically sophisticated, is relatively simple to implement.

2. **Time-of-Travel:** In this method, the protection zone is actually a stream reach rather than an area. This method is typically used for determining response times for spill events. The time-of-

travel between an upstream monitoring point and the point of interest is calculated. Potential contaminants with a certain time-of-travel would be of primary concern.

3. **Modeling:** Surface runoff and ground water discharge models can be used to assess the impact of individual contaminants from possible contaminating activities (PCAs), and to identify areas within the watershed with the greatest potential impact on drinking water source quality.

Regardless of the method used, factors that may be considered in determining zones include topography (slopes), soils, geology, vegetation, precipitation, hydrology and land uses.

Establishment of zones, if done by public water systems or communities, should be done in consultation with DHS.

Interested water suppliers, communities or groups that require additional information may wish to refer to the EPA document, *State Methods for Delineating Source Water Protection Areas for Surface Water Supplied Sources of Drinking Water* (US EPA, 1997).

If zones within the watershed are established for a surface water source, DHS suggests distances of 400 feet from reservoir or primary stream boundaries, 200 feet from tributaries, and 2,500 feet from intakes. The zones may be limited to that portion of the watershed within a travel-time distance from the intake that allows adequate time to respond to spill events.

Ground water under the influence of surface water

For drinking water sources that have been classified as ground water under the direct influence of surface water (GWUDI), the source area should include the land area within the watershed boundaries. This is consistent with DHS regulations, because GWUDI wells are considered surface water sources and are subject to surface water treatment regulations. Zones for these sources may be established by ground water methods and/or surface water methods.

For drinking water sources that are indirectly under the influence of surface water (e.g. where the source of water is underflow of a surface water body, and the source has not been classified as GWUDI) it is appropriate to include the land area within the watershed boundaries in the source area. The recharge area, if different than the watershed area, may also be included in the source area. Zones are to be established using ground water methods as appropriate. The areas to be assessed should be determined in consultation with DHS.

6.2 Delineation for Ground Water Sources

The source area for a ground water source includes the recharge area; where the recharge area is separate from the well, the source area also includes the area within the protection zones established for the well. In addition, the source area may include a buffer zone, if one is established. These areas and zones are described in this section.

6.2.1 Types of Aquifers

The DWSAP Program assumes two primary types of aquifers for ground water sources: porous media and fractured rock. Although there are additional types of aquifers in California, this program uses a simplified approach by categorizing sources into one of these two types. A water system conducting its own assessment may use a different approach after consultation with DHS.

For **porous media aquifers**, open spaces within the aquifer are assumed to exist between individual particles that comprise the aquifer. In a typical porous material, such as sediment (e.g., sand and gravel), the openings are primary–that is, they represent the spaces between grains that were formed when the sediment was originally deposited. Consequently, they are numerous and regularly spaced, with a density and orientation of open spaces that tends to be isotropic (uniform in all directions) within the aquifer. Using water well data, ground water flow conditions of such aquifers are readily measured and quantified.

Fractured rock aquifers may also have primary porosity and permeability, such as cavities which form in new lava flows. Most “bedrock” aquifers, however, have open space along faults and fractures which formed long after the rock was formed ("secondary permeability and porosity”). Because fractures develop in response to geologic stresses, they are often grouped in specific directions, creating permeability and ground water flow paths which are anisotropic (not uniform in all directions). Such aquifers can have highly localized and complex ground water flow properties which may be difficult to characterize quantitatively.

6.2.2 Recharge Areas

The source area for a ground water source includes the recharge area. Recharge areas, which may be natural or artificial, are land areas that contribute water to an aquifer. Recharge occurs naturally from lakes, wetlands, direct precipitation, stream inflow, and subsurface inflow from upgradient sources of groundwater. Figure 6-2 is an illustration of a recharge area.

Artificial recharge can occur as a result of injection wells and man-made facilities such as spreading grounds, unlined canals, and activities such as irrigation practices. Wells and bore holes can act as conduits to aquifers.

Recharge Areas for Porous Media Aquifers

The **primary** recharge area consists of the area with permeable alluvial materials directly overlying an unconfined or semi-confined aquifer, where there is direct percolation of water into the unconfined or semi-confined aquifer. The primary recharge area for a confined aquifer also consists of the permeable materials, but the recharge area may be several or many miles away from the area of the confined aquifer from which extraction takes place.

Secondary or upland (i.e., watershed) recharge areas include the land at higher elevations usually consisting of a rock type that is much less permeable than the alluvial materials. Water recharges aquifers from these areas by overland flow of surface water and infiltration from stream flow into fractures in the rock. The groundwater in these fractures may then recharge groundwater in the alluvial aquifers.

Recharge Areas for Fractured Rock Aquifers

Recharge areas for fractured rock aquifers are similar to those for porous media, but because flow patterns are typically more complex, recharge area boundaries are more difficult to determine. Fractured rock aquifers can also exist in either confined or unconfined settings. In unconfined or poorly confined conditions, these aquifers can have very high flow (and contaminant transport) rates under rapid recharge conditions such as storm events. Transport times across fractured rock flow systems may be as short as hours to weeks, much more brief than in porous media aquifers.

Most types of fractured rock aquifers have proportionally less water storage capacity than porous media aquifers. Bedrock aquifers may still provide significant water supply where the aquifers are part of regional bedrock ground water systems, or whether the aquifers are associated with mountainous areas of high precipitation and recharge. Fractured rock aquifers are characterized by rapid and large rises in the water table during recharge/maximum flow events, and can be influenced by recharge from a large portion of the drainage basin. For this reason, in the DWSAP program the initial estimates of the boundaries of a recharge area for a well in a fractured rock aquifer are the general physical boundaries of the drainage basin.

The recharge area for each ground water source should be identified to the extent possible from a review of the topography, hydrogeology, and other information for the area. If possible, the approximate location of the recharge area should be shown on the drinking

water source assessment map. An assessment of the entire recharge area is not necessary for this program, but may be useful to a water purveyor.

Though the recharge area for a ground water well may be some distance away from the well, defining protection zones immediately around the ground water source provides a starting point for PCA inventories and protection efforts.

Even ground water sources that are in confined aquifers where the recharge area is located at a distance are susceptible to nearby activities that may cause contamination (e.g., improperly constructed wells, or abandoned, improperly destroyed wells).

6.2.3 Delineation Methods for Ground Water Zones

According to the 1986 Safe Drinking Water Act Amendments, the areas to be assessed and protected for ground water sources (wellhead protection areas) are defined as "the surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field".

For purposes of the DWSAP, the areas to be assessed for ground water sources are a set of protection zones at the land surface adjacent to and surrounding the well. Zones identify and differentiate areas of varying significance in terms of threat to the water source from contamination.

In confined aquifers, the zones are adjacent to and surrounding the well, but the recharge area may be located at a distance from the area immediately associated with the well, as discussed above. Unconfined aquifers may also have primary recharge areas at some extended distance from the well. Table 6-1 presents information about the confinement of aquifers.

There are a number of methods for defining zones for ground water sources. The methods recommended for use in California are listed below with a brief description. The primary criterion to be used is time-of-travel (the time for ground water to travel from a point in an aquifer to a pumping well). Particular contaminants may travel faster or slower than ground water, though it is generally rare that contaminants move faster than water within an aquifer. In some cases, contaminants (e.g., free phase solvents) are not necessarily subject to the same limitations as water. The time-of-travel criterion is more accurate for estimating zones than an arbitrary distance approach. However, due to limited resources to conduct assessments, zones for non-community water systems may be initially delineated by the arbitrary fixed distance method.

Delineation methods range from simple to complex, requiring varying amounts of hydrogeologic data and technical expertise. Simpler methods may be done initially to approximate the zones and to determine where more detailed hydrogeologic data is

needed. If necessary, the delineations can be refined at a later date using a more complex method if the drinking water source is determined to be vulnerable to PCAs.

There are six primary delineation methods selected for use in California, in order of increasing technical sophistication.

1. Arbitrary fixed radius
2. Calculated fixed radius
3. Modified calculated fixed radius
4. Analytical methods
5. Hydrogeologic mapping
6. Numerical flow/transport models

These methods range from simple and inexpensive to highly complex and costly. It is important to note that more than one method can be used to determine protection areas and zones for a ground water source. When resources, site-specific information and technical expertise are available, the more sophisticated analytical, mapping or modeling methods can be used to provide a higher degree of accuracy. Listed below is a description of each method.

Arbitrary Fixed Radius

This method involves drawing a circle of a specified radius around a well being protected. The radius is a reasonably conservative minimum distance determined by DHS based upon general hydrogeological considerations and professional judgement. In the DWSAP program this method may only be used for non-community water systems.

Calculated Fixed Radius

The pumping of wells within an aquifer results in artificially induced changes (such as drawdown and cones of depression) to the natural ground water system. (See Figure 6-3). This delineation method attempts to define zones that encompass the land surface area impacted by the changes due to a pumping well.

The calculated fixed radius (CFR) method involves drawing a circle around a well to estimate the zone of contribution (ZOC) for a specified time-of-travel criterion. A radius is calculated using Equation 6-1 shown below that is based on the theoretical volume of water that will be drawn to a well in the specified time. The input data required by the equation includes the pumping capacity of the well, the screened interval of the well and the effective porosity of the aquifer. The time period to be used is described in Section 6.2.5.

The protection zone determined by the calculated fixed radius (CFR) (Equation 6-1) is a circle that extends the same distance in all directions from the well. In an area with a flat water table, this is a reasonable approximation of the zone of contribution. This method

provides a more accurate estimate of the appropriate size of zones than the arbitrary fixed radius method, but may still be inaccurate because it does not take into account the actual rate and direction of ground water flow, recharge and other factors that may influence contaminant transport.

The equation for the calculated fixed radius is

$$R_t = \sqrt{Q\,t / \pi\,\eta\,H} \qquad \textbf{Equation 6-1}$$

where

R_t = radius of zone (feet) for time period t
Q = pumping capacity of well (ft^3/year), where ft^3/year = gpm x 70,267
t = travel time (years) (2, 5, or 10 years, as described in Section 6.2.5)
π = 3.1416
η = effective porosity (decimal percent)
H = screened interval of well (feet)

The pumping capacity to be used is the maximum rate the well can be pumped, in gallons per minute converted to the equivalent in cubic feet per year. Pumping capacity of the well should be known by the water purveyor. If the capacity is unknown, the purveyor may conduct a pump test to determine the appropriate value. If that is not possible, an estimate can be made if justification is provided. If there are no references to use to estimate the pumping rate, DHS should be consulted for assistance in determining the appropriate value to use in the delineation.

For wells that are used intermittently, using the maximum pumping rate of the well may result in extremely large zones which do not correspond to the actual production of the well, particularly at the 5 and 10-year travel times. In this case, with the concurrence of DHS, a water supplier may use the total annual production of the well (in ft3/year) in the highest of the previous three to five years. Water suppliers are encouraged to consider future production levels if significant growth is expected to occur in the service area.

The length of screened interval to be used in the equation should be based on well construction information. If the actual value is unknown, an initial conservative estimate can be made equal to 10% of the pumping capacity of the well in gallons per minute (gpm), with a minimum of 10 feet. For example, the estimated screened interval for a well that pumps at 400 gpm is 40 feet.

Effective porosity should be estimated using available information for the aquifer. However, if a value is not known, a value of 0.2 can be used for an initial calculation. The estimated value of 0.2 for effective porosity is reasonably conservative for most aquifers in California based on available information.

Figure 6-4 is an illustration of the CFR method. Figure 6-5 is a conceptual illustration of the three zones using the CFR method.

Modified Calculated Fixed Radius Method

In an area with a sloping water table (the most common situation), the circle described by Equation 6-1 tends to overestimate the zone of contribution (ZOC) in the down-gradient direction and to underestimate the ZOC in the up-gradient direction. To address this situation, the DWSAP provides a modified calculated fixed radius approach for sites where the direction of ground water flow is known. This approach is appropriate for ground water sources located in porous media aquifers.

In the modified approach, the radius is calculated using Equation 6-1 and the associated input data. The upgradient extent of the zone is determined as **1.5 R** (e.g., one and one-half times the calculated radius). The down-gradient extent of the zone is **0.5 R** (e.g., one-half the calculated radius). The resulting shape is a circle with a radius of **R**, shifted upgradient by a distance of **0.5 R**. Figure 6-6 is a conceptual illustration of the three zones using the modified CFR method. The sizes of the zones in the modified CFR are the same as those determined by the CFR method (Figure 6-5).

If a water purveyor wishes to use the modified CFR method, the calculations used to determine the direction of ground water flow should be submitted with the assessment report (see below).

Estimation of direction of ground water flow. In order to accurately estimate the direction of ground water flow, the estimate must use at least three (3) wells in the vicinity of the drinking water well. The topographic elevation at each well, the distances between the wells, and the total head at each well must be known. Ground water "contours" or equipotential lines are determined from the information for the three wells, and the ground water flow direction is perpendicular to the contour lines. For more information in determining the direction of ground water flow, refer to the EPA document *Ground Water and Wellhead Protection*, pages 30 to 31 (US EPA, 1994).

The "total head" is the water level in a well, usually expressed as feet above sea level, which consists of the elevation head and the pressure head. In an unconfined aquifer, the pressure head equals zero at the water table surface.

Analytical Methods

These methods involve the use of equations to define ground water flow and contaminant transport. The uniform flow equations (Todd, 1980) shown in Figure 6-7 are often used to define the area of contribution to a pumping well in a sloping water table. These are the most widely used methods for accurately delineating ground water protection zones.

These methods require the input of various hydrogeologic parameters to calculate the distance to the downgradient divide, or stagnation point, and the width of the zone of contribution to the well. The upgradient extent of the protection area can then be calculated based on either a time-of-travel or flow boundaries criterion. Site specific hydrogeologic parameters are required as input data for each well at which the method is applied. These parameters can include the transmissivity, porosity, hydraulic gradient, hydraulic conductivity, and saturated thickness of the aquifer.

Figure 6-8 illustrates an example of a protection zone determined by using the analytical methods.

Detailed Hydrogeologic Mapping

In many hydrogeologic settings, flow boundary and time-of-travel criteria can be mapped by geological, geophysical, and ground water tracing methods. The flow boundaries are defined by lithologic variation or permeability contrasts within the aquifer. Geological observations may provide surface indications of lithology changes, which will correlate with ground water source area boundaries. Detailed hydrogeologic mapping may also include mapping of ground water levels in order to identify ground water drainage divides.

This method for delineating ground water protection zones within a source area may be particularly useful for shallow aquifers, and for fractured rock aquifers.

Figure 6-9 is a conceptual example of using hydrogeologic mapping to delineate ground water protection zones in fractured bedrock.

Numeric Flow/Transport Models

Ground water source areas and protection zones can be delineated using computer models that approximate ground water flow and/or solute transport equations numerically. A wide variety of numerical models are presently available both commercially and through various organizations.

Numeric flow/transport models are particularly useful for delineating protection areas where boundary and hydrogeologic conditions are complex. Input data may include such hydrogeologic parameters as permeability, porosity, specific yield, saturated thickness, recharge rates, aquifer geometry, and the locations of hydrologic boundaries. Solute transport parameters such as dispersivity may also be incorporated in these models.

To be accurate, these models require site-specific field verification and adjustment.

6.2.4 Selecting A Ground Water Delineation Method

Protection zones within a source area should be delineated using the times-of-travel specified in Section 6.2.5. The preferred delineation method is one that utilizes the most detailed information available, although a simpler approach may be appropriate for an initial delineation, with a more detailed evaluation later (e.g., in a voluntary protection program). A simpler approach may result in larger delineated protection zones than might be obtained from a more elaborate approach, given the conservative (i.e., health protective) nature of the simple models.

DHS staff will use simple approaches, due to the number of drinking water sources that need to be assessed. However, DHS believes that the more complex approaches are beneficial where appropriate data are available. Such approaches give the most site-specific information, and may preclude the initiation of protection activities beyond those that are needed for protection of a specific ground water source.

Table 6-2 provides guidance on the types of delineation methods that should be used.

Porous Media Aquifers

As a general approach, DHS will use the calculated fixed radius method for delineations for assessment purposes. For non-community water systems, DHS may choose to use the arbitrary fixed radius method. Where DHS has sufficiently detailed information on the direction of ground water flow, the modified calculated fixed radius method will be used.

Fractured Rock Aquifers

In fractured rock aquifers, the complexity of the flow system does not lend itself to a simple delineation method that accurately reflects the appropriate size, shape and direction of zones. Given the resources and time available to conduct the assessments, DHS recommends the minimum delineation method in fractured rock to be the calculated fixed radius method, increasing the calculated radius of each zone by 50%. The default effective porosity of 0.2 would be used in the equation. Increasing the size of the zones in fractured rock reflects the increased vulnerability of these sources compared to those in porous media aquifers.

Wells in Multiple Aquifers

When a well is located in multiple aquifers, the protection zones should be delineated using the methods and values that are more conservative (i.e., health protective). If the well is located in multiple porous media aquifers with varying effective porosity or other parameters, the delineation should use the values that produce the larger delineated area. If the well is located in porous media and fractured rock aquifers the delineation should use the fractured rock method.

Ground water under the influence of surface water

For wells that are ground water under the direct influence of surface water (GWUDI), the source area should include the land area within the watershed boundaries. This is consistent with DHS regulations, because GWUDI wells are considered surface water sources and are subject to surface water treatment regulations. Zones for these sources may be established by ground water methods and/or surface water methods.

For wells that are indirectly under the influence of surface water (e.g., where the source of water is underflow of a surface water body, and the source has not been classified as GWUDI) it is appropriate to include the land area within the watershed boundaries in the source area. The recharge area, if different than the watershed area, may also be included in the source area. A source that is indirectly under the influence of surface water may be indicated if the ground water zones encompass a surface water body. Zones are to be established using ground water methods as appropriate. The areas to be assessed should be determined in consultation with DHS.

6.2.5 Approach for Defining Ground Water Zones

All ground water sources should have zones defined. The suggested approach is to define four zones, and an optional fifth zone. See Figure 6-10 for a conceptual illustration of these zones.

If the delineated area for a ground water source encompasses a surface water body (lake, river, stream, creek, wetland, etc.), the source may be under the influence of surface water and the delineation should be reviewed in consultation with DHS (see Section 6.2.4).

Suggested protection activities for each of the zones are discussed in Part Four, Voluntary Drinking Water Source Protection Programs.

Well Site Control Zone

The well site control zone encompasses the area immediately surrounding the well, what most people think of as the "wellhead." The purpose of this zone is to provide protection from vandalism, tampering, or other threats at the well site.

This zone is determined by using a simple radius, (or equivalent area if a different shape, i.e., a square, is desired). DHS recommends a minimum radius of 50 feet for well site control zones for all public water systems in the state.

Zone A - Microbial/Direct Chemical Contamination Zone

The purpose of this zone is to protect the drinking water supply from viral, microbial and direct chemical contamination. The zone is defined by the surface area overlying the portion of the aquifer that contributes water to the well within a **two-year time-of-travel**.

The two-year time-of-travel criterion is used because this is the current recommendation of the proposed Ground Water Rule (GWR). Existing research indicates that bacteria and viruses survive less than two years in soil and ground water. Use of this criterion provides consistency with the proposed GWR.

This area provides only a limited time for responding to serious microbiological contamination or chemical spills.

As an illustration of what the size of Zone A might be, see the chart in Figure 6-11, for the calculated fixed radius method using the two-year time-of-travel, with porosity assumed as 0.2 and varying screened intervals. The DHS-recommended minimum radius is 600 feet for all ground water sources of drinking water in porous media aquifers, and 900 feet in fractured rock aquifers. These distances are believed to be sufficiently conservative (i.e., health protective) for protection from microbiological contaminants.

Zones B5 and B10 - Chemical Contamination Zones

The purpose of Zones B5 and B10 is to prevent chemical contamination of the water supply, and to protect the drinking water source for the long term. These zones are used to focus attention on possible chemical contamination that may exist near the well but at a greater distance than Zone A.

Zone B5 encompasses the area between the two- and **five-year time-of-travel**. This zone provides for more response time for chemical spills than Zone A.

Zone B10 encompasses the area between the five- and **ten-year time-of-travel**. The primary purpose of this zone (along with the recharge area) is to encourage decision-makers and planners to recognize long-term aspects of the drinking water source. The ten-year time-of-travel allows for some attenuation or remediation of contaminant sites, or if necessary, time to develop alternate sources of water supply.

Figures 6-12 and 6-13 are illustrations of the sizes of Zones B5 and B10, respectively, determined by the calculated fixed radius method, using five- and ten-year travel times, with porosity assumed as 0.2 and varying screened intervals.

The DHS-recommended minimum radius is 1,000 feet for Zone B5, and 1,500 feet for Zone B10 for porous media aquifers, and 1,500 and 2,250 feet, respectively, for fractured rock aquifers.

A more sophisticated delineation method (e.g., as done voluntarily by a public water system) may determine zones that encompass a smaller area than a circle with the DHS minimum radius.

This may be technically appropriate for the source and documentation should be provided to DHS.

Buffer Zone—Additional Zone, If Needed

The purpose of this zone is to provide added protection for drinking water sources. It can be used to delineate a larger setback away from activities that may be significant potential sources of contamination (e.g., landfills or hazardous material disposal sites), and to provide additional information that may be helpful for longer term planning. The buffer zone is generally upgradient from the protection zones and may include the entire zone of contribution for the well, indirect recharge areas, or locations where the aquifer may be exposed at the surface.

Drinking water systems that choose to establish a Buffer Zone may do so based on activities that occur outside of the protection zones, and the vulnerability of the drinking water source to possible contamination.

Detailed analytical methods may be necessary to determine the appropriate area for the Buffer Zone. Determination of Buffer Zones may be done in consultation with DHS. An assessment of the buffer zone may be useful to the water purveyor.

6.2.6 Modification of the Shape and Size of Zones

Local knowledge and professional judgement may be used to modify the shape and size of the zones to allow for site-specific characteristics, taking into account the DHS minimum distances. For example, where several wells have overlapping protection areas, it may be appropriate to combine the zones of the individual wells into a larger combined zone. The larger combined zone could then be evaluated as a single entity for purposes of subsequent steps in the assessment. Similarly, if narrow areas of land exist between delineated zones of neighboring wells, it may be appropriate to merge the zones of the two wells, incorporating the area in between, and evaluate the merged area as a single zone.

For wells located within the same wellfield, it may be appropriate to consider the wellfield as one larger well with the combined production capacity of all the wells. Zones could be established around the entire wellfield.

6.3 Assessment Map

After the delineation of the source area and protection zones has been completed, the locations should be shown on the assessment map. The map should be based on a USGS quadrangle 7.5 minute series topographic map, and should also show the location of the drinking water source.

6.4 Boundary Drinking Water Sources

Several drinking water sources originate beyond California's boundaries (e.g., Colorado River, Klamath River). DHS will work with Region 9 of the US EPA and other states, as appropriate, to obtain information pertinent to source water assessments for drinking water systems that utilize these water bodies. For ground water sources with source areas or protection zones that may cross California's boundaries, DHS will also work with US EPA Region 9 and other states to obtain pertinent information and coordinate assessments to the extent practical.

Where drinking water sources outside of California (e.g., Truckee River) may require information for their source water assessments, DHS will also work with US EPA Region 9 and other states, as appropriate, to provide information.

6.5 Tribal Drinking Water Sources

For drinking water sources on tribal lands, DHS will work with US EPA Region 9 and tribes to provide pertinent information that is needed to complete drinking water source assessments for tribal lands. Where tribal lands occupy protection areas or zones of non-tribal sources of drinking water, DHS will work with US EPA Region 9 and tribes to obtain information that is needed for those specific assessments.

6.6 Transmission Facilities from Drinking Water Intake to Treatment Plant

When a drinking water intake is located at a different site than the treatment plant (if there is one), the untreated water may be conveyed through an aqueduct, canal, pipeline or other transmission facility. There is the possibility that an activity may exist within the vicinity of the transmission facility that could contaminate the water supply. In California, the threat of contamination to the water supply through this means is reviewed in two ways:

1. Water systems using surface water sources that utilize open channel transmission facilities are required to include the drainage area that contributes to the channels in the watershed sanitary survey for the source. As part of the DWSAP program, the transmission facilities will be assessed using the information from the watershed sanitary surveys.

2. Closed transmission facilities (pipelines) are reviewed and evaluated by DHS (or LPAs) during water system inspections (sanitary surveys).

Table 6-1. Indicators of presence and degree of confinement of aquifers.

Information Source	Highly Confined	Semiconfined (Leaky)
Geologic		
Geologic maps and cross-sections	Presence of continuous, unfractured, confining strata (clays, glacial till, shale, siltstone).	Evidence of vertical permeability in confining strata (fracture traces, faults, mineralization or oxidation of fractures observed in cores).
Environmental geologic and hydrogeologic maps	See above.	Presence of artificial penetrations (abandoned or producing oil and gas wells, water wells, exploration boreholes).
Hydrologic		
Water level elevation (single well) of potentiometric surface	Above the top of the aquifer (not diagnostic for differentiation of highly and semi-confined aquifers).	Same
Hydraulic head differences between aquifers	Large head difference in water levels measured in wells cased in different aquifers (not diagnostic for differentiation of highly and semiconfined aquifers).	Same
Water level fluctuations (continuous measurement)	Short-lived and diurnal fluctuations in response to changes in barometric pressure, tidal effects, external loading, no response to recharge events.	Similar to highly confined aquifer, but may also exhibit relatively large and rapid response to recharge events because of leakage through discrete points.
Hydrologic measurements in confining strata	No changes in water levels in response to pumping; diurnal but not seasonal water level fluctuations (see above).	Changes in water levels in response to pumping; seasonal water-level fluctuations in response to seasonal variations in precipitation.
Pump test for storativity	Storativity less than 0.001.	Between 0.01 and 0.001 (not diagnostic).
Pump test for leakage	Pump drawdown vs time curve matches analytical solution(s) for highly confined aquifer. Estimated or calculated leakage less than 10^{-3} gal/day/ft2.	Pump drawdown vs time curve requires use of analytical solution for leaky aquifer. Estimated or calculated leakage 10^{-2} to 10^{2} gal/day/ft2 .
Numerical modeling	Simulation of potentiometric surface possible without estimates of leakage, or required estimates are low (see above).	Simulation of potentiometric surface requires use of large leakage values.
Hydrochemistry		
General water chemistry	Chemical characteristics indicative of long distance from recharge area(region-specific).	Qualifies as confined using other criteria, but chemical characteristics more similar to ground water in recharge zones.
Anthropogenic atmospheric tracers	No detectable tritium or fluorocarbons in ground water.	Detectable concentrations of tritium or fluorocarbons (less than 40 years old).
Isotope chemistry	Carbon-14 dating of water samples indicates age > 500 years.	See above.
Contaminants	No detectable concentrations of potential contaminants identified by inventory of possible contaminating activities.	Qualifies as confined using other criteria, and contaminants detected in aquifer.
Changes in water chemistry over time	Head declines from long-term pumping have not resulted in changes in water chemistry indicators of vertical leakage.	Head declines from long term pumping have resulted in changes in water chemistry indicators of vertical leakage (see above).
Time of travel through confining strata	Time of travel calculations based on measured or estimated values of difference in hydraulic head, porosity and hydraulic conductivity exceed 40 years.	Time of travel through confining strata < 40 years based on calculations or presence of tritium or fluorocarbons.

Source: Handbook Ground Water and Wellhead Protection, EPA, September 1994, Document EPA/625/R-94/001

Table 6-2. Delineation methods, types of system that may use particular methods, minimum data that are required, and the minimum radii of zones.

Delineation method	Type of system that may use method	Minimum data required	Minimum radius of zone
Arbitrary fixed radius	Non-community	Location of source	See below for Porous Media and Fractured Rock
Calculated fixed radius (CFR) (porous media)	All*	Location of source, Pumping capacity of well (gpm), Screened interval of well (indicate method used to estimate), Effective porosity (indicate method used to estimate)	A = 600 feet B5 = 1,000 feet B10 = 1,500 feet
CFR (fractured rock) Note that fractured rock uses CFR and increases size by 50 percent.	All*	Location, Pumping capacity, Screened interval, Effective porosity	A = 900 feet B5 = 1,500 feet B10 = 2,250 feet
Modified CFR	All*	Location, Pumping capacity, Screened interval, Effective porosity, Direction of ground water flow	A = 600 feet B5 = 1,000 feet B10 = 1,500 feet
Analytical methods	All	Location, Capacity, Screened interval, Effective porosity, Hydraulic conductivity, Hydraulic gradient, Direction of ground water flow	No minimums**
Hydrogeologic mapping	All	Hydrogeologic parameters, Lithology, Groundwater level	No minimums**
Numeric flow/transport models	All	Hydrogeologic parameters, Recharge rates, Aquifer geometry, Hydrologic boundaries	No minimums**

* Systems with detailed hydrogeologic data are encouraged to conduct more sophisticated analyses.

** Systems using more sophisticated methods are encouraged to compare the sizes of zones to minimum sizes derived by simpler methods to assist in the review of the delineation.

ZONE A = 400' from reservoir or primary stream boundaries
200' from tributaries

ZONE B = 2500' from intake

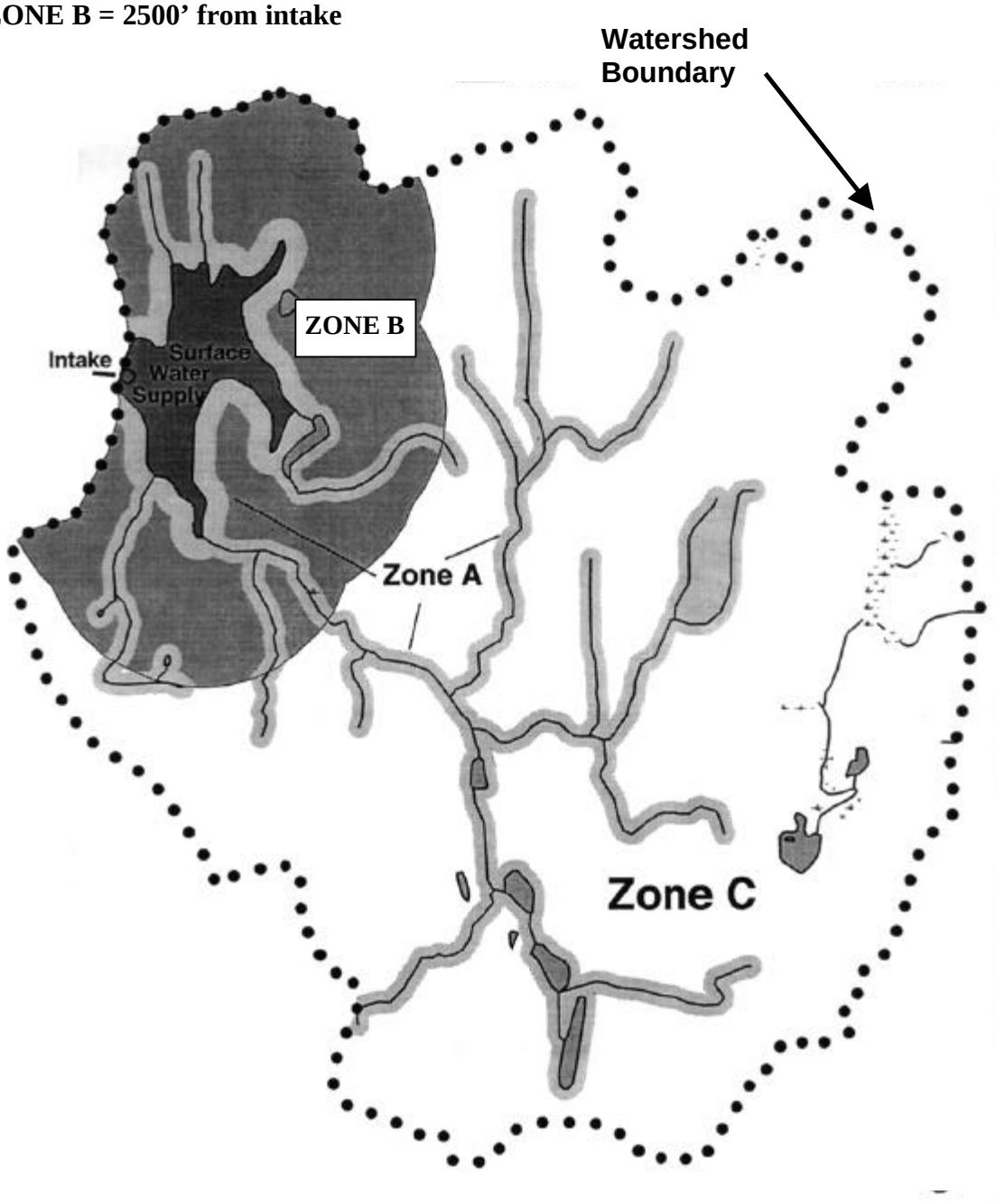


Figure 6-1. Surface water supply protection areas showing suggested zones (Adapted from Massachusetts DEP "Developing a Local Surface Water Supply Protection Plan," 1996)

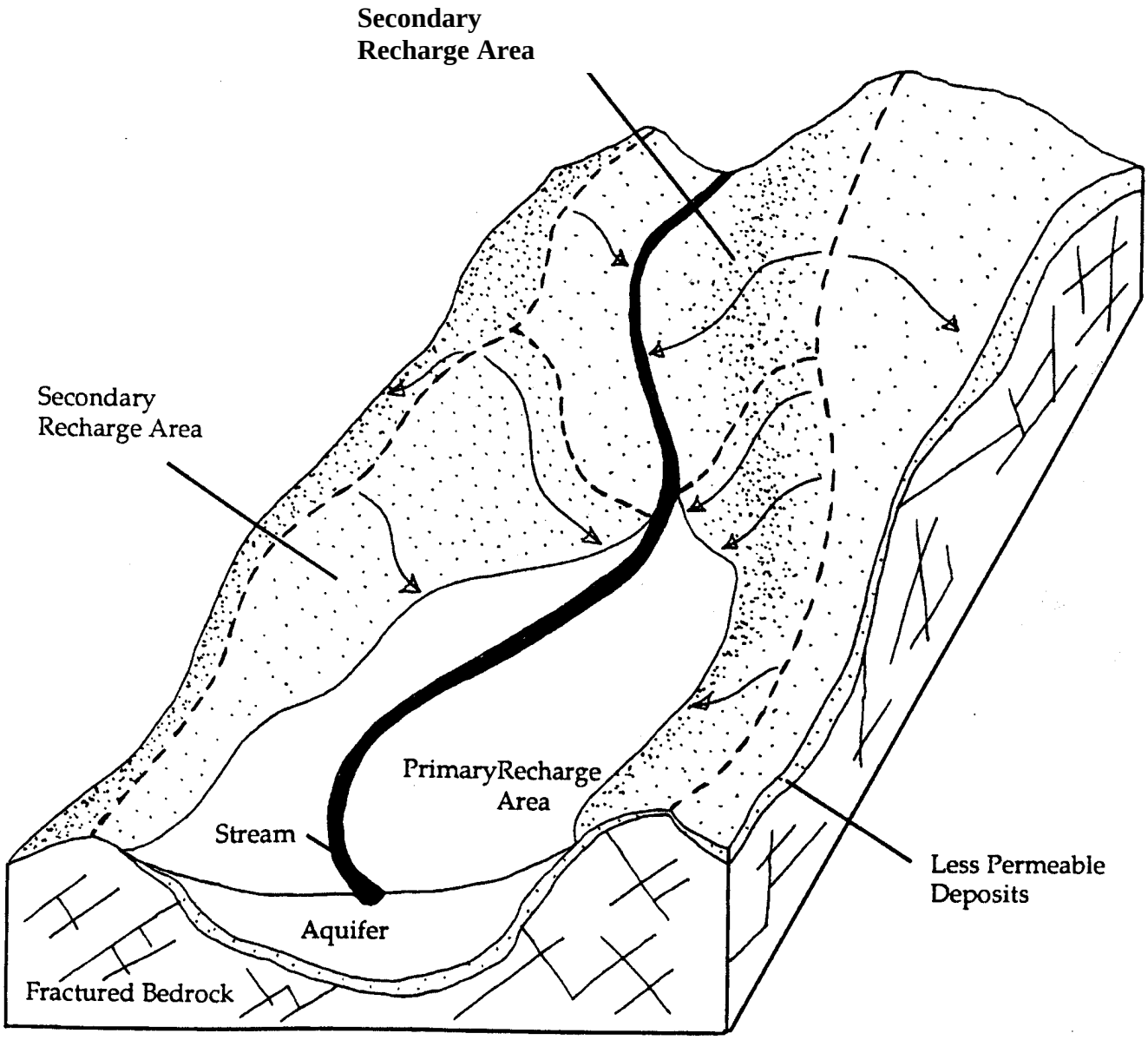


Figure 6-2. Illustration of recharge areas (Adapted from Witten and Horsley, 1995)

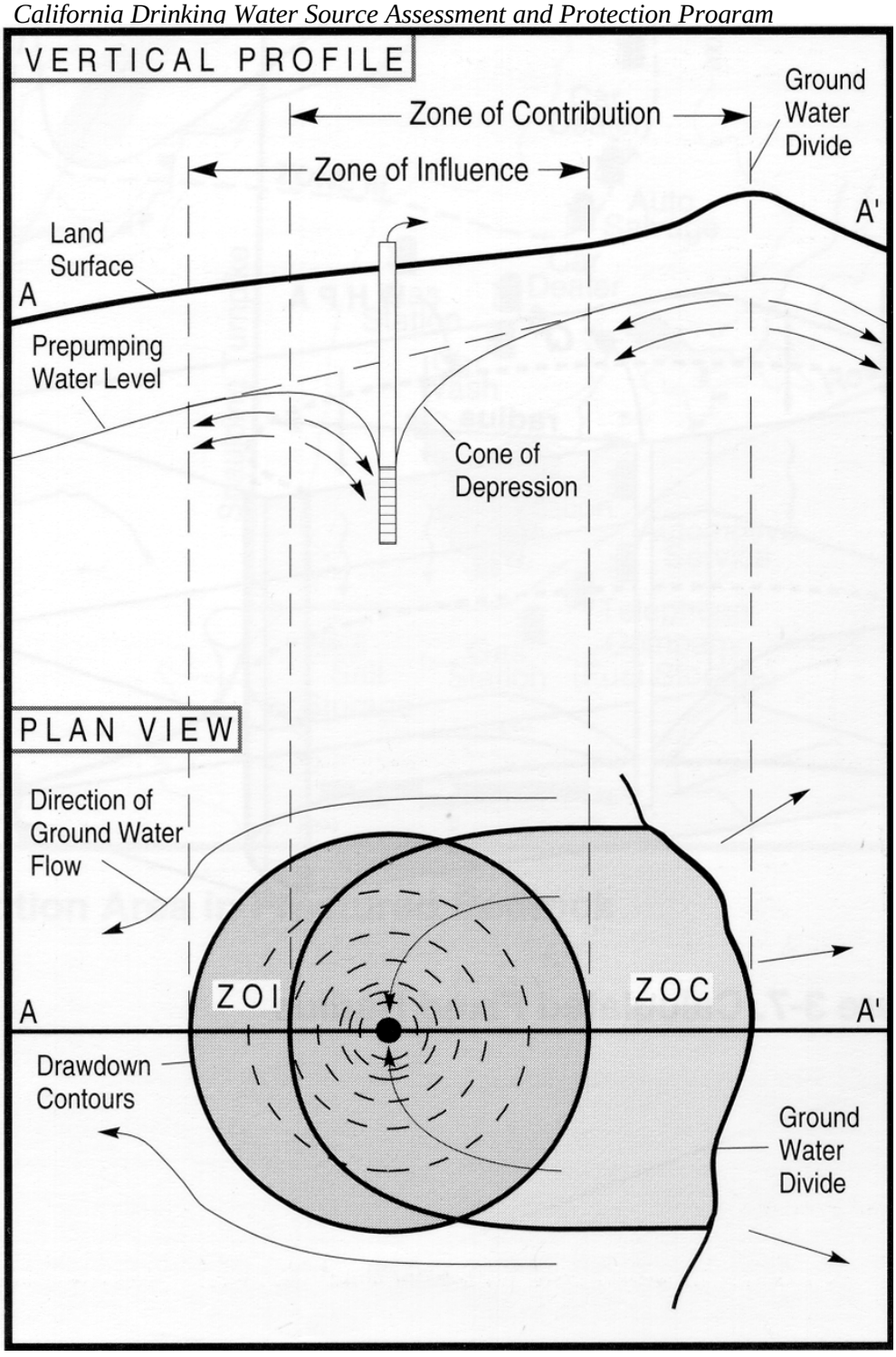


Fig. 6-3. Changes to the ground water system due to a pumping well (From Witten, Horsley, 1995)

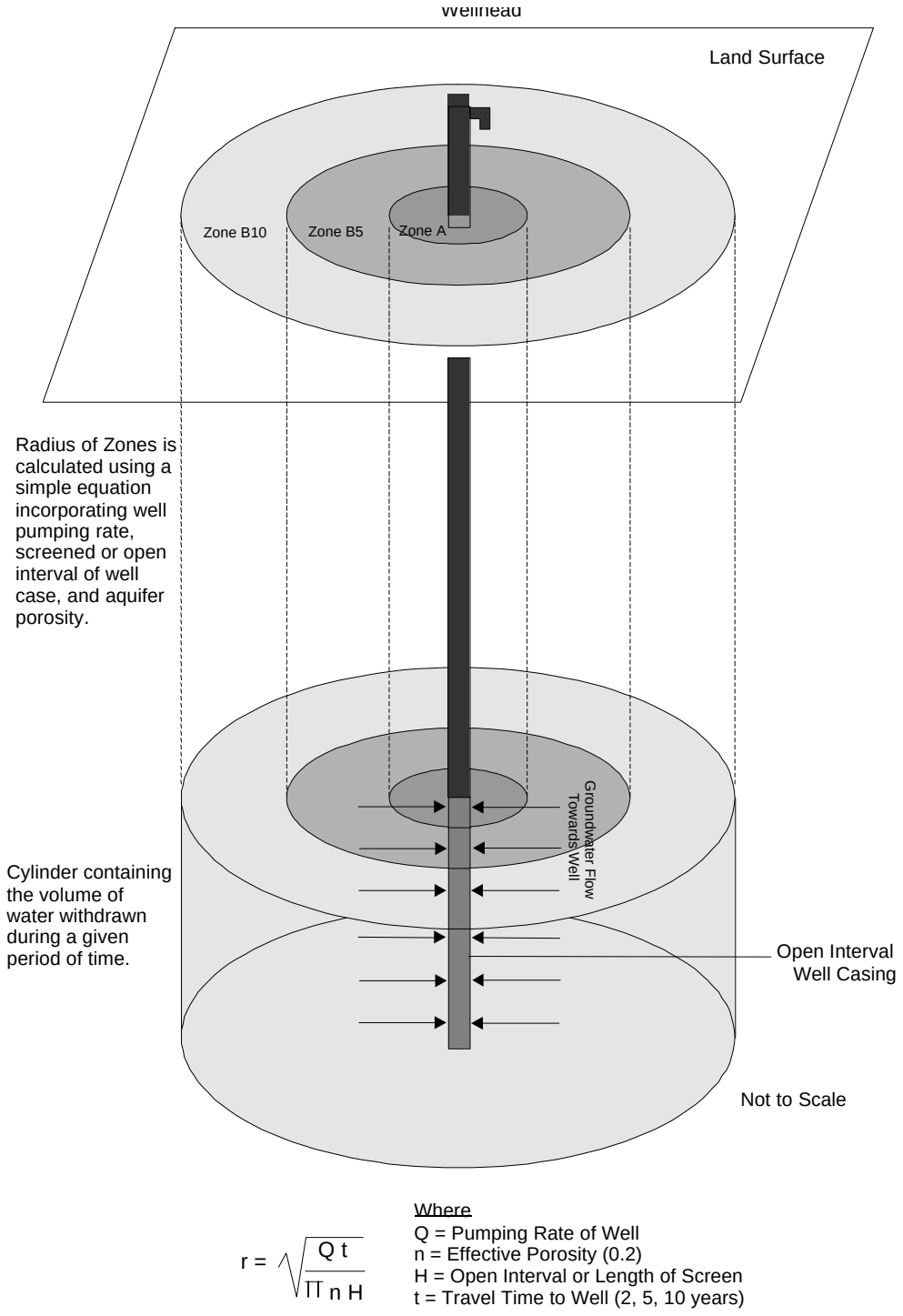


Figure 6-4. Calculated fixed radius delineation method (Adapted from Washington State, "Wellhead Protection Program Guidance Document," 1995)

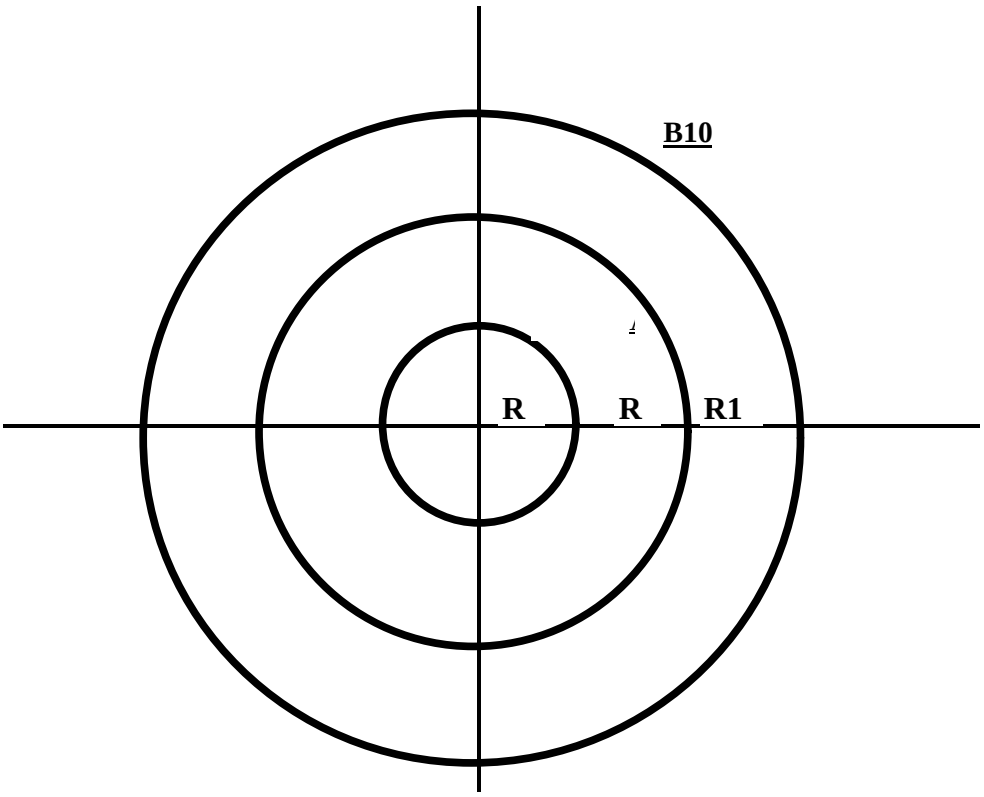


Figure 6-5. Conceptual illustration of the calculated fixed radius method.

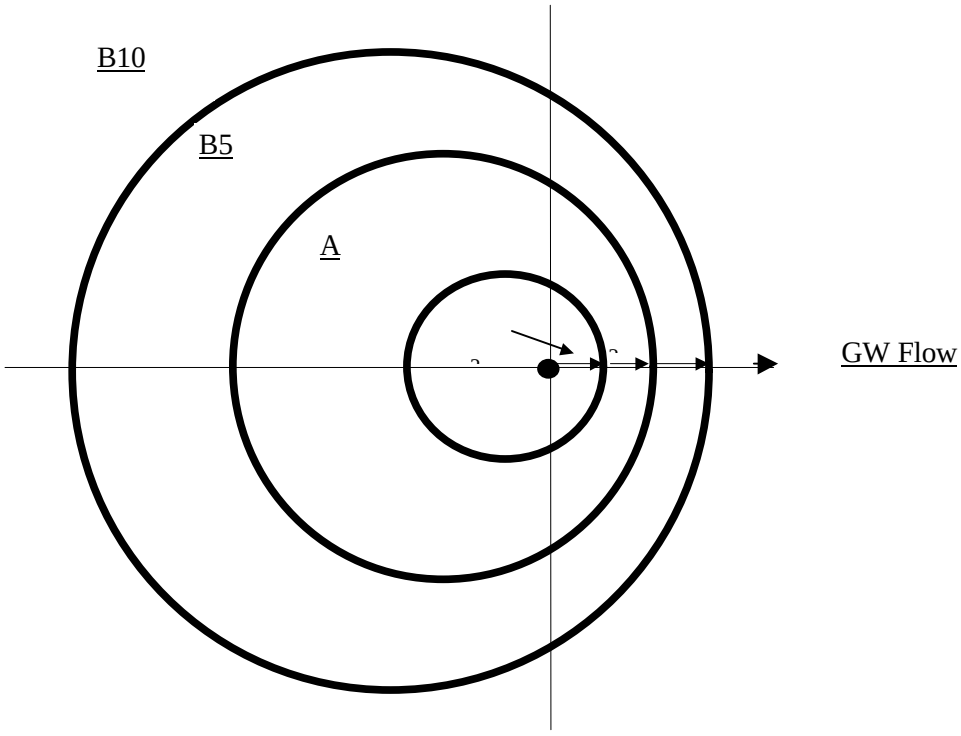
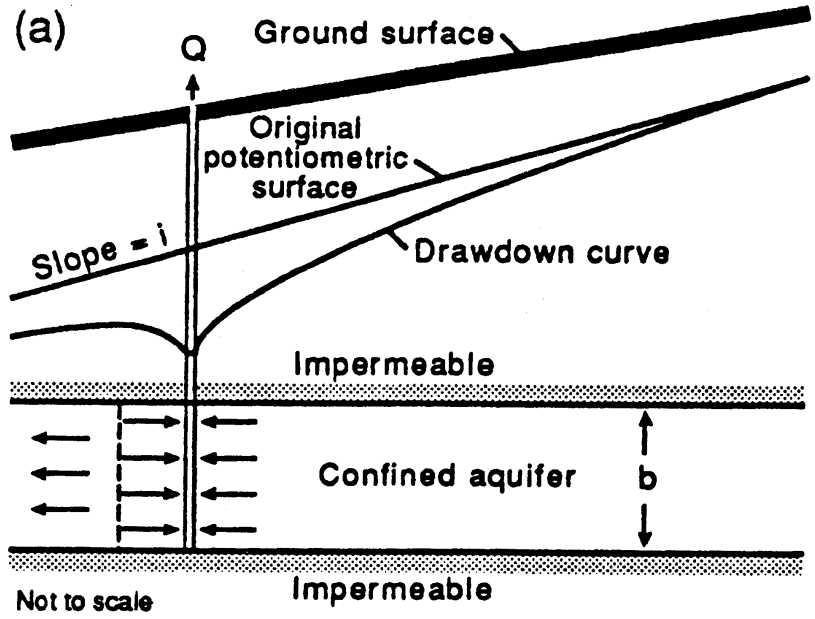
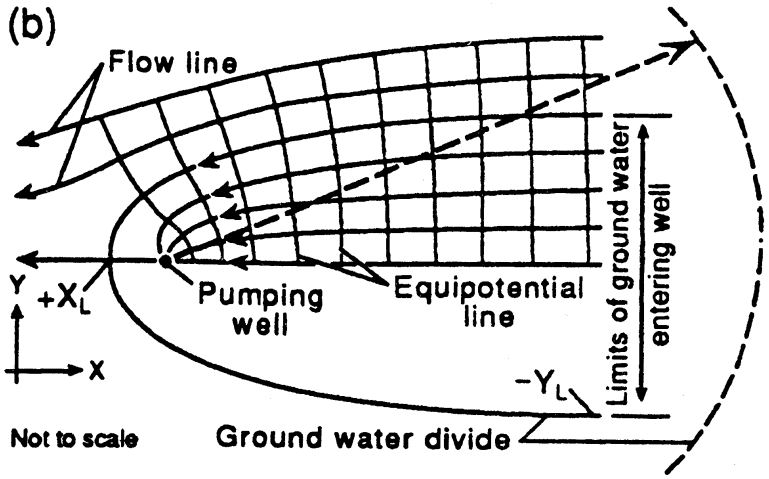


Figure 6-6. Conceptual illustration of the modified calculated fixed radius method.





Uniform flow equation: $$-\frac{Y}{X} = \tan\left(\frac{2\pi Kbi}{Q} Y\right)$$

Distance to down-gradient null point: $$X_L = -\frac{Q}{2\pi Kbi}$$

Boundary limit: $$Y_L = \pm\frac{Q}{2Kbi}$$

Where: Q = Well pumping rate
K = Hydraulic conductivity
b = saturated thickness

Figure 6-7. Uniform flow equations for determining area of contribution to a pumping well (adapted from Todd, 1980)

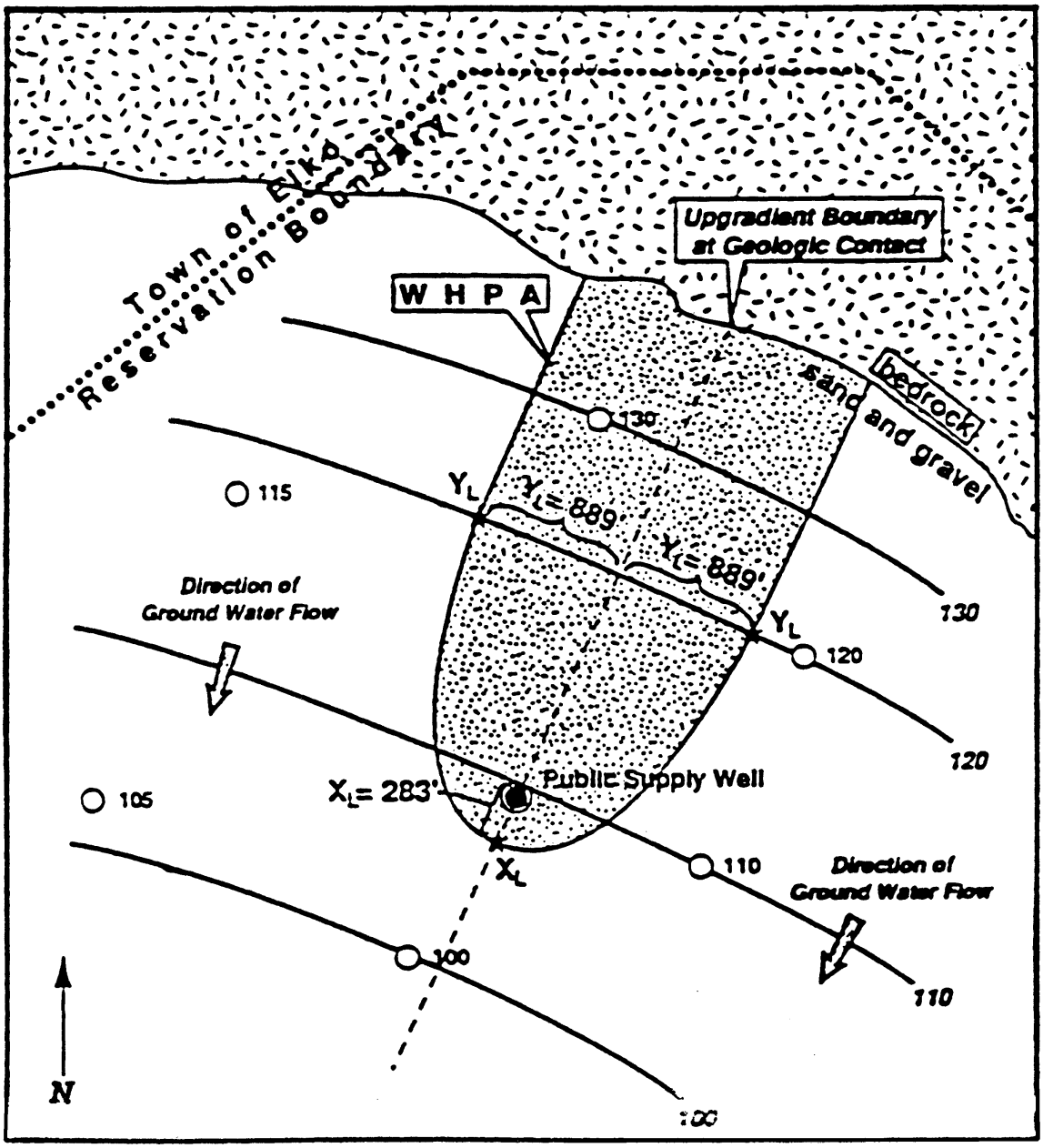


Figure 6-8. Delineation of a drinking water source protection area by analytical methods.

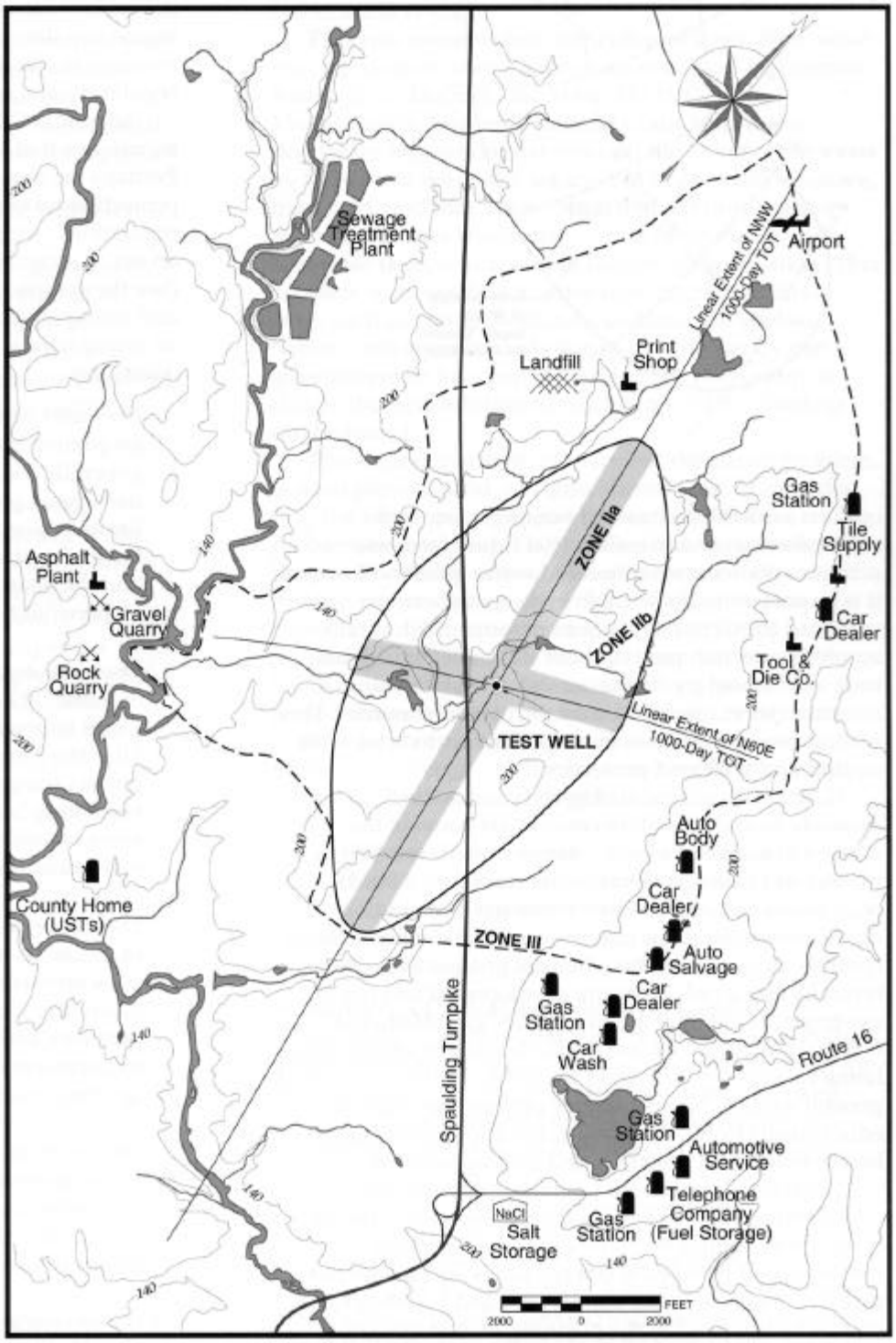


Figure 6-9. Conceptual example of source area and zones using hydrogeologic mapping (From Witten and Horsley, 1995)

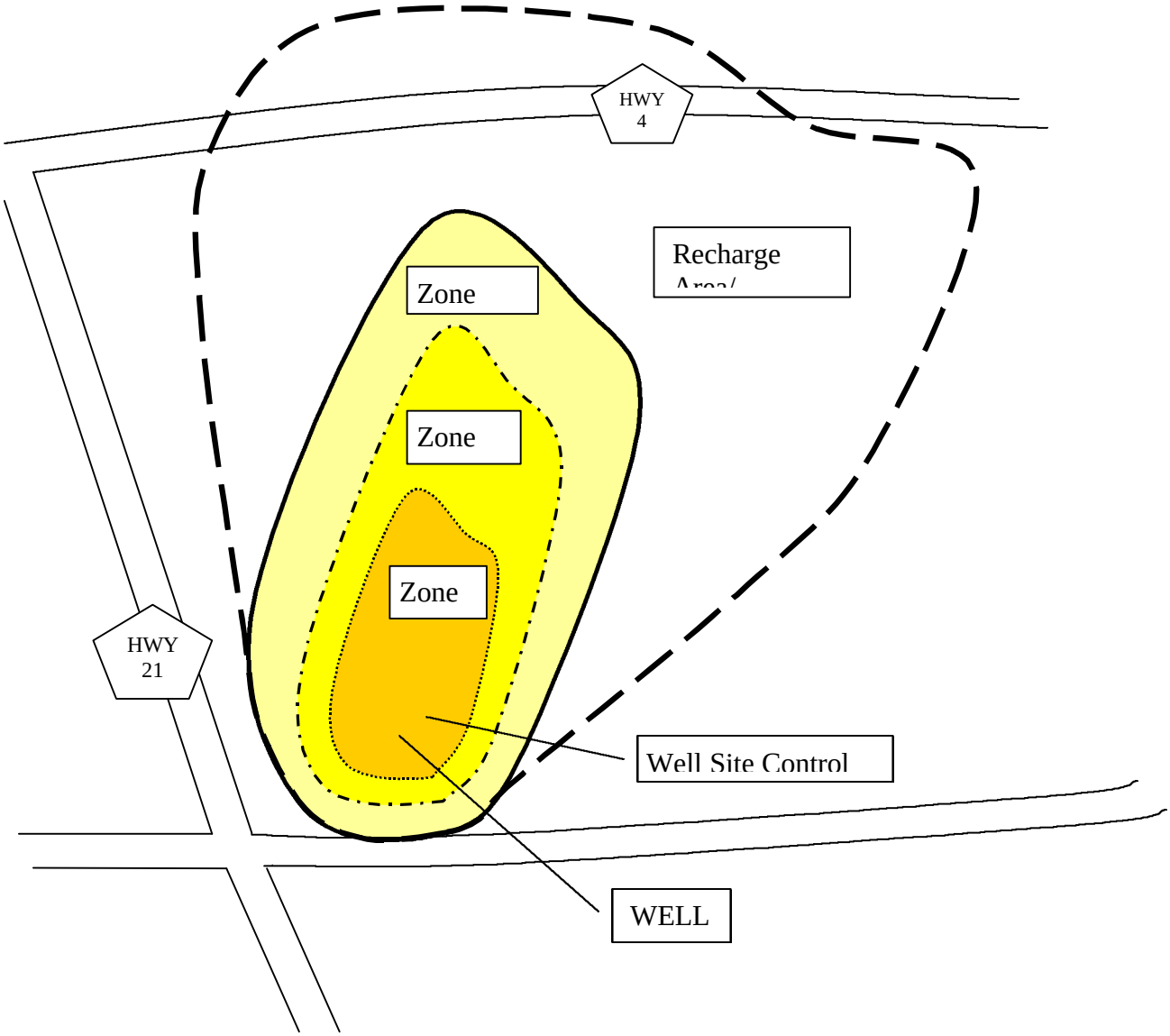


Figure 6-10. Illustration of conceptual ground water source area and protection zones (Adapted from Witten and Horsley, 1995)

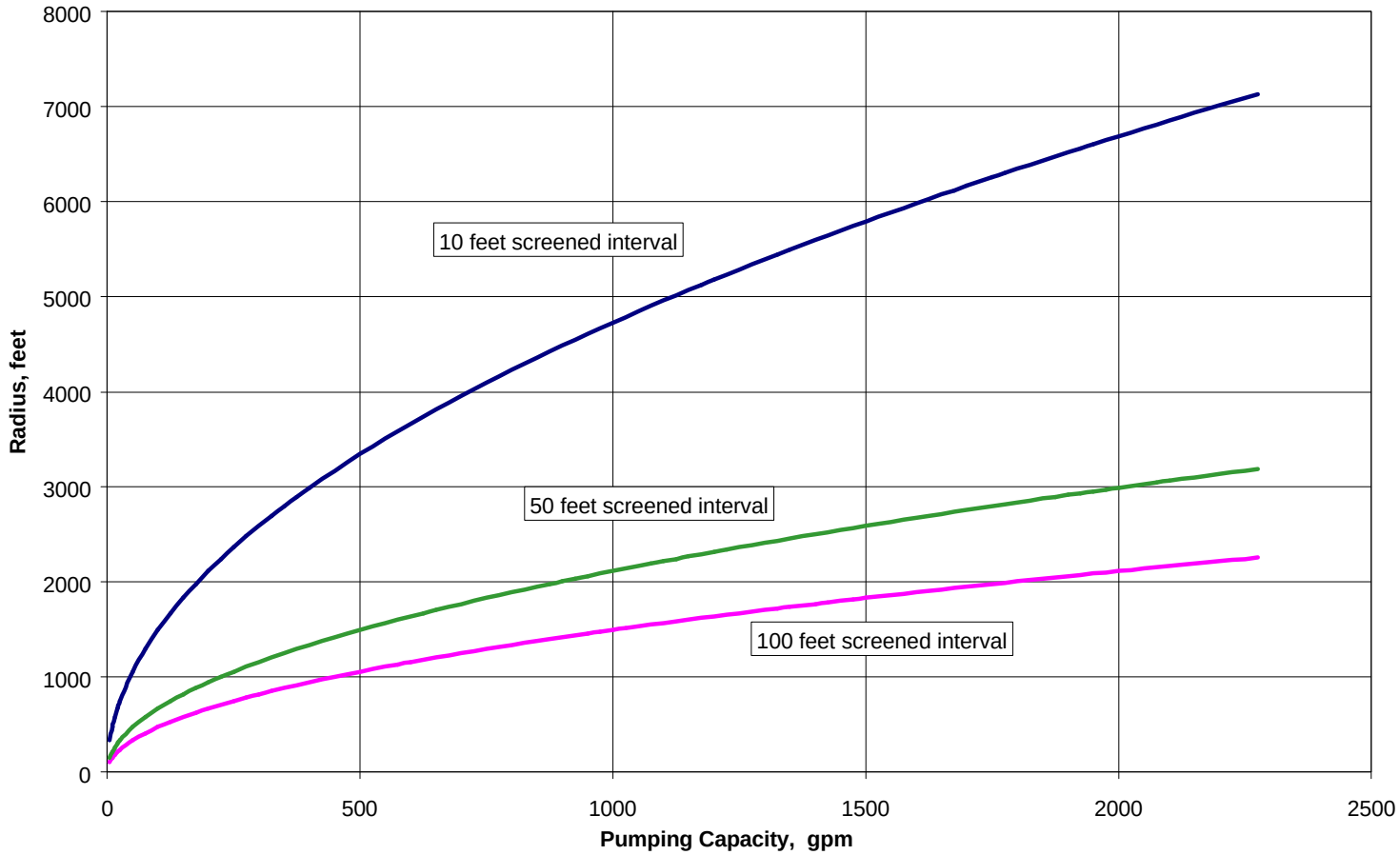


Figure 6-11. Radius of microbiological Zone A (2-year time of travel), using calculated fixed radius method (assumes porosity = 0.2)

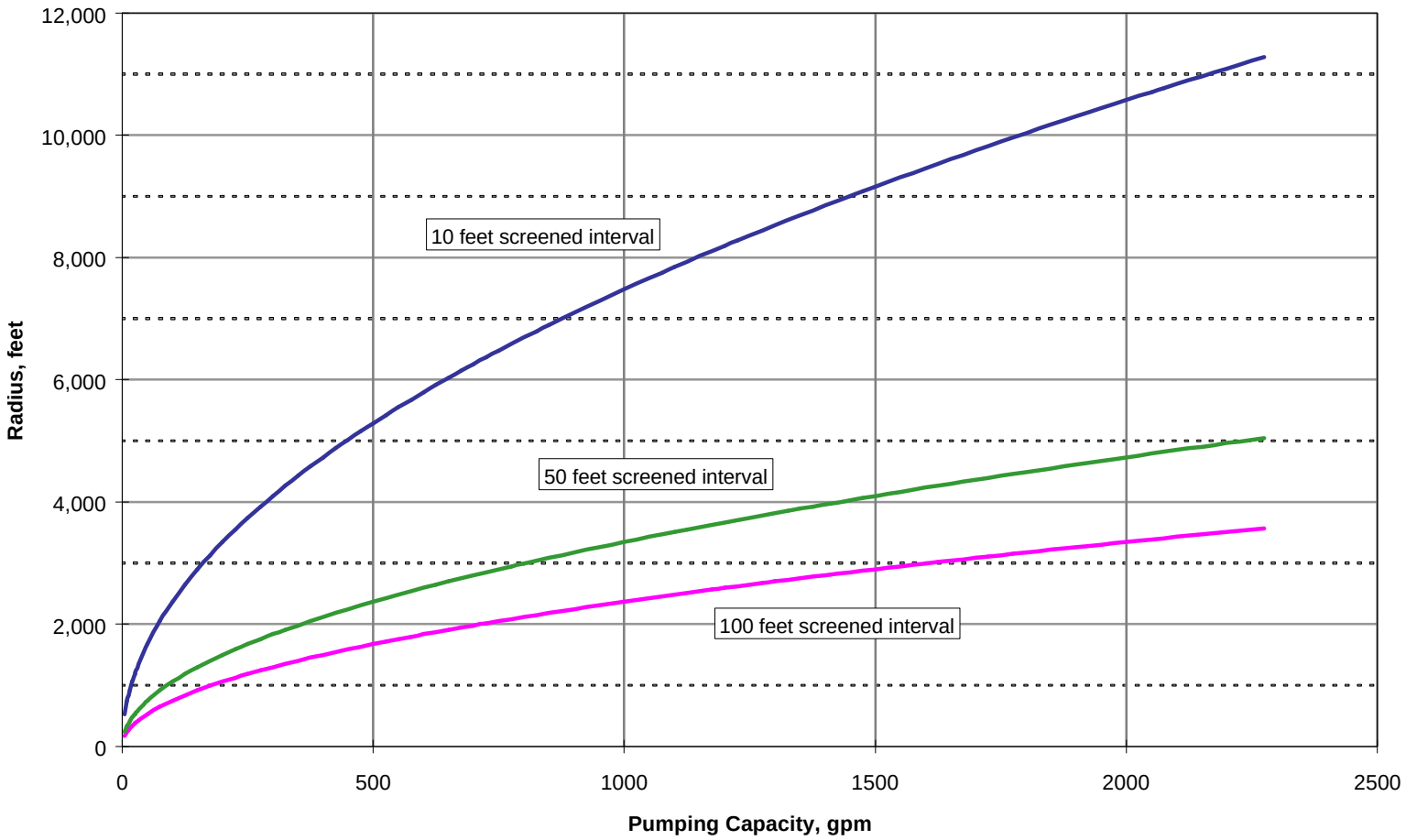


Figure 6-12. Radius of Zone B5 (5-year time of travel), using calculated fixed radius method (assumes porosity =0.2)

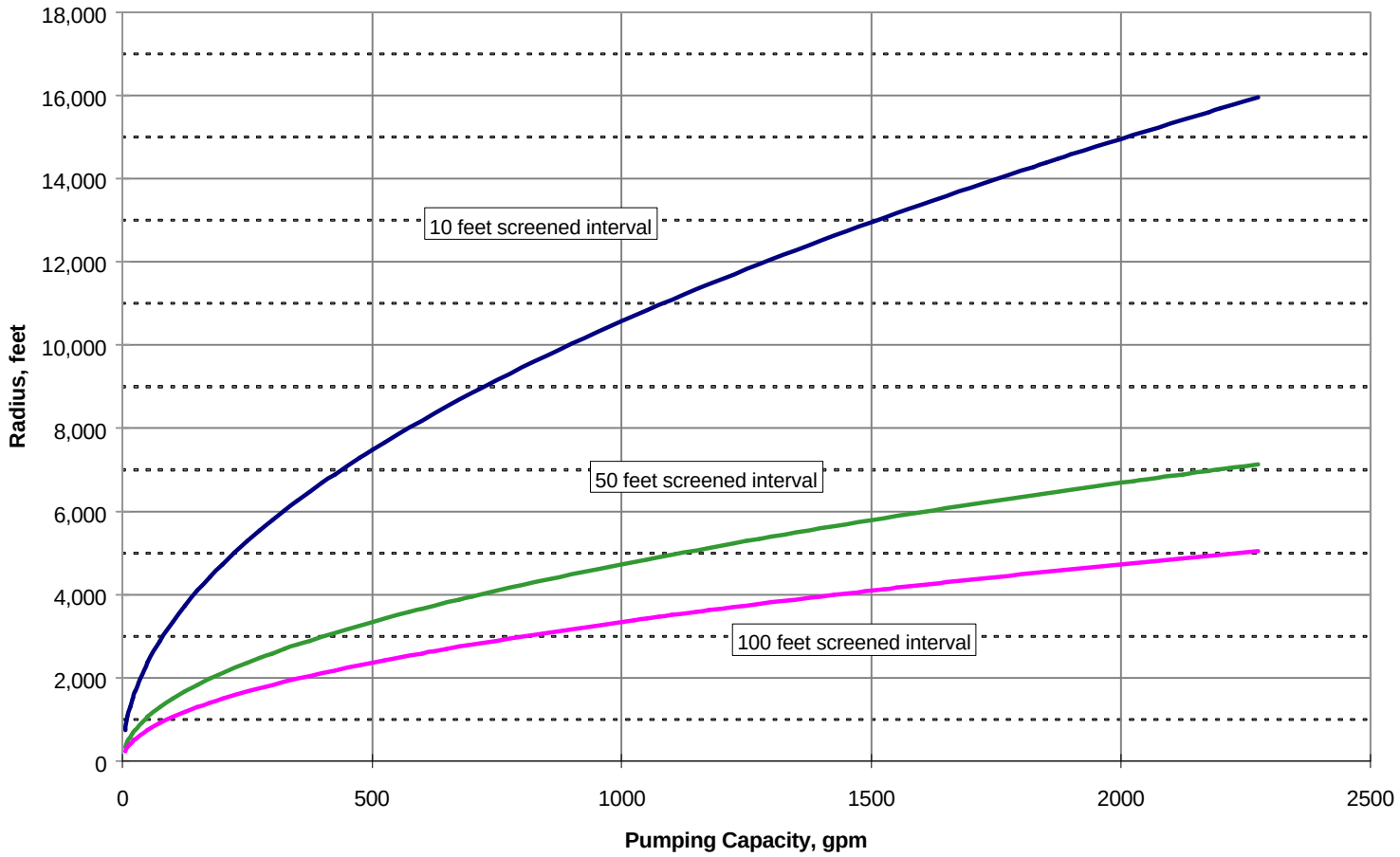


Figure 6-13. Radius of Zone B10 (10-year time of travel), using calculated fixed radius method (assumes porosity =0.2)

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7.0 Inventory of Possible Contaminating Activities (PCAs) within Source Areas and Protection Zones

An essential element of the drinking water source assessment program is an inventory of possible contaminating activities, industries, or land use. PCAs are considered to be potential origins of contamination in drinking water source areas and protection zones.

An inventory of PCAs can serve at least three important functions:

- Identify past and present activities -- and others that are proposed (to the extent feasible) -- that may pose a threat to the drinking water supply, based on their potential for contamination of ground water or surface water. These activities may include transporting, storing, manufacturing, producing, using, or disposing of potential contaminants. Historic activities are also important to include, as are activities that may contribute to a cumulative impact by a potential contaminant that may otherwise be considered somewhat innocuous.

- Provide information on the existence of PCAs and their proximity to the drinking water source, especially those that present the greatest risks to the water supply.

- Provide an effective means of educating the local public about potential problems.

Although there are various steps in developing the PCA inventory, the process should be viewed as an iterative one. If a type of activity occurs within a zone, then there is a potential origin of contamination, and this would be indicated in the initial phases of the source assessment. Additional review may provide site-specific information that indicates that the activity is not a potential origin of significant contamination. For example, a septic system that is far away from a well may be of less importance than one nearby, in terms of its microbiological significance. A PCA may be important even though it is a great distance away from the source because of the particular contaminant(s) associated with it, other characteristics of the PCA, or characteristics of the drinking water source.

The information obtained in the PCA inventory may be helpful in refining the delineation process described in Section 6.0. In addition, iterations of the PCA inventory and delineations of the source area and protection zones are important in voluntary protection programs.

Contaminants of concern. If any of the following contaminants of concern are associated with an activity, then that activity needs to be in the PCA inventory.

- Microorganisms of drinking water importance, including fecal coliform bacteria, *Escherichia coli*, viruses, *Giardia lambia*, and *Cryptospordium*.

- Chemicals for which maximum contaminant levels (MCLs) or California drinking water action levels have been established, and unregulated chemicals in drinking water for which monitoring is required (Table 7-1).

- Turbidity and total organic carbon (TOC). Turbidity can affect treatment and monitoring for microbiological contaminants, while TOC can influence the presence of disinfection byproducts, which have an attendant carcinogenic concern.

7.1 Alternative Approaches for Conducting a PCA Inventory

For the minimum program, a PCA inventory focuses on identifying whether a type of activity (PCA) exists within a source area or protection zone. Neither the exact location nor the number of sites of that type of PCA need be determined for the minimum assessment. For a more detailed assessment specific PCA locations and the density (number of facilities) for a PCA type can be included in the inventory. This is particularly useful if a source protection program is anticipated.

7.2 Information for PCA Inventories

PCA inventories should be coordinated with work done to comply with requirements of various state, local and federal agencies. Information may be obtained from permitting agencies, such as the state Department of Toxic Substances Control, the Regional Water Quality Control Boards, the Integrated Waste Management Board, the Department of Pesticide Regulation, the Department of Food and Agriculture, the local air pollution control districts, or other local agencies.

To assist in the PCA inventory process, DHS is preparing a list of agencies that have data available, some of it electronically accessible. This list will include agencies with data on topography, soils, watersheds, drinking water sources, permitted waste dischargers, hazardous waste and other waste sites, leaking underground fuel tanks, pesticide use, and others (see Section 5.0).

DHS will include on its Internet site a list of agencies and other locations that have or may have pertinent data, and DHS will have Internet links to them when possible. DHS will update and maintain the listing, but will not be responsible for the quality of, or for updating the data of, other agencies. Accessing this listing and the data other agencies have available could be an initial step in conducting a PCA inventory.

Information from the state-wide data sources will need to be supplemented with local information: septic systems, land application of biosolids (sewage sludge), livestock operations, wildlife refuges, storm water runoff, recreational bathing beaches, and various hazardous substances data bases maintained by local fire departments, county environmental health departments, and county agricultural commissioners.

7.3 Steps in Developing an Inventory of PCAs

The purpose of the PCA inventory is to identify the existence and proximity to the water source of past, present and proposed activities that might be a potential threat to the water supply.

The steps involved in a PCA inventory are detailed below.

7.3.1 Develop an Initial List of Types of PCAs of Concern that May Exist Within or Near the Source Area or Protection Zone

The initial list of types of PCAs should include known sources of contamination, significantly high risk activities within or near the recharge area or watershed, and other activities that should not be overlooked in the inventory process. Table 7-2 is a list of activities that may possibly release contaminants.

Before proceeding with the inventory, resources should be assembled that will assist in locating activities; the DHS Internet site data directory, land use maps, files, and contacts for people that may have current and historical knowledge of the area.

7.3.2 Prepare a PCA Inventory Form

DHS has developed PCA Inventory Forms for surface water sources (Appendix D) and for ground water sources (Appendix K). The PCA inventory forms presented in the appendices should not be considered complete lists of all potential origins of contamination. If a type of PCA of concern from the initial list (Section 7.2.1) is not on an inventory form, it should be added to the appropriate inventory form. Other forms may be acceptable for the PCA inventory; this should be determined in consultation with DHS.

Tables 7-3, 7-4, 7-5 and 7-6 list activities differentiated by potential risk to a water supply (very high, high, moderate, and low). The lists in those tables provide a means of ranking types of PCAs for the vulnerability analysis (Section 8.0). The inventory forms (Appendix D for surface water sources and Appendix K for ground water sources) incorporate the information from Tables 7-3, 7-4, 7-5 and 7-6.

The list of PCAs and the associated risk rankings were developed based on EPA guidance materials, other state programs, input from advisory committees and comments on the program. The risk ranking for a type of PCA is based on the relative risk of a drinking water supply to the contaminants associated with that PCA. The risk ranking may change based on the zone in which the PCA occurs. For example, PCAs associated with microbiological contamination (septic systems, animal facilities, sewer lines) are a very high risk if located within Zone A. Outside of this area they are considered less of a risk because the bacteria and viruses die off over time.

7.3.3 Conduct the PCA Inventory within the Source Area and/or Protection Zones

The initial review of the PCA inventory may be best performed by an individual or group with knowledge of activities around the drinking water source. The initial review could be done with

the Assessment Map (showing drinking water source, source area and zones) and additional maps that may be available.

The initial review allows those doing the assessment to narrow the PCA inventory lists, eliminating types of PCAs that do not occur, and noting the proximity (zone) of types of PCAs whose existence is known.

After the initial review, the PCA inventory should be completed using readily available resources. This may include consultation with various government agency or water system staff (especially for historical information), review of maps and files, access to electronic data sources, and field visits.

Again, it is not the intent of the assessment program to identify the exact location of each and every PCA within the source area and protection zones. The assessments are intended as a first step in an on-going iterative process. The initial PCA inventory should be considered an identification of the types of PCAs that exist within the delineated area(s). A water purveyor may desire to do a more detailed PCA inventory for purposes of a protection program (see Section 11.0). When more detailed information is available it is useful to include this in the assessment.

7.3.4 Attach a List of PCAs to the Assessment Map

As a minimum, a list of the types of PCAs and the area or zone(s) in which they occur should be attached to the assessment map. If the information is available, the locations of some PCAs may be shown as points or symbols on the assessment map. If a water system has a map that more clearly indicates the location of PCAs (e.g., parcel, land use, or service area maps) this may be submitted in addition to the Assessment Map.

It should be noted that the assessment map may be based on general information and approximations. It should not be used as an endpoint for targeting source protection efforts and resources but as a starting point for further investigation. It should never be assumed that an assessment map and the attached list contains all possible contaminating activities or activity types, nor should it be assumed that all possible contaminating activities on the list are actual contamination sources.

7.4 Names and Addresses Associated with PCAs

During the development of the DWSAP, DHS received a number of comments on whether or not specific names and addresses of PCAs should be identified in the PCA inventory.

Considerable concern was expressed about labeling a specific business as a "polluter," when in fact, inclusion of a PCA only refers to an activity that is "possibly contaminating."

Concern was also expressed about lumping together all facilities of an activity as one PCA without taking into account whether an individual facility is small or large, or whether it poses an

actual risk (based on historical contamination), or a potential risk, based on its specific business operations.

DHS determined that specific identification of a PCA in terms of name and address is not needed for the minimum assessment. For example, if one or more gas stations are located within Zone A, B5 or B10 of a well, for purposes of the DWSAP, the presence of the facilities and the general proximity to the water source are the most significant.

Information about ownership and other specifics about any property site or business activity can be readily accessed from other public agencies, if it is needed for local protection programs or other reasons.

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Table 7-1. California Drinking Water Primary and Secondary Maximum Contaminant Levels, Action Levels, and Unregulated Chemicals Requiring Monitoring.

Maximum Contaminant Levels. MCLs are primary and secondary drinking water standards. They are enforceable regulatory levels, under the Safe Drinking Water Act, and must be met by all public drinking water systems to which they apply.

Primary MCLs are established for a number of chemical and radioactive contaminants. Primary MCLs can be found in Title 22 California Code of Regulations (CCR) for inorganic chemicals (§64431), trihalomethanes (§64439), radioactivity (§64441 and §64443) and organic chemicals (§64444).

Lead and copper have specific regulations in 22 CCR, Chapter 17.5 §64670 *et seq*. The lead and copper regulations use the term "action level" for each substance, for purposes of regulatory compliance.

Secondary MCLS, which are set for taste, odor, or appearance of drinking water, are presented in 22 CCR §64449. Secondary MCLs exist for more than a dozen chemicals/characteristics.

Action Levels (ALs). Except for lead and copper, as described above, ALs are advisory levels for unregulated chemicals, and are not enforceable standards. The ALs are listed below. DHS recommends that drinking water utilities provide public notification if ALs are exceeded. If sources exceeding ALs are taken out of service, notification is not needed.

Unregulated chemicals requiring monitoring. Some chemicals, (e.g., MtBE) are "unregulated" but have certain monitoring requirements, as set forth in 22 CCR §64450. There are a number of unregulated chemicals that are or may be required to be monitored, depending on the vulnerability of drinking water systems.

PRIMARY MAXIMUM CONTAMINANT LEVELS
[All values in milligrams per liter (mg/L), unless otherwise noted.]

Constituent	Primary MCL
22 CCR §64431, Table 64431-A--Inorganic Chemicals	
Aluminum	1
Antimony	0.006
Arsenic	0.05
Asbestos	7 MFL[a]
Barium	1
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.2
Fluoride	2.0
Mercury	0.002
Nickel	0.1
Nitrate (as NO_3)	45
Nitrate + Nitrite (sum as nitrogen)	10

Nitrite (as nitrogen)	1
Selenium	0.05
Thallium	0.002

22 CCR §64433.2, Table 64433.2-A—Optimal Fluoride Levels
See also the Fluoride MCL, 22 CCR §64431, Table 64431-A

Annual average of maximum daily air temperature	Optimal Level (Range)
50.0 to 53.7 degrees Fahrenheit (ºF)	1.2 (1.1–1.7)
53.8 to 58.3 ºF	1.1 (1.0–1.6)
58.4 to 63.8 ºF	1.0 (0.9–1.5)
63.9 to 70.6 ºF	0.9 (0.8–1.4)
70.7 to 79.2 ºF	0.8 (0.7–1.3)
79.3 to 90.5 ºF	0.7 (0.6–1.2)

22 CCR §64441 and §64443--Radioactivity

Gross alpha particle activity[b]	15 pCi/L[c]
Gross beta particle activity	50 pCi/L
Combined Radium-226 and Radium-228	5 pCi/L
Strontium-90	8 pCi/L
Tritium	20,000 pCi/L
Uranium	20 pCi/L

22 CCR §64439--Total Trihalomethanes

Sum of bromodichloromethane, dibromochloromethane, bromoform, and chloroform	0.1

22 CCR §64444--Organic Chemicals

Alachlor (Alanex)	0.002
Atrazine (Aatrex)	0.003
Bentazon (Basagran)	0.018
Benzene	0.001
Benzo(a)pyrene	0.0002
Carbofuran (Furadan)	0.018
Carbon tetrachloride	0.0005
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002
1,2-Dichlorobenzene (o-Dichlorobenzene)	0.6
1,4-Dichlorobenzene (p-DCB)	0.005
1,1-Dichloroethane (1,1-DCA)	0.005
1,2-Dichloroethane (1,2-DCA)	0.0005
1,1-Dichloroethylene (1,1-DCE)	0.006
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.01
Dichloromethane (Methylene chloride)	0.005
1,2-Dichloropropane (Propylene dichloride)	0.005
Di(2-ethylhexyl)adipate	0.4
1,3-Dichloropropene	0.0005
Di(2-ethylhexylphthalate (DEHP)	0.004
Dinoseb	0.007
Diquat	0.02
Endrin	0.002
Endothal	0.1
Ethylbenzene (Phenylethane)	0.7

Ethylene dibromide (EDB)	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor epoxide	0.00001
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane (gamma-BHC)	0.0002
Methoxychlor	0.04
Molinate (Ordam)	0.02
Monochlorobenzene (Chlorobenzene)	0.07
Oxamyl	0.2
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated biphenyls (PCBs)	0.0005
Simazine (Princep)	0.004
Styrene (Vinylbenzene)	0.1
2,4,5-TP (Silvex)	0.05
2,3,7,8-TCDD (Dioxin)	0.00000003
1,1,2,2-Tetrachloroethane	0.001
Tetrachloroethylene (PCE)	0.005
Thiobencarb (Bolero)[d]	0.07
Toluene (Methylbenzene)	0.15
Toxaphene	0.003
1,2,4-Trichlorobenzene (Unsym-Trichlorobenzene)	0.07
1,1,1-Trichloroethane (1,1,1-TCA)	0.200
1,1,2-Trichloroethane (1,1,2-TCA)	0.005
Trichloroethylene (TCE)	0.005
Trichlorofluoromethane (Freon 11)	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2
Vinyl chloride	0.0005
Xylenes (single isomer or sum of isomers)	1.750

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[a] MFL = million fibers per liter, MCL is for fibers exceeding 10 microns in length.
[b] Including radium-226 but excluding radon and uranium.
[c] pCi/L = picocuries per liter.
[d] Also listed with a Secondary MCL of 0.001 mg/L.

LEAD AND COPPER, 22 CCR §64672.3
[All values in milligrams per liter (mg/L).]

Constituent	Action Level
Copper (Level to be met at customer tap)	1.3[e]
Lead (Level to be met at customer tap)	0.015[e]

[e] The action levels for copper and lead are used to determine the treatment requirements that a water system is required to complete. The action level for copper is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with 22 CCR §64682-§64685 is greater than 1.3 mg/L. Similarly, the action level for lead is exceeded if the concentration of lead in more than 10 percent of tap water samples collected in accordance with 22 CCR §64682-§64685 is greater than 0.015 mg/L. Failure to comply with the applicable requirements for lead and copper (22 CCR Chapter 17.5) is a violation of primary drinking water standards for these substances.

SECONDARY MAXIMUM CONTAMINANT LEVELS, 22 CCR §64449
[All values in milligrams per liter (mg/L), unless otherwise noted.]

CONSUMER ACCEPTANCE LIMITS

Constituent	Secondary MCL
Aluminum	0.2
Color	15 units
Copper	1.0
Corrosivity	Non-corrosive
Foaming agents (MBAS)	0.5
Iron	0.3
Manganese	0.05
Methyl tertiary Butyl Ether (MTBE) [f]	0.005
Odor-Threshold	3 units
Silver	0.1
Thiobencarb (Bolero)[g]	0.001
Turbidity	5 units
Zinc	5.0

[f] Also listed with an Action Level of 0.035 mg/L.
[g] Also listed with a Primary MCL of 0.07 mg/L.

Constituent	Secondary MCL Ranges		
	Recommended	Upper	Short Term
Total Dissolved Solids	500	1,000	1,500
or			
Specific Conductance, micromhos	900	1,600	2,200
Chloride	250	500	600
Sulfate	250	500	600

ACTION LEVELS
[All values in milligrams per liter (mg/L).]

Constituent	Action Level
Inorganic Chemicals	
Boron	1
Perchlorate	0.018
Organic Chemicals	
Aldicarb (Temik) [h]	0.01
Aldrin [h]	0.00005
Baygon	0.090
a-Benzene Hexachloride (a-BHC)	0.0007
b-Benzene Hexachloride (b-BHC)	0.0003
n-Butylbenzene (1-Butylpropane) [h]	0.045
Captan	0.350
Carbaryl (Sevin) [g]	0.060
Chloropicrin	0.050(0.037)[j]
2-Chlorotoluene (o-Chlorotoluene) [g]	0.045
4-Chlorotoluene (p-chlorotoluene) [g]	0.045
Diazinon (Basudin, Neocidol)	0.014
1,2-Dichlorobenzene (o-Dichlorobenzene)	0.130(0.010)[k]
1,3-Dichlorobenzene (m-Dichlorobenzene)	0.130(0.020)[k]
Dichlorodifluoromethane (Difluorodichloromethane) [g]	1.0
Dieldrin [h]	0.00005
1,4-Dioxane	0.003
Dimethoate (Cygon) [h]	0.140
2,4-Dimethylphenol	0.40
Diphenamide	0.040
Ethion	0.035
Formaldehyde	0.030
Isopropyl N (3-Chlorophenyl) Carbamate (CIPC)	0.350
Malathion	0.160
Methyl Isobutyl Ketone (MIBK)	0.040
Methyl Parathion	0.030
Methyl-tert-butyl ether (MTBE) [h,i]	0.035
N-Nitrosodimethylamine (NDMA)	0.000002
Parathion	0.030
Pentachloronitrobenzene (Terrachlor)	0.0009
Phenol	0.0050[j]
Trithion	0.0070

[h] Chemical is identified as "unregulated" for purposes of monitoring.
[i] Chemical also has secondary MCL
[j] Taste and odor threshold.
[k] Taste and odor threshold either for a single isomer or the sum of the two isomers.
[j] Taste and odor threshold for chlorinated systems.

UNREGULATED CHEMICALS REQUIRING MONITORING, 22 CCR §64450

Monitoring is required for chemicals designated "a". If a system is determined to be vulnerable, monitoring is required for chemicals designated "b,"c," and "d."

Constituent	Unregulated category
Inorganic Chemicals	
Perchlorate	d
Organic Chemicals	
Aldicarb (Temik) [l]	c
Aldicarb sulfone	c
Aldicarb sulfoxide	c
Aldrin [l]	c
Bromacil (Hyvar X, Hyvar XL)	b
Bromobenzene (Monobromobenzene)	a
Bromochloromethane (Chlorobromomethane)	b
Bromodichloromethane (Dichlorobromomethane)	a
Bromoform (Tribromomethane)	a
Bromomethane (Methyl bromide)	a
Butachlor (Butanex, Lambast, Machete)	c
n-Butylbenzene (1-Butylpropane) [l]	b
sec-Butylbenzene (2-Phenylbutane)	b
tert-Butylbenzene (2-Methyl-2-phenylpropane)	b
Carbaryl (Sevin) [l]	c
Chlorodibromomethane (Dibromochloromethane)	a
Chloroethane (Ethyl chloride)	a
Chloroform (Trichloromethane)	a
Chloromethane (Methyl chloride)	a
Chlorothalonil (Bravo)	b
2-Chlorotoluene (o-Chlorotoluene) [l]	a
4-Chlorotoluene (p-chlorotoluene) [l]	a
Dibromochloromethane (Chlorodibromomethane)	a
Dibromomethane (Methylene bromide)	a
Dicamba (Banax, Banvel, Dianat)	c
1,3-Dichlorobenzene (m-Dichlorobenzene) [l]	a
Dichlorodifluoromethane (Difluorodichloromethane)	a
1,3-Dichloropropane	a
2,2-Dichloropropane	a
1,1-Dichloropropene	a
Dieldrin [l]	c
Dimethoate (Cygon) [l]	b
Diuron (Karmex, Krovar)	b
Ethyl tertiary butyl ether (ETBE)	b
Hexachlorobutadiene (Perchlorobutadiene)	b
3-Hydroxycarbofuran	c
Isopropylbenzene (Cumene)	b
p-Isopropyltoluene (p-Cymene)	b
Methoxychlor (Lannate)	c
Methyl-tert-butyl ether (MTBE) [m]	b
Metolachlor (Metelilachlor)	c
Metribuzin (Lexone, Sencor, Sencoral)	c
Naphthalene (Naphthalin)	b

1-Phenylpropane (n-Propylbenzene)	b
Prometryn (Caparol)	b
Propachlor (Albrass, Ramrod)	c
Tertiary amyl methyl ether (TAME)	b
1,1,1,2-Tetrachloroethane	a
1,2,3-Trichlorobenzene (vic-Trichlorobenzene)	b
1,2,3-Trichloropropane (Allyl Trichloride)	a
1,2,4-Trimethylbenzene (Pseudocumene)	b
1,3,5-Trimethylbenzene (Mesitylene)	b

[l] Chemical also has a California drinking water action level.
[m] Chemical also has a California secondary MCL and a drinking water action level.

Table 7-2. Potential sources of surface water and ground water contaminants.

Potential Sources of Surface Water and Ground Water Contaminants	
Source	*Groundwater Contaminants* [1,2,3]
Commercial / Industrial	
Automobile Body shops/repair shops Car washes Gas stations/sumps	 Waste oils; solvents; acids; paints; automotive wastes;[4] miscellaneous cutting oils Soaps; detergents, waxes; miscellaneous chemicals, hydrocarbons Oils; solvents; miscellaneous wastes
Boat Services/repair/refinishing	Diesel fuels; oil; septage from boat waste disposal area; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes[4]
Cement/concrete plants	Diesel fuels; solvents; oils; miscellaneous wastes; salts, high pH
Chemical/petroleum processing/storage	Hazardous chemicals; solvents; hydrocarbons; heavy metals; asphalt
Dry cleaners	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)
Electrical/electronic manufacturing	Cyanides; metal sludges; caustic (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Fleet/trucking/bus terminals	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes[4]
Food processing	Nitrates; salts; phosphorus; miscellaneous food wastes; chlorine; ammonia; ethylene glycol
Funeral services/graveyards	Formaldehyde; wetting agents; fumigants; solvents; leachate; lawn and garden maintenance chemicals[5]
Furniture repair/manufacturing	Paints; solvents; degreasing and solvent recovery sludges; lacquers; sealants
Hardware/lumber/parts stores	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote; paints; thinners; lacquers; varnishes
Home manufacturing	Solvents; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy wastes; miscellaneous chemical wastes
Junk/scrap/salvage yards	Automotive wastes [4]; PCB contaminated wastes; any wastes from businesses[6] and households[7]; oils; lead
Machine shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachloroethylene); metal marking fluids; mold-release agents
Medical/vet offices	X-ray developers and fixers[8]; infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Metal plating/finishing/ fabricating	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid; boric acid; paint wastes; heavy metals; plating wastes; oils; solvents

Mines/gravel pits	Mine spills or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides; metals; acids; minerals sulfides; other hazardous and nonhazardous chemicals[9]
Office buildings/complexes	Building wastes[6]; lawn and garden maintenance chemicals[5]; gasoline; motor oil
Parking lots/malls (> 50 spaces)	Hydrocarbons; heavy metals; building wastes[6]
Photo processing/printing	Biosludges; silver sludges; cyanides; miscellaneous sludges; solvents; inks; dyes; oils; photographic chemicals
Plastics/synthetics producers	Solvents; oils; miscellaneous organic and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfacant; glycols; phenols; formaldehyde; peroxides; etc.
Research laboratories	X-ray developers and fixers[8]; infectious wastes; radiological wastes; biological wastes, disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants; (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); miscellaneous chemicals
Recreational vehicle (RV)/mini storage	Automobile wastes[4]; gasoline and diesel fuel from vehicles and storage tanks
Sewer lines	Sewage
Wood preserving/treating	Wood preservatives; creosote, pentachlorophenol, arsenic
Wood/pulp/paper processing and mills	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals[9]; organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide; treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes
Agricultural/Rural	
Confined animal feeding operations	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral and fungal pests on livestocks; coliform[10] and noncoliform bacteria; viruses; protozoa; total dissolved solids
Grazing animals, other animal operations	Livestock sewage wastes; nitrates; phosphates; coliform and noncoliform bacteria; protozoa, viruses; total dissolved solids;
Dairies	Livestock sewage wastes; nitrates; total dissolved solids; salts; phosphates; potassium.
Farm chemical distributor/application service	Pesticides[11]; fertilizers[12]; hydrocarbons from motor vehicles and storage tanks
Farm machinery repair	Automotive wastes[4]; welding wastes
Irrigated crops	Pesticides[11]; fertilizers [12]; nitrates; phosphates; potassium (can be worsened by over-watering)
Lagoons	Nitrates; Livestock sewage wastes; salts; pesticides[11]; fertilizers[17]; bacteria
Nonirrigated crops	Pesticides[11]; fertilizers[12]; nitrates; phosphates; potassium
Pesticide/fertilizer/petroleum storage & transfer areas	Pesticides[11]; fertilizers[12]; petroleum residues
Rural homesteads	*Machine shops:* Automotive wastes[4]; welding wastes; solvents; metals; lubricants; sludges *Septic systems:* Septage; coliform[10] and noncoliform bacteria; viruses; nitrates; heavy metals; synthetic detergents; cooking

	and motor oils; bleach; pesticides;[5,13] paints; paint thinner; photographic chemicals; swimming pool chemicals;[14] septic tank/cesspool cleaner chemicals;[15] elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Sludge application to land	Organic and inorganic chemicals, coliform and noncoliform bacteria, viruses, protozoa[16]
Agricultural Drainage	Pesticides[11]; fertilizers[12]; total dissolved solids; total organic carbon; nitrates
Residential / Municipal	
Airports (maintenance/fueling areas)	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes;[4] heating oil; building wastes[6]
Apartments and condominiums	Swimming pool maintenance chemicals[14]; pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control[5,13], wastes from on-site sewage treatment plants; household hazardous wastes[7]
Camp grounds/RV parks	Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests[11,13]; household hazardous wastes from RVs[7]
Drinking water treatment plants	Treatment chemicals; pesticides[11]
Fire stations	General building wastes[6]; hydrocarbons from test burn areas
Golf courses	Fertilizers[12]; herbicides[11]; pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests[5]
Housing	*Household hazardous wastes*[7] Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides;[13] photo chemical; printing ink, paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers *Mechanical Repair and Other Maintenance Products:* Automotive wastes;[4] waste oils; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes and polishes; rock salt; refrigerants *Lawn/garden care:* Fertilizers;[11] herbicides and other pesticides used for lawn and garden maintenance[5] (can be worsened by over-watering) *Swimming pools:* Swimming pool maintenance chemicals[14] *Urban runoff/stormwater*[3]: Gasoline; oil; other petroleum products; microbiological contaminants
Landfills/dumps	Leachate; organic and inorganic chemical contaminants; waste from households[7] and businesses[6]; nitrates; oils; metals; solvents; sludge

Motor pools	Automotive wastes[4]: solvents; waste oils; hydrocarbons from storage tanks
Parks	Fertilizers[12]; herbicides[5]; insecticides[11,13]; (can be worsened by over-watering)
Railroad yards/maintenance/fueling areas	Diesel fuel; herbicides for rights-of-way [11]; creosote for preserving wood ties; solvents; paints; waste oils
Recreational use of surface water sources (body contact)	Microbiological contamination from swimmers
Recreational use of surface water sources (motorized watercraft)	Gasoline fuel from watercraft; marinas.

Schools	Machinery/vehicle serving wastes; gasoline and heating oil from storage tanks; general building wastes[6]; pesticides[11,13]:
Septic systems	Septage; coliform[10] and noncoliform bacteria; viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides;[5,13] paints; paint thinner; photographic chemicals; swimming pool chemicals;[14] septic tank/cesspool cleaner chemicals[15] ; elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate; other household hazardous wastes[7] ;
Sewer lines	Sewage
Utility stations/maintenance areas	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Waste transfer/recycling stations	Residential and commercial solid waste residues
Wastewater	Municipal wastewater; sludge[16]; treatment chemicals[17]; nitrates; heavy metals; coliform[10] and noncoliform bacteria; nonhazardous wastes[16]
Other	
Above ground storage tanks	Heating oil; diesel fuel; gasoline; other chemicals
Construction/demolition areas (plumbing, heating, and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, roofing, and sheet metal etc.)	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Historic gas stations	Diesel fuel; gasoline; kerosene
Historic waste dumps/landfills	Leachate; organic and inorganic chemicals; waste from households [7]; and businesses [6]; nitrates; oils; heavy metals; solvents
Hospitals	Various chemical and radiological substances, and microorganisms.
Injection wells/drywells/sumps	Stormwater runoff [3]; spilled liquids; used oils; antifreeze; gasoline; solvents; other petroleum products; pesticides[11]; and a wide variety of other substances
Managed forests	Pesticides; fertilizers; total dissolved solids
Medical/dental offices and clinics	Various chemical substances.
Military installations	Wide variety of hazardous and nonhazardous wastes depending on the nature of the facility and operation[3,9]; diesel fuels; jet fuels; solvents; paints; waste oils; heavy metals; radioactive wastes
Seawater intrusion	Salinity, disinfection byproducts
Silviculture	Pesticides, fertilizers, total dissolved solids
Surface water - stream/lakes/rivers	(Directly related to surface water quality in the stream, lake, or river which is recharging groundwater)
Transportation corridors	Herbicides in highway right-of-way[11,5]; road salt (sodium and calcium chloride); road salt, anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes[4]

Underground storage tanks	Diesel fuel; gasoline; heating oil; other chemical and petroleum products
Veterinary offices/clinics	Various chemical and radiological substances and microorganisms.
Wells, agricultural (such as irrigation wells, abandoned wells)	Storm water runoff, irrigation water runoff, nitrates, pesticides, and other substances
Wells, gas, oil, geothermal	Various petroleum-related substances, inorganics
Wells (such as water supply wells, monitoring wells, unsealed or abandoned wells, and test holes)	Storm water runoff [3]; solvents; nitrates; septic tanks; hydrocarbons; and other substances

SOURCE: Adapted from EPA (1993), and from the Oregon Wellhead Protection Program

[1]In general, source water contamination stems from the *misuse and improper disposal* of liquid and solid wastes; the *illegal dumping or abandonment* of household, commercial, or industrial chemicals; the *accidental spilling* of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the *improper siting, design, construction, operation, or maintenance* of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from *atmospheric pollutants*, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, and which are removed from the atmosphere by wet or dry deposition, and runoff from or percolate through the soil. ***When the sources listed in this table are used and managed properly, contamination is not likely to occur, or is likely to occur at low levels.***

[2]Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

[3]This table lists the most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in stormwater runoff or from military installations.

[4]Automobile wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

[5]Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

[6]Common wastes from public and commercial buildings include automotive wastes; and residues from cleaning products that may contain chemicals such a xylenols, glycol esters, isopropanol, 1,1,1,-trichloroethane, sulfonates, chlorinated phenols, and cresols.

[7] Household hazardous wastes are common household products that contain a variety of toxic or hazardous components.

[8]X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

[9]The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water

Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) generated by businesses.

[10]Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

[11]Pesticides include herbicides, insecticides, rodenticides, fungicides and avicides. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine, which EPA classifies as *moderately toxic* (class 3) and *slightly toxic* (class 4) materials, respectively

[12]The EPA National Pesticides Survey found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.

[13]Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worm, rates, and mice can contain active ingredients include naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

[14]Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algaecides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

[15]Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

[16]Municipal wastewater treatment sludge can contain organic matter, nitrates; inorganic salts, heavy metals; coliform and noncoliform bacteria; protozoa (giardia and cryptosporidium) and viruses.

[17]Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

Table 7-3. Possible Contaminating Activities (PCAs) associated with Very High potential risks. Very High risk PCAs are considered to have the highest potential for drinking water contamination, greater than those designated High risk (Table 7-4), Moderate risk (Table 7-5), or Low risk (Table 7-6). The risk rankings are based on the general nature of activities and the contaminants associated with them (refer to Table 7-2), not on facility-specific management practices. Instead, such management practices may be considered in the vulnerability analysis, and should be considered in a protection program. (An asterisk [*] indicates PCAs that may be associated with microbiological contamination.)

COMMERCIAL/INDUSTRIAL

Automobile-related activities
Gas stations
Chemical/petroleum processing/storage
Dry cleaners
Metal plating/ finishing/fabricating
Plastics/synthetics producers

RESIDENTIAL/MUNICIPAL

Airports - maintenance/fueling areas
Landfills/dumps
*Septic systems - High density (>1/acre) (VH if in Zone A, otherwise M)
*Wastewater Treatment Plants (VH in Zone A, otherwise H)

AGRICULTURAL/RURAL

* Animal Feeding Operations (VH in Zone A, otherwise H)
* Concentrated Aquatic Animal Production Facilities (VH for surface water in Zone A, otherwise H)
* Managed Forests (VH for surface water in Zone A, otherwise H)

OTHER

Underground injection of commercial/ industrial discharges
Historic gas stations
Historic waste dumps/landfills
Injection wells/dry wells/sumps
Known contaminant plumes
Military installations
Mining operations
- Historic
- Active

Underground storage tanks
- Confirmed leaking tanks

Table 7-4. Possible Contaminating Activities (PCAs) associated with High potential risks. High risk PCAs are considered to have less potential for drinking water contamination than those designated Very High risk (Table 7-3), but greater potential for contamination than those designated Moderate risk (Table 7-5), or Low risk (Table 7-6). The risk rankings are based on the general nature of activities and the contaminants associated with them (refer to Table 7-2), not on facility-specific management practices. (An asterisk [*] indicates PCAs that may be associated with microbiological contamination.)

COMMERCIAL/INDUSTRIAL

Automobile related Activities
- Body shops
- Repair shops

Boat services/repair/refinishing
Chemical/petroleum pipelines
Electrical/electronic manufacturing
Fleet/trucking/bus terminals
Furniture repair/manufacturing
Home manufacturing
Junk/scrap/salvage yards
Machine shops
Photo processing/printing
Research laboratories
Wood preserving/treating
Lumber processing and manufacturing
Wood/pulp/paper processing and mills
*Sewer collection systems (H, if in Zone A, otherwise L)

RESIDENTIAL/MUNICIPAL

Railroad yards/maintenance/fueling areas
*Sewer collection systems (H, if in Zone A, otherwise L)
Utility stations - maintenance areas
*Wastewater Treatment Plants (VH in Zone A, otherwise H)

AGRICULTURAL/RURAL

* Grazing (> 5 animals/acre) (H in Zone A, otherwise M)
* Animal Feeding Operations (VH in Zone A, otherwise H)
* Other animal operations (H in Zone A, otherwise M)
Concentrated Aquatic Animal Production Facilities (VH in Zones for surface water, otherwise H)
Other aquatic animal operations (H in Zones for surface water, otherwise M)
Farm chemical distributor/ application service
Farm machinery repair
*Septic systems- low density (<1/acre) (H if in Zone A, otherwise L)
*Lagoons/liquid wastes
Machine shops
Pesticide/fertilizer/petroleum storage and transfer areas
Managed Forests (VH in Zones for surface water, otherwise H)
Agricultural Drainage (H in Zone A, otherwise M)
Wells- Agricultural, Irrigation

OTHER

NPDES/WDR permitted discharges
Illegal activities/unauthorized dumping
Mining – Sand/Gravel
Wells- Oil, Gas, Geothermal
Salt water intrusion
*Recreational area - surface water source
Underground storage tanks:
Non-regulated tanks (tanks smaller than regulatory limit)
Not yet upgraded or registered tanks
Snow Ski Areas (H in Zones for surface water, otherwise M)
Recent (< 10 years) Burn Areas (H in Zones for surface water, otherwise M)
Dredging (H in Zones for surface water, otherwise M)

Table 7-5. Possible Contaminating Activities (PCAs) associated with Moderate potential risks. Moderate risk PCAs are considered to have a lower potential for drinking water contamination than those designated Very High risk (Table 7-3) and High risk (Table 7-4), and a greater potential for drinking water contamination than activities designated Low risk (Table 7-6). The risk rankings are based on the general nature of activities and the contaminants associated with them (refer to Table 7-2), not on facility-specific management practices. (An asterisk [*] indicates activities that may be associated with microbiological contamination.)

COMMERCIAL/INDUSTRIAL

Car washes
Parking lots/malls (>50 spaces)
Cement/concrete plants
*Food processing
Funeral services/graveyards
Hardware/lumber/parts stores

RESIDENTIAL/MUNICIPAL

*Septic systems - High density (>1/acre) (VH if in Zone A, otherwise M)
Drinking water treatment plants
Golf courses
Housing - High density (>1 house/0.5 acres)
Motor pools
Parks
Waste transfer/recycling stations

AGRICULTURAL/RURAL

* Grazing (> 5 animals/acre) (H in Zone A, otherwise M)
* Other animal operations (H in Zone A, otherwise M)
Other aquatic animal operations (H in Zones for surface water, otherwise M)
Crops, irrigated (berries, hops, mint, orchards, sod, greenhouses, vineyards, nurseries, vegetables)
NOTE: Drip-irrigated crops are considered Low risks.
*Sewage sludge (biosolids) land application
Fertilizer, pesticide/herbicide application
Managed Forests (M for ground water)
Agricultural Drainage (H in Zone A, otherwise M)

OTHER

Above ground storage tanks
Wells – water supply
Construction/demolition staging areas
Contractor or government agency equipment storage yards
Managed forests
Transportation corridors
Freeways/state highways
Railroads
Historic railroad right-of-ways
Road right-of-ways (herbicide use areas)
Hospitals
Storm drain discharge points
Storm water detention facilities
Artificial recharge projects – non-potable water (includes recycled, storm, and untreated imported water)
Injection wells
Spreading basins
Snow Ski Areas (H in Zones for surface water, otherwise M)
Recent (< 10 years) Burn Areas (H in Zones for surface water, otherwise M)
Dredging (H in Zones for surface water, otherwise M)

Table 7-6. Possible Contaminating Activities (PCAs) associated with Low potential risks. Low risk PCAs are considered to have a lower potential for drinking water contamination than those designated Very High risk (Table 7-3), High risk (Table 7-4) or Moderate risk (Table 7-5). The risk rankings are based on the general nature of activities and the contaminants associated with them (refer to Table 7-2), not on facility-specific management practices. Instead, such management practices may be considered in the vulnerability analysis, and should be considered in a protection program. (An asterisk [*] indicates PCAs that may be associated with microbiological contamination.)

COMMERCIAL/INDUSTRIAL

*Sewer collection systems (H, if in Zone A, otherwise L)
Appliance/Electronic repair
Office buildings/complexes
Rental yards
RV/mini storage

RESIDENTIAL/MUNICIPAL

*Sewer collection systems (H, if in Zone A, otherwise L)
Apartments and condominiums
Campgrounds/Recreational areas
Fire stations
RV parks
Schools
Hotels, Motels

AGRICULTURAL/RURAL

Crops, non-irrigated (e.g. Christmas trees, grains, grass seeds, hay) (or drip-irrigated crops)
* Septic systems – low density (<1/acre) (H if in Zone A, otherwise L)

OTHER

Underground storage tanks
- Decommissioned - inactive
- Upgraded and/or registered – active

Roads/Streets
Artificial recharge projects - potable water
- Injection wells
- Spreading basins

Medical/dental offices/clinics
Veterinary offices/clinics
*Surface water - streams/lakes/rivers
Wells – Monitoring, test holes, borings

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8.0 Vulnerability of Drinking Water Sources to Contamination

After the initial inventory of Possible Contaminating Activities (PCAs) has been completed (Section 7), a vulnerability analysis is conducted to determine the types of PCAs to which the drinking water source is most vulnerable by prioritizing the list of activities identified in the inventory. The analysis factors in the source and/or site characteristics that may affect the vulnerability of the source to contamination from the types of PCAs identified in the inventory.

8.1 Definition

Vulnerability: A determination of the most significant threats to the quality of the water supply that takes into account the physical barrier effectiveness of the drinking water source. The vulnerability determination also considers the type and proximity to the water supply of activities that could release contaminants.

Vulnerability, as defined in the DWSAP Program, is consistent with existing California regulations (see Section 8.4).

8.2 Vulnerability Analysis Procedures

The vulnerability analysis evaluates the types of PCAs identified in the inventory within the context of the characteristics of the source and its site. The first step in the analysis is to determine the Physical Barrier Effectiveness (PBE) for the drinking water source. The PBE can be determined using site-specific information on hydrogeology, hydrology and soils. Additional information is required depending upon whether the source is ground water or surface water.

8.2.1 Drinking Water Source and Site Characteristics

8.2.1.1 Drinking Water Source Information

The information needed to determine the Physical Barrier Effectiveness should be compiled using readily available data and reports. A minimum level of information is necessary to make the initial determination, but additional information may be useful in refining the determination.

For surface water sources, Appendix C shows the minimum water body and watershed information necessary to determine Physical Barrier Effectiveness. Most of this information can be found in the Watershed Sanitary Survey for the source.

For ground water sources, the minimum information necessary to determine Physical Barrier Effectiveness is shown in Appendix J. The information to be collected should be available from well logs, soil survey maps, some general knowledge of the hydrogeology of the area, and well operation information.

8.2.1.2 Determination of Physical Barrier Effectiveness

The Physical Barrier Effectiveness is essentially an estimate of the ability of the natural geologic materials, hydraulic conditions, and construction features of the well or intake to prevent the movement of contaminants to the drinking water source.

A qualitative rating of low, moderate or high Physical Barrier Effectiveness (PBE), based on the drinking water source and site characteristics, is determined for each source. A simple approach to determining PBE for surface water is shown in Appendix C, and for ground water in Appendix J. In the DWSAP approach, the reviewer collects some basic information on the water body and watershed for surface water, and on the drinking water source and aquifer for ground water. This information is then evaluated with parameters that indicate the relative effectiveness of the source and site in preventing the migration of contaminants to the water supply.

In general, the intent of the Physical Barrier Effectiveness determination is to highlight the sources that have "high" or "low" effectiveness. Most sources will have "moderate" PBE. A more detailed review of the Physical Barrier Effectiveness at a site can be done during the development of a local source water protection program (see Section 11.0).

Surface Water

For surface water, the PBE evaluation considers several parameters including the size of, and detention time in, the reservoir, topography, geology, soils, vegetation, precipitation and ground water recharge. The size of the watershed is also important to consider, in terms of its potential for dilution or retardation of contaminants.

As shown in Appendix C, in order to get a high PBE ranking, all the parameters for a source must have values that indicate an effective barrier. For example, a source with a high PBE would be in flat terrain, with low precipitation and non-erosive soils covered by grassland.

A source is considered to have low PBE (i.e. high potential for contamination), if any of the parameters have values that do not indicate an effective barrier. For example, a source would be considered to have a low PBE if the watershed has steep slopes or if the soils are erodible or have high runoff potential.

For surface water, all sources that do not clearly have a low or high PBE are considered to have a moderate PBE. To be conservative (i.e., health protective), if any of the parameters is unknown, the drinking water source is considered to have low physical barrier effectiveness.

Ground Water

For ground water, the evaluation of Physical Barrier Effectiveness first considers the degree of confinement of the aquifer. An aquifer is classified as confined or unconfined (which includes semi-confined, leaky, and unknown). Detailed review is necessary to determine that an aquifer is confined. Table 6-1 lists indicators to consider in determining the presence or degree of confinement of an aquifer. In general, DHS will assume that an aquifer is unconfined unless detailed hydrogeologic information is available that clearly indicates that the aquifer is confined. Fractured rock aquifers, for purposes of the PBE analysis, are included in the unconfined aquifers, due to the complexity of their flow patterns.

PBE of Confined Aquifers

Confined aquifers generally are considered highly effective in preventing the migration of contaminants. However, the PBE may be diminished if abandoned or improperly destroyed wells are present that corrupt the integrity of the confining layer. The PBE may be improved if the hydraulic head in the confined aquifer is higher than the hydraulic head of aquifers above (i.e., the well exists under artesian conditions). The construction of the well can impact the effectiveness in retarding contaminants, particularly the presence of a properly constructed sanitary seal.

PBE of Unconfined Aquifers

For aquifers that are unconfined, semi-confined or of unknown confinement, the PBE evaluation next considers the soil materials in the aquifer. Wells in fractured rock are always considered to have low PBE due to the high transport velocities that can occur within fractures. Sources in porous media that have a thick continuous layer of clay above the water table have more effective barriers, similar to confined aquifers.

Abandoned or improperly destroyed wells within the protection zones for a source can decrease the effectiveness of the barrier. Because of the prevalence of abandoned and improperly destroyed wells, and the difficulty of locating them, they are considered to decrease the effectiveness of all ground water sources unless their absence can be assured.

In unconfined aquifers, water level conditions of a well can impact the likelihood that contaminants may be drawn to the well. Greater depths to ground water are more effective at preventing contamination. Wells with high production rates, short screened

intervals and perforations located close to the top of the water table are more likely to pull contaminants towards the well.

As with unconfined aquifers, the construction of the well in a confined aquifer can impact its effectiveness in retarding contaminants, particularly the presence of a properly constructed sanitary seal.

The procedures for determining PBE for ground water use the checklist in Appendix J. A ground water source is assigned points for each parameter on the Physical Barrier Effectiveness checklist. The points are totaled to arrive at a PBE score for the source, ranging from a low of 0 points to a high of 100 points. The PBE points in themselves are not a quantitative value; rather they are used to determine the overall PBE rating for the source: low, moderate or high.

Physical Barrier Effectiveness
Score Interpretation

Point Total	PBE
0 to 35	Low (includes all sources in fractured rock)
36 to 69	Moderate
70 to 100	High

Notes on Physical Barrier Effectiveness checklist for ground water:

- **The highest score a source in a confined aquifer can get is 100 (High PBE). The lowest score a source in a confined aquifer can get is 40 (Moderate PBE).**

  - The highest score a source in an unconfined aquifer can get is 70 (High PBE). Without having a clay layer 25' thick, the highest score for a source in an unconfined aquifer is 60 (Moderate PBE).

- The only sources that can get High PBE are those in confined aquifers, and those in unconfined aquifers with a clay layer, with no abandoned or improperly destroyed wells in the protection zones.

- All sources in fractured rock are considered to have Low PBE.

8.2.2 Modifying the Risk Ranking for a PCA

As described in Section 7.0, the PCA inventory includes a ranking of the potential risk or threat of contamination to a drinking water source for each type of PCA. In the inventory, activities that are considered to have a high potential for pollution of drinking

water sources are designated “very high” or ‘high” risk. Other activities having lower potential for drinking water pollution are designated “moderate” or “low” risk.

The risk ranking provides a simple approach to comparing the relative risk of types of PCAs. The risk rankings are based on the general nature of the activities and the contaminants associated with them (refer to Table 7-2), not on the density (number of facilities) or facility-specific information, such as management practices.

Comments were received regarding the ability to modify the risk ranking for an individual facility for a type of PCA. The DWSAP program is intended to be a simple, first-cut screening tool. Further detail, such as modifying the risk ranking of types of PCAs (Appendix E or L), is an optional part of the minimum drinking water source assessment. Evaluation of site-specific information may best be performed during the development of a local protection program (see Section 11.0).

8.2.3 Determination of Vulnerability

DHS has developed a simple approach to substitute for a detailed vulnerability determination. The vulnerability analysis uses the PCA inventory and the Physical Barrier Effectiveness determination to prioritize the list of types of PCAs in order to determine to which the drinking water source is most vulnerable.

The vulnerability ranking process is shown in Appendix F for surface water sources and Appendix K for ground water sources. The process involves reviewing each type of PCA identified in the inventory (and those types of PCAs whose presence is unknown) and assigning points based on the risk ranking of the type of PCA, the zone in which it occurs, and the Physical Barrier Effectiveness of the drinking water source. The points are added together, and the types of PCAs are prioritized according to points from highest to lowest, with the highest points representing the types of PCAs to which the source is most vulnerable. Finally, a cutoff point is identified, and the source is not considered vulnerable to types of PCAs with points below the cutoff.

As with the PBE scores, the vulnerability points in and of themselves do not have a quantitative value. Rather, the points are used to relatively rank the types of PCAs for an individual source. The ranking is intended as a preliminary tool to facilitate local source water protection programs that are site-specific.

The steps in the vulnerability ranking are listed below. The points for each element and the process for adding the points and assessing the relative vulnerability can be found following the steps.

1. Determine if any contaminants have been detected in the water supply (the information collected for use in the Consumer Confidence Report may be used for this purpose).

2. Determine, to the extent practical, the types of PCAs associated with detected contaminants.

3. For each type of PCA identified as existing in the protection zone(s), or as unknown, determine the number of points for the associated risk ranking.

4. For each type of PCA, determine the zone in which it occurs and add the points associated with that zone. If that type of PCA exists within more than one zone, repeat the process for each zone.

5. For each drinking water source, determine the Physical Barrier Effectiveness (PBE) and add the points associated with that PBE (these points are for Low, Moderate and High PBE as shown below).

6. Prioritize the types of PCAs by the vulnerability points, from the most points to the least.

7. The drinking water source is vulnerable to all types of PCAs with vulnerability points above the cutoff. Refer to the appropriate Vulnerability Matrix below.

8. The drinking water source is <u>most</u> vulnerable to PCA types with the highest vulnerability points, and to those PCA types associated with a contaminant detected in the water source, regardless of the vulnerability points.

9. The drinking water source is considered vulnerable to types of PCAs whose existence is Unknown, if the vulnerability points are equal to or greater than the cutoff.

Points for Vulnerability Analysis

PCA Risk Ranking Points:

Very High	7
High	5
Moderate	3
Low	1

Zone Points:

Surface Water (Zones defined)		Surface Water (Zones not defined)		**Ground Water**	
Zone A	= 5	Watershed	= 5	Zone A	= 5
Zone B	= 3			Zone B5	= 3
Remainder of Watershed	= 1			Zone B10	= 1
Unknown	= 0	Unknown	= 0	Unknown	= 0

Physical Barrier Effectiveness points:

Low	5
Moderate	3
High	1

Vulnerability Matrix for SURFACE WATER SOURCES

The cutoff point for vulnerability is **11**. The drinking water source is considered Vulnerable to all PCA's with Vulnerability Score greater than or equal to **11** (shaded boxes).

PCA points	**Zone points**		**PCA + Zone points**	PBE Points			**Vulnerability Score PCA + Zone + PBE points**		
Risk Ranking	Zones Defined	Zones Not Defined		Low	Med	High	PBE Low	PBE Med	PBE High
VH (7)	A (5)	Watershed (5)	12	5	3	1	17	15	13
VH (7)	B (3)		10	5	3	1	15	13	11
VH (7)	Watershed (1)		8	5	3	1	13	11	9
VH (7)	Unknown (0)*	Unknown (0)*	7	5	3	1	12	10	8
H (5)	A (5)	Watershed (5)	10	5	3	1	15	13	11
H (5)	B (3)		8	5	3	1	13	11	9
H (5)	Watershed (1)		6	5	3	1	11	9	7
H (5)	Unknown (0)*	Unknown (0)*	5	5	3	1	10	8	6
M (3)	A (5)	Watershed (5)	8	5	3	1	13	11	9
M (3)	B (3)		6	5	3	1	11	9	7
M (3)	Watershed (1)		4	5	3	1	9	7	5
M (3)	Unknown (0)*	Unknown (0)*	3	5	3	1	8	6	4
L (1)	A (5)	Watershed (5)	6	5	3	1	11	9	7
L (1)	B (3)		4	5	3	1	9	7	5
L (1)	Watershed (1)		2	5	3	1	7	5	1
L (1)	Unknown (0)*	Unknown (0)*	1	5	3	1	6	4	2

* Source is considered vulnerable to types of PCAs that are Unknown, if the Vulnerability Score is 11 or higher.

Vulnerability Matrix for GROUND WATER SOURCES

The cutoff point for vulnerability is **8**. The drinking water source is considered Vulnerable to all PCA's with Vulnerability Score greater than or equal to **8** (shaded boxes).

PCA points	**Zone points**	**PCA + Zone points**	PBE Points			**Vulnerability Score PCA + Zone + PBE points**		
Risk Ranking	A, B5, B10		Low	Med	High	PBE Low	PBE Med	PBE High
VH (7)	A (5)	12	5	3	1	17	15	13
VH (7)	B5 (3)	10	5	3	1	15	13	11
VH (7)	B10 (1)	8	5	3	1	13	11	9
VH (7)	Unknown (0) *	7	5	3	1	12	10	8
H (5)	A (5)	10	5	3	1	15	13	11
H (5)	B5 (3)	8	5	3	1	13	11	9
H (5)	B10 (1)	6	5	3	1	11	9	7
H (5)	Unknown (0) *	5	5	3	1	10	8	6
M (3)	A (5)	8	5	3	1	13	11	9
M (3)	B5 (3)	6	5	3	1	11	9	7
M (3)	B10 (1)	4	5	3	1	9	7	5
M (3)	Unknown (0) *	3	5	3	1	8	6	4
L (1)	A (5)	6	5	3	1	11	9	7
L (1)	B5 (3)	4	5	3	1	9	7	5
L (1)	B10 (1)	2	5	3	1	7	5	1
L (1)	Unknown (0) *	1	5	3	1	6	4	2

* Source is considered vulnerable to types of PCAs that are Unknown, if the Vulnerability Score is 8 or higher.

8.3 Uses of Vulnerability Analyses

The prioritized list from the vulnerability analysis may be used by a water system in developing protection measures to address activities that are most significant to the water supply.

In addition, the prioritized list will be useful to DHS to determine drinking water sources that may be eligible for chemical monitoring relief.

The prioritized list may also be useful on a statewide basis in determining the types of activities that represent the greatest threats to drinking water supplies, their proximity to drinking water sources, and an estimate of their prevalence.

The PBE determination may be useful for a water system in comparing water sources to each other, and identifying the ones that are at greater risk. The PBE determination may be useful on a state-wide basis in determining areas where sources with high or low effectiveness may be concentrated.

8.4. Vulnerability Assessment Procedures in California Regulations

Existing California regulations detail the vulnerability assessment procedures required to obtain a waiver for monitoring certain organic and inorganic chemicals in drinking water supplies.

California Code of Regulations (CCR), Title 22, Chapter 15, Section 64432(l) addresses vulnerability waivers for cyanide:

> (l) A water system may be eligible for a waiver from the monitoring frequencies for cyanide specified in paragraph (b)(1) of this section without any prior monitoring if it is able to document that it is not vulnerable to cyanide contamination pursuant to the requirements in section 64445(d)(1) or (d)(2). *(See below).*

CCR, Title 22, Chapter 15, Section 64432.2 addresses vulnerability waivers for asbestos for ground water systems:

> The Department will determine the vulnerability of ground water sources on the basis of historical monitoring data and possible influence of serpentine formations.

CCR, Title 22, Chapter 15, Section 64445(d)(1) and (2) addresses waivers for organic chemicals based on use and susceptibility:

(d) A water system may apply to the Department for a monitoring waiver for one or more of the organic chemicals on Table 64444-A in accordance with the following:

(1) A source may be eligible for a waiver if it can be documented that the chemical has not been previously used, manufactured, transported, stored, or disposed of within the watershed or zone of influence and therefore, that the source can be designated non-vulnerable.

(2) If previous use of the chemical locally is unknown or the chemical is known to have been used previously and the source cannot be designated non-vulnerable pursuant to Paragraph (d)(1), it may still be eligible for a waiver based on a review related to susceptibility to contamination. The application to the Department for a waiver based on susceptibility shall include the following:

(A) Previous monitoring results;
(B) user population characteristics;
(C) proximity to sources of contamination;
(D) surrounding land uses;
(E) degree of protection of the water source;
(F) environmental persistence and transport of the chemical in water, soil and air;
(G) elevated nitrate levels at the water supply source; and
(H) historical system operation and maintenance data including previous Departmental inspection results.

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9.0 Implementation of the Drinking Water Source Assessment Program

California is mandated by federal law to conduct the assessment portion of DWSAP Program. However, time and financial resources are not sufficient to enable DHS to perform comprehensive, detailed assessments, though the state will provide guidance, recommendations and technical assistance to water systems that choose to do more detailed assessments on their own.

A completed drinking water source assessment will likely be a future requirement for water systems to obtain or continue chemical monitoring waivers. Existing regulations require a vulnerability analysis for waivers (see Section 8.4). The assessment procedures will fulfill the vulnerability analysis requirements.

DHS encourages large systems to do their own source water assessments. Large public water systems with surface water sources should make use of their watershed sanitary surveys to satisfy the requirement for a drinking water source assessment. DHS considers a watershed sanitary survey completed in accordance with existing watershed sanitary survey guidance to satisfy most of the assessment components of the Program.

Systems that have performed evaluations for their ground water sources (e.g., work done for Assembly Bill 3030 Groundwater Management Plans) may find that, depending on the extent of those evaluations, they may satisfy all or portions of the components of the DWSAP Program.

DHS plans to conduct source water assessments for those sources not voluntarily assessed by public water systems or by local primacy agency (LPA) counties. The methods herein describe DHS' approach to conducting the assessments; this defines the minimum components of a source water assessment.

9.1 Source Location

In the course of routine inspection and permitting activities, DHS will determine locations (latitude and longitude) of wells and surface water intakes as accurately as possible, via Global Position System (GPS), using GPS units with a sensitivity (accuracy) of 25 meters or less. The 25-meter accuracy goal is based on US EPA's Locational Data Policy.

Each drinking water source may not receive a site visit during EPA's time frame for source water assessments (1999 – May 2003). For purposes of completing the assessments, DHS will determine interim locations through the use of USGS quadrangle maps (7.5 minute series), and make use of locational data from other sources (i.e., public water systems). The method for determining locations and the associated accuracy of the method will be recorded.

9.2 Source Area and Protection Zone Delineation

Because of limited resources and time constraints, DHS does not anticipate using the more sophisticated models described in Section 6.0, and instead will use simplified methods. However, drinking water systems that choose to do their own assessments may utilize more complex models, with DHS concurrence.

For surface water sources, DHS will delineate the entire watershed as a source area, and will define protection zones if warranted.

For ground water sources, the source area will be comprised of the recharge area and delineated protection zones. DHS will generally delineate protection zones by using the calculated fixed radius method.

For noncommunity water systems with ground water sources, DHS may use the arbitrary fixed radius method. For transient-noncommunity water systems, DHS may establish only one protection zone for acute contaminants (bacteriological and nitrate) at the minimum distance for Zone A (600' in porous media, 900' in fractured rock).

Recharge areas will be identified to the extent that they can be determined from readily available information.

9.3 Inventory of PCAs

Details of the PCA inventory are presented in Section 7.0.

DHS will use readily available information from state and local programs. As part of the DWSAP program, DHS will collaborate in improving the accessibility of data from state agencies. Some of this data may currently be accessible electronically, as mentioned in Section 7.1.

For transient-noncommunity water systems, DHS may limit the inventory to activities associated with bacteriological and nitrate contamination. Readily available state-wide databases may also be reviewed.

9.4 Vulnerability Analyses

Details of the vulnerability analysis procedures are presented in Section 8.0.

DHS will use information in water system files to evaluate Physical Barrier Effectiveness (PBE), and will rank types of PCAs based on risk rankings and proximity to the source. DHS will not include the density of facilities or facility-specific information in the vulnerability analysis.

For transient-noncommunity water systems, DHS may use a default PBE of Low, and the source will be considered most vulnerable to all activities identified in the reduced inventory.

9.5 Completion of Assessments and Summary

A checklist for a completed source water assessment is presented in Appendix G for a surface water source and Appendix K for a ground water source.

DHS will prepare a summary of each assessment that includes the assessment map and the prioritized list of the types of PCAs identified in the inventory, noting the ones to which the source is most vulnerable.

DHS will prepare vulnerability summary for assessments using standardized language. Specific information for each source, or a group of sources if appropriate, will be inserted in the summary. The language is not yet developed, but it will probably be similar to the following:

> *"An assessment of the drinking water source(s) for XYZ water system was completed in month and year. The source(s) are considered most vulnerable to the following activities associated with contaminants detected in the water supply: _____, _____, _____. In addition, the source is considered most vulnerable to these activities: _____, _____, _____.*
>
> *"A copy of the complete assessment is available at DHS District Office address or Water System Address. You may request a summary of the assessment be sent to you by contacting DHS district engineer or Water System Representative at phone number."*

9.6 Availability of Assessment Results to the Public

Copies of completed assessment results (including inventory forms, maps, and other information described in Appendices G and K) will be available for public review in DHS district field offices and are recommended to be available for public review at the office of the public water system. The means of providing results of assessments at other locations will be dictated by the size and complexity of the assessments, and by local interest.

DHS will send out the summary of an assessment upon request.

If DHS conducts the assessment, DHS will send the vulnerability summary for the assessment to the water system for inclusion in the annual consumer confidence report.

9.7 Updating Information

DHS recommends that assessments be reviewed and updated every five years. DHS will update assessments, to the extent possible, in the course of routine activities.

Water systems, as part of an assessment update, may solicit comments from local agencies and the public, or others who may have suggestions of additional information that should be included or other possible improvements. Where a local drinking water source protection program has been put in place, DHS anticipates that information from that program would be included in any assessment updates.

9.8 Anticipated Schedule for Drinking Water Source Assessments

As mentioned above, a number of activities required under existing law (e.g., watershed sanitary surveys for surface water sources) are related to surface water and ground water assessment and protection. These activities will proceed and can be incorporated easily into the DWSAP Program.

There are approximately 16,000 active drinking water sources in California (Table 9.1), and several thousand standby and inactive sources. Given the resource limitations (approximately $7.5 million from the federal Drinking Water State Revolving Fund, or roughly a few hundred dollars per source), DHS envisions scheduling its assessments according to its normal three- to five-year cycle for water system inspections. Further, since public water systems with surface water sources need to update watershed sanitary surveys on a five-year cycle, that requirement will dictate the schedule for surface water sources. To the extent that public water systems elect to conduct their own assessments, the schedule will be modified (See Section 9.9).

DHS intends to expeditiously conduct assessments throughout the time period 1999 - May 2003 generally according to the following priortized list:

1. Community water systems with more than 1,000 and up to 10,000 service connections, approximately 660 ground water sources (100 systems) and 50 surface water sources (30 systems) per year.

2. Community water systems with 200 to 1,000 service connections, approximately 280 ground water sources (90 systems) and 30 surface water sources (25 systems) per year.

3. Community water systems with fewer than 200 service connections, approximately 670 ground water sources (540 systems) and 60 surface water sources (50 systems) per year.

4. Nontransient-noncommunity water systems, approximately 280 ground water sources (240 systems) and 10 surface water sources (10 systems) per year.

5. Transient-noncommunity water systems: approximately 980 ground water sources (approximately 940 systems) and 80 surface water sources (80 systems) per year.

6. Community water systems with more than 10,000 service connections, approximately 840 ground water sources (40 systems) and 50 surface water sources (20 systems) per year.

Standby and inactive sources will not be scheduled for a source water assessment during this period, unless they are activated. If activated after April 1, 2003, public water systems will need to complete a source water assessment for standby and inactive sources before they can be used.

New sources will be assessed by the public water systems that intend to bring them on line (see Section 10.0).

DHS intends assessments to be completed by May 2003, in order to meet the federally-required completion deadline.

The overall order for conducting drinking water source assessments will change if some public water systems complete their own assessments, as discussed in the next section.

9.9 Assessments Done Voluntarily by Drinking Water Systems

As mentioned previously, conducting drinking water source assessments is the responsibility of DHS. However, drinking water systems are not precluded from conducting their own, upon notification to DHS, and they may voluntarily choose to do so.

A number of public water systems have already performed evaluations that may satisfy many of the components of the drinking water assessment. A watershed sanitary survey, for example, has been mentioned throughout this document as an example of previously conducted work for surface water sources that will largely satisfy the assessment components of the DWSAP program. Some public water systems may have already conducted similar kinds of evaluations for their ground water sources of drinking water.

Those systems should contact the DHS district office to determine whether their prior work or portions of it are sufficient to satisfy the needs of the DWSAP Program.

There are a number of benefits to a drinking water system that has a complete comprehensive assessment of its sources. These include:

- DHS will incorporate the DWSAP approach for assessing vulnerability into its determination for monitoring waivers (see Section 8.4). A deadline will likely be established beyond which any waiver renewals will be subject to the new approach.

- Source water assessments will be a prerequisite for gaining access to State Revolving Fund monies for local source water protection projects and programs (see Section 11.0).

- DHS will incorporate assessment procedures into the permit requirements for new sources (see Section 10.0).

- A drinking water system may be qualified for some relief of regulatory requirements under the anticipated Ground Water Rule if it has completed a comprehensive source water assessment.

- A comprehensive assessment can serve as a document to share with land use planning agencies.

- For communities interested in source water protection activities, the DWSAP assessments provide the basic information to begin those activities.

- A comprehensive assessment will contribute to the institutional memory of a drinking water system.

- A comprehensive assessment brings a variety of information together in a single place.

- A comprehensive assessment can provide a drinking water system with a useful public relations and public information tool.

Based on the history of implementing other drinking water-related programs in California, DHS believes that some systems will proceed with conducting their own source water assessments. Those water systems that plan to conduct their own assessments will need to notify DHS by December 31, 2000, submit a progress report to DHS no later than February 2002, and submit the final assessment to DHS no later than

January 1, 2003, to enable departmental review. Those systems intending to incorporate the drinking water source assessment into their scheduled watershed sanitary survey update cycle should inform DHS and indicate when the update will be available (no later than January 1, 2003).

An estimate of the possible implementation is as follows:

Large water systems (>10,000 service connections). DHS expects that these systems will voluntarily conduct all the elements of a source water assessment, with some data tools provided by DHS and other agencies.

Medium water systems (>1,000 to 10,000 service connections). DHS expects that most of these systems will voluntarily conduct some of the elements of a source water assessment (location of drinking water sources, delineation of source areas and protection zones, PCA inventory, dissemination of assessment results to the public). Roughly half of these systems are expected to conduct their vulnerability analyses with technical support by DHS and other agencies. The remainder will be performed by DHS.

Small water systems (<1,000 service connections). DHS and LPA counties are expected to conduct all of the source water assessments for these systems, using State Revolving Fund monies. Some may be able to conduct their own PCA inventories.

For drinking water systems or communities that want to immediately embark on voluntary source water protection programs (see Section 11.0), incorporation of the source water assessment steps into those programs is appropriate, and is encouraged by DHS.

DHS will have to conduct the assessments if they are not completed by public water systems.

Table 9-1. Distribution of California's 15,984 active drinking water sources by public drinking water system size and source type.

System Size, by Service Connections (SCs)	Ground Water		Surface Water	
	Systems	Sources	Systems	Sources
>10,000 SCs	152	3,362	74	165
1,000–10,000 SCs	394	2,656	130	192
200–1,000 SCs	359	1,130	102	134
<200 SCs	2,151	2,689	209	226
Non-Transient	964	1,135	47	48
Transient	3,773	3,929	313	318
Total	7,793*	14,901	875*	1,083

* Some systems have both ground water and surface water sources, and are included in each column. Therefore, the total of 8,668 ground water and surface water systems presented in this table exceeds the actual number of systems.

10.0 New Drinking Water Sources

New water systems, or existing water systems that add a source of supply, are required to submit a permit application to DHS (California Health and Safety Code, Section 116525, et seq.). As part of the permit application, the water system is required to submit a technical report. DHS will incorporate the DWSAP assessment procedures into the permit requirements for new drinking water sources. The assessment will be considered in the permitting of the source.

Assessment work that has been done for existing drinking water sources may be useful in fulfilling these requirements.

As part of the permit application the water system will be required to submit the minimum components for an assessment as described in Section 3.0 and listed here (pertinent sections of this document are noted):

✓**Location of the Drinking Water Source.** Section 9.1 and Appendix A or H.

✓**Delineation of Source Areas and Protection Zones.** Section 6.0, and Appendix B or I.

✓**Inventory of Possible Contaminating Activities (PCAs).** Section 7.0 and Appendix D or K.

✓**Physical Barrier Effectiveness Checklist.** Section 8.0 and Appendix C or J.

✓**Vulnerability Ranking – Prioritized Listing of PCAs.** Section 8.0 and Appendix F or M.

✓**Assessment Map.** Section 6.3 and Appendix G or N.

✓**Drinking Water Source Assessment Checklist.** Appendix G or N.

Water systems are encouraged to conduct a preliminary assessment before constructing new drinking water sources.

Voluntary protection activities for new sources would be similar to those for existing sources, as discussed in Section 11.0.

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PART FOUR

Voluntary Drinking Water Source Protection Programs

A description of the approach public water systems and communities may wish to use in developing source water protection programs

Section 11—Implementation of a voluntary source water protection program

Section 12—Management approaches within source areas and protection zones

Section 13—Contingency planning for drinking water supplies

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11.0 Implementation of A Voluntary Source Water Protection Program

A voluntary drinking water source water protection plan offers a public water system or community an opportunity to build on work done for drinking water source assessments.

The goal of a local source protection program is to identify, develop and implement local measures that advance the protection of the drinking water supply. A local program should maximize use of existing data and develop more detailed information, drawing on local knowledge.

The following steps are recommended for drinking water systems or communities that choose to implement a voluntary source water protection program.

- Review the State's DWSAP Program
- Establish a local advisory committee
- Review the initial drinking water source assessment and determine if and where to expand and refine it. Activities that may be appropriate include:
    - Gathering additional information
    - Revising delineations of the source area and protection zones, if necessary
    - Refining and updating the inventory of possible contaminating activities (PCAs)
    - Reviewing the vulnerability analysis and vulnerability ranking
    - Prioritizing the contaminant activities that need to be studied more closely based on vulnerability of the drinking water source
- Prepare reports and maps
- Develop a protection program based on revised assessment
- Submit the protection program (and revised assessment) to DHS, other agencies, and the public
- Implement the protection program and its management approaches
- Conduct contingency planning

The sharing of information is encouraged, especially among drinking water systems or communities with common delineated source areas or protection zones, or those that share aquifers or watersheds. DHS recommends that communities and systems with common interests work together on protection programs. The DHS' local offices can provide examples of groups of water systems that have joined together to work on similar projects (e.g., watershed surveys).

Smaller systems, whose source areas and protection zones lie within the source areas and/or protection zones of a larger system, may be able to make use of the information developed by the larger system, as well as provide information to the larger system.

More detail about some of the steps is provided below.

11.1 Involve the Public during Development of a Source Water Protection Program

A successful source water protection program requires that drinking water systems or communities involve the public. Such involvement may be through local public advisory groups or the use of volunteers for information collection, to name two examples. Representatives from a variety of stakeholder groups (See Table 4-1) may be appropriate to include in forming local advisory groups.

11.2 Review initial source water assessment and determine whether revisions are appropriate

The source water assessment for the drinking water source should be reviewed to determine whether it should be updated or revised. Revisions of the assessment, if appropriate, could be made on the delineation, the PCA inventory, the vulnerability analysis or a combination of these elements.

Delineation

Local drinking water systems or communities may revise the source areas or protection zones that were used in the initial assessment, based on more detailed or more accurate data. Various methods for delineating source areas and protection zones are described in Section 6.0.

PCA Inventory

As with the original assessment, gathering supplemental information should be coordinated with the work of various state, local and federal agencies. It should also make use of the permits issued and the enforcement actions taken. Some examples of these are presented in Sections 5.0 and Sections 7.0 of this document. Some communities have inventoried PCAs on a parcel-by-parcel basis, sometimes by using volunteers from the community.

As part of a local protection program, other potential contaminants associated with particular activities could be considered besides those subject to drinking water

regulation (see Section 7.0). Those could include the following: US EPA's priority pollutants; chemicals that are subject to the Toxic Release Inventory; California's list of hazardous substances; chemicals identified as causing cancer or birth defects or other reproductive harm for purposes of California's Safe Drinking Water and Toxic Enforcement Act of 1986 ("Proposition 65"); or chemicals for which permits are issued by the Regional Water Quality Control Board.

Supplemental inventories could include research of written documents, review of land use data, conducting surveys, and field reconnaissance. Each of these methods is described in more detail below.

Written documents include those maintained by federal, state, and local agencies, such as lists, inventories, records and other items that would identify the following: underground or above ground storage tanks, federal Superfund sites, contamination sites, landfill locations, septic systems, and other state and locally regulated activities. Other documents include telephone directories, business records, property tax records, news articles, and historical or archival information.

Land use data can help identify possible contaminant activities or sources of pollution. These can often be identified from information that may be available from the local planning or building departments. These may include aerial photographs, topographic maps, zoning maps, and building permits.

Surveys may also be done to confirm or supplement information collected by other means. The surveys can be prioritized by type of PCA or by zone. Types of surveys include mail questionnaires, telephone surveys, personal interviews, and automobile windshield surveys.

A field review may be done to identify land uses and to look for potential sources of contamination not clearly identified by the previous methods. Items to document could include: abandoned or improperly destroyed wells, closely spaced septic systems, point source and non-point source contaminants, unauthorized activities and changes in business use.

Vulnerability Analysis

The objective of the vulnerability analysis in a protection program is to more accurately determine which of the types of PCAs pose the greatest threat to the water supply. Procedures for the minimum assessment are described in Section 8.0.

The physical barrier effectiveness determination could be modified based upon more detailed information on the hydrology or hydrogeology of the watershed or aquifer, and the source. Water systems may choose to use a different method to evaluate physical barrier effectiveness, provided that it considers the same factors as the DWSAP method.

The vulnerability ranking could be modified by considering additional information on some or all of the PCAs. The density (number of facilities) and the quantity and/or extent of the area that the type of PCA occupies in the protection zone could be included in determining potential risk.

In addition, facility-specific information (compliance, construction, operation, etc.) could be considered. Appendix E or L may be useful for this purpose.

Update of assessment maps

Results of the revised assessment could be illustrated on an updated map that identifies the drinking water source, source areas and protection zones, and PCAs to which the source is most vulnerable. Such a map is helpful in the development of a protection program and in describing the program to the public.

Follow-Up Iterations

Iterations are important in this process, particularly since, for many drinking water systems, a simple approach will be used for the initial assessment. A simple delineation and inventory may suggest that a drinking water source is at risk of contamination, while a more detailed approach may show that the "risk" initially identified reflected the assumptions used and not the actual situation.

11.3 Initiate Protection Measures, If Appropriate

If the drinking water source is vulnerable to contamination, protection measures may be taken. These might include increased monitoring, abatement or remediation of the contaminant source, planning for an alternative source of supply, or other management activities, as described in Sections 12.0 and 13.0.

11.4 Provide Information to the Public

When the drinking water system or community decides to make the findings of its protection efforts available to the public, the following methods are examples of those that may be used.

- Provide documents for review in public libraries
- Provide documents for review at county health/environmental health department
- Issue press releases that refer public to locations of documents for public review
- Mail notice to organizations identifying locations of documents for public review
- Mail notice to customers of locations of documents for public review

- Hold a public meeting that describes the findings of the protection program and refers to locations of documents for public review
- Mail assessment map and summary to customers/public
- Provide results or a summary in annual consumer confidence report to customers/public
- Make results available by electronic access (e.g., Internet)

In all cases, copies of source water assessment and protection reports should be provided to DHS.

11.5 Update Source Water Assessment and Protection Information

The public water system or community should develop a schedule for updating its protection program. To be consistent with source water assessments, the protection program should be reviewed for possible update every five years.

Information for the public should be updated based on revised assessment maps and follow-up iterations as described in Section 11.2. This will ensure that the public receives the most up-to-date and accurate information.

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12.0 Management Approaches within Source Areas and Protection Zones

Source water protection is not a mandated element of the EPA's Source Water Assessment Program requirements. However, protection is required for a complete wellhead protection program. EPA and DHS encourage development of protection programs for all sources, recognizing that prevention of contamination is of greater benefit to the public and to drinking water utilities than dealing with it after the fact, through expensive drinking water monitoring and treatment and other expensive environmental cleanup activities.

A drinking water system with a completed source water assessment and a protection program may be eligible for waivers from monitoring. As mentioned previously for the assessment program, the State could require protection programs to be in place for permitting and waivers, particularly for water systems with sources that have detected levels of a regulated or unregulated chemical.

Drinking water systems and communities are encouraged to develop management strategies to mitigate the impact and risk of contamination of the drinking water supply. Another activity related to the DWSAP is contingency planning, which is discussed in Section 13.0

Management within source water protection areas is primarily the responsibility of local governments and public drinking water systems, supported and guided by State policies and programs. Source water protection activities in California can be divided into three categories. Each category is described below:

1. State programs related to drinking water source protection
2. Recommended guidelines for management in protection areas
3. Local management activities

12.1 State Programs Related to Drinking Water Source Protection

Existing state programs to protect water supplies and to inventory, regulate, and clean up contaminant sources are described in Section 5.0, Roles and Responsibilities of Government Agencies.

DHS will actively promote the development of local drinking water source protection programs. DHS' activities to promote protection of drinking water supplies include technical assistance, financial assistance, training, education, and demonstration projects.

As each assessment performed by DHS is completed, the information will be shared with the public water system along with guidance for local protection programs.

Technical Assistance

The DHS Drinking Water Program has a source water (wellhead) protection coordinator available to assist local agencies with protection programs. In addition, staff at Drinking Water Program district offices are available for assistance, if requested. These DHS personnel can make presentations to water suppliers and community groups about source water protection, and can review technical elements of proposed programs.

Financial Assistance

California is establishing a State Revolving Fund (SRF) for drinking water. These funds will be primarily targeted to water system infrastructure improvements. However, some portion of the funding will be available for source water protection activities. The state is currently developing guidelines for the SRF program.

Training

DHS, in conjunction with EPA, is preparing a training program in source water protection for utility operators, managers and board members. This training will be offered for the first time in 1999, and on a repeating basis thereafter throughout the state. Other organizations may offer training as well.

Education

DHS will be preparing educational materials for use by water utilities, community groups, and other interested parties. These materials may include additional guidance documents for implementation of the DWSAP Program.

Demonstration Projects

DHS is participating in several demonstration projects. The first community demonstration project is focused on ground water sources of the City of Sebastopol in Sonoma County. The project is funded by the City of Sebastopol, with DHS providing project coordination and technical assistance. Another demonstration project is a drinking water source protection program for Yosemite National Park, funded by the US EPA and DHS. Additional ground water (wellhead) demonstration projects may develop, including some in conjunction with the California Rural Water Association.

Directory of Source Water Protection-Related Activities

DHS has prepared a directory of agency programs (see Section 5.0) to enable drinking water systems and communities to access pertinent information for drinking water source protection activities. The data directory will be available through the Internet.

12.2 Recommended Guidelines for Management in Source Areas and Protection Zones

The protection areas and zones mentioned in the following subsections refer to those identified in Section 6.0 for surface water and ground water sources.

12.2.1 Surface Water Sources

Surface water intakes, and land areas near surface water sources should be managed to reduce the possibility of contamination. Potential origins of contamination such as septic systems should be designed and used with appropriate precautions to ensure protection of surface water from microbial organisms. Chemicals capable of contaminating surface water should not be stored or used near surface water intakes or near surface water sources of drinking water, or should be stored and used with appropriate precautions to eliminate the possibility of spills or discharges.

If zones are established within a surface water source area (i.e., watershed), the zones that are farther from the source, yet still within the watershed, allow the community to appropriately plan and site future high risk and medium risk PCAs. These zones also serve as an educational tool for industry, the general public, and others to understand the source of their drinking water and the significance of their actions within a watershed or surface water source area.

12.2.2 Ground Water Sources

Recharge Areas

Where ground water recharge areas can be identified, they should be managed in a manner generally similar to that described above for surface water sources, using primary and secondary recharge areas (Section 6.3) to represent source areas and protection zones.

Protection Zones

Protection zones within the source area of a ground water source allow the community to appropriately plan and site future high risk and medium risk PCAs. These zones also serve as an educational tool for industry, the general public, and others to understand the

source of their drinking water and the significance of their actions upgradient or within the protection zones of their drinking water wells, and for the entire aquifer and recharge area, too.

Well Site Control Zone

The well site control zone should be managed to reduce the possibility of surface flows reaching the wellhead and traveling down the casing. It is recommended that the water purveyor own this area, or have a permanent easement. Within this zone, the immediate vicinity of the well should be fenced and locked, or may include a well house or other building. It is not necessary for the entire zone to be fenced.

Zone A - Microbial/Direct Chemical Contamination Protection Zone

Within Zone A, the protection zone established on the basis of the two-year time of travel, activities that could be potential sources of microbial or direct chemical contamination should be strictly managed to eliminate or reduce the risk of contamination of the water supply.

Potential sources of contamination such as septic systems and animal facilities should be designed and used with appropriate precautions to ensure appreciable reduction in nitrates and microbial organisms before reaching ground water or surface water.

Activities should be managed so that chemicals capable of contaminating ground water would not be stored or used, or would be stored and used with appropriate precautions to eliminate the possibility of spills or discharges.

Zones B5 and B10 - Chemical Contamination Protection Zones

Zone B5, the area within the five-year time-of-travel, should be actively managed for control of potential chemical contaminants. Within Zone B5, chemicals capable of contaminating ground water should be stored and used with appropriate precautions to eliminate the possibility of spills or discharges.

Zone B10, the area between the five- and ten-year time-of-travel, allows the community to plan and site future high risk and medium risk sources of ground water contamination at a distance from the source where they are less likely to contaminate the water supply.

Buffer Zone - Additional Chemical Contamination Zone

A buffer zone enables additional planning for particular activities that may affect the community's ground water supplies.

12.3 Local Management Measures

After identifying source areas, protection zones, and types of PCAs, and developing a vulnerability ranking, the local community or water supplier may choose to develop a management strategy for protecting the water supply. The strategy could identify measures to be accomplished at the local level, and may affect agencies, districts or other communities besides the community served by the water supply. The cooperation of the entire community is vital for source water protection management measures to work.

A source water protection management strategy could include measures that are already undertaken, and ones to implement in the future.

There are both non-regulatory and regulatory management measures that can be effective as part of a source water protection program. The easiest ones to implement are non-regulatory, such as public education, and they may be very successful. If, however, as a result of the PCA inventory and vulnerability analysis, a local community determines that the water supply is at high risk of contamination, then land use planning, permitting, and possibly more restrictive regulatory methods may be necessary to ensure protection of the water supply. Potential local management measures are listed in Table 12-1.

In assessing the merits of protection measures, consideration should be given to the costs to parties of implementing the measures, the probable effects of implementing the measures, and the benefits associated with those effects. Source water protection is a valuable tool in water quality management, but not all source water protection measures will be cost effective.

There have been a number of documents published that can assist water systems and communities in developing local protection programs. Several organizations assist with source water protection efforts. Water systems and communities are encouraged to review the resource documents listed in Table 12-2 and to contact the organizations listed in Table 12-3. In addition, DHS intends to develop state-specific guidance for local protection programs.

Table 12-1. Potential management measures for local source water protection programs.

Regulatory

Zoning

Overlay Source Water Protection Districts
Prohibition of Various Land Uses
Special Permitting
Large-Lot Zoning
Transfer of Development Rights
Cluster/PUD Design
Growth Controls/Timing
Performance Standards

Land Use Permit Conditions

New Uses – Review for ground or surface water contamination potential
Existing Uses – Require review for change in chemical type/quantity/handling
Underground Storage Tank requirements

Subdivision Control

Drainage Requirements
Impact Fees

Other

Septic System Upgrades
Toxic and Hazardous Materials Handling Regulations
Private Well Protection
Sewer system hookups

Non-Regulatory

Land Transfer and Voluntary Restrictions

Sale/Donation
Conservation Easements
Limited Development

Other

Watershed Restoration Efforts
Storm Water Monitoring
Ground Water Monitoring
- Review existing monitoring wells
- Install new monitoring wells
- Conduct sampling of existing private wells

Contingency Plans
Hazardous Waste/Used Oil Collection
Public Education
Identify Underground Injection Sources or Abandoned Wells
Notify Other Agencies with Land Use or Regulatory Authority
Groundwater Guardian *(contact Groundwater Foundation)*
Storm Drain Labeling
Fencing/ Access Restriction

Legislative

Regional Wellhead Protection Area Districts
Land Banking

Table 12-2. Documents related to source water protection and wellhead protection

California Well Standards, DWR Bulletin 74-90 and DWR Bulletin 74-81

A Guide to Wellhead Protection, Witten, J. and Horsley, S., American Planning Association, Planning Advisory Service, Report #457/458, August, 1995,

Basic Ground-Water Hydrology, USGS Publication #2220

California Groundwater Management, Groundwater Resources Association of California

Delineation of Wellhead Protection Areas in Fracture Rocks, EPA Publication EPA570991009

Ground Water and Wellhead Protection, EPA Handbook EPA625/R94001

Guide to Groundwater Supply Contingency Planning for Local and State Government, EPA Technical Assistance Document EPA4404690003

Guidelines for Delineation of Wellhead Protection Areas, EPA Publication EPA440593001

Protecting Local Ground-water Supplies through Wellhead Protection, EPA Publication EPA570991007

Wellhead Protection : A Guide for Small Communities, EPA Seminar Publication EPA625R93002

Wellhead Protection in Confined, Semi-Confined, Fractured, Aquifer Settings, EPA Publication ERIC: G-127, EPA813K93001, NTIS:PB94-109402

Wellhead Protection Programs: Tools for Local Governments, EPA Publication EPA440/6-89/002

Wellhead Protection Strategies for Confined Aquifer Settings, EPA Publication EPA570991008

Why Do Wellhead Protection? Issues and Answers in Protecting Public Drinking Water Supply Systems, EPA Publication EPA813K95001

GroundWater and Surface Water – A Single Resource, USGS Circular 1139

Table 12-3. Organizations that may assist with source water protection efforts

California Groundwater Association
P.O. Box 14369
Santa Rosa, California 95402-6369
(707) 578-4408

California Rural Water Association
8300 Fair Oaks Boulevard, Suite 302
Carmichael, California 95608
1-800-833-0322

Groundwater Resources Association of California
601 Villanova Drive
Davis, California 95616
(530) 758-3656

Water Education Foundation
717 K Street, Suite 517
Sacramento, California 95814
(916) 444-6240

The GroundWater Foundation
P.O. Box 22558
Lincoln, Nebraska 68542-2558
(402) 434-2740

National Rural Water Association
2915 South 13th Street
Duncan, Oklahoma 73533
(405) 252-0629

Farm*A*Syst / Home*A*Syst
(assessment procedures for farms and homes)
B142 Steenbock Library
550 Babcock Drive
Madison, WI 53706-1293
(608)262-0024

13.0 Contingency Planning for Drinking Water Supplies

Contingency planning to protect drinking water supplies is an essential element of a complete source water protection program. It is also required by the Safe Drinking Water Act (SDWA) and the Emergency Planning and Community Right-to-Know Act of 1986, enacted as Title III of the Superfund Amendments and Re-authorization Act (SARA).

Local governments are typically given responsibility for implementing components of a drinking water source protection program. While program requirements may vary, a public water supplier should develop a contingency plan to locate and provide alternate drinking water supplies in the event of contamination. A contingency plan should not be limited to planning for alternative supplies; it should be used to identify and to prevent both physical and operational threats from contaminating or closing a public water supply.

The following are minimum components for local contingency plans. These will ensure adequate planning, encourage reliability and consistency, and create uniform response protocols. Any local plan should be consistent with Urban Water Plans.

A contingency plan could be made a condition of a public water system's water supply permit. Such a plan is required for a complete wellhead protection program.

13.1 Contingency Planning at the State Level

Contingency planning at the state level is also an important component of the State Drinking Water Source Assessment and Protection Program. A state plan would identify state roles, responsibilities, and resources.

A State Contingency Plan could include the following activities: Analysis of the characteristics of water systems statewide; analysis of the vulnerability of surface and ground water supplies statewide; review of existing State emergency response plans; analysis of water supply replacement options statewide; evaluation of the State's technical, logistical, and financial resources to support local response activities; development of guidance and standards to direct local plan development; identification of future steps that should be taken to prevent or mitigate future disruptions; improvement of the State's ability to respond to major supply disruptions; and organization of a process for reviewing and updating the plan.

A State Contingency Plan would provide the overall framework for state and local responses and integrate other state and federal programs, and provide direction for local plans. A State

Contingency Plan could be developed after EPA approval of the State Drinking Water Source Assessment and Protection Program.

13.2 Minimum Components of Local Contingency Plans

A local contingency plan should include an assessment of the water system's ability to function with a loss of major supply, and it should address alternate supplies in case they are needed. Specific steps are identified in this section.

13.2.1 Assessment of the Ability of the Water System to Function with the Loss of the Largest Source of Supply

In order to assess the ability to function with the loss of the largest source of supply, the water supplier should do the following: (1) Identify the water system's maximum capacity considering the source, distribution system, and water rights or other restrictions; and (2) re-evaluate this capacity if the largest supply source were to be lost.

13.2.2 Development of a Plan for Alternate Water Supplies

To develop a plan for alternate water supplies, the water supplier should determine both short-term and long-term supplies, the additional capacity that would be provided from the alternate supplies, and the associated costs. The plan should consider such alternatives as: increasing production from existing sources, identifying existing and potential inter-ties with other public water systems, and installing treatment on sources not currently used because of water quality problems.

13.2.3 Development of a Spill/Incident Response Plan

Using the results of the PCA inventory, a response plan for spills and emergencies should be developed with local emergency responders. Emergency response actions to be taken should consider protection of the water supply. For example, chemical spills within the protection area should be soaked up with absorbent materials rather than being washed away to drainage systems. Similarly, in the event of a fire it may be best to allow certain facilities to burn rather than have contaminated runoff that could pollute the community water supply.

References

American Water Works Association, California-Nevada Section, 1993. *Watershed Sanitary Survey Guidance Manual*. Source Water Quality Committee, December.

California Department of Water Resources, California Well Standards, DWR Bulletin 74-81.

California Department of Water Resources, California Well Standards, DWR Bulletin 74-90.

Massachusetts Department of Environmental Protection, 1996. *Developing a Local Surface Water Supply Protection Plan.*

Todd, D.K. 1980. *Groundwater Hydrology*. 2nd Ed. New York: John Wiley & Sons.

Washington State Department of Health, Environmental Health Programs. 1995. *Washington State Wellhead Protection Program Guidance Document*. Olympia, Washington. DOH Publication 331-018, April.

US Environmental Protection Agency, 1997. *State Methods for Delineating Source Water Protection Areas for Surface Water Supplied Sources of Drinking Water*, EPA 816-R-97-008, August.

US Environmental Protection Agency, 1997. *State Source Water Assessment and Protection Programs Guidance*, Final Guidance, Office of Water, EPA 816-R-97-009, August.

Witten, J. and Horsley, S., 1995. *A Guide to Wellhead Protection*. American Planning Association, Planning Advisory Service, Report #457/458. August.

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Appendices

Drinking water systems and communities that choose to perform their own source water assessments as part of a drinking water source assessment and protection program should contact their regional DHS drinking water office to make sure they are using the up-to-date version of the forms and checklists contained in the Appendices.

APPENDICES TO BE USED FOR A SURFACE WATER SOURCE

Appendix A — Drinking Water Source Location – Surface Water

Appendix B — Delineation of Surface Water Protection Zones

Appendix C — Physical Barrier Effectiveness Checklist – Surface Water Source

Appendix D — Possible Contaminating Activity (PCA) Inventory Form – Surface Water Source

Appendix E — Possible Contaminating Activities Evaluation – Surface Water Source

Appendix F — Vulnerability Analysis Procedures – Surface Water Source

Appendix G — Checklist for Drinking Water Source Assessment – Surface Water Source

APPENDICES TO BE USED FOR A GROUND WATER SOURCE

Appendix H — Drinking Water Source Location – Ground Water

Appendix I — Delineation of Ground Water Protection Zones

Appendix J — Physical Barrier Effectiveness Checklist and Well Data Sheet – Ground Water Source

Appendix K— Possible Contaminating Activity (PCA) Inventory Form – Ground Water Source

Appendix L — Possible Contaminating Activities Evaluation – Ground Water Source

Appendix M — Vulnerability Analysis Procedures – Ground Water Source

Appendix N — Checklist for Drinking Water Source Assessment – Ground Water Source

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APPENDICES TO BE USED FOR A SURFACE WATER SOURCE

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Appendix A

Drinking Water Source Location – Surface Water

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Location date: _____ Source located by (name of person): _____

Method of determining location:

_____ USGS quad map (7.5 minute series, 1:24,000 scale), hand calculated

_____ USGS quad map (7.5 minute series, 1:24,000 scale), computer calculated

_____ Global Positioning System (GPS)

Unit (manufacturer/model): _____

Accuracy of GPS unit (+/- _____ ft.)

_____ Other Method _____

Accuracy of method (+/- _____ ft.)

Location of intake (decimal degrees): Latitude: _____

Longitude: _____

Physical description of location [Name of surface water body, pertinent landmarks, address, or approximate address (cross streets, etc.)]:

NOTE: Indicate location of the surface water intake on the drinking water source assessment map. Map should also indicate the source area (watershed) and protection zones, if established (See other Appendices).

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Appendix B

Delineation of Surface Water Protection Zones

Public water system: _____ID No.:_____

Name of source:_____ID No.:_____

Delineation date:_____Delineation conducted by _____

The delineation of protection zones for a surface water source is optional. The source area for a surface water source is the watershed.

If protection zones are established, the recommended distances are as follows:

Zone A:	400 feet from reservoir banks or primary stream boundaries
	200 feet from tributaries
Zone B:	2,500 feet from intakes

Protection zones established for this source are:

Zone A:	_____feet from reservoir banks or primary stream boundaries
	_____feet from tributaries
Zone B:	_____feet from intakes

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Appendix C

Physical Barrier Effectiveness Checklist -- Surface Water Source

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

Drinking Water Source/ Watershed Information

Note: Other methods of determine Physical Barrier Effectiveness may be acceptable. Consult with DHS.

Note: Most of the following information should be available from the Watershed Sanitary Survey of the water source.

1. Is the source an impounded reservoir or a direct stream intake?
    a. Reservoir
    b. Stream intake
    c. Other, describe: _____

2. Source Characteristics
    a. Area of tributary watershed: _____ acres or square miles
    b. Area of water body within watershed: _____ acres or square miles
    c. Volume of water body: _____ acre-feet
    d. Maximum rate of withdrawal through intake: _____ gallons per day
    e. Are the primary tributaries seasonal, perennial or both? _____

3. What is the approximate travel time to the intake for water at farthest reaches of the impounded water body?
    a. Source is direct intake, no impounded water body
    b. Less than 30 days, or unknown
    c. More than 30 days and less than 1 year
    d. More than 1 year

4. What is the general topography of the watershed?
    a. Flat terrain (<10% slopes)
    b. Hilly (10 to 30% slopes)
    c. Mountainous (> 30% slopes)
    d. Not sure

5. What is the general geology of the watershed?
    a. Materials prone to landslides
    b. Materials not prone to landslides
    c. Not sure

6. What general soil types are on the watershed?
    a. Rock
    b. Loams, sands
    c. Clay
    d. Not sure

7. What type of vegetation covers most of the watershed?
    a. Grasses
    b. Low growing plants and shrubs
    c. Trees
    d. Not sure

8. What is the mean seasonal precipitation on the watershed?
    a. More than 40 inches/year
    b. 10 to 40 inches/year
    c. Less than 10 inches/year
    d. Not sure

9. Is there significant ground water recharge to the water body?
    a. Yes
    b. No
    c. Not sure

Physical Barrier Effectiveness Determination

Parameters indicating **Low Physical Barrier Effectiveness** (LE)
(A source with any of the parameters listed below would be considered to have less effective physical barrier properties)

3a
4c or 4d
5a or 5c
7c or 7d
8a or 8d
9a

Parameters indicating **High Physical Barrier Effectiveness** (HE)
(A source would need to have all of the parameters listed below to be considered to have highly effective physical barrier properties)

3d and
4a and
5b and
7a and
8c and
9b

All other sources are considered to have **Moderate Physical Barrier Effectiveness**

Determination for this source:

Low (LE)

Moderate (ME)

High (HE)

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Appendix D

Possible Contaminating Activities (PCA) Inventory Form

Surface Water Source

Public water system name:_____ ID No. _____

Name of drinking water source:_____ ID No._____

Inventory date:_____ Inventory conducted by:_____

Name of Surface Water Body :_____

Indicate PCAs pertinent to the drinking water source, its source area (watershed) and protection zones (if established), from the following tables, as applicable:

Commercial/Industrial (Table D-1) _____

Residential/Municipal (Table D-2) _____

Agricultural/Rural (Table D-3) _____

Other (required for all) (Table D-4) _____

Are zones established? YES or NO

Attach map of Drinking Water Source with watershed boundaries and zones (if established) indicated.

Proceed to appropriate checklist or checklists. Place a mark in the appropriate boxes. Example:

		X

Risk Ranking of PCAs (see Tables 7-2, 7-3, 7-4 and 7-5 for separate category lists), where VH = Very High Risk, H = High Risk, M = Moderate Risk, L = Low Risk

Note: If zones are not established use higher risk ranking. If zones are established, use higher risk ranking in zones, lower risk ranking for remainder of watershed.

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PCA Checklist **Table D-1, page 1 of 2**						
COMMERCIAL/INDUSTRIAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Automobile-related activities						
Body shops (H)						
Car washes (M)						
Gas stations (VH)						
Repair shops (H)						
Boat services/repair/ refinishing (H)						
Chemical/petroleum processing/storage (VH)						
Chemical/petroleum pipelines (H)						
Dry cleaners (VH)						
Electrical/electronic manufacturing (H)						
Fleet/truck/bus terminals (H)						
Furniture repair/ manufacturing (H)						
Home manufacturing (H)						
Junk/scrap/salvage yards (H)						
Machine shops (H)						
Metal plating/ finishing/fabricating (VH)						
Photo processing/printing (H)						
Plastics/synthetics producers (VH)						
Research laboratories (H)						

PCA Checklist **Table D-1, page 2 of 2**						
COMMERCIAL/INDUSTRIAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Wood preserving/treating (H)						
Wood/pulp/paper processing and mills (H)						
Lumber processing and manufacturing (H)						
Sewer collection systems (H, if in Zones, otherwise L)						
Parking lots/malls (>50 spaces) (M)						
Cement/concrete plants (M)						
Food processing (M)						
Funeral services/graveyards (M)						
Hardware/lumber/parts stores (M)						
Appliance/Electronic Repair (L)						
Office buildings/complexes (L)						
Rental Yards (L)						
RV/mini storage (L)						
Other (list)						

PCA Checklist **Table D-2, page 1 of 2**						
RESIDENTIAL/MUNICIPAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Airports - Maintenance/ fueling areas (VH)						
Landfills/dumps (VH)						
Railroad yards/ maintenance/ fueling areas (H)						
Septic systems - high density (>1/acre) (VH if in Zones, otherwise M)						
Sewer collection systems (H, if in Zones, otherwise L)						
Utility stations - maintenance areas (H)						
Wastewater treatment and disposal facilities (VH in Zones, otherwise H)						
Drinking water treatment plants (M)						
Golf courses (M)						
Housing - high density (>1 house/0.5 acres) (M)						
Motor pools (M)						
Parks (M)						
Waste transfer/recycling stations (M)						

PCA Checklist
Table D-2, page 2 of 2

RESIDENTIAL/MUNICIPAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Apartments and condominiums (L)						
Campgrounds/ Recreational areas (L)						
Fire stations (L)						
RV Parks (L)						
Schools (L)						
Hotels, Motels (L)						
Other (list)						

PCA Checklist **Table D-3, page 1 of 3**						
AGRICULTURAL/RURAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Grazing (> 5 large animals or equivalent per acre) (H in Zones, otherwise M)						
Concentrated Animal Feeding Operations (CAFOs) as defined in federal regulation[1] (VH in Zones, otherwise H)						
Animal Feeding Operations as defined in federal regulation[2] (VH in Zones, otherwise H)						
Other Animal operations (H in Zones, otherwise M)						
Concentrated Aquatic Animal Production Facilities, as defined in federal regulation (VH in Zones, otherwise H)						
Other Aquatic Animal production operations (H in Zones, otherwise M)						
Managed Forests (VH in Zones, otherwise H) (unless additional detail provided*)						
Farm chemical distributor/ application service (H)						
Farm machinery repair (H)						

PCA Checklist **Table D-3, page 2 of 3**						
AGRICULTURAL/RURAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Septic systems – Low density (<1/acre) (H in Zones, otherwise L)						
Lagoons / liquid wastes (H)						
Machine shops (H)						
Pesticide/fertilizer/ petroleum storage & transfer areas (H)						
Agricultural Drainage (H in Zones, otherwise M)						
Wells - Agricultural/ Irrigation (H)						
Crops, irrigated (Berries, hops, mint, orchards, sod, greenhouses, vineyards, nurseries, vegetable) (M)						
Sewage sludge/biosolids application (M)						
Fertilizer, Pesticide/ Herbicide Application (M)						
Crops, nonirrigated (e.g., Christmas trees, grains, grass seeds, hay, pasture) (L) (includes drip-irrigated crops)						
Other (list)						

PCA Checklist Table D-3, page 3 of 3						
AGRICULTURAL/RURAL						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
* Additional Detail for Managed Forests The following categories can be used in lieu of the default risk ranking for Managed Forests:						
* Managed Forests - Broadcast fertilized areas (M in Zones, otherwise L)						
* Managed Forests - Clearcut harvested <30 years (VH in Zones, otherwise H)						
* Managed Forests - Partial harvested <10 years (H in Zones, otherwise M)						
* Managed Forests - Road density > 2 mi/sq. mi) (H in Zones, otherwise M)						

1. Concentrated Animal Feeding Operation: Animal Feeding Operation (requires NPDES permit) with greater than:

If pollutants discharged (directly or indirectly) to navigable waters	**If pollutants not discharged**
300 slaughter or feeder cattle	1,000 slaughter or feeder cattle
200 mature dairy cows	700 mature dairy cows
750 swine	2500 swine
150 horses	500 horses
3000 sheep or lambs	10,000 sheep or lambs
16,500 turkeys	55,000 turkeys
9,000 laying hens or broilers (liquid manure system)	30,000 laying hens or broilers (liquid manure system)
1500 ducks	5000 ducks
300 animal units	1000 animal units

2. Animal Feeding Operation: lot or facility where animals (other than aquatic) have been or will be stabled or confined and fed or maintained for total of 45 days or more in any 12 month period.

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PCA Checklist **Table D-4, page 1 of 3**						
OTHER ACTIVITIES						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
NPDES/WDR permitted discharges (H)						
Underground Injection of Commercial/Industrial Discharges (VH)						
Historic gas stations (VH)						
Historic waste dumps/ landfills (VH)						
Illegal activities/ unauthorized dumping (H)						
Injection wells/ dry wells/ sumps (VH)						
Known contaminant plumes (VH)						
Military installations (VH)						
Mining operations - Historic (VH)						
Mining operations – Active (VH)						
Mining - Sand/Gravel (H)						
Wells – Oil, Gas, Geothermal (H)						
Salt Water Intrusion (H)						
Recreational area – surface water source (H)						
Snow Ski Areas (H in Zones, otherwise M)						
Recent (< 10 years) Burn Areas (H in Zones, otherwise M)						

PCA Checklist **Table D-4, page 2 of 3**						
OTHER ACTIVITIES						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Dredging (H in Zones, otherwise M)						
Underground storage tanks						
Confirmed leaking tanks (VH)						
Decommissioned - inactive tanks (L)						
Non-regulated tanks (tanks < than regulatory limit) (H)						
Not yet upgraded or registered tanks (H)						
Upgraded and/or registered - active tanks (L)						
Above ground storage tanks (M)						
Wells – Water supply (M)						
Construction/demolition staging areas (M)						
Contractor or government agency equipment storage yards (M)						
Transportation corridors						
Freeways/state highways (M)						
Railroads (M)						
Historic railroad right-of-ways (M)						
Road Right-of-ways (herbicide use areas) (M)						
Roads/ Streets (L)						

PCA Checklist Table D-4, page 3 of 3						
OTHER ACTIVITIES						
	IF ZONES ESTABLISHED					
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B?	PCA in Watershed	Unknown	Comments
Hospitals (M)						
Storm Drain Discharge Points (M)						
Storm Water Detention Facilities (M)						
Artificial Recharge Projects						
Injection wells (potable water) (L)						
Injection wells (non-potable water) (M)						
Spreading Basins (potable water) (L)						
Spreading Basins (non-potable water) (M)						
Medical/dental offices/clinics (L)						
Veterinary offices/clinics (L)						
Surface water - streams/ lakes/rivers (L)						
Other (list)						

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Appendix E

Possible Contaminating Activities Evaluation – Surface Water Source

(Note: This form is OPTIONAL. It should be completed if a modification of the risk ranking for a type of PCA is desired)

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

PCA/Potential Contaminant Information

1. Type of Activity (from contaminant inventory checklist):

2. Type of potential contaminant associated with this activity (refer to Table 7-2):
   a. Microbiological
   b. Chemical
   c. Both or Other

3. Potential Risk (from PCA contaminant inventory checklist):
   a. Low
   b. Medium
   c. High
   d. Very High

4. Location:
   a. Within a zone (if defined) or within DHS minimum setback distances
   b. On the watershed outside of zones (if defined) or outside DHS minimum setback distances
   c. On the watershed (if no zones defined)

5. Spatial Area occupied by activity as percentage of watershed area:
   a. Small (<1% of area)
   b. Moderate (1% to 10% of area)
   c. High (>10% of area)
   d. Unknown

6. Volume of potential contaminant *(not applicable for microbiological contaminants)*:
   If the maximum quantity of potential contaminant stored at the facility were discharged into

the quantity of water produced by the drinking water supply in a day would the concentration be:

a. Small (less than one part per billion)
b. Moderate (between one part per thousand and one part per billion)
c. High (more than one part per thousand)
d. Unknown

7. Magnitude of potential acute or chronic health effects associated with the contaminant:
   a. Low
   b. High
   c. Unknown

8. Likelihood of potential contaminant to migrate to drinking water supply:
a. Low
b. High
c. Unknown

9. Has the potential contaminant been detected in the drinking water supply or near-by monitoring wells?

a. Yes
b. No
c. Unknown

10. Compliance of facility (demonstrated performance to keep potential contaminant from being discharged)

a. Good
b. Poor
c. Unknown

Determination of revised risk ranking for PCAs

Microbiological Contamination

If the PCA is categorized as **2a or 2c**, the risk ranking would be LOW if the PCA meets all of the parameters in the table below for **Low.** The risk ranking would be HIGH if the PCA meets all of the parameters in the table for **High**. Otherwise the risk ranking is MODERATE.

Microbiological Contamination
PCA Risk Ranking

Parameter	Low	High
3	**a**	**c or d**
4	**b**	**a or c**
5	**a**	**c or d**
7	**a**	**b or c**
8	**a**	**b or c**
9	**b**	**a or c**
10	**a**	**b or c**

Chemical Contamination

If the PCA is categorized as **2b or 2c**, the risk ranking would be LOW if the PCA meets all of the parameters in the table below for **Low.** The risk ranking would be HIGH if the PCA meets all of the parameters in the table for **High**. Otherwise the risk ranking is MODERATE.

Chemical Contamination
PCA Risk Ranking

Parameter	Low	High
3	**a**	**c or d**
4	**b**	**a or c**
5	**a**	**c or d**
6	**a**	**c or d**
7	**a**	**b or c**
8	**a**	**b or c**
9	**b**	**a or c**
10	**a**	**b or c**

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Appendix F

Vulnerability Analysis Procedures – Surface Water Source

The Vulnerability analysis incorporates the types of Possible Contaminating Activities (PCAs) identified in the inventory, their respective Risk Rankings, the Zone and the Physical Barrier Effectiveness determination. These factors are used to develop a prioritized listing of types of PCAs and to determine the types of PCAs to which the drinking water source is most vulnerable.

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

Vulnerability analysis steps:

1. For each type of PCA identified as existing in the watershed and/or zones, or unknown, determine the number of PCA risk ranking points for that type of PCA. (If the risk ranking for a type of PCA has been modified, Appendix E should be attached). (*For example, Very High (VH) risk activities are 7 points.)*

2. For each type of PCA determine the zone in which it occurs (if zones are defined, or within the watershed if zones are not defined). Add the points associated with that zone to the PCA risk ranking points. If the type of PCA exists within more than one zone, repeat the process for each zone. (*For example, if a type of PCA exists in Zone A add 5 points. For a VH risk PCA in Zone A, the PCA Risk Ranking points + Zone points = 7 + 5 = 12 points*.)

3. Determine the Physical Barrier Effectiveness (PBE) for the drinking water source (from Appendix C). Add the points associated with that PBE to the PCA risk ranking and zone points. The total is the Vulnerability Score. (*For example, if the PBE is Low add 5 points. For a VH risk PCA in Zone A, the Vulnerability Score = PCA Risk Ranking points + Zone points + PBE points = 7 + 5 + 5 = 17 points.)*

4. Prioritize all types of PCAs by the Vulnerability Score, from the most points to the least. A sample form is shown below.

5. The drinking water source is vulnerable to all types of PCAs with a Vulnerability Score of **11** or greater. Refer to the Vulnerability Matrix below. The source is <u>most</u> vulnerable to the types of PCAs with the highest score.

6. **In addition, the Drinking Water Source is <u>most</u> vulnerable to all types of PCAs associated with a contaminant detected in the water source, regardless of Vulnerability Score.**

Vulnerability Matrix for SURFACE WATER SOURCES

INDICATE WHICH APPLIES:

WITHIN ZONES (if defined) OR
WITHIN ENTIRE WATERSHED (if zones are not defined)

The cutoff point for surface water vulnerability is **11**. The drinking water source is considered Vulnerable to all types of PCAs with Vulnerability Score greater than or equal to **11** (shaded boxes).

PCA points	**Zone points**		**PCA + Zone points**	**PBE Points**			**Vulnerability Score PCA + Zone + PBE points**		
Risk Ranking	Zones Defined	Zones Not Defined		Low	Mod	High	PBE Low	PBE Mod	PBE High
VH (7)	A (5)	Watershed (5)	12	5	3	1	17	15	13
VH (7)	B (3)		10	5	3	1	15	13	11
VH (7)	Watershed (1)		8	5	3	1	13	11	9
VH (7)	Unknown (0)*	Unknown (0)*	7	5	3	1	12	10	8
H (5)	A (5)	Watershed (5)	10	5	3	1	15	13	11
H (5)	B (3)		8	5	3	1	13	11	9
H (5)	Watershed (1)		6	5	3	1	11	9	7
H (5)	Unknown (0)*	Unknown (0)*	5	5	3	1	10	8	6
M (3)	A (5)	Watershed (5)	8	5	3	1	13	11	9
M (3)	B (3)		6	5	3	1	11	9	7
M (3)	Watershed (1)		4	5	3	1	9	7	5
M (3)	Unknown (0)*	Unknown (0)*	3	5	3	1	8	6	4
L (1)	A (5)	Watershed (5)	6	5	3	1	11	9	7
L (1)	B (3)		4	5	3	1	9	7	5
L (1)	Watershed (1)		2	5	3	1	7	5	1
L (1)	Unknown (0)*	Unknown (0)*	1	5	3	1	6	4	2

* Source is considered vulnerable to type of PCAs that are Unknown, if the Vulnerability Score is 11 or higher.

Format for Prioritized Listing of type of PCAs

List type of PCAs in order by Vulnerability Score from highest to lowest.

Zone	Type of PCA	PCA Points VH = 7 H = 5 M = 3 L = 1	Zone Points Watershed = 5 (*or A = 5, B = 3, Watershed = 1 See vulnerability matrix)* Unknown = 0	PBE Points L= 5 M = 3 H = 1	Vulnerability Score PCA points + Zone points + PBE points

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Appendix G

Checklist for Drinking Water Source Assessment – Surface Water Source

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

The following information should be contained in the drinking water source assessment submittal.

If another report that is the functional equivalent to the drinking water assessment (e.g., Watershed Sanitary Survey) is included in this assessment, the part of that report that fulfills the components of the source water assessment should be clearly indicated.

_____ Source name, system name, source and system identification numbers, date of assessment, name of person and/or organization conducting the assessment (Appendix G, this form)

_____ Assessment map with source location, source area (watershed), and protection zones (if defined).

_____ Drinking water source location coordinates and accuracy of method used (Appendix A or equivalent)

_____ Delineation of protection zones, if applicable (Appendix B or equivalent)

_____ Drinking water Physical Barrier Effectiveness Checklist (Appendix C)

_____ Possible contaminating activities (PCA) inventory form (Appendix D).

_____ Possible contaminating activities evaluation (optional) (Appendix E)

_____ Vulnerability ranking (Appendix F)

_____ Additional maps (optional) (e.g. local maps of zones and PCAs, recharge area maps, or maps indicating direction of ground water flow)

_____ Means of Public Availability of Report (indicate those that will be used)

- _____ Notice in the annual water quality/consumer confidence report* (minimum)
- _____ Copy in DHS district office (minimum)
- _____ Copy in public water system office (recommended)
- _____ Copy in public library/libraries
- _____ Internet (indicate Internet address: _____)
- _____ Other (describe)

*The annual report should indicate where customers can review the assessments.

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APPENDICES TO BE USED FOR A GROUND WATER SOURCE

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Appendix H

Drinking Water Source Location – Ground Water

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Location date: _____ Source located by (name of person): _____

Method of determining location:

_____ USGS quad map (7.5 minute series, 1:24,000 scale), hand calculated

_____ USGS quad map (7.5 minute series, 1:24,000 scale), computer calculated

_____ Global Positioning System (GPS)

Unit (manufacturer/model): _____

Accuracy of GPS unit (+/- _____ ft.)

_____ Other Method _____

Accuracy of method (+/- _____ ft.)

Location of well (decimal degrees): Latitude: _____

Longitude: _____

Physical description of location [Pertinent landmarks, address, or approximate address (cross streets, etc.)]:

General description of recharge area, if known:

NOTE: Indicate location of the well on the drinking water source assessment map. The map should also indicate locations of the source area and protection zones. (See other Appendices).

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Appendix I

Delineation of Ground Water Protection Zones

Public water system: _____ID No.:_____

Name of source:_____ID No.:_____

Delineation date:_____Delineation conducted by _____

Indicate the method used to delineate the zones:

_____Calculated Fixed Radius (Default) (Show calculations below)

_____Modified Calculated Fixed Radius (Show calculations below and attach documentation for direction of ground water flow)

_____More detailed methods
Type used (i.e., analytical methods, hydrogeologic mapping, modeling):

_____Arbitrary Fixed Radius (For use only by or with permission of DHS—use minimum distances shown below)

Calculated Fixed Radius Equation

The equation for the calculated fixed radius (R) is $R_t = \sqrt{Q\,t / \pi\,\eta\,H}$

$R_t = R_2$, R_5, or R_{10} corresponding to t (Calculate R for each of three times of travel, TOT)
Q = maximum pumping capacity of well
(ft^3/year = gpm x 70,267):_____
t = time of travel (years), 2, 5 and 10 years
π = 3.1416
η = effective porosity (decimal percent) (If unknown, assume 0.2):
_____
H = screened interval of well (feet) (If unknown, assume 10% of Q gpm, 10 ft minimum):
_____

Specific methods follow on next page

Calculated Fixed Radius Delineation Method (Default)

Using the equation presented above, calculate the size of zones for the appropriate aquifer setting of the source.

Porous Media Aquifer

Zone A (2 year TOT) R_2 = _____ft, minimum = 600 ft —use larger: _____ft
Zone B5 (5 year TOT) R_5 = _____ft, minimum = 1,000 ft—use larger: _____ft
Zone B10 (10 year TOT) R_{10} = _____ft, minimum = 1,500 ft—use larger: _____ft

Fractured Rock Aquifer

(Increase size of zones by 50%)

Zone A (2 year TOT) $1.5R_2$ = _____ft, minimum = 900 ft—use larger: _____ft
Zone B5 (5 year TOT) $1.5R_5$ = _____ft, minimum = 1,500 ft—use larger: _____ft
Zone B10 (10 year TOT) $1.5R_{10}$ = _____ft, minimum = 2,250 ft—use larger: _____ft

Modified Calculated Fixed Radius Delineation Method

In porous media aquifers, if the direction of ground water flow is known (see Section 6.2.3), the default zone circle may be shifted upgradient by $0.5R_t$. The upgradient and downgradient limits of the zone are determined below.

Zone A (2-year TOT)

upgradient distance = $1.5R_2$ = _____ft, minimum = 900 ft, use larger: _____ft
downgradient distance = $0.5R_2$ = _____ft, minimum = 300 ft, use larger: _____ft

Zone B5 (5-year TOT)

upgradient distance = $1.5R_5$ = _____ft, minimum = 1,500 ft, use larger: _____ft
downgradient distance = $0.5R_5$ = _____ft, minimum = 500 ft, use larger: _____ft

Zone B10 (10-year TOT)

upgradient distance = $1.5R_{10}$ = _____ft, minimum = 2,250 ft, use larger: _____ft
downgradient distance = $0.5R_{10}$ = _____ft, minimum = 750 ft, use larger: _____ft

Appendix J

Physical Barrier Effectiveness Checklist and Well Data Sheet - Ground Water Source

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

Complete DHS Well Data Sheet (attached) and include with Assessment submittal.

Directions:

1. Read through the form and collect the information needed to complete the form. (Hydrogeology, Soils, Presence of abandoned or improperly destroyed wells, Well construction and operation.)

2. Determine Parameter A, Type of Aquifer.
   - If the aquifer is confined, use the right-hand column, and evaluate only the parameters indicated for confined aquifers.
   - If the aquifer is unconfined, semi-confined, or the degree of confinement is unknown, or if the aquifer is fractured rock, use the left-hand column and evaluate only the parameters for unconfined aquifers.

3. For each parameter appropriate for the source, place a check in the box for the answer that most closely applies to that source. If more than one answer is possible, select the more conservative (i.e., lower points) answer. *[For example, if the depth to static water (Parameter D) has varied between 45 and 55 feet, choose answer 2 (20 to 50 feet).]*

4. Add the points in the column appropriate for the source and interpret the score as shown on the bottom of the last page.
   - Determine whether the source has a High, Moderate or Low Physical Barrier Effectiveness. Use this in the Vulnerability analysis. The higher the points, generally the more effective the source and site are to retarding the movement of contaminants to the water supply.

NOTE: If the source is located in fractured rock the source is considered to have a Low Physical Barrier Effectiveness, regardless of the point total. So, if Parameter B, Aquifer Material is 3, the remainder of the form does not need to be completed.

Physical Barrier Effectiveness (PBE) – Ground Water, page 1 of 2
Source Name:_____Source No.:_____

PARAMETER	*POINTS*			
	Unconfined		Confined	
A. TYPE OF AQUIFER Confinement *(up to **50** points maximum)* choose one				
a. Unconfined, Semi-confined, Fractured Rock, Unknown	0			
b. Confined			50	
B. AQUIFER MATERIAL (Unconfined Aquifer) Type of materials within the aquifer *(up to **20** points maximum)* choose one				
1. Porous Media (Interbedded sands, silts, clays, gravels) with continuous clay layer minimum 25' thick above water table within Zone A	20			
2. Porous Media (Interbedded sands, silts, clays, and gravels)	10			
3. Fractured rock * (* Low Physical Barrier Effectiveness - no further questions required)	0			
C. PATHWAYS OF CONTAMINATION (All Aquifers) Presence of Abandoned or Improperly Destroyed Wells *(up to **10** points maximum)*				
1. Are they present within Zone A (2-year time of travel (TOT) distance)?				
a. Yes or unknown	0		0	
b. No	5		5	
2. Are they present within Zone B5 (2- to 5-year TOT distance)?				
a. Yes or unknown	0		0	
b. No	3		3	
3. Are they present within Zone B10 (5- to 10-year TOT distance)?				
a. Yes or unknown	0		0	
b. No	2		2	
D. STATIC WATER CONDITIONS (Unconfined Aquifer) Depth to static Water (DTW) = _____ feet *(up to **10** points maximum)* choose one				
1. 0 to 20 feet	0			
2. 20 to 50 feet	2			
3. 50 to 100 feet	6			
4. > 100 feet	10			
E. WELL OPERATION (Unconfined Aquifer) Depth to Uppermost Perforations (DUP) DUP = _____ feet Maximum Pumping Rate of Well (Q) Q = _____ gallons/minute Length of screened interval (H) H = _____ feet				
[(DUP – DTW) / (Q/H)] = *(up to **10** points maximum*) choose one				
1. < 5	0			
2. 5 to 10	5			
3. > 10	10			

Physical Barrier Effectiveness – Ground Water, page 2 of 2
Source Name:_____Source No._____

PARAMETER	*POINTS*			
	Unconfined		Confined	
F. HYDRAULIC HEAD (Confined Aquifer) What is the relationship in hydraulic head between the confined aquifer and the overlying unconfined aquifer? (i.e., does the well flow under artesian conditions?) *(up to **20** points maximum)* choose one				
1. head in confined aquifer is higher than head in unconfined aquifer under all conditions			20	
2. head in confined aquifer is higher than head in unconfined aquifer under static conditions			10	
3. head in confined aquifer is lower than or same as head in unconfined aquifer			0	
4. unknown			0	
G. WELL CONSTRUCTION (All Aquifers) 1. Sanitary Seal (Annular Seal) Depth = _____ feet *(up to **10** points maximum)* choose one				
a. None or less than 20 feet deep	0		0	
b. 20 to 50 ft deep	6		10	
c. 50 ft or greater	10		10	
2. Surface seal (concrete cap) *(up to **4** points maximum)* choose one				
a. Not present or improperly constructed	0		0	
b. Watertight, slopes away from well, at least 2' laterally in all directions	4		4	
3. Flooding potential at well site *(up to **1** point maximum)* choose one				
a. Subject to localized flooding (i.e. in low area or unsealed pit or vault) or Within 100 year flood plain	0		0	
b. Not subject to flooding	1		1	
4. Security at well site *(up to **5** points maximum)* choose one				
a. Not secure	0		0	
b. Secure (i.e. housing, fencing, etc.)	5		5	
Maximum Points Possible	70		100	
POINT TOTAL FOR THIS SOURCE				

Physical Barrier Effectiveness SCORE INTERPRETATION

Point Total		**Effectiveness**	
_____**0 to 35**	**=**	**Low**	(includes all sources in Fractured Rock)
_____**36 to 69**	**=**	**Moderate**	
_____**70 to 100**	**=**	**High**	

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WELL DATA SHEET (Sheet 1 of 3)

Complete as much information as possible. Leave blank if information is not available, use N.A. if not applicable.		
** Indicates items required for Source Water Assessment*	*** Indicates additional items required for Ground Water Rule*	
		Actual or Estimated?
DATA SHEET GENERAL INFORMATION		
System Name		
System Number		
Source of Information *(See Note 1)*		
Personnel Collecting Information		
Date		
WELL IDENTIFICATION		
* Well Number or Name		
* DHS Source Identification Number (FRDS ID No.)		
DWR Well Log on File? (yes or no)		
State Well Number (from DWR)		
Well Status (Active, Standby, Inactive)		
Date of Inactive Status (if applicable)		
WELL LOCATION		
Latitude		
Longitude		
Elevation		
Street Address		
* Neighborhood/Surrounding Area *(see Note 2)*		
Site plan on file? (yes or no)		
DWR Ground Water Basin		
DWR Ground Water Sub-basin		
SANITARY CONDITIONS		
** Distance to: Sewer Line, Sewage Disposal, or Septic tank		
Distance to: Other sanitary concerns		
Distance to: Other Wells (Active)		
Distance to: Other Wells (Abandoned)		
** Size of controlled area around well (square feet)		
* Type of access control to well site *(See Note 3)*		
* Surface Seal? (Concrete slab) (yes or no)		
* Dimensions of concrete surface slab (ft)		
* Within 100 year flood plain? (yes or no)		
* Drainage away from well? (yes or no)		
ENCLOSURE/HOUSING		
Type		
Condition		
Pit depth (if applicable)		
Pit Drained? (if applicable)		
Floor (material)		

WELL DATA SHEET (Sheet 2 of 3)

WELL CONSTRUCTION		Actual or Estimated?
Date drilled		
Drilling Method		
Depth of Bore Hole (feet below ground surface)		
Casing Depth (feet below ground surface)		
Casing Diameter (inches)		
Casing Material		
Additional casing depth (if applicable)		
Additional casing diameter (if applicable)		
Additional casing material (if applicable)		
Conductor casing used? (yes or no) *(See Note 4)*		
Conductor casing removed? (yes or no)		
* Depth to highest perforations/screens(ft below surface)		
Depth(s) and Length(s) of screened interval(s)		
* Total length of screened interval		
* Annular Seal? (yes, no, or not sure) *(See Note 5)*		
* Depth of Annular Seal (ft)		
Material of Annular Seal (cement grout, bentonite, etc.)		
Gravel pack, Depth to top (ft below ground surface)		
Total length of gravel pack (ft)		
AQUIFER		
* Aquifer Materials *(See Note 6)*		
* Confining layer (impervious strata) above aquifer? (yes, no or not sure)		
Thickness of confining layer, if known (ft)		
Depth to confining layer, if known (ft below ground)		
Sanitary Seal terminates in impervious strata? (yes or no)		
* Static water level (ft below ground surface)		
Pumping water level (ft below ground surface)		
Date water level measured		
WELL PRODUCTION		
Well Yield (gpm)		
Well Yield Based On (i.e., pump test, etc.)		
Date measured		
Production (gallons per year)		
Frequency of Use (hours/year)		
Typical pumping duration (hours/day)		
PUMP		
Make		
Type		
Size (hp)		
* Capacity (gpm)		
Depth to suction intake (ft below ground surface)		

WELL DATA SHEET (Sheet 3 of 3)

		Actual or Estimated?
Lubrication Type		
Type of Power: (i.e., electric, diesel, etc.)		
Auxiliary power available? (yes or no)		
Operation controlled by: *(See Note 7)*		
Pump to Waste capability? (yes or no)		
Discharges to: (i.e., distribution system, storage, etc.)		
(Use or note these items as appropriate)		
Raw Water Quality concerns? (coliform, chemicals, other)		
Continuous Chlorination provided?		
Pitless Adapter? Make and Model		
Height of pump base (inches)		
Casing Vent? (yes or no)		
Air/Vacuum Release? (yes or no)		
Sampling Taps? (yes or no)		
Location of sampling taps		
Wellhead Riser? (yes or no) height above well		
NOTES		
1. Sources of information: well log, DHS or County files, system files, personnel, etc.		
2. Neighborhood/Surrounding Area (list all that apply): A= Agricultural, Ru = Rural, Re = Residential, Co = Commercial, I = Industrial, Mu = Municipal, P = Pristine, O = Other		
3. Access Control: fencing, building, etc.		
4. Annular Seal - Seal of grout in the space between the well casing and the wall of the drilled hole. Sometimes called "sanitary seal".		
5. Conductor Casing - Oversized casing used to stabilize bore hole during well construction. Usually removed during installation of annular seal.		
6. Aquifer materials (list all that apply): sands, silts, clays, gravel, rocks, fractured rock		
7. Operation controlled by: level in tank, system demand, pressure, etc.		

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Appendix K

Possible Contaminating Activity (PCA) Inventory Form

Ground Water Source

Public water system name:_____ ID No._____

Name of drinking water source:_____ ID No._____

Inventory date:_____ Inventory conducted by:_____

Indicate PCAs pertinent to the drinking water source, its source area and protection zones, from the following tables, as applicable:

Commercial/Industrial (Table K-1) _____

Residential/Municipal (Table K-2) _____

Agricultural/Rural (Table K-3) _____

Other (required for all) (Table K-4) _____

Is this for a ground water recharge area? YES/NO _____ (If YES, also use Appendix D, Tables D-1 through D-4, as appropriate)

Attach map of Drinking Water Source with Zones A, B5 and B10 indicated, and buffer zones (if defined).

Proceed to appropriate checklist or checklists. Place a mark in the appropriate boxes. Example:

		X

Risk Ranking of PCAs (see Tables 7-2, 7-3, 7-4 and 7-5 for separate category lists), where VH = Very High Risk, H = High Risk, M = Moderate Risk, L = Low Risk

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PCA Checklist **Table K-1, page 1 of 2**						
COMMERCIAL/INDUSTRIAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Automobile-related activities						
Body shops (H)						
Car washes (M)						
Gas stations (VH)						
Repair shops (H)						
Boat services/repair/ refinishing (H)						
Chemical/petroleum processing/storage (VH)						
Chemical/petroleum pipelines (H)						
Dry cleaners (VH)						
Electrical/electronic manufacturing (H)						
Fleet/truck/bus terminals (H)						
Furniture repair/ manufacturing (H)						
Home manufacturing (H)						
Junk/scrap/salvage yards (H)						
Machine shops (H)						
Metal plating/ finishing/fabricating (VH)						
Photo processing/printing (H)						
Plastics/synthetics producers (VH)						
Research laboratories (H)						

PCA Checklist **Table K-1, page 2 of 2**						
COMMERCIAL/INDUSTRIAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Wood preserving/treating (H)						
Wood/pulp/paper processing and mills (H)						
Lumber processing and manufacturing (H)						
Sewer collection systems (H, if in Zone A, otherwise L)						
Parking lots/malls (>50 spaces) (M)						
Cement/concrete plants (M)						
Food processing (M)						
Funeral services/graveyards (M)						
Hardware/lumber/parts stores (M)						
Appliance/Electronic Repair (L)						
Office buildings/complexes (L)						
Rental Yards (L)						
RV/mini storage (L)						
Other (list)						

PCA Checklist **Table K-2, page 1 of 2**						
RESIDENTIAL/MUNICIPAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Airports - Maintenance/ fueling areas (VH)						
Landfills/dumps (VH)						
Railroad yards/ maintenance/ fueling areas (H)						
Septic systems - high density (>1/acre) (VH if in Zone A, otherwise M)						
Sewer collection systems (H, if in Zone A, otherwise L)						
Utility stations - maintenance areas (H)						
Wastewater treatment and disposal facilities (VH in Zone A, otherwise H)						
Drinking water treatment plants (M)						
Golf courses (M)						
Housing - high density (>1 house/0.5 acres) (M)						
Motor pools (M)						
Parks (M)						
Waste transfer/recycling stations (M)						

PCA Checklist **Table K-2, page 2 of 2**						
RESIDENTIAL/MUNICIPAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Apartments and condominiums (L)						
Campgrounds/ Recreational areas (L)						
Fire stations (L)						
RV Parks (L)						
Schools (L)						
Hotels, Motels (L)						
Other (list)						

PCA Checklist **Table K-3, page 1of 2**						
AGRICULTURAL/RURAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Grazing (> 5 large animals or equivalent per acre) (H in Zone A, otherwise M)						
Concentrated Animal Feeding Operations (CAFOs) as defined in federal regulation[1] (VH in Zone A, otherwise H)						
Animal Feeding Operations as defined in federal regulation[2] (VH in Zone A, otherwise H)						
Other Animal operations (H in Zone A, otherwise M)						
Farm chemical distributor/ application service (H)						
Farm machinery repair (H)						
Septic systems – low density (<1/acre) (H in Zone A, otherwise L)						
Lagoons / liquid wastes (H)						
Machine shops (H)						
Pesticide/fertilizer/ petroleum storage & transfer areas (H)						
Agricultural Drainage (H in Zone A, otherwise M)						
Wells - Agricultural/ Irrigation (H)						

PCA Checklist **Table K-3, page 2 of 2**						
AGRICULTURAL/RURAL						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Managed Forests (M)						
Crops, irrigated (Berries, hops, mint, orchards, sod, greenhouses, vineyards, nurseries, vegetable) (M)						
Fertilizer, Pesticide/ Herbicide Application (M)						
Sewage sludge/biosolids application (M)						
Crops, nonirrigated (e.g., Christmas trees, grains, grass seeds, hay, pasture) (L) (includes drip-irrigated crops)						
Other (list)						

3. Concentrated Animal Feeding Operation: Animal Feeding Operation (requires NPDES permit) with greater than:

If pollutants discharged (directly or indirectly) to navigable waters	**If pollutants not discharged**
300 slaughter or feeder cattle	1,000 slaughter or feeder cattle
200 mature dairy cows	700 mature dairy cows
750 swine	2500 swine
150 horses	500 horses
3000 sheep or lambs	10,000 sheep or lambs
16,500 turkeys	55,000 turkeys
9,000 laying hens or broilers (liquid manure system)	30,000 laying hens or broilers (liquid manure system)
1500 ducks	5000 ducks
300 animal units	1000 animal units

4. Animal Feeding Operation: lot or facility where animals (other than aquatic) have been or will be stabled or confined and fed or maintained for total of 45 days or more in any 12 month period.

PCA Checklist **Table K-4, page 1 of 3**						
OTHER ACTIVITIES						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
NPDES/WDR permitted discharges (H)						
Underground Injection of Commercial/Industrial Discharges (VH)						
Historic gas stations (VH)						
Historic waste dumps/ landfills (VH)						
Illegal activities/ unauthorized dumping (H)						
Injection wells/ dry wells/ sumps (VH)						
Known Contaminant Plumes (VH)						
Military installations (VH)						
Mining operations - Historic (VH)						
Mining operations – Active (VH)						
Mining - Sand/Gravel (H)						
Wells – Oil, Gas, Geothermal (H)						
Salt Water Intrusion (H)						
Recreational area— surface water source (H)						

PCA Checklist **Table K-4 , page 2 of 3**						
OTHER ACTIVITIES						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Underground storage tanks						
Confirmed leaking tanks (VH)						
Decommissioned - inactive tanks (L)						
Non-regulated tanks (tanks smaller than regulatory limit) (H)						
Not yet upgraded or registered tanks (H)						
Upgraded and/or registered - active tanks (L)						
Above ground storage tanks (M)						
Wells – Water supply (M)						
Construction/demolition staging areas (M)						
Contractor or government agency equipment storage yards (M)						
Dredging (M)						
Transportation corridors						
Freeways/state highways (M)						
Railroads (M)						
Historic railroad right-of-ways (M)						
Road Right-of-ways (herbicide use areas) (M)						
Roads/ Streets (L)						
PCA Checklist **Table K-4, page 3 of 3**						

OTHER ACTIVITIES						
PCA (Risk Ranking)	No PCA in zones	PCA in Zone A?	PCA in Zone B5?	PCA in Zone B10?	Unknown	Comments
Hospitals (M)						
Storm Drain Discharge Points (M)						
Storm Water Detention Facilities (M)						
Artificial Recharge Projects						
Injection wells (potable water) (L)						
Injection wells (non-potable water) (M)						
Spreading Basins (potable water) (L)						
Spreading Basins (non-potable water) (M)						
Medical/dental offices/clinics (L)						
Veterinary offices/clinics (L)						
Surface water - streams/ lakes/rivers (L)						
Wells – monitoring, test holes (L)						
Other (list)						

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Appendix L

Possible Contaminating Activities Evaluation– Ground Water Source

(Note: This form is OPTIONAL. It should be completed for each PCA if a modification of the risk ranking of a PCA is desired)

Public water system _____ID No. _____

Name of source _____ID No. _____

Assessment date:_____ Assessment conducted by _____

PCA/Potential Contaminant Information

1. Type of Activity (from the PCA contaminant inventory checklist):

2. Type of potential contaminant associated with this activity (Refer Table 7-2):
   a. Microbiological
   b. Chemical
   c. Both or Other

3. Potential Risk (from PCA contaminant inventory checklist):
   a. Low
   b. Medium
   c. High
   d. Very High

4. Location:
   a. Zone A
   b. Zone B5
   c. Zone B10

5. Spatial Area occupied by activity as percentage of Zone:
   a. Small (<1% of area)
   b. Moderate (1% to 10% of area)
   c. High (>10% of area)
   d. Unknown

6. Volume of potential contaminant *(not applicable for microbiological contaminants)*:
   If the maximum quantity of potential contaminant stored at the facility were discharged into

the quantity of water produced by the drinking water supply in a day would the concentration be:
a. Small (less than one part per billion)
b. Moderate (between one part per thousand and one part per billion)
c. High (more than one part per thousand)
d. Unknown

7. Magnitude of potential acute or chronic health effects associated with the contaminant:
a. Low
b. High
c. Unknown

8. Likelihood of potential contaminant to migrate to drinking water supply:
a. Low
b. High
c. Unknown

9. Has the potential contaminant been detected in the drinking water supply or near-by monitoring wells?
a. Yes
b. No
c. Unknown

10. Compliance of facility (demonstrated performance to keep potential contaminant from being discharged)
a. Good
b. Poor
c. Unknown

Determination of revised risk ranking for PCAs

Microbiological Contamination

NOTE: In fractured rock aquifers, microbiological PCAs are always high risk, regardless of the zone, and cannot be modified.

If the PCA is categorized as **2a or 2c**, the risk ranking would be LOW if the PCA meets all of the parameters in the table below for **Low.** The risk ranking would be HIGH if the PCA meets all of the parameters in the table for **High**. Otherwise the risk ranking is MODERATE.

Microbiological Contamination
PCA Risk Ranking

Parameter	Low	High
3	**a or b**	**c or d**
4	**b or c**	**a**
5	**a**	**c or d**
7	**a**	**b or c**
8	**a**	**b or c**
9	**b**	**a or c**
10	**a**	**b or c**

Chemical Contamination

If the PCA is categorized as **2b or 2c**, the risk ranking would be LOW if the PCA meets all of the parameters in the table below for **Low.** The risk ranking would be HIGH if the PCA meets all of the parameters in the table for **High**. Otherwise the risk ranking is MODERATE.

Chemical Contamination
PCA Risk Ranking

Parameter	Low	High
3	**a or b**	**c or d**
4	**c**	**a or b or c**
5	**a**	**c or d**
6	**a**	**c or d**
7	**a**	**b or c**
8	**a**	**b or c**
9	**b**	**a or c**
10	**a**	**b or c**

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Appendix M

Vulnerability Analysis Procedures – Ground Water Source

The Vulnerability analysis incorporates the types of Possible Contaminating Activities (PCAs) identified in the inventory, their respective Risk Rankings, the Zone and the Physical Barrier Effectiveness determination. These factors are used to develop a prioritized listing of types of PCAs and to determine the types of PCAs to which the drinking water source is most vulnerable.

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

Vulnerability analysis steps:

1. For each type of PCA identified as existing in the protection zones, or as unknown, determine the number of PCA risk ranking points for that type of PCA. (If the risk ranking for a type of PCA has been modified, Appendix L should be attached). (*For example, Very High (VH) risk activities are 7 points.)*

2. For each type of PCA determine the zone in which it occurs. Add the points associated with that zone to the PCA risk ranking points. If the type of PCA exists within more than one zone, repeat the process for each zone. (*For example, if a type of PCA exists in Zone A add 5 points. For a VH risk PCA in Zone A, the PCA Risk Ranking points + Zone points = 7 + 5 = 12 points*.)

3. Determine the Physical Barrier Effectiveness (PBE) for the drinking water source (from Appendix J). Add the points associated with that PBE to the PCA risk ranking and zone points. The total is the Vulnerability Score. (*For example, if the PBE is Low add 5 points. For a VH risk PCA in Zone A, the Vulnerability Score = PCA Risk Ranking points + Zone points + PBE points = 7 + 5 + 5 = 17 points.)*

4. Prioritize all types of PCAs by the Vulnerability Score, from the most points to the least. A sample form is shown below.

5. The drinking water source is vulnerable to all types of PCAs with a Vulnerability Score of **8** or greater. Refer to the Vulnerability Matrix below. The source is <u>most</u> vulnerable to the types of PCAs with the highest score.

6. **In addition, the Drinking Water Source is <u>most</u> vulnerable to all types of PCAs associated with a contaminant detected in the water source, regardless of Vulnerability Score.**

Vulnerability Matrix for GROUND WATER SOURCES

The cutoff point for vulnerability is **8**. The drinking water source is considered Vulnerable to all PCAs with Vulnerability Score greater than or equal to **8** (shaded boxes).

PCA points	**Zone points**	**PCA + Zone points**	**PBE Points**			**Vulnerability Score PCA + Zone + PBE points**		
Risk Ranking	A, B5, B10		Low	Mod	High	PBE Low	PBE Mod	PBE High
VH (7)	A (5)	12	5	3	1	17	15	13
VH (7)	B5 (3)	10	5	3	1	15	13	11
VH (7)	B10 (1)	8	5	3	1	13	11	9
VH (7)	Unknown (0) *	7	5	3	1	12	10	8
H (5)	A (5)	10	5	3	1	15	13	11
H (5)	B5 (3)	8	5	3	1	13	11	9
H (5)	B10 (1)	6	5	3	1	11	9	7
H (5)	Unknown (0) *	5	5	3	1	10	8	6
M (3)	A (5)	8	5	3	1	13	11	9
M (3)	B5 (3)	6	5	3	1	11	9	7
M (3)	B10 (1)	4	5	3	1	9	7	5
M (3)	Unknown (0) *	3	5	3	1	8	6	4
L (1)	A (5)	6	5	3	1	11	9	7
L (1)	B5 (3)	4	5	3	1	9	7	5
L (1)	B10 (1)	2	5	3	1	7	5	1
L (1)	Unknown (0) *	1	5	3	1	6	4	2

* Source is considered vulnerable to types of PCAs that are Unknown, if the Vulnerability Score is 8 or higher.

Format for Prioritized Listing of PCAs

List types of PCAs in order by Vulnerability Score from highest to lowest.

Zone	Type of PCA	PCA Points VH = 7 H = 5 M = 3 L = 1	Zone Points A = 5 B5 = 3 B10 = 1 Unknown = 0	PBE Points L = 5 M = 3 H = 1	Vulnerability Score PCA points + Zone points + PBE points

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Appendix N
Checklist for Drinking Water Source Assessment – Ground Water Source

Public water system: _____ ID No.: _____

Name of source: _____ ID No.: _____

Assessment date: _____ Assessment conducted by _____

The following information should be contained in the drinking water source assessment submittal.

If another report that is the functional equivalent to the drinking water assessment (e.g., parts of a Ground Water Management Plan) is included in this assessment, the part of that report that fulfills the components of the source water assessment should be clearly indicated.

_____ Source name, system name, source and system identification numbers, date of assessment, name of person and/or organization conducting the assessment (Appendix N, this form)

_____ Assessment map with source location, source area (if known), and protection zones

_____ Drinking water source location coordinates and accuracy of method used (Appendix H or equivalent)

_____ Delineation of protection zones (Appendix I or equivalent)

_____ Drinking water Physical Barrier Effectiveness Checklist (Appendix J)

_____ Well Data Sheet

_____ Possible contaminating activity (PCA) inventory form (Appendix K)

_____ Possible contaminating activities evaluation (optional) (Appendix L)

_____ Vulnerability ranking (Appendix M)

_____ Additional maps (optional) (e.g., local maps of zones and PCAs, recharge area maps, or maps indicating direction of ground water flow)

_____ Means of Public Availability of Report (indicate those that will be used)

- _____ Notice in the annual consumer confidence report* (minimum)
- _____ Copy in DHS district office (minimum)
- _____ Copy in public water system office (recommended)
- _____ Copy in public library/libraries
- _____ Internet (indicate Internet address: _____)
- _____ Other (describe)

*The annual report should indicate where customers can review the assessments.

Los Angeles Regional Water Quality Control Board (LARWQCB)

National Pollution Discharge Elimination System (NPDES) Permit

Federal National Pollutant Discharge Elimination System (NPDES) Permit Application Form

TO: Applicant for National Pollutant Discharge Elimination System (NPDES) Permit

CERTIFICATION REQUIREMENT FOR APPLICATION

On September 1, 1983, the United States Environmental Protection Agency (USEPA) promulgated new regulations which revised the procedures for applying for NPDES permits. Section 40 CFR 122.22 (d) specifies that each person signing an NPDES application shall make a specific certification as to the accuracy and completeness of the information provided. Unfortunately, the NPDES application forms currently in use were developed before 1983 and do not include the proper certification statement. The forms still in use that do not include the proper certification are:

Standard Form A: For Publicly Owned Treatment Works (POTW's) serving over 10,000 capita or with flow greater than 5.0 million gallons per day (MGD) or significant industrial waste.

Form 1: To accompany all other forms under EPA's Consolidated Permits Program.

We have prepared a form (copy attached) which is to be signed by the person signing the NPDES application and submitted as a supplement to the NPDES application to show compliance with 40 CFR 122.22 (d).

Section 40 CFR 122.22 (a) also revised the signature requirements for the NPDES application and specifies that the NPDES application must be signed as follows:

For a corporation - by a responsible corporate officer, which means; (i) by a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million, if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship - by a general partner or the proprietor respectively.

For a municipality, state, federal, or other public agency - by either a principal executive officer or ranking elected official. A principal executive officer of a federal agency includes (i) the chief executive officer of the agency or (ii) a senior executive officer having responsibility for the overall operations or a principal geographic unit of the agency.

CERTIFICATION SUPPLEMENT
FOR
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT APPLICATION

Please Print or Type

Legal Name of Applicant: _____

_____

Facility: _____

_____

"I Certify under penalty of law that his document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____
Printed Name or Person Signing Official Title

_____ _____
Signature Date Application Signed

_____
Date Supplement Signed

Signing the NPDES application may not be delegated by any of the above to a person at a lower level. However, reports and other submittals (other than NPDES applications) may be signed by duly authorized representative if:

a. The authorization is made in writing by signer of the NPDES permit application; and

b. The authorization specifies either an individual or position having responsibility for overall operation of the regulated facility, such as the position of plan manager, superintendent, or position of equivalent responsibility. (A duly authorized representative may be either a named individual or any individual occupying a named position.)

The written authorization must be submitted to:

Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4TH Street, Suite 200
Los Angeles, CA 90013

vbc 4/99

RWQCB Permit Application Form 200

INTRODUCTION

This application package constitutes a Report of Waste Discharge (ROWD) pursuant to California Water Code Section 13260. Section 13260 states that persons discharging or proposing to discharge waste that could affect the quality of the waters of the State, other than into a community sewer system, shall file a ROWD containing information which may be required by the appropriate Regional Water Quality Control Board (RWQCB).

This package is to be used to start the application process for all waste discharge requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits* issued by a RWQCB except:

a) Those landfill facilities that must use a joint Solid Waste Facility Permit Application Form, California Integrated Waste Management Board Form E-1-77; and
b) General WDRs or general NPDES permits that use a Notice of Intent to comply or specify the use of an alternative application form designed for that permit.

This application package contains:

1. Application/General Information Form for WDRs and NPDES Permits [Form 200 (10/97)].
2. Application/General Information Instructions.

Instructions

Instructions are provided to assist you with completion of the application. If you are unable to find the answers to your questions or need assistance with the completion of the application package, please contact your RWQCB representative. *The RWQCBs strongly recommend that you make initial telephone or personal contact with RWQCB regulatory staff to discuss a proposed new discharge before submitting your application.* The RWQCB representative will be able to answer procedural and annual fee related questions that you may have. (See map and telephone numbers inside of application cover.)

All dischargers regulated under WDRs and NPDES permits must pay an annual fee, except dairies, which pay a filing fee only. The RWQCB will notify you of your annual fee based on an evaluation of your proposed discharge. Please do NOT submit a check for your first annual fee or filing fee until requested to do so by a RWQCB representative. Dischargers applying for reissuance (renewal) of an existing NPDES permit or update of an existing WDR will be billed through the annual fee billing system and are therefore requested NOT to submit a check with their application. Checks should be made payable to the State Water Resources Control Board.

Additional Information Requirements

A RWQCB representative will notify you within 30 days of receipt of the application form and any supplemental documents whether your application is complete. If your application is incomplete, the RWQCB representative will send you a detailed list of discharge specific information necessary to complete the application process. The completion date of your application is normally the date when all required information, including the correct fee, is received by the RWQCB.

*** NPDES PERMITS:** If you are applying for a permit to discharge to surface water, you will need an NPDES permit which is issued under both State and Federal law and may be required to complete one or more of the following Federal NPDES permit application forms: Short Form A, Standard Form A, Forms 1, 2B, 2C, 2D, 2E, and 2F. These forms may be obtained at a RWQCB office or can be ordered from the National Center for Environmental Publications and Information at (513) 891-6561.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

INSTRUCTIONS

FOR COMPLETING THE APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR: WASTE DISCHARGE REQUIREMENTS/NPDES PERMIT

If you have any questions on the completion of any part of the application, please contact your RWQCB representative. A map of RWQCB locations, addresses, and telephone numbers is located on the reverse side of the application cover.

I. FACILITY INFORMATION

You must provide the factual information listed below for ALL owners, operators, and locations and, where appropriate, for ALL general partners and lease holders.

A. FACILITY:
Legal name, physical address including the county, person to contact, and phone number at the facility. (**NO P.O. Box numbers!** If no address exists, use street and nearest cross street.)

B. FACILITY OWNER:
Legal owner, address, person to contact, and phone number. Also include the owner's Federal Tax Identification Number.

OWNER TYPE:
Check the appropriate Owner Type. The legal owner will be named in the WDRs/NPDES permit.

C. FACILITY OPERATOR (The agency or business, not the person):
If applicable, the name, address, person to contact, and telephone number for the facility operator. Check the appropriate Operator Type. If identical to B. above, enter "same as owner".

D. OWNER OF THE LAND:
Legal owner of the land(s) where the facility is located, address, person to contact, and phone number. Check the appropriate Owner Type. If identical to B. above, enter "same as owner".

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED:
Address where legal notice may be served, person to contact, and phone number. If identical to B. above, enter "same as owner".

F. BILLING ADDRESS
Address where annual fee invoices should be sent, person to contact, and phone number. If identical to B. above, enter "same as owner".

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check the appropriate box to describe whether the waste will be discharged to: A. Land, or B. Surface Water.

Check the appropriate box(es) which best describe the activities at your facility.

Hazardous Waste - **If you check the Hazardous Waste box,** STOP **and contact a representative of the RWQCB for further instructions.**

Landfills - **A separate form, APPLICATION FOR SOLID WASTE FACILITY PERMIT/WASTE DISCHARGE REQUIREMENTS, California Integrated Waste Management Board Form E-1-77, may be required. Contact a RWQCB representative to help determine the appropriate form for your discharge.**

III. LOCATION OF THE FACILITY

1. Enter the Assessor's Parcel Number(s) (APN), which is located on the property tax bill. The number can also be obtained from the County Assessor's Office. Indicate the APN for both the facility and the discharge point.

2. Enter the Latitude of the entrance to the proposed/existing facility and of the discharge point. Latitude and longitude information can be obtained from a U.S. Geological Survey quadrangle topographic map. Other maps may also contain this information.

3. Enter the Longitude of the entrance to the proposed/existing facility and of the discharge point.

IV. REASON FOR FILING

NEW DISCHARGE OR FACILITY:
A discharge or facility that is proposed but does not now exist, or that does not yet have WDRs or an NPDES permit.

CHANGE IN DESIGN OR OPERATION:
A material change in design or operation from existing discharge requirements. Final determination of whether the reported change is material will be made by the RWQCB.

CHANGE IN QUANTITY/TYPE OF DISCHARGE:
A material change in characteristics of the waste from existing discharge requirements. Final determination of whether the reported change would have a significant effect will be made by the RWQCB.

CHANGE IN OWNERSHIP/OPERATOR:
Change of legal owner of the facility. Complete Parts I, III, and IV only and contact the RWQCB to determine if additional information is required.

WASTE DISCHARGE REQUIREMENTS UPDATE OR NPDES PERMIT REISSUANCE:
WDRs must be updated periodically to reflect changing technology standards and conditions. A new application is required to reissue an NPDES permit which has expired.

OTHER:
If there is a reason other than the ones listed, please describe the reason on the space provided. (If more space is needed, attach a separate sheet.)

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

It should be emphasized that communication with the appropriate RWQCB staff is vital before starting the CEQA documentation, and is recommended before completing this application. There are Basin Plan issues which may complicate the CEQA effort, and RWQCB staff may be able to help in providing the needed information to complete the CEQA documentation.

Name the Lead Agency responsible for completion of CEQA requirements for the project, i.e., completion and certification of CEQA documentation.

Check YES or NO. Has a public agency determined that the proposed project is exempt from CEQA?
If the answer is YES, state the basis for the exemption and the name of the agency supplying the exemption on the space provided. (Remember that, if extra space is needed, use an extra sheet of paper, but be sure to indicate the attached sheet under Section VII. Other.)

Check YES or NO. Has the "Notice of Determination" been filed under CEQA? If YES, give the date the notice was filed and enclose a copy of the Notice of Determination and the Initial Study, Environmental Impact Report, or Negative Declaration. If NO, check the box of the expected type of CEQA document for this project, and include the expected date of completion using the timelines given under CEQA. The date of completion should be taken as the date that the Notice of Determination will be submitted. (If not known, write "Unknown")

VI. OTHER REQUIRED INFORMATION

To be approved, your application MUST include a COMPLETE characterization of the discharge. If the characterization is found to be incomplete, RWQCB staff will contact you and request that additional specific information be submitted.

This application MUST be accompanied by a site map. A USGS 7.5' Quadrangle map or a street map, if more appropriate, is sufficient for most applications.

VII. OTHER

If any of the answers on your application form need further explanation, attach a separate sheet. Please list any attachments with the titles and dates on the space provided.

VIII. CERTIFICATION

Certification by the owner of the facility or the operator of the facility, if the operator is different from the owner, is required. The appropriate person must sign the application form.
Acceptable signatures are:

1. **for a corporation,** a principal executive officer of at least the level of senior vice-president;
2. **for a partnership or individual (sole proprietorship),** a general partner or the proprietor;
3. **for a governmental or public agency,** either a principal executive officer or ranking elected/appointed official.

DISCHARGE SPECIFIC INFORMATION

In most cases, a request to supply additional discharge specific information will be sent to you by a representative of the RWQCB. If the RWQCB determines that additional discharge specific information is not needed to process your application, you will be so notified.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name:			
Address:			
City:	County:	State:	Zip Code:
Contact Person:		Telephone Number:	

B. Facility Owner:

Name:			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: _____
Address:			
City:	State:	Zip Code:	
Contact Person:	Telephone Number:	Federal Tax ID:	

C. Facility Operator (The agency or business, not the person):

Name:			Operator Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: _____
Address:			
City:	State:	Zip Code:	
Contact Person:	Telephone Number:		

D. Owner of the Land:

Name:			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: _____
Address:			
City:	State:	Zip Code:	
Contact Person:	Telephone Number:		

E. Address Where Legal Notice May Be Served:

Address:		
City:	State:	Zip Code:
Contact Person:	Telephone Number:	

F. Billing Address:

Address:		
City:	State:	Zip Code:
Contact Person:	Telephone Number:	

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☐ **A. WASTE DISCHARGE TO LAND** ☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

☐ Domestic/Municipal Wastewater Treatment and Disposal
☐ Cooling Water
☐ Mining
☐ Waste Pile
☐ Wastewater Reclamation
☐ Other, please describe: _____

☐ Animal Waste Solids
☐ Land Treatment Unit
☐ Dredge Material Disposal
☐ Surface Impoundment
☐ Industrial Process Wastewater

☐ Animal or Aquacultural Wastewater
☐ Biosolids/Residual
☐ Hazardous Waste (see instructions)
☐ Landfill (see instructions)
☐ Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)	**2. Latitude**	**3. Longitude**
Facility:	**Facility:**	**Facility:**
Discharge Point:	**Discharge Point:**	**Discharge Point:**

IV. REASON FOR FILING

☐ New Discharge or Facility
☐ Change in Design or Operation
☐ Change in Quantity/Type of Discharge
☐ Changes in Ownership/Operator (see instructions)
☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: _____

Has a public agency determined that the proposed project is exempt from CEQA? ☐ **Yes** ☐ **No**

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ **Yes** ☐ **No**

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration** **Expected CEQA Completion Date:** _____

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

_____

_____

_____

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: _____ **Title:** _____

Signature: _____ **Date:** _____

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

California Environmental Protection Agency
Bill of Rights for Environmental
Permit Applicants

California Environmental Protection Agency (Cal/EPA) recognizes that many complex issues must be addressed when pursuing reforms of environmental permits and that significant challenges remain. We have initiated reforms and intend to continue the effort to make environmental permitting more efficient, less costly, and to ensure that those seeking permits receive timely responses from the boards and departments of the Cal/EPA. To further this goal, Cal/EPA endorses the following precepts that form the basis of a permit applicant's "Bill of Rights."

1. Permit applicants have the right to assistance in understanding regulatory and permit requirements. All Cal/EPA programs maintain an Ombudsman to work directly with applicants. Permit Assistance Centers located throughout California have permit specialists from all the State, regional, and local agencies to identify permit requirements and assist in permit processing.

2. Permit applicants have the right to know the projected fees for review of applications, how any costs will be determined and billed, and procedures for resolving any disputes over fee billings.

3. Permit applicants have the right of access to complete and clearly written guidance documents that explain the regulatory requirements. Agencies must publish a list of all information required in a permit application and of criteria used to determine whether the submitted information is adequate.

4. Permit applicants have the right of timely completeness determinations for their applications. In general, agencies notify the applicant within 30 days of any deficiencies or determine that the application is complete. California Environmental Quality Act (CEQA) and public hearing requests may require additional information.

5. Permit applicants have the right to know exactly how their applications are deficient and what further information is needed to make their applications complete. Pursuant to California Government code Section 65944, after an application is accepted as complete, an agency may not request any new or additional information that was not specified in the original application.

6. Permit applicants have the right of a timely decision on their permit application. The agencies are required to establish time limits for permit reviews.

7. Permit applicants have the right to appeal permit review time limits by statute or administratively that have been violated without good cause. For state environmental agencies, appeals are made directly to the Cal/EPA Secretary or to a specific board. For local environmental agencies, appeals are generally made to the local governing board or, under certain circumstances, to Cal/EPA. Through this appeal, applicants may obtain a set date for a decision on their permit and, in some cases, a refund of all application fees (ask boards and departments for details).

8. Permit applicants have the right to work with a single lead agency where multiple environmental approvals are needed. For multiple permits, all agency actions can be consolidated under a lead agency. For site remediation, all applicable laws can be administered through a single agency.

9. Permit applicants have the right to know who will be reviewing their application and the time required to complete the full review process.

Certification Requirement for Application

TO: Applicant for National Pollutant Discharge Elimination System (NPDES) Permit

CERTIFICATION REQUIREMENT FOR APPLICATION

On September 1, 1983, the United States Environmental Protection Agency (USEPA) promulgated new regulations which revised the procedures for applying for NPDES permits. Section 40 CFR 122.22 (d) specifies that each person signing an NPDES application shall make a specific certification as to the accuracy and completeness of the information provided. Unfortunately, the NPDES application forms currently in use were developed before 1983 and do not include the proper certification statement. The forms still in use that do not include the proper certification are:

Standard Form A: For Publicly Owned Treatment Works (POTW's) serving over 10,000 capita or with flow greater than 5.0 million gallons per day (MGD) or significant industrial waste.

Form 1: To accompany all other forms under EPA's Consolidated Permits Program.

We have prepared a form (copy attached) which is to be signed by the person signing the NPDES application and submitted as a supplement to the NPDES application to show compliance with 40 CFR 122.22 (d).

Section 40 CFR 122.22 (a) also revised the signature requirements for the NPDES application and specifies that the NPDES application must be signed as follows:

For a corporation - by a responsible corporate officer, which means; (i) by a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million, if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship - by a general partner or the proprietor respectively.

For a municipality, state, federal, or other public agency - by either a principal executive officer or ranking elected official. A principal executive officer of a federal agency includes (i) the chief executive officer of the agency or (ii) a senior executive officer having responsibility for the overall operations or a principal geographic unit of the agency.

CERTIFICATION SUPPLEMENT
FOR
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT APPLICATION

Please Print or Type

Legal Name of Applicant: _____

_____

Facility: _____

_____

"I Certify under penalty of law that his document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____
Printed Name or Person Signing Official Title

_____ _____
Signature Date Application Signed

_____
Date Supplement Signed

Signing the NPDES application may not be delegated by any of the above to a person at a lower level. However, reports and other submittals (other than NPDES applications) may be signed by duly authorized representative if:

a. The authorization is made in writing by signer of the NPDES permit application; and

b. The authorization specifies either an individual or position having responsibility for overall operation of the regulated facility, such as the position of plan manager, superintendent, or position of equivalent responsibility. (A duly authorized representative may be either a named individual or any individual occupying a named position.)

The written authorization must be submitted to:

Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4TH Street, Suite 200
Los Angeles, CA 90013

vbc 4/99

Permit Writer's Manual

U.S. Environmental Protection Agency

NPDES Permit Writers' Manual

U.S. Environmental Protection Agency
Office of Wastewater Management, Water Permits Division
State and Regional Branch

EPA-833-K-10-001 • September 2010

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United States
Environmental Protection
Agency

Office of Water
Washington, DC

United States
Environmental Protection Agency

National Pollutant Discharge Elimination System (NPDES) Permit Writers' Manual

This guidance was developed by staff within the U.S. Environmental Protection Agency's (EPA's) Office of Wastewater Management and addresses development of wastewater discharge permits under the National Pollutant Discharge Elimination System (NPDES). NPDES permit development is governed by existing requirements of the Clean Water Act (CWA) and the EPA NPDES implementing regulations. CWA provisions and regulations contain legally binding requirements. This document does not substitute for those provisions or regulations. Recommendations in this guidance are not binding; the permitting authority may consider other approaches consistent with the CWA and EPA regulations. When EPA makes a permitting decision, it will make each decision on a case-by-case basis and will be guided by the applicable requirements of the CWA and implementing regulations, taking into account comments and information presented at that time by interested persons regarding the appropriateness of applying these recommendations to the situation. This guidance incorporates, and does not modify, existing EPA policy and guidance on developing NPDES permits. EPA may change this guidance in the future.

Water Permits Division
Office of Wastewater Management
Washington, DC 20460
(4203)
www.epa.gov/npdes

EPA-833-K-10-001
September 2010

Acknowledgements

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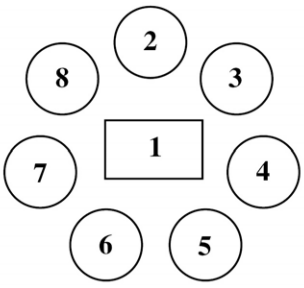
4. Concentrated Animal Feeding Operation—USDA NRCS
5. Incidental Vessel Discharges—Smithsonian Environmental Research Center, National Ballast Information Clearinghouse
6. Non-Municipal (Industrial)—EPA
7. Construction Stormwater—Barry Tonning, Tetra Tech, Inc.
8. Combined Sewer Overflow—EPA



Contents

Exhibits

Introduction to the Manual

This manual reviews the statutory and regulatory framework of the National Pollutant Discharge Elimination System (NPDES) program and examines technical considerations for developing NPDES permits for wastewater discharges. The manual is designed, primarily, for new permit writers becoming acquainted with the NPDES program and the process of permit writing, but can also serve as a reference for experienced permit writers or anyone interested in learning about the legal and technical aspects of developing NPDES permits. This manual replaces the *1996 U.S. EPA NPDES Permit Writers' Manual*[1] <www.epa.gov/npdes/pubs/owm0243.pdf>, which updated the *1993 Training Manual for NPDES Permit Writers*[2] <www.epa.gov/npdes/pubs/owm0339.pdf>.

To assist the reader, acronyms and abbreviations are defined for the first use in each chapter and in Appendix A of the manual. Endnotes are provided at the end of each chapter.

Purpose of this Manual

The purpose of this *NPDES Permit Writers' Manual* (manual) is to provide a general reference for permitting authorities that outlines and explains the core elements of the NPDES permit program. The core elements form the foundation of the NPDES program on which guidance for specific areas of the program (e.g., stormwater, concentrated animal feeding operations) can be built. While the guidance for these core program areas will be applicable in many cases, the U.S. Environmental Protection Agency (EPA) recognizes that each EPA Regional Office or authorized state, territory, or tribe (hereafter *state*) will tailor specific aspects of its NPDES permitting procedures to address state and local laws and site-specific concerns and conditions.

The specific objectives and functions of this manual are as follows:

- Provide an overview of the scope and the statutory and regulatory framework of the NPDES program.
- Describe the essential components of a permit and provide an overview of the permitting process.
- Describe the different types of effluent limitations and the legal and technical considerations involved in developing effluent limitations.
- Describe the legal and technical considerations involved in developing other permit conditions including
  - Monitoring and reporting requirements.
  - Special conditions.
  - Standard conditions.
- Describe other permitting considerations including
  - Variances.
  - Anti-backsliding.
  - Other applicable statutes.

- Explain the administrative process for issuing, modifying, revoking and terminating NPDES permits.

This manual is not intended to be a standalone reference document. Rather, it establishes the framework for NPDES permit development and should be supplemented, where necessary, by additional EPA and state regulations, policy, and detailed guidance applicable to specific types of dischargers and circumstances. To that end, this manual identifies and references relevant regulations, policy, and other guidance documents throughout the text.

Publications Referenced

This manual provides links to publications available online that supplement the information in the manual. All documents available electronically were accessed and available as of the date of this manual's publication. Some documents are not available in an electronic format. In those instances, readers should check the following sources to determine the availability of and to obtain printed copies of the documents:

- Office of Water Resource Center (OWRC) <www.epa.gov/safewater/resource/>
  OWRC is a contractor-operated facility providing document delivery, information/referral, and reference services to public users and EPA staff interested in Office of Water Program information
  phone: 202-566-1729 or 800-832-7828, fax: 202-566-1736, e-mail: <center.water-resource@epa.gov>.
- EPA Library Services and Repositories <www.epa.gov/natlibra/libraries.htm>
  EPA's library services and repositories provide access to information about the environment and related scientific, technical, management, and policy information. Library services <www.epa.gov/natlibra/library_services.html> are delivered through the National Library Network <www.epa.gov/natlibra/index.html>.
- National Service Center for Environmental Publications (NSCEP) <www.epa.gov/ncepihom/>
  NSCEP, formerly NCEPI, maintains and distributes EPA publications in hardcopy, CD ROM and other multimedia formats. The publication inventory includes more than 7,000 titles
  phone: 513-489-8190 or 800-490-9198, fax: 513-489-8695, e-mail: ncepimal@one.net.
- National Technical Information Service (NTIS) <www.ntis.gov/>
  NTIS is the largest central resource for government-funded scientific, technical, engineering, and business related information covering more than 350 subject areas from more than 200 federal agencies
  phone: 703-605-6050 or 888-584-8332, fax: 703-605-6900, e-mail: customerservice@ntis.gov.

Legislative and Regulatory Citations

There are a number of different conventions used to cite legislation and regulations. In this manual, the following conventions have been used:

- When citing the *United States Code*, the abbreviation U.S.C. is used. The abbreviation is preceded by the Title of the U.S.C. and then followed by the section number.
  Example: 16 U.S.C. 1531 *et seq*. and 33 U.S.C. §§ 1251-1387.

- When citing the Clean Water Act, the abbreviation CWA is used. The abbreviation is followed by the word *section* and then the section number.
  Example: CWA section 402 and CWA section 402(o).
- When citing the *Code of Federal Regulations* (CFR), the convention depends on the location of the reference. For first references, the abbreviation CFR is preceded by the title number of the CFR and followed either by the word *Part* (if it is a part—a whole number) or the number of the subsection (if it is a subpart/subsection). For subsequent references, the title and CFR are omitted and just the word *Part* or the section symbol (§) is used.
  Example: First citation: 40 CFR Part 136 or 40 CFR 122.44
  Subsequent citations: Part 136 or § 122.44.

Almost all the regulatory citations in this manual are for Title 40 of the CFR (with the exception of the other federal laws referenced in section 11.1 of this manual). Any other Titles are explicitly referenced and in the format for the first regulatory citation (e.g., 50 CFR Part 402).

Electronic NPDES Information

Websites and electronically stored publications and data are available to help permit writers draft NPDES permits. Tools have been created to assist permit writers with specific aspects of permit development and are discussed in their respective sections. The electronic tools listed below apply to all aspects of permit development and serve as valuable references for the permit writer.

NPDES Website and Resources

The Water Permits Division (WPD) within the EPA Office of Water (OW), Office of Wastewater Management, has developed a comprehensive NPDES Website <www.epa.gov/npdes> with technical and regulatory information about the NPDES permit program, information on related programs and initiatives, and documents published by WPD. Where applicable, this manual references the NPDES Website and provides links to relevant documents on that site. This manual also references other EPA and non-EPA websites that contain information that might be helpful to NPDES permit writers. Note, however, that EPA is not responsible for information provided on websites outside the EPA Website <www.epa.gov>.

WPD also has prepared several websites and other resources to help permit writers draft permits. This manual references those websites and resources in the appropriate section of this manual.

Electronic Permitting Tools

Many EPA Regions and authorized states have developed tools to help them manage the permit issuance process. Electronic permitting tools range from spreadsheets and word processing applications to sophisticated Web-based systems that enable permitting authorities to manage their entire environmental program. For example, some states have built systems that enable dischargers to electronically sign and submit discharge reports; create, track, and store permit documents; and manage enforcement, compliance, and inspections related to permits. As technologies continue to evolve, many permitting authorities are likely to begin using more information technology applications to manage the process of permitting.

ICIS-NPDES

Together with OW, the Office of Enforcement and Compliance Assurance (OECA) is responsible for oversight of implementation of the NPDES program. OW is responsible for the NPDES implementing regulations and oversight of permit issuance by states and EPA Regions. OECA, along with its regional, state, tribal and local counterparts, is responsible for tracking and maintaining enforcement and compliance activities, monitoring and enforcement and compliance status of the regulated community, and reviewing and evaluating program performance. OECA also maintains national data systems to support program management and oversight of the NPDES program.

The Permit Compliance System (PCS), one of two national NPDES electronic databases, supports the management and oversight of the NPDES program. Since the last modernization of PCS in 1985, the NPDES program has evolved significantly to include additional program requirements, such as the NPDES program for stormwater and implementation of the Combined Sewer Overflow Control Policy. Because of limitations to PCS, OECA is working to phase out this system and move to a more modern data management system described below.

The Integrated Compliance Information System for NPDES permits (ICIS-NPDES) <https://icis.epa.gov/icis>, the successor to PCS, provides an updated system that enables national program management and oversight activities such as

- Permit tracking and management.
- Compliance monitoring.
- NPDES program management.
- Enforcement actions.

ICIS-NPDES is a Web-based system with an electronic database capable of handling the large amount of data generated by and about the NPDES program. Section 11.5.1.1 of this manual provides more information on ICIS-NPDES as it relates to NPDES permit compliance.

Hyperlinks in this Document

Where a website provides supplementary information or is referenced in this manual, the actual site or higher level site address appears in the symbols < > so that readers will have a reference to the address even in a printed version of this document. In the electronic version of the manual, the text in carats is also the hyperlink to the referenced website. Care has been taken to provide the correct Web addresses and hyperlinks; however, these references can change or become outdated after this manual's publication.

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[1] U.S. Environmental Protection Agency. 1996. *U.S. EPA NPDES Permit Writers' Manual*. EPA-833-B-96-003. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0243.pdf>. Separate sections of this document are also available on the NPDES Website by going to <www.epa.gov/npdes>, clicking on Publications and entering NPDES Permit Writers' Manual in the Search box.

[2] U.S. Environmental Protection Agency. 1993. *Training Manual for NPDES Permit Writers*. EPA-833-B-93-003. U.S. Environmental Protection Agency, Office of Wastewater Management, Washington, DC. <www.epa.gov/npdes/pubs/owm0339.pdf>.

CHAPTER 1. Development of the Clean Water Act and the NPDES Program

This chapter presents an overview of the history of water pollution control in the United States and the evolution and accomplishments of the National Pollutant Discharge Elimination System (NPDES) Program.

1.1 History of Water Pollution Control in the United States

Major water pollution control legislation in the United States dates back to the end of the 19th century. Exhibit 1-1 presents a summary of key legislative and executive actions in the history of clean water program development in the United States.

Exhibit 1-1 Important milestones of clean water program development

1899 Rivers and Harbors Act
1948 Federal Water Pollution Control Act (FWPCA)
1965 Water Quality Act
1970 Executive Order–U.S. Environmental Protection Agency (EPA) established
1970 Refuse Act Permit Program (RAPP)
1972 FWPCA Amendments
1977 Clean Water Act (CWA)
1987 Water Quality Act (WQA)

The first major water pollution control statute was the **1899 Rivers and Harbors Act**, which established permit requirements to prevent unauthorized obstruction or alteration of any navigable water of the United States. That act focused on navigation rather than water quality.

The **1948 Federal Water Pollution Control Act (FWPCA)** initiated the federal government's involvement in water pollution control for public health protection. The act allotted funds to state and local governments for water pollution control and emphasized the states' role in controlling and protecting water resources with few federal limitations or guidelines. The act, however, did charge the U.S. Surgeon General with developing comprehensive programs to eliminate or reduce the pollution of interstate waters.

Over the next two decades, Congress became increasingly interested in the problem of water quality degradation. From 1956 through 1966, it enacted four major laws to strengthen the federal role in water pollution control, including the FWPCA Amendments of 1956 and the FWPCA Amendments of 1961. Those statutes focused primarily on providing funding to municipalities to construct wastewater treatment plants.

Just a few years later, Congress further strengthened federal water pollution control laws by enacting the **1965 Water Quality Act**. This law created the Federal Water Pollution Control Administration and

represented a major regulatory advancement in water pollution control by requiring states to develop water quality standards for interstate waters by 1967. The Water Quality Act also called for states to quantify the amount of pollutants that each discharger could release without exceeding the water quality standards (i.e., pollutant loadings). Despite escalating public concern and increased public spending, only about half of the states developed water quality standards by 1971. Furthermore, enforcement of the federal statute was minimal because the regulatory agencies had to demonstrate a direct link between a discharge and a health or water quality problem, and the scientific data to make such demonstrations were often lacking. Finally, there were no criminal or civil penalties for violations of statutory requirements.

Growing concern about the environment prompted President Nixon to form the **U.S. Environmental Protection Agency (EPA**) in 1970 to enforce environmental compliance and consolidate federal pollution control activities. That year, the President also created the **Refuse Act Permit Program (RAPP)** through Executive Order 11574 and under the authority of section 13 of the 1899 Rivers and Harbors Act (a section also known as the Refuse Act). This new permitting program was focused on controlling industrial water pollution. EPA and the U.S. Army Corps of Engineers (Corps) would prepare the program requirements and the Corps would administer the program. EPA was tasked with developing *guidelines on effluent quality* for 22 different categories of sources. A discharger would apply for a permit, and the Corps would ask EPA if the proposed effluent levels were consonant with state water quality standards and with the newly developed guidelines on effluent quality. States would be asked to examine permit applications and advise EPA whether existing or proposed treatment processes would ensure that established water quality standards would be met. EPA would review the state's response for interstate waters and instruct the Corps whether to issue the permit. However, the U.S. District Court for the District of Columbia struck down RAPP (*Kalur v. Resor*, Civ. Action No. 1331-71 [D.D.C. Dec. 21, 1971]) because the program would allow the issuance of permits to discharge refuse to non-navigable tributaries of navigable waterways, which the Court said exceeded the authority given in the Act, and because the regulations implementing the program did not require compliance with certain procedural requirements of the National Environmental Policy Act.

Because of the perceived need for a discharge permit program, and to rectify the problems encountered in earlier water pollution control legislation, Congress enacted the **FWPCA Amendments of 1972**. This legislation, which was passed over a Presidential veto in November 1972, provided a comprehensive re-codification and revision of past federal water pollution control law. The 1972 amendments marked a distinct change in the philosophy of water pollution control in the United States and marked the beginning of the present water programs, including the NPDES permit program. Under those amendments, the federal government assumed a major role in directing and defining water pollution control programs. In establishing the basis for clean water programs, Congress sought a balance between economics (considering both the costs and benefits of cleanup) and ecology (setting deadlines and ambitious requirements for reducing discharges and restoring water quality).

The FWPCA Amendments of 1972 established a series of goals in section 101. Perhaps the most notable goal was that the discharge of pollutants into navigable waters be eliminated by 1985. Although that goal remains unmet, it underlies the CWA approach to establishing the technology standards that are implemented through technology-based effluent limitations (TBELs) in NPDES permits. The FWPCA Amendments of 1972 also set an interim goal of achieving, "water quality [that] provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water" by July 1, 1983. That goal is commonly referred to as the *fishable, swimmable* goal of the act and is one

of the factors that states must consider in the development of their water quality standards. The water quality standards are implemented in NPDES permits through water quality-based effluent limitations (WQBELs). By prohibiting the discharge of a pollutant or pollutants from a point source to waters of the United States—except as in compliance with the statute, the FWPCA Amendments of 1972 also established the important principle that the discharge of pollutants to navigable waters is not a right.

Since 1972, the FWPCA has been further amended on several occasions, including the **1977 Clean Water Act** (CWA), which is now the name for the statute, and the **1987 Water Quality Act** (WQA). Both of these statutes are discussed further in section 1.2 below with regard to their impact on the evolution of the NPDES program. Exhibit B-1, Index to Sections of the CWA, in Appendix B of this document matches the key sections of the CWA to their appropriate reference in the *United States Code* (U.S.C.). This information is at U.S.C., Title 33 (Navigation and Navigable Waters), Chapter 26 (Water Pollution Prevention and Control), 1251-1387 (33 U.S.C. §§ 1251-1387) <www.epa.gov/lawsregs/laws/cwa.html>.

1.2 Evolution of the NPDES Program

Section 402 of Title IV of the FWPCA, Permits and Licenses, created today's system for permitting wastewater discharges, known as the NPDES program. Under the requirements of the program, a point source may be authorized to discharge pollutants into waters of the United States by obtaining a permit. Section 1.3 below discusses this basic statutory framework in detail. A permit provides two types of control: technology-based limitations (based on the technological and economic ability of dischargers in the same category to control the discharge of pollutants in wastewater) and water quality-based limitations (to protect the quality of the specific waterbody receiving the discharge).

The FWPCA Amendments of 1972 established several important requirements and deadlines. Municipal facilities were required to meet secondary treatment standards by July 1, 1977. Industrial facilities were required to meet two levels of technology standards: *Best Practicable Control Technology Currently Available* (BPT) and *Best Available Technology Economically Achievable* (BAT), which would bring them further toward the goal of eliminating the discharge of all pollutants. [CWA section 301 (b)(2)(A)]. Compliance deadlines for BPT and BAT were established as of July 1, 1977, and July 1, 1983, respectively.

In addition to BPT and BAT requirements for industrial categories, the 1972 FWPCA Amendments established *new source performance standards* (NSPS) or best available demonstrated control technology including where practicable a standard permitting no discharge of pollutants [CWA section 306(a)]. The Legislative History indicates that Congress believed that technologies would be more affordable for new dischargers who could plan control technologies at the design phase. The standards represent state-of-the-art control technologies for new sources because the permittees have the opportunity to install the most efficient production processes and the latest in treatment technologies during construction. NSPS are effective on the date the facility begins operation, and the facility must demonstrate compliance within 90 days of start-up.

EPA tried to set national, uniform effluent limitations guidelines and standards (effluent guidelines) as a basis for technology-based limitations; however, most effluent guidelines were not in place when the first set of permits was issued between 1973 and 1976. About 75 percent of the first round permits were issued

under a section of the act that allows a permit writer to use his or her best professional judgment to establish case-by-case limitations. Using that approach, a single permit writer developed effluent limitations for a specific facility using his or her knowledge of the industry and the specific discharge, rather than using a set of national standards and limitations developed by EPA for the entire industry.

This first round of permitting focused on *conventional pollutants*, which generally are found in sanitary waste from households, businesses, and industries. CWA section 304(a)(4) and Title 40 of the *Code of Federal Regulations* (CFR) 401.16 designate the conventional pollutants with oil and grease added to § 401.16 in 1979. The following are formally designated as conventional pollutants:

- Five-day Biochemical Oxygen Demand (BOD_5).
- Total Suspended Solids (TSS).
- pH.
- Fecal Coliform.
- Oil and Grease.

The 1972 FWPCA Amendments, however, also required that EPA publish a list of toxic pollutants within 90 days and propose effluent standards for those pollutants 6 months later. EPA was not able to meet those requirements because of the lack of information on treatability. The Natural Resources Defense Council (NRDC) sued EPA, resulting in a court supervised *consent decree* (*NRDC et al. v. Train, 8 E.R.C. 2120*, DDC 1976) that identified the following:

- Toxic (priority) pollutants to be controlled.
- Primary industries for technology-based control.
- Methods for regulating toxic discharges through the authorities of the FWPCA Amendments.

The provisions of the consent decree were incorporated into the framework of the 1977 FWPCA Amendments, formally known as the CWA. This statute shifted the emphasis of the NPDES program from controlling conventional pollutants to controlling toxic pollutant discharges. CWA section 307(a)(1) required EPA to publish a list of toxic pollutants or combination of pollutants. Those pollutants often are called the priority pollutants and are listed in § 401.15. The terms *toxic pollutant* and *priority pollutant* are used interchangeably throughout this document.

CWA section 307(a) originally identified 65 toxic pollutants and classes of pollutants for 21 major categories of industries (known as *primary industries*). That list was later further defined as the current list of 126 toxic pollutants. The priority pollutants are listed in Appendix C of this document and in Appendix A of Part 423. Note that the list goes up to 129; however, there are only 126 priority pollutants because 017, 049, and 050 were deleted.

The 1977 CWA adjusted technology standards to reflect the shift toward control of toxics, clarified and expanded the concept of BAT controls, created a new level of control for conventional pollutants, and made changes to strengthen the industrial pretreatment program. The 1977 law created a new pollutant category, nonconventional pollutants, that included pollutants (such as chlorine and ammonia) not specifically categorized as conventional or toxic. The CWA clarified that BAT covers both toxic and nonconventional pollutants, extended the compliance deadline for BAT for toxic pollutants to July 1, 1984, established a three-year deadline for compliance with BAT for newly listed toxics, and gave industries until as late as July 1, 1987 to meet BAT requirements for nonconventional pollutants. In addition, conventional pollutants, controlled by BPT and BAT in the first round of permitting, were now

subject to a new level of control termed *Best Conventional Pollutant Control Technology* (BCT). The CWA established a compliance deadline for BCT of July 1, 1984. BCT was not an additional performance standard, but replaced BAT for the control of conventional pollutants. Finally, among other changes, the 1977 CWA authorized EPA to approve local pretreatment programs and required authorized states to modify their programs to provide for local pretreatment program oversight.

The 1977 CWA recognized that the technology-based limitations were not able to prevent the discharge of toxic substances in toxic amounts in all waterways. To complement its work on technology-based limitations, EPA initiated a national policy in February 1984 to control toxics using a water quality approach. On February 4, 1987, Congress amended the CWA with the 1987 WQA that outlined a strategy to accomplish the goal of meeting state water quality standards. The 1987 WQA required all states to identify waters that were not expected to meet water quality standards after technology-based controls on point source were imposed. Each state then had to prepare individual control strategies to reduce toxics from point and nonpoint sources to meet the water quality standards. Among other measures, those plans were expected to address control of pollutants beyond technology-based levels.

The 1987 WQA further extended the compliance deadline for BAT- and BCT-based effluent limitations, this time to a new deadline of March 31, 1989. The 1987 WQA also established new schedules for issuing NPDES permits to industrial and municipal stormwater dischargers. In addition to meeting water quality-based standards, industrial stormwater discharges must meet the equivalent of BAT and BCT effluent quality standards. *Municipal separate storm sewer systems* (MS4s) were required to have controls to reduce pollutant discharges to the *maximum extent practicable* (MEP), including management practices, control techniques and system design and engineering methods, and such other provisions as the Administrator deems appropriate for the control of such pollutants [CWA section 402(p)(3)(B)]. The 1987 WQA also required EPA to identify toxics in sewage sludge and establish numeric limitations to control such toxics. A statutory *anti-backsliding* requirement in the WQA specified the circumstances under which an existing permit can be modified or reissued with less stringent effluent limitations, standards, or conditions than those already imposed.

Since 1987, there have been minor revisions to the CWA (e.g., Combined Sewer Overflow program requirements). However, the basic structure of the NPDES program remains unchanged from the framework established in the 1972 FWPCA Amendments.

1.3 NPDES Statutory Framework

As noted in section 1.2 above, under the NPDES program any point source that discharges or proposes to discharge pollutants into waters of the United States is required to obtain an NPDES permit. Understanding how each of these terms (i.e., permit, pollutant, waters of the United States, and point source) is defined is the key to defining the scope of the NPDES program.

1.3.1 Permit

A permit is a license, issued by the government to a person or persons granting permission to do something that would otherwise be illegal without the permit. An NPDES permit typically is a license for a facility to discharge a specified amount of a pollutant into a receiving water under certain conditions; however, NPDES permits can also authorize facilities to process, incinerate, landfill, or beneficially use

biosolids (sewage sludge). A discharger does not have a right to receive a permit, and permits may be revoked for cause such as noncompliance with the conditions of the permit.

1.3.2 Pollutant

The term *pollutant* is defined in CWA section 502(6) and § 122.2. The statute defines pollutant very broadly and includes any type of industrial, municipal, or agricultural waste (including heat) discharged into water. For regulatory purposes, pollutants are grouped into three categories under the NPDES program: conventional, toxic, and nonconventional.

- **Conventional** pollutants are those defined in CWA section 304(a)(4) and § 401.16 (BOD_5, TSS, fecal coliform, pH, and oil and grease).
- **Toxic (priority)** pollutants are those defined in CWA section 307(a)(1) (and listed in § 401.15 and Appendix A of Part 423) and include 126 metals and manmade organic compounds (see Exhibit C-1 in Appendix C of this document).
- **Nonconventional** pollutants are those that do not fall under either of the above categories (conventional or toxic pollutants) and include parameters such as chlorine, ammonia, nitrogen, phosphorus, chemical oxygen demand (COD), and whole effluent toxicity (WET).

Sewage from vessels and, under certain conditions, water, gas, or other material injected into wells to facilitate production of oil or gas or water derived in association with oil and gas production and disposed of in a well are specifically excluded from the definition of pollutant under the NPDES program.

1.3.3 Waters of the United States

The CWA regulates discharges to *navigable waters*. CWA section 502(7) defines navigable waters as "waters of the United States, including the territorial seas." NPDES regulations define *waters of the United States* to mean,

- Waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters subject to the ebb and flow of the tide.
- Interstate waters including interstate *wetlands*.
- Other waters that could affect interstate or foreign commerce.
- Impoundments of waters of the United States.
- Tributaries of the above categories of waters.
- Territorial seas.
- Wetlands adjacent to other waters (except wetlands themselves) in the above categories.

Wetlands are further defined in § 122.2. In addition, the definition of waters of the United States contains exclusions for waste treatment systems (other than certain cooling ponds) designed to meet the requirements of the CWA and also for *prior converted croplands*, which is mostly relevant to the CWA section 404 permitting program administered by the Corps.

Waters of the United States covers a broad range of surface waters. The CWA does not give EPA the authority to regulate ground water quality through NPDES permits. If a discharge of pollutants to ground water reaches waters of the United States, however, it could be a discharge to the surface water (albeit indirectly via a direct hydrological connection, i.e., the ground water) that needs an NPDES permit.

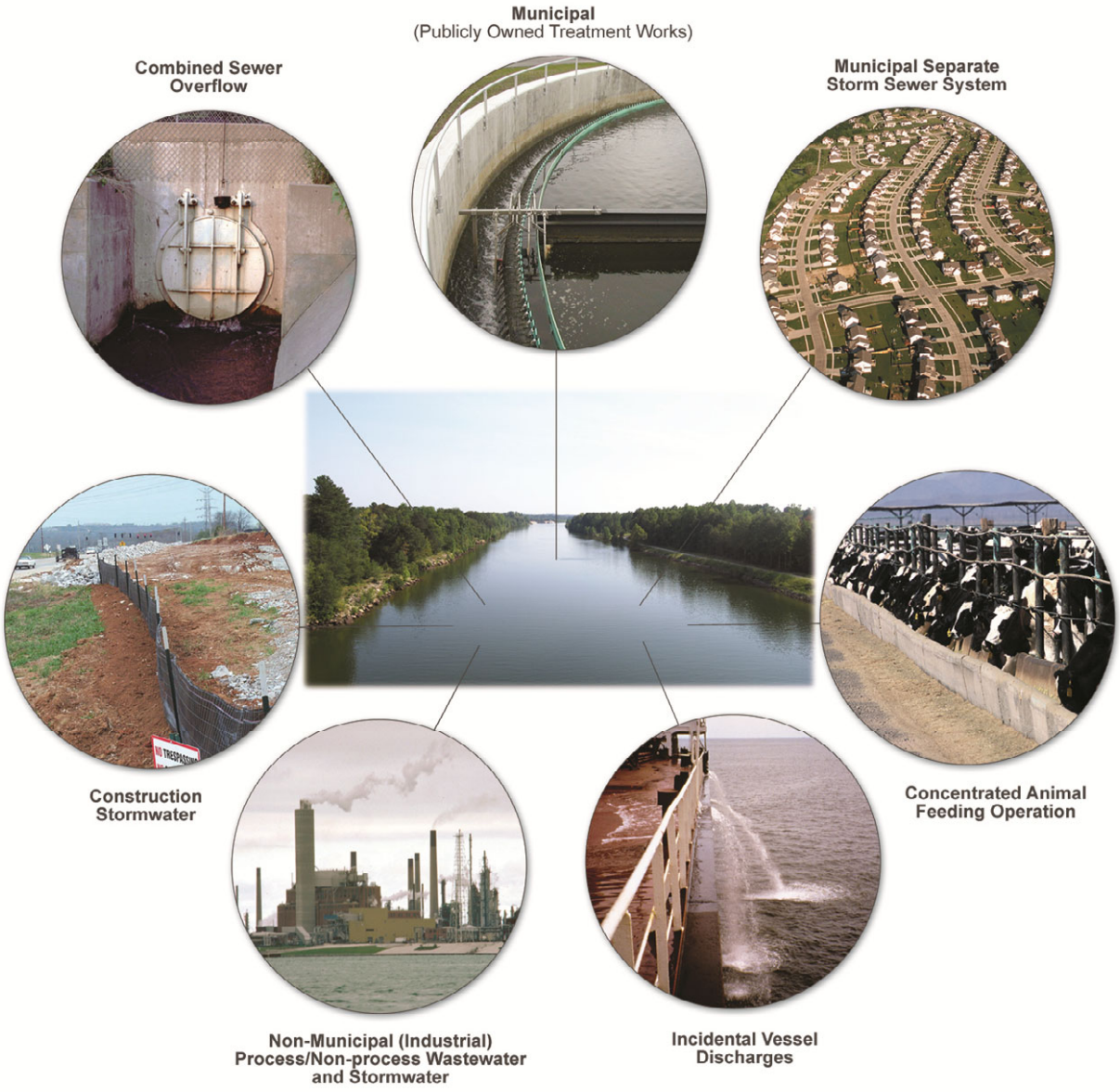
The scope of waters of the United States has been the subject of several U.S. Supreme Court cases (the most recent as of the time of publication of this manual being a decision from 2006 in the combined Rapanos/Carabell wetland cases) and numerous lower court cases. The court cases often have been difficult to interpret, resulting in much litigation and an evolving understanding of the exact scope of waters subject to CWA jurisdiction. Also, permit writers should keep in mind that discharges through non-jurisdictional features that reach waters of the United States may need a permit even if the discharge is not directly to a jurisdictional waterbody. EPA Regional wetlands staff have significant expertise in jurisdictional issues related to the scope of waters of the United States. Some Regions have interoffice teams to address jurisdictional issues that come up in the different CWA programs. In addition, guidance on waters of the United States is on EPA's Office of Wetlands, Oceans, and Watersheds Website <www.epa.gov/wetlands/guidance/CWAwaters.html>.

1.3.4 Point Source

Pollutants can enter water via a variety of pathways including agricultural, domestic and industrial sources. For regulatory purposes, these sources generally are categorized as either point sources or nonpoint sources. The term *point source* is defined in CWA section 502(14) and § 122.2 to include any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. Point source discharges include discharges from publicly owned treatment works (POTWs), industrial process wastewater discharges, runoff conveyed through a storm sewer system, and discharges from concentrated animal feeding operations (CAFOs), among others (see Exhibit 1-2). Return flows from irrigated agriculture and agricultural stormwater runoff specifically are excluded from the definition of a point source.

Pollutant contributions to waters of the United States may come from both direct and indirect discharges. Direct discharge (which is synonymous with *discharge of a pollutant*) is defined by the NPDES regulations at § 122.2 to include any addition of any pollutant or combination of pollutants to a water of the United States from any point source. An *indirect discharger* is defined as, "a nondomestic discharger introducing pollutants to a POTW." Under the national program, NPDES permits are issued only to direct dischargers. The National Pretreatment Program controls industrial and commercial indirect dischargers (for more on pretreatment, see section 2.3.1.2 of this manual).

Exhibit 1-2 Common point source discharges of pollutants to waters of the United States



CHAPTER 2. Regulatory Framework and Program Areas of the NPDES Program

This chapter discusses the regulatory framework of the National Pollutant Discharge Elimination System (NPDES) program, identifies the types of activities regulated under the NPDES program, describes the roles and responsibilities of federal and state governments, and presents the program areas that address the various types of regulated activities.

2.1 Regulatory Framework of the NPDES Program

Chapter 1 discussed how Congress, in Clean Water Act (CWA) section 402, required the U.S. Environmental Protection Agency (EPA) to develop and implement the NPDES permit program. While Congress' intent was established in the CWA, EPA was required to develop specific regulations to carry out the congressional mandate. The regulations developed by EPA to implement and administer the NPDES program primarily are in Title 40 of the *Code of Federal Regulations* (CFR) Part 122 <www.epa.gov/lawsregs/search/40cfr.html>.

The CFR is an annual codification of the general and permanent rules published in the *Federal Register* (FR) by the executive departments and agencies of the federal government. The CFR is divided into 50 titles that represent broad areas subject to federal regulation. Title 40 covers protection of the environment. The FR is a legal publication that contains federal agency regulations; proposed rules and notices; and executive orders, proclamations and other presidential documents. The National Archives and Records Administration, an independent federal agency responsible for managing all federal records, publishes the FR and CFR. The text of all final regulations is found in the CFR. The background and implementation information related to these regulations, however, are found in the preamble to the regulations contained in the FR. This information is important to permit writers because it explains the legal, technical, and scientific bases on which regulatory decisions are made.

Exhibit 2-1 lists regulations in 40 CFR that are related to the NPDES program, and Exhibit 2-2 is an outline of the federal NPDES regulations from Part 122. The regulations at § 123.25 should be referenced for information applicable to state NPDES programs. Exhibit B-2 in Appendix B of this document is an Index to NPDES Regulations that provides regulatory citations by topic area.

Exhibit 2-1 Regulations related to the NPDES program

Regulation (40 CFR)	Subject
Part 121	State certification
Part 122	The federal NPDES permit program
Part 123	State program requirements
Part 124	Procedures for decision making
Part 125	Technology standards
Part 129	Toxic pollutant effluent standards
Part 130	Water quality planning and management
Part 131	Water quality standards
Part 133	Secondary treatment regulations
Part 135	Citizen suits
Part 136	Analytical procedures
Part 257	State sludge disposal regulations
Part 401	General provisions for effluent limitations guidelines and standards (effluent guidelines)
Part 403	General pretreatment regulations
Parts 405-471	Effluent guidelines
Part 501	State sewage sludge management program requirements
Part 503	Standards for use or disposal of sewage sludge

2.2 Federal and State Responsibilities

This section discusses the relationship between federal and state governments in the administration of the NPDES program and the process by which a state can become *authorized*.

2.2.1 State NPDES Program Authority

EPA may authorize qualified state, territorial, or tribal government agencies to implement all or parts of the NPDES program. States, territories, or tribes (hereafter *states*) are authorized through a process defined by the CWA section 402(b) and NPDES regulations Part 123. A state wanting to be authorized to administer the NPDES program submits to EPA a letter from the governor requesting review and approval of its program submission, a Memorandum of Agreement (MOA), a Program Description, a Statement of Legal Authority (also known as an *Attorney General's Statement* or *AG Statement*), and the underlying state laws and regulations. EPA determines whether the package is complete within 30 days of receipt. Within 90 days of receipt, EPA renders a decision to approve or disapprove the program. The time for review can be extended by agreement. The process of authorization includes a public review and comment period, and a public hearing.

States may apply for the authority to issue one or more of the following five types of NPDES authorization:

- NPDES Base Program for individual municipal and industrial facilities.
- General Permit Program.
- Pretreatment Program.
- Federal Facilities Program.
- Biosolids (Sewage Sludge) Program.

Exhibit 2-2 Federal NPDES regulations (40 CFR Part 122)

Subpart A–Definitions and General Program Requirements

§ 122.1 Purpose and scope
§ 122.2 Definitions
§ 122.3 Exclusions
§ 122.4 Prohibitions
§ 122.5 Effect of a permit
§ 122.6 Continuation of expiring permits
§ 122.7 Confidentiality of information

Subpart B–Permit Application and Special NPDES Program Requirements

§ 122.21 Applications
§ 122.22 Signatories to permit applications and reports
§ 122.23 Concentrated animal feeding operations
§ 122.24 Concentrated aquatic animal production
§ 122.25 Aquaculture projects
§ 122.26 Stormwater discharges
§ 122.27 Silviculture activities
§ 122.28 General permits
§ 122.29 New sources and new dischargers
§ 122.30-122.37 MS4s

Subpart C–Permit Conditions

§ 122.41 Standard conditions applicable to all permits
§ 122.42 Standard conditions applicable to specified categories of permits
§ 122.43 Establishing permit conditions
§ 122.44 Establishing limitations, standards, and other permit conditions

(a) Technology basis
(b) Other basis (not WQ)
(c) Reopeners
(d) Water quality basis
(e) Toxic (priority) pollutants
(f) Notification levels
(g) 24 Hour reporting
(h) Duration of permits
(i) Monitoring
(j) Pretreatment program
(k) Best management practices (BMPs)
(l) Anti-backsliding
(m) Privately owned treatment works
(n) Grants
(o) Sewage sludge
(p) Coast Guard
(q) Navigation
(r) Great Lakes
(s) Qualifying programs

§ 122.45 Calculating limitations

(a) Outfalls and discharge points
(b) Production basis
(c) Metals
(d) Continuous discharges
(e) Non-continuous discharges
(f) Mass limitations
(g) Pollutants in intake water
(h) Internal waste streams
(i) Discharge into wells, into publicly owned treatment works or by land application

§ 122.46 Duration of permits
§ 122.47 Schedules of compliance
§ 122.48 Requirements for recording and reporting of monitoring results
§ 122.49 Consideration under federal law
§ 122.50 Disposal into wells, into publicly owned treatment works or by land application

Subpart D–Transfer, Modification, Revocation and Reissuance, and Termination of Permit

§ 122.61 Transfer of permits
§ 122.62 Modification or revocation and reissuance of permits
§ 122.63 Minor modifications of permits
§ 122.64 Termination of permits

A state can receive authorization for one or more of the NPDES program components. For example, a state might receive authorization for the NPDES Base Program, General Permit Program, and Pretreatment Program, but not the Federal Facilities Program or Biosolids Program. In such a case, EPA continues to issue permits to federal facilities (e.g., facilities on military installations, federal lands) for discharges originating within the state and continues to implement the Biosolids Program. (Section 2.2.2 below provides additional discussion of Biosolids Program implementation.)

If EPA approves a program, the state assumes permitting authority in lieu of EPA. All new permit applications would then be submitted to the state agency for NPDES permit issuance. Certain permits issued before authorization might continue under EPA administration as set forth in the MOA. Even after a state receives NPDES authorization, EPA continues to issue NPDES permits on tribal lands within the boundaries of the state (if the tribe is not administering its own approved NPDES program). Following authorization, EPA also continues its national program management responsibilities by ensuring that state programs meet applicable federal requirements. If EPA disapproves the program, EPA remains the permitting authority for that state.

The State Program Status Website <www.epa.gov/npdes/authorization> provides the current authorization status for the states.

2.2.2 Roles and Responsibilities of the Federal and State Authorities

Until a state program is authorized, EPA is the permitting authority that issues all permits, conducts all compliance and monitoring activities, and enforces all program requirements.

As noted above, if a state has only partial authority, EPA will implement the other program activities. For example, where a state has an approved NPDES program but has not received EPA approval of its state sewage sludge management program, the EPA Region is responsible for including conditions to implement the Part 503 Standards for the Use or Disposal of Sewage Sludge in permits issued to treatment works treating domestic sewage (TWTDS) in that state. EPA could issue a separate permit with the applicable sewage sludge standards and requirements, or collaborate with the state on joint issuance of NPDES permits containing the Part 503 sewage sludge standards. The same process also applies where a state has not received approval of its pretreatment program or federal facilities program. One exception to that process is where an NPDES-authorized state is not approved to implement the general permit program. In such cases, EPA may not issue a general permit in that state as clarified in the memorandum *EPA's Authority to Issue NPDES General Permits in Approved NPDES States*[1] <www.epa.gov/npdes/pubs/owm0444.pdf>.

Once a state is authorized to issue permits, EPA generally is precluded from issuing permits in the state; however, EPA must be provided with an opportunity to review certain permits and may formally object to elements that conflict with federal requirements. If the permitting agency does not satisfactorily address the points of objection, EPA will issue the permit directly. Once a permit is issued through a government agency, it is enforceable by the approved state and federal agencies (including EPA) with legal authority to implement and enforce the permit. Private citizens may also bring a civil action in federal court against an alleged violator or against the EPA Administrator for alleged failure to enforce NPDES permit requirements. Exhibit 2-3 presents a summary of federal and state roles before and after program authorization.

Exhibit 2-3 Summary of federal and state/territorial/tribal roles in the NPDES permitting program

Before state/territorial/tribal program approval:

- EPA issues permits
- EPA conducts compliance and monitoring activities
- EPA enforces
- State/territory/tribe reviews permits and grants CWA section 401 certification

After state/territorial/tribal program approval:

- State/territory/tribe issues permits
- State/territory/tribe conducts compliance and monitoring activities
- State/territory/tribe enforces
- EPA provides administrative, technical and legal support
- EPA ensures state program meets federal requirements
- EPA offers NPDES program training
- EPA oversees grants to states (e.g., CWA section 106)
- EPA reviews permits and, as necessary, comments or objects
- EPA oversees and, as necessary, assumes enforcement of permits

2.3 NPDES Program Areas

NPDES permittees can be broadly classified as municipal (publicly owned treatment works [POTWs] and related discharges) and non-municipal facilities. Federal facilities fall into the broader category of non-municipal facilities. Within those broad categories, there might also be specific types of activities that are subject to unique programmatic requirements in the NPDES regulations. Exhibit 2-4 provides an overview of the different activities related to municipal and non-municipal sources; identifies the NPDES program areas that address these activities; and identifies the applicable regulations for each NPDES program area.

2.3.1 NPDES Program Areas Applicable to Municipal Sources

The NPDES regulations establish technology-based effluent requirements applicable to discharges from POTWs. In addition to effluent requirements, the NPDES regulations establish other programmatic requirements applicable to other POTW activities (e.g., sewage sludge disposal and management, stormwater discharges from the treatment plant site) or activities that may be conducted by a municipality (e.g., municipal separate storm sewer systems, combined sewer overflows). A description of those programs and how they relate to NPDES permits is provided in the following sections.

2.3.1.1 Publicly Owned Treatment Works (POTWs)

The federal regulations at § 403.3 define a POTW as a treatment works (as defined in CWA section 212) that is owned by a state or municipality [as defined in CWA section 502(4)]. The definition includes any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW. Finally, the term also means the municipality that has the jurisdiction over the indirect discharges to and the discharges from the treatment works. Federally owned treatment works, privately owned treatment works, and other treatment plants not owned by a state or municipality are not considered POTWs.

Exhibit 2-4 NPDES program areas and applicable regulations

Source	Program areas	Applicable regulations (40 CFR)
Municipal	Municipal (POTWs) effluent discharges	Part 122 Part 125 Part 133
	Indirect non-municipal discharges (Pretreatment)	Part 122 Part 403 Parts 405-471
	Biosolids (sewage sludge) use and disposal	Part 122 Part 257 Part 501 Part 503
	Combined sewer overflow (CSO) discharges	Part 122 Part 125
	Sanitary sewer overflow (SSO) discharges	Part 122
	Municipal separate storm sewer systems (MS4s) discharges	Part 122 Part 125
Non-municipal (Industrial)	Process wastewater discharges	Part 122 Part 125 Parts 405-471
	Non-process wastewater discharges	Part 122 Part 125
	Stormwater discharges associated with industrial activity	Part 122 Part 125
	Stormwater discharges from construction activities*	Part 122 Part 125
	Cooling water intake structures (CWIS)	Part 122 Part 125 Part 401
	Concentrated animal feeding operations (CAFOs)	Part 122 Part 123 Part 125 Part 412
	Concentrated aquatic animal production (CAAP) facilities	Part 122 Part 125 Part 451
	Vessel Discharges	Part 122

* Though stormwater discharges from construction activity resulting in disturbance of 5 or more acres of total land area technically are considered, "stormwater discharges associated with industrial activity" as defined by §122.26(b)(14)(x), these discharges are commonly referred to as stormwater discharges from *large* construction activities.

POTWs receive, primarily, domestic sewage from residential and commercial customers. Larger POTWs also typically receive and treat wastewater from industrial facilities (indirect dischargers) connected to the collection system. The types of pollutants treated by a POTW always include conventional pollutants and may include nonconventional and toxic pollutants, depending on the characteristics of the sources discharging to the POTW. The treatment provided by a POTW typically produces a treated effluent and a biosolids (sewage sludge) residual.

2.3.1.2 The National Pretreatment Program

The National Pretreatment Program <www.epa.gov/npdes/pretreatment> regulates the introduction of nondomestic (i.e., industrial and commercial) wastewater to POTWs. Because such discharges are treated by the POTW before release to a water of the United States, they are termed *indirect discharges*. The

pretreatment program prohibits industrial and commercial indirect dischargers from discharging pollutants to a POTW that will pass through the POTW to receiving waters or interfering with POTW treatment processes or contaminating sewage sludge. The federal program also requires certain indirect dischargers to meet technology-based requirements developed specifically for such POTW users that are similar to those for direct dischargers.

EPA's pretreatment regulations require certain POTWs to develop a pretreatment program, the requirements of which are generally included as conditions of a POTW's NPDES permit. The federal regulations specifying which POTWs must have pretreatment programs, and the authorities and procedures that must be developed by the POTW before program approval, are in Part 403. The requirement to develop and implement a local pretreatment program typically is included as a special condition in the POTW's NPDES permit. Section 9.2.1 of this manual includes a discussion on incorporating pretreatment special conditions into permits.

2.3.1.3 Biosolids (Sewage Sludge)

In 1987 Congress amended CWA section 405 to establish a comprehensive sewage sludge program <www.epa.gov/OW-OWM.html/mtb/biosolids/index.htm>. The program regulates the use and disposal of sewage sludge by POTWs and by other TWTDS. TWTDS include facilities that generate sewage sludge, provide commercial treatment of sewage sludge, manufacture a product derived from sewage sludge, or provide disposal of sewage sludge. CWA section 405 required EPA to develop technical standards that establish sewage sludge management practices and acceptable levels of toxic pollutants in sewage sludge. The terms *biosolids*, *sewage sludge*, and *municipal sludge* are used interchangeably throughout this document.

Regulations for state sewage sludge program approval are at Part 123 or Part 501 (depending on whether the state wishes to administer the sewage sludge program under its NPDES program or under another program, e.g., a solid waste program). The technical standards governing sewage sludge use and disposal are in Part 503. TWTDS not otherwise subject to the NPDES permit requirements under CWA section 402 must apply for and receive a permit addressing standards for use and disposal of sewage sludge in Part 503. Details of this rule are described in *A Plain English Guide to the EPA Part 503 Biosolids Rule*[2] <www.epa.gov/owm/mtb/biosolids/503pe/>. Where applicable, sewage sludge management requirements may be included as a special condition in permits issued to POTWs. Section 9.2.2 of this manual includes a discussion on incorporating special conditions that address sewage sludge requirements.

2.3.1.4 Combined Sewer Overflows (CSOs)

An additional concern for some older POTWs may be combined *sewer systems* (CSS), which are wastewater collection systems owned by a state or municipality [as defined by CWA section 502(4)] that convey sanitary wastewater (domestic, commercial and industrial wastewaters) and stormwater through a single-pipe system to a POTW [as defined by § 403.3(q)]. EPA estimates that CSSs serve about 40 million people in 772 communities nationwide <www.epa.gov/npdes/cso/csodem>. During dry weather, CSSs collect and convey domestic, commercial, and industrial wastewater to a POTW; however, during periods of rainfall, snowmelt, and other forms of precipitation, the systems can become overloaded. When that overloading occurs, the CSS can overflow at designed relief points and discharge a combination of untreated sanitary wastewater and stormwater directly to a surface waterbody.

A combined sewer overflow (CSO) <www.epa.gov/npdes/cso> is the discharge from a CSS at a point before the POTW. CSOs can be a major source of water pollution in communities served by CSSs. CSOs often contain high levels of suspended solids (SS), pathogenic microorganisms, toxic pollutants, floatables, nutrients, oxygen-demanding organic compounds, oil and grease, and other pollutants, causing water quality standards to be exceeded.

To address CSOs, EPA issued the National CSO Control Strategy (54 FR 37370, September 8, 1989). While implementation of the 1989 strategy has resulted in progress toward controlling CSOs, significant public health and water quality risks remain. To expedite compliance with the CWA, and to elaborate on the 1989 strategy, EPA, after collaboration with other CSO stakeholders (communities with CSSs, state water quality authorities, and environmental groups), published the CSO Control Policy <www.epa.gov/npdes/cso/controlpolicy> (59 FR 18688, April 19, 1994). The 1994 CSO policy represents a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a comprehensive and coordinated planning effort to achieve cost-effective CSO controls that ultimately meet appropriate health and environmental objectives. The Wet Weather Water Quality Act of 2000 stipulates that NDPES permits, enforcement orders, or decrees must conform to the 1994 CSO Policy [CWA section 402(q)].

Before issuing a permit with conditions that address CSOs, permit writers should consult the CSO Control Policy and associated guidance. Section 9.2.3 of this manual includes a discussion on incorporating appropriate CSO permit conditions.

2.3.1.5 Sanitary Sewer Overflows (SSOs)

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all the sewage that flows into them to a POTW; however, occasional, unintentional spills of raw sewage from municipal sanitary sewers occur in almost every system. Such types of releases are called sanitary sewer overflows (SSOs) <www.epa.gov/npdes/sso>.

SSOs have a variety of causes including severe weather, improper system operation and maintenance, and vandalism. EPA estimates that over 40.000 SSO events occur per year in the United States (excluding basement backups). Overflows of untreated wastewater can present risks of human exposure when released to certain areas, such as streets, private property, basements, and receiving waters used for drinking water, fishing and shellfishing, or contact recreation. A description of the extent of human health and environmental impacts caused by releases of untreated sewage, along with other information, is provided in the *Report to Congress on the Impacts and Control of CSOs and SSOs*[3] <www.epa.gov/npdes/csossoreport2004>. That 2004 report shows that NPDES permit requirements establishing clear reporting, record keeping, third party notification of overflows from municipal sewage collection systems, and clear requirements to properly operate and maintain the collection system, are critical to effective program implementation.

EPA has developed a draft fact sheet <www.epa.gov/npdes/pubs/sso_fact_sheet_model_permit_cond.pdf> and draft model permit conditions <www.epa.gov/npdes/pubs/sso_model_permit_conditions.pdf> that explain how NPDES permitting authorities can better address SSOs and sanitary sewer collection systems. Section 9.2.4 of this manual discusses incorporation of conditions to address SSOs in NPDES permits.

2.3.1.6 Municipal Separate Storm Sewer Systems (MS4s)

Stormwater from major metropolitan areas is a significant source of pollutants discharged to waters of the United States. While rainfall and snow are natural events, the nature of stormwater discharges and their impact on receiving waters are greatly affected by human activities and land use. Stormwater from lands modified by human activities, such as metropolitan areas and urban streets, can affect surface water resources by modifying natural flow patterns or by elevating pollution concentrations and loadings.

To address such concerns, the 1987 amendments to the CWA added section 402(p), a provision that directed EPA to establish phased NPDES requirements for stormwater discharges. Phase I of the stormwater program addresses permits for discharges from medium and large MS4s serving a population of 100,000 or more, as well as certain categories of industrial activity, including construction activity disturbing greater than 5 acres. Phase II expanded the stormwater program to include small MS4s and construction activity disturbing between 1–5 acres.

The MS4 stormwater application regulations (Phase I) established requirements for a two-part permit application that allowed large and medium local governments to help define priority pollutant sources in the municipality and to develop and implement appropriate controls for such discharges to MS4s (55 FR 47990, November 16, 1990). Part II of the application requires municipal applicants to propose municipal stormwater management programs to control pollutants to the *maximum extent practicable* (MEP) and to effectively prohibit non-stormwater discharges to the municipal system. Medium and large MS4 operators are required to submit comprehensive permit applications and are issued individual permits.

Phase II of the stormwater program extended the NPDES permitting program to small MS4s in urbanized areas (64 FR 68722, December 8, 1999). The Phase II MS4 regulations require small MS4s to develop a program to address six *minimum control measures* that include BMPs and measurable goals for each BMP. Permit writers have the option of permitting regulated small MS4 operators using an individual permit, a general permit, or a modification of an existing Phase I MS4's individual permit (although the vast majority of small MS4s have been covered under general permits).

Municipal stormwater management programs combine source controls and management practices that address targeted sources in the boundaries of the municipal system. For example, a municipality that expects significant new development may focus more on proposing requirements for new development and construction. On the other hand, a municipality that does not expect significant new development could focus more on municipal activities that affect stormwater quality such as: maintenance of leaking sanitary sewers, road de-icing and maintenance, operation of municipal landfills, flood control efforts, and control of industrial contributions of stormwater.

MEP is not precisely defined so as to allow maximum flexibility in MS4 permitting to optimize reductions in stormwater pollutants on a location-by-location basis (64 FR 68754, December 8, 1999). Therefore, permit writers must rely on application requirements specified in the regulations and the applicant's proposed management program when developing appropriate permit conditions. The stormwater Phase II rule was challenged in the courts, with the U.S. Court of Appeals for the Ninth Circuit generally upholding the Phase II rule but remanding three issues back to EPA. EPA issued guidance on April 16, 2004 for how new general permits should address the remanded issues of public availability of notices of intent (NOIs), opportunity for public hearings, and permitting authority reviews of NOIs titled *Implementing the Partial Remand of the Stormwater Phase II Regulations Regarding*

Notices of Intent & NPDES General Permitting for Phase II MS4s[4] <www.epa.gov/npdes/pubs/hanlonphase2apr14signed.pdf>.

In addition to information on the Stormwater Discharges From Municipal Separate Storm Sewer Systems (MS4s) Website <www.epa.gov/npdes/stormwater/municipal>, EPA has developed the following guidance documents and memoranda to help permit writers and permittees implement the municipal stormwater program:

- *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharge from Municipal Separate Storm Sewer Systems*[5] <www.epa.gov/npdes/pubs/owm0246.pdf>.
- *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits*[6] <www.epa.gov/npdes/pubs/swpol.pdf>.
- *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*[7] <www.epa.gov/npdes/pubs/final-wwtmdl.pdf>.
- *MS4 Program Evaluation Guidance*[8] <www.epa.gov/npdes/pubs/ms4guide_withappendixa.pdf>.
- *MS4 Permit Improvement Guide*[9] <www.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf>.

The application requirements for stormwater discharges from MS4s serving a population greater than 100,000 and for stormwater discharges from small MS4s are discussed in sections 4.3.10 and 4.3.11 of this manual.

2.3.2 NPDES Program Areas Applicable to Non-Municipal Sources

Non-municipal sources include industrial and commercial facilities, industrial stormwater (including large construction activities), and discharges from small construction activity, concentrated animal feeding operations (CAFOs) and concentrated aquatic animal production (CAAP) facilities. Unlike municipal sources, the types of raw materials, production processes, treatment technologies used and pollutants discharged at industrial facilities vary widely and are dependent on the type of industry and specific facility characteristics. The operations, however, generally are carried out within a more clearly defined area; thus, the collection systems are less complex than POTW collection systems. In addition, unlike biosolids at POTWs, the NPDES program does not regulate residuals (sludge) generated by non-municipal facilities.

Non-municipal facilities can have discharges of stormwater that might be contaminated through contact with manufacturing activities or raw material and product storage, or they can have non-process wastewater discharges such as non-contact cooling water. In addition, some non-municipal facilities take in cooling water. Those discharges and intakes may be regulated under an NPDES permit in addition to any process wastewater.

2.3.2.1 Process Wastewater

Industrial and commercial facilities often use water in the manufacture and processing of products. The regulations at § 122.2 define process wastewater as, "[a]ny water which, during manufacturing or processing, comes into direct contact with, or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product."

Process wastewater can contain pollutants at levels that could affect the quality of receiving waters. The NPDES permit program establishes specific requirements for discharges of process wastewater from industrial and commercial sources. If a facility discharges directly to surface water, it would require an individual or general NPDES permit. An industrial or commercial facility also may discharge wastewater to a municipal sewer system, which would be covered under the NPDES pretreatment program. Many types of industrial facilities, whether they discharge directly to surface water or to a municipal sewer system, are covered by effluent guidelines and standards (see section 5.2 of this manual). The stormwater that runs off the property of an industrial or commercial facility or from a construction site might require an NPDES permit under the industrial stormwater program (see section 2.3.2.3 below).

2.3.2.2 Non-Process Wastewater

Industrial and commercial facilities often use water for purposes other than processing products, such as using non-contact cooling water for heat exchange, and may discharge wastewater from sources such as sanitary or cafeteria wastes. Like process wastewater, non-process wastewater is regulated under the NPDES program. Non-process wastewater might also be important to the permit writer when drafting monitoring conditions for facilities where the non-process wastewater dilutes the concentration of pollutants of concern in process wastewater. The permit writer must ensure that specified monitoring locations ensure accurate measurement for compliance with all effluent limitations.

2.3.2.3 Stormwater Associated with Industrial Activity

To minimize the impact of stormwater discharges from industrial facilities, the NPDES program includes an industrial stormwater permitting component. Operators of industrial facilities included in 1 of the 11 categories of stormwater discharges associated with industrial activity that discharge or propose to discharge stormwater to an MS4 or directly to waters of the United States require authorization under an NPDES industrial stormwater permit. EPA published permit regulations and permit application requirements for stormwater discharges associated with industrial activity in 55 FR 48063, November 16, 1990.

Permit Regulations for Stormwater Associated with Industrial Activity

The regulations define stormwater discharges associated with industrial activity as discharges from any conveyance used for collecting and conveying stormwater and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. The regulations at § 122.26(b)(14)(i - xi) identify the following 11 industrial categories required to apply for NPDES permits for stormwater discharges:

- Facilities subject to stormwater effluent guidelines, new source performance standards, or toxic pollutant effluent standards under Parts 400-471 (Subchapter N).
- Certain heavy manufacturing facilities (lumber, paper, chemicals, petroleum refining, leather tanning, stone, clay, glass, concrete, ship construction).
- Active and inactive mining operations and oil and gas operations with contaminated stormwater.
- Hazardous waste treatment, storage, or disposal facilities, including Resource Conservation and Recovery Act (RCRA) Subtitle C facilities.
- Landfills, land application sites, open dumps, and RCRA Subtitle D facilities.

- Recycling facilities, including metal scrap yards, battery reclaimers, salvage yards, and automotive junkyards.
- Steam electric power generating facilities, including coal-handling sites.
- Transportation facilities that have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations.
- Major POTW sludge handling facilities, including on-site application of sewage sludge.
- Construction activities that disturb five acres or more (see subsection below).
- Light industrial manufacturing facilities.

Operators of industrial facilities that are federally, state- or municipally owned or operated that meet the above descriptions must also submit applications.

EPA issued a final rule for Phase II of the stormwater program in 64 FR 68722, December 8, 1999. That rule clarified that stormwater discharges from industrial facilities that have *no exposure* of industrial activities or materials to stormwater may be conditionally excluded from the stormwater permitting program. To qualify for the no exposure exclusion, the industrial operator must complete a no exposure certification form and submit this to EPA once every 5 years. For more information, see the Conditional No Exposure Exclusion Website <www.epa.gov/npdes/stormwater/noexposure>.

Generally, EPA- or state-issued general permits regulate stormwater discharges from industrial, construction and Phase II municipal sources, while Phase I municipal sources usually are issued individual permits. In some cases, stormwater conditions may be incorporated into a comprehensive individual NPDES permit for a facility or a stormwater-specific individual NPDES permit. Incorporating permit conditions to address stormwater discharges associated with industrial and construction activities into an individual facility permit is discussed in the subsections below. For more information regarding the scope of the NPDES stormwater program, see the NPDES Stormwater Program Website <www.epa.gov/npdes/stormwater>.

Permit Conditions for Stormwater Discharges Associated with Industrial Activity

All stormwater discharges associated with industrial activity that discharge stormwater through a separate MS4 or discharge directly to waters of the United States are required to obtain an NPDES permit. Because of the large number of facilities requiring permits, EPA and most NPDES-authorized states choose to issue general permits to regulate stormwater discharges. The Phase I rule in 1990 established the concept of a permitting exemption for industrial facilities with little or no likelihood of discharging contaminated stormwater; however, this exemption was not well-defined or required to be submitted to the NPDES permitting authority. The Phase II rule in December 1999 clarified and expanded the no exposure certification requirement to require industrial facilities with no exposure of industrial processes to stormwater to submit a written certification notifying EPA or the authorized state that the facility wishes to be excluded from the NPDES program.

Each industrial facility covered under an EPA-issued stormwater general permit must meet the numeric and non-numeric effluent limitations established in the general permit. Industrial facilities can meet those effluent limitations by implementing control measures, including BMPs, that control the discharge of stormwater associated with industrial activity.

The EPA- and state-issued stormwater general permits generally require the facility to develop and implement a site-specific *stormwater pollution prevention plan* (SWPPP). The SWPPP describes the control measures, whether structural or nonstructural, which are used for controlling stormwater discharges from the industrial facility. The special conditions component of EPA's stormwater general permits identifies the requirements that must be documented in the SWPPP, including the following:

- A description of potential pollutant sources at the facility, including the following:
  - A map of the facility indicating the drainage areas of the site and the industrial activities that occur in each drainage area.
  - An inventory of materials that could be exposed to stormwater.
  - A description of the likely sources of pollutants from the site and a prediction of the pollutants likely to be present in the stormwater.
  - The history of spills and leaks of toxic and hazardous materials over the past 3 years.
- The measures and controls that will be implemented to prevent or minimize pollution of stormwater, including the following:
  - Good housekeeping or upkeep of industrial areas exposed to stormwater.
  - Preventive maintenance of stormwater controls and other facility equipment.
  - Spill prevention and response procedures.
  - Testing of outfalls to ensure that there are no illicit discharges.
  - Employee training on pollution prevention measure and controls, and record keeping.

A permit writer's best sources of information for developing appropriate special conditions for stormwater control measures are other stormwater general permits. Using existing general permits as the basis for special conditions is encouraged because doing so will reduce duplication of effort. A listing of individual and general permits (stormwater and non-stormwater) issued by EPA and authorized states is on the View NPDES Individual and General Permits Website <www.epa.gov/npdes/permitsearch>. In addition to the Stormwater Discharge From Industrial Facilities Website <www.epa.gov/npdes/stormwater/indust>, EPA published *Developing Your Stormwater Pollution Prevention Plan: A Guide for Industrial Operators*[10] <www.epa.gov/npdes/pubs/industrial_swppp_guide.pdf> to help permit writers identify components of SWPPPs and BMPs and to help permittees develop their own plans. Section 4.3.8 of this manual discusses Form 2F and individual permit requirements for stormwater discharges associated with industrial activity.

Permit Conditions for Stormwater Discharges associated with Construction Activities

EPA and most NPDES-authorized states have issued NPDES general stormwater permits for discharges associated with construction activity that are separate from the industrial stormwater general permits. The Phase I stormwater regulations require permit coverage for all construction activity that results in the disturbance of five acres or greater of the total land area. This includes disturbance of less than five acres of total land area that is part of larger common plan of development or sale if the larger common plan will ultimately disturb five acres of more. The Phase II stormwater regulations require permit coverage for all construction activity that result in land disturbance of equal to or greater than one acre and less than five acres. This includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Since March 2003, most construction activity disturbing one to five acres has been required to comply with the conditions of the relevant NPDES permit (typically under the relevant construction general permit for stormwater discharges), though states have the option of not requiring the submittal of NOIs for stormwater discharges associated with small construction activity.

EPA and NPDES-authorized state permitting authorities may include permit conditions that incorporate qualifying state or local erosion and sediment control program requirements by reference. A qualifying state or local erosion and sediment control program is one that includes the requirements at § 122.44(s). Once EPA or an NPDES authorized state identifies and incorporates a qualifying local program in their NPDES construction general permit, operators can follow the erosion and sediment control requirements of the qualifying local program. By incorporating the qualifying local program by reference the permitting authority can avoid duplicative or conflicting erosion and sediment control requirements between the local program requirements and the NPDES general permit control requirements addressing stormwater discharges associated with construction activity. Operators that are engaged in construction activity within a qualifying program must still submit an NOI under the appropriate construction general permit and comply with all other permit conditions.

The permit requirements in a construction general permit may be similar to those in an industrial general permit, including the development of a SWPPP. In addition to the Stormwater Discharges from Construction Activities Website <www.epa.gov/npdes/stormwater/construction>, EPA also developed the Stormwater Pollution Prevention Plans for Construction Activities Website <www.epa.gov/npdes/swpppguide>. Section 4.3.9 of this manual discusses individual permit requirements for stormwater discharges associated with construction activity.

2.3.2.4 Cooling Water Intake Structures

CWA section 316(b) provides that any standard established pursuant to CWA sections 301 or 306 and applicable to a point source will require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. This CWA provision is unique because it addresses the *intake* of water, in contrast to other provisions that regulate the discharge of pollutants into waters of the United States. EPA has established national performance standards under CWA section 316(b) designed to reduce the impingement and entrainment of fish and other aquatic organisms as they are drawn into a facility's cooling water intake structure(s). Impingement occurs when organisms are trapped against cooling water intake structures by the force of water being drawn through the intake structure. Entrainment occurs when organisms are drawn through a cooling water intake structure into a cooling system, through the heat exchanger, and then pumped back out into the waterbody. For more information, see section 4.3.12 of this manual.

In April 1976, EPA published regulations at Part 402 to address cooling water intake structures. Fifty-eight electric utility companies challenged the final rule. The U.S. Court of Appeals for the Fourth Circuit remanded the rule in 1977, and in 1979, EPA withdrew Part 402. Beginning in 1977, NPDES permit authorities made decisions implementing CWA section 316(b) on a case-by-case basis using best professional judgment (BPJ) (§§ 125.90(b) and 401.14).

In the 1990s, EPA began developing CWA section 316(b) regulations establishing national standards. EPA divided the rulemaking into three phases:

- Phase I addressed new facilities and was completed in December 2001 (Part 125, Subpart I).
- Phase II addressed existing electric generating plants that use at least 50 million gallons per day (mgd) of cooling water was completed in July 2004 (Part 125, Subpart J).

- Phase III addressed other existing facilities, including small existing electric generating plants that use less than 50 mgd of cooling water, manufacturers, and new offshore and coastal oil and gas extraction facilities.

The Phase III regulations, finalized in June 2006, establish national standards only for new offshore and coastal oil and gas extraction facilities (Part 125, Subpart N). EPA decided that other Phase III industrial facilities withdrawing water for cooling purposes would not be covered by national standards but would continue to be subject to CWA section 316(b) requirements set by the NPDES Permitting Director on a case-by-case, BPJ basis (§§ 125.90(b) and 401.14).

All three regulations were subject to judicial challenges. While the Phase I rule was largely upheld, the court reviewing the Phase II regulation rejected a number of its provisions. Under remands from the reviewing courts, EPA is reevaluating the Phase II regulation and the decision in the Phase III regulation not to establish national standards for existing Phase III facilities. In the interim, as noted above, NPDES permits must include CWA section 316(b) conditions developed on a case-by-case basis. For the most current information on regulatory requirements, see the Cooling Water Intake Structure Program Website <www.epa.gov/waterscience/316b/>, and for additional Cooling Water Intake Structures regulatory requirements, see section 4.3.12 of this manual.

2.3.2.5 Concentrated Animal Feeding Operations (CAFOs)

Animal feeding operations (AFOs) are agricultural facilities where animals are kept and raised in confined situations. AFOs typically maintain animals, feed, and manure and have production operations in a limited land area. Manure and wastewater from AFOs have the potential to contribute pollutants such as nitrogen and phosphorus, organic matter, sediments, pathogens, heavy metals, hormones, antibiotics, and ammonia to the environment. An AFO is a lot or facility (other than an aquatic animal production facility) where the following conditions are met:

- Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period.
- Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

AFOs that meet the regulatory definition of a CAFO, or that are designated as CAFOs by the permitting authority, and that discharge or propose to discharge are required to be permitted under the NPDES permitting program.

An animal operation must meet the definition of an AFO [§ 122.23(b)(1)] before it can be considered a CAFO. To be defined as a CAFO, an AFO must meet the regulatory definition [§§ 122.23(b)(4) or 122.23(b)(6)] of a large or medium CAFO or must be designated by the permitting authority [§ 122.23(c)]. Only CAFOs that discharge or propose to discharge are subject to NPDES permitting requirements.

CAFOs are subject to requirements that limit discharges from the production area and requirements applicable to land application areas under the control of the CAFO operator. Large CAFOs are subject to a no discharge requirement for production areas, whereas other CAFOs are subject to BPJ requirements for their production areas. One of the principal substantive pollution control conditions in any CAFO

permit is the requirement to implement the terms of the nutrient management plan (NMP) incorporated into the permit when permit authorization is granted. For more information, see the Animal Feeding Operations Website <www.epa.gov/npdes/cafo>. In addition, section 4.3.4 of this manual discusses application requirements for CAFOs.

2.3.2.6 Concentrated Aquatic Animal Production (CAAP) Facilities

CAAP facilities also are regulated under the NPDES program. In 2004 EPA promulgated new effluent guidelines that address CAAP facilities. The effluent guidelines apply to CAAP facilities (flow-through, recirculating, and net pen) that directly discharge wastewater and have annual production equal to or greater than 100,000 pounds of aquatic animals. The rule requires a BMP plan and implementation of measures, including recordkeeping and reporting requirements, to minimize discharges of solids, to prevent spills of drugs, feed, and chemicals that could result in discharges to waters of the United States, and to ensure proper maintenance of the facility. A facility that does not meet the effluent guideline threshold might still need an NPDES permit if it meets the CAAP facilities thresholds established in the NPDES regulations at § 122.24(b) or if it is designated as a CAAP facility under the designation authority in § 122.24(c). For more information, see the Aquatic Animal Production Industry Effluent Guidelines Website <www.epa.gov/guide/aquaculture/>.

2.3.2.7 Vessel Discharges

On March 30, 2005, the U.S. District Court for the Northern District of California (in *Northwest Environmental Advocates et al. v. EPA*) ruled that the EPA regulation excluding discharges incidental to the normal operation of a vessel from NPDES permitting exceeded the Agency's authority under the CWA. On September 18, 2006, the Court issued an order revoking this regulation [40 CFR 122.3(a)] as of September 30, 2008. EPA appealed the District Court's decision, and on July 23, 2008, the Ninth Circuit upheld the decision, leaving the September 30, 2008, *vacatur* date in effect. In response to the Court order, EPA developed two proposed permits to regulate discharges from vessels. The district court ultimately extended the date of *vacatur* to February 6, 2009.

In July 2008, Congress amended the CWA (P.L. No. 110-288) to add a new section 402(r), which excludes discharges incidental to the normal operation of a recreational vessel from NPDES permitting. Instead, it directs EPA to regulate those discharges under a newly created CWA section 312(o). As a result of the law, EPA did not finalize the previously proposed Recreational Vessel General Permit and is instead undertaking rulemaking to develop BMPs for these vessels under the authority of CWA section 312(o).

In July 2010 P.L. 111-215 (Senate Bill S. 3372) was signed into law. This law amends P.L. 110-299 (Senate Bill S. 3298), which generally imposes a moratorium during which time neither EPA nor states may require NPDES permits for discharges incidental to the normal operation of commercial fishing vessels and other non-recreational vessels less than 79 feet. As a result, of P.L. 110-299, the Vessel General Permit (VGP) does not cover vessels less than 79 feet, or commercial fishing vessels, unless they have ballast water discharges. P.L. 111-215 extended the expiration date of the moratorium from July 31, 2010, to December 18, 2013.

As a result of the court ruling, EPA issued the VGP on December 18, 2008. The 2008 VGP regulates discharges incidental to the normal operation of vessels operating in a capacity as a means of transportation. The VGP includes the following:

- general effluent limits applicable to all discharges.
- general effluent limits applicable to 26 specific discharge streams.
- narrative water-quality based effluent limits.
- inspection, monitoring, recordkeeping, and reporting requirements.
- additional requirements applicable to certain vessel types.

EPA estimates that approximately 61,000 domestically flagged commercial vessels and approximately 8,000 foreign flagged vessels could be affected by this permit.

Because this area of the NPDES permit program is relatively new and continues to evolve, for the most current information, see EPA's Vessel Discharges Website <www.epa.gov/npdes/vessels>.

2.4 Major/Minor Facility Designation

In addition to categorizing facilities as municipal and non-municipal, EPA has also developed criteria to determine which of the sources should be considered *major facilities*. The distinction was made initially to assist EPA and states in setting priorities for permit issuance and reissuance. The regulations at § 122.2 define major facility as, "any NPDES *facility or activity* classified as such by the Regional Administrator, or in the case of *approved state programs*, the Regional Administrator in conjunction with the [s]tate Director." All facilities that are not designated as *majors* are considered *minor* facilities.

Through policy, including the memoranda *Procedures for Revising the Major Permit List*[11] <www.epa.gov/npdes/pubs/owm0364.pdf> and *Delegation of Updates to Major/Minor Lists*[12] <www.epa.gov/npdes/pubs/owm0142.pdf>, EPA has established working definitions for POTW and non-municipal major facilities. For POTWs, major facilities are those that have a design flow of one million gallons per day or greater or serve a population of 10,000 or more or cause significant water quality impacts. Non-POTW discharges are classified as major facilities on the basis of the number of points accumulated using the NPDES Permit Rating Work Sheet <www.epa.gov/npdes/pubs/owm0116.pdf>. The worksheet evaluates the significance of a facility using several criteria, including toxic pollutant potential, flow volume, and water quality factors such as impairment of the receiving water or proximity of the discharge to coastal waters.

2.5 Growth and Change in the NPDES Program

The basic structure of the NPDES program has remained the same since the 1972 Federal Water Pollution Control Act amendments, but as EPA develops new regulations, policies, and guidance or modifies existing program requirements and guidance, the existing program is refined and new aspects of the program can emerge. To stay informed about the most recent program developments, permit writers should visit EPA's NPDES Program Website <www.epa.gov/npdes/> frequently.

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[3] U.S. Environmental Protection Agency. 2004. *Report to Congress on the Impacts and Control of CSOs and SSOs.* EPA 833-R-04-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/csossoreport2004>.

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[9] U.S. Environmental Protection Agency. 2010. *MS4 Permit Improvement Guide*. EPA833-R-10-001. U.S. Environmental Protection Agency. Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf>

[10] U.S. Environmental Protection Agency. 2009. *Developing Your Stormwater Pollution Prevention Plan: A Guide for Industrial Operators*. EPA 833-B-09-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/industrial_swppp_guide.pdf>.

[11] Dougherty, Cynthia. 1988. *Procedures for Revising the Major Permit List.* U.S. Environmental Protection Agency, Permits Division. Memorandum, December 28, 1988. <www.epa.gov/npdes/pubs/owm0364.pdf>.

[12] Pendergast, James F. 1995. *Delegation of Updates to Major/Minor Lists.* U.S. Environmental Protection Agency, Office of Wastewater Management. Memorandum, February 6, 1995. <www.epa.gov/npdes/pubs/owm0142.pdf>.

CHAPTER 3. Overview of the NPDES Permitting Process

This chapter presents an overview of the different types of National Pollutant Discharge Elimination System (NPDES) permits, the major permit components, and the permit development and issuance process. The permit process is illustrated by flow charts. The tasks identified within the flow charts are described in detail in subsequent chapters.

3.1 Types of Permits

The two basic types of NPDES permits are individual and general permits. These permit types share the same components but are used under different circumstances and involve different permit issuance processes.

3.1.1 Individual Permits

An individual permit is a permit specifically tailored to an individual facility. Upon receiving the appropriate application form(s), the permitting authority develops a permit for that facility on the basis of information from the permit application and other sources (e.g., previous permit requirements, discharge monitoring reports, technology and water quality standards, total maximum daily loads, ambient water quality data, special studies). The permitting authority then issues the permit to the facility for a specific period not to exceed 5 years, with a requirement to reapply before the expiration date.

3.1.2 General Permits

A permitting authority develops and issues a general permit to cover multiple facilities in a specific category of discharges or of sludge use or disposal practices. General permits can be a cost-effective option for agencies because of the large number of facilities that can be covered under a single permit. According to Title 40 of the *Code of Federal Regulations* (CFR) 122.28(a)(2), general permits may be written to cover stormwater point sources or other categories of point sources having the following common elements:

- Sources that involve the same or substantially similar types of operations.
- Sources that discharge the same types of wastes or engage in the same types of sludge use or disposal.
- Sources that require the same effluent limitations or operating conditions, or standards for sewage sludge use or disposal.
- Sources that require the same monitoring where tiered conditions may be used for minor differences within a class (e.g., size or seasonal activity).
- Sources that are more appropriately regulated by a general permit.

The regulations at § 122.28(a)(1) provide for general permits to cover dischargers within an area corresponding to specific geographic or political boundaries such as the following:

- Designated planning area.
- Sewer district.
- City, county, or state boundary.

- State highway system.
- Standard metropolitan statistical area.
- Urbanized area.

The regulation also allows a general permit to cover any other appropriate division or combination of such boundaries. For example, EPA has issued general permits that cover multiple states, territories, and tribes where EPA is the permitting authority.

Where a large number of similar facilities require permits, a general permit allows the permitting authority to allocate resources in a more efficient manner and to provide more timely permit coverage than issuing an individual permit to each facility. In addition, using a general permit ensures consistent permit conditions for comparable facilities.

3.2 Major Components of a Permit

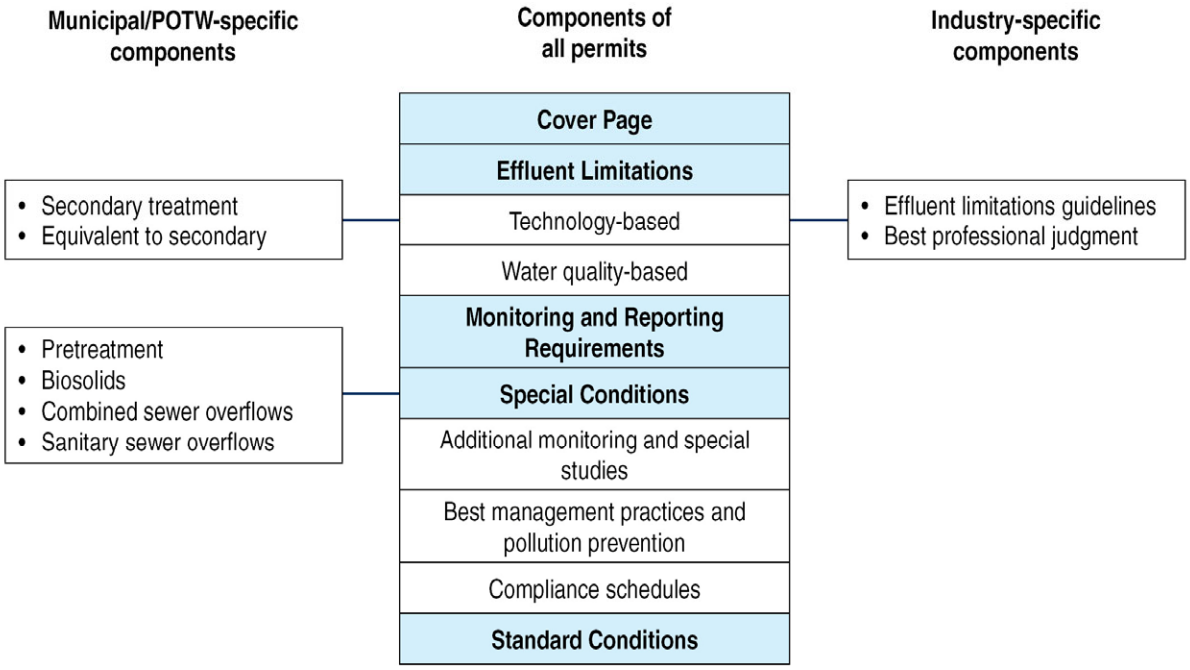
All NPDES permits consist, at a minimum, of five sections:

- **Cover Page:** Contains the name and location of the permittee, a statement authorizing the discharge, and a listing of the specific locations for which a discharge is authorized.
- **Effluent Limitations:** The primary mechanism for controlling discharges of pollutants to receiving waters. A permit writer spends the majority of his or her time, when drafting a permit, deriving appropriate effluent limitations on the basis of applicable technology and water quality standards.
- **Monitoring and Reporting Requirements:** Used to characterize wastestreams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions.
- **Special Conditions:** Conditions developed to supplement numeric effluent limitations. Examples include additional monitoring activities, special studies, best management practices (BMPs), and compliance schedules.
- **Standard Conditions:** Pre-established conditions that apply to all NPDES permits and delineate the legal, administrative, and procedural requirements of the NPDES permit.

In addition to the components of the permit, a fact sheet or statement of basis explaining the rationale for permit conditions makes up part of the documentation that supports a draft permit. Section 11.2 of this manual includes additional discussion of permit documentation and the required elements of a fact sheet or statement of basis.

Although the major sections of a permit listed above are part of all permits, the contents of some sections vary depending on the nature of the discharge (e.g., municipal effluent, industrial process wastewater, stormwater, vessel discharges) and whether the permit is issued to an individual facility or to multiple dischargers (i.e., a general permit). Exhibit 3-1 shows the components of a permit and highlights some distinctions between the contents of NPDES permits for municipal (i.e., POTW) and industrial facilities. Permit writers should note that it is common for different permitting authorities to use different names for each section of a permit.

Exhibit 3-1 Permit components



3.3 Overview of the Development and Issuance Process for NPDES Individual Permits

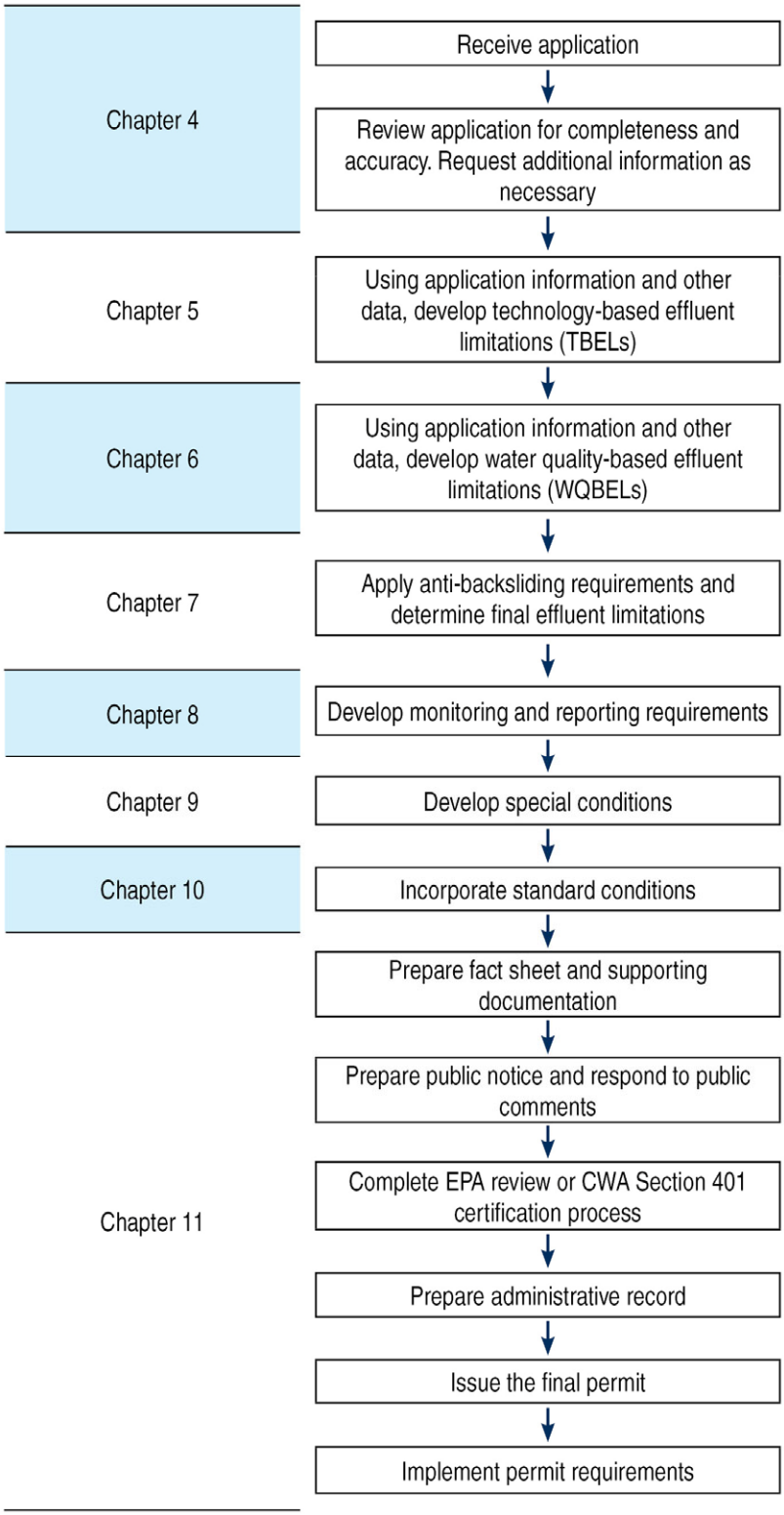
While the limitations and conditions in NPDES individual permits are unique to each permittee, the process used to develop the limitations and conditions and issue each permit generally follows a common set of steps. Exhibit 3-2 illustrates the major steps to develop and issue NPDES individual permits and also serves as an index for the subsequent chapters of this manual by identifying which chapter presents more detailed information on each step.

For individual permits, the permitting process generally begins when a facility operator submits an application. After receiving the application and making a decision to proceed with the permit, the permit writer reviews the application for completeness and accuracy. When the permit writer determines that the application is complete and has any additional information needed to draft the permit, the permit writer develops the draft permit and the justification for the permit conditions (i.e., the fact sheet or statement of basis).

The first major step in the permit development process is deriving technology-based effluent limitations (TBELs). Following that step, the permit writer derives effluent limitations that are protective of state water quality standards (i.e., water quality-based effluent limitations [WQBELs]) as needed. The permit writer then compares the TBELs with the WQBELs and, after conducting an anti-backsliding analysis if necessary, applies the final limitations in the NPDES permit. The permit writer must document the decision-making process for deriving limitations in the permit fact sheet. It is quite possible that a permit will have limitations that are technology-based for some parameters and water quality-based for others. For example, a permit could contain effluent limitations for total suspended solids (TSS) based on national effluent limitations guidelines and standards (effluent guidelines) (technology-based), limitations for ammonia based on preventing toxicity to aquatic life (water quality-based), and limitations for 5-day

biochemical oxygen demand (BOD_5) that have different bases, such as an average monthly limitation based on effluent guidelines and a maximum daily limitation based on water quality standards.

Exhibit 3-2 Major steps to develop and issue NPDES individual permits



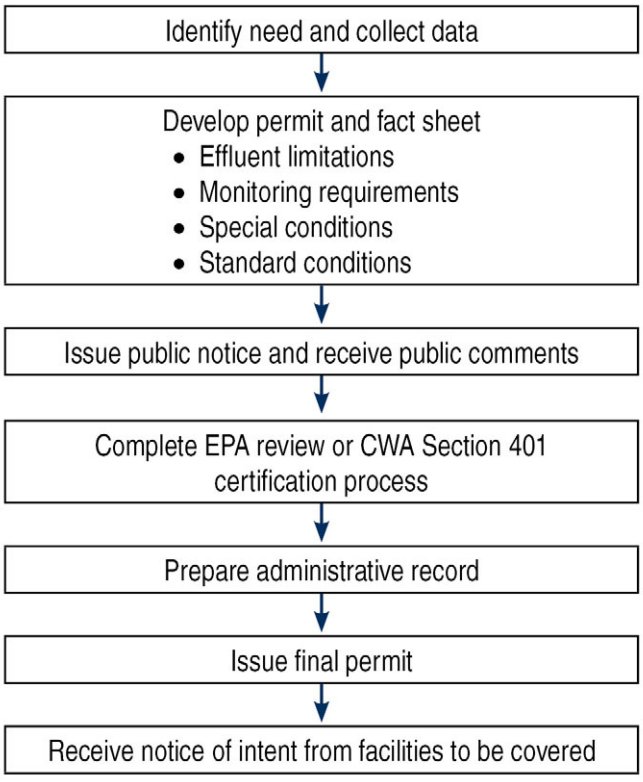
After effluent limitation development, the permit writer develops appropriate monitoring and reporting requirements and facility-specific special conditions. The permit writer then adds standard conditions, which are the same for all permits.

The next step is to provide an opportunity for public participation in the permit process and EPA review of the permit or, in the case of an EPA-issued permit, certification under CWA section 401 by the state with jurisdiction over the receiving water that the permit will comply with its water quality standards. The permitting authority issues a public notice announcing the draft permit and inviting interested parties to submit comments. If there is significant public interest, the permitting authority can hold a public hearing. Taking into consideration the public comments, the permitting authority then produces a final permit, with careful attention to documenting the process and decisions for the administrative record, and issues the final permit to the facility. The permitting authority might decide to make significant changes to the draft permit according to public comment and then provide another opportunity for public review and comment on the revised permit. Section 11.3 of this manual discusses items to address before final permit issuance in more detail.

3.4 Overview of the Development and Issuance Process for NPDES General Permits

The process for developing and issuing NPDES general permits is similar to the process for individual permits; however, there are some differences in the sequence of events. Exhibit 3-3 illustrates the major steps to develop and issue NPDES general permits.

Exhibit 3-3 Major steps to develop and issue NPDES general permits



For general permits, the permitting authority first identifies the need for a general permit and collects data that demonstrate that a group or category of dischargers has similarities that warrant a general permit. In deciding whether to develop a general permit, permitting authorities consider whether

- A large number of facilities will be covered.
- The facilities have similar production processes or activities.
- The facilities generate similar pollutants.
- Whether uniform WQBELs (where necessary) will appropriately implement water quality standards.

The remaining steps of the permit process are the same as for individual permits. The permitting authority develops a draft permit that includes effluent limitations, monitoring conditions, special conditions, and standard conditions. The permitting authority then issues a public notice and addresses public comments, completes the EPA review or CWA section 401 certification process, develops the administrative record, and issues the final permit. The final permit will also establish the requirements for the specific information that must be submitted by a facility that wishes to be covered under the general permit.

After the final general permit has been issued, facilities that wish to be covered under the general permit typically submit a Notice of Intent (NOI) to the permitting authority. After receiving the NOI, the permitting authority can request additional information describing the facility, notify the facility that it is covered by the general permit, or require the facility to apply for an individual permit.

The following chapters in this manual describe steps in the permitting process in detail. In general, the chapters focus on the steps necessary to develop and issue an individual permit, but much of the technical discussion applies equally to general permit development.

CHAPTER 4. NPDES Permit Application Process

This chapter describes the National Pollutant Discharge Elimination System (NPDES) permit application process, including the permit writer's role in reviewing the application and evaluating background information about the applicant. Through this process the permit writer gains an understanding of the circumstances of the discharge and the characteristics of the proposed effluent, which is necessary to develop appropriate permit limitations and conditions.

4.1 Who Applies for an NPDES Permit?

The NPDES regulations at Title 40 of the *Code of Federal Regulations* (CFR) 122.21(a) require that any person, except persons covered by general permits under § 122.28, who discharges pollutants or proposes to discharge pollutants to waters of the United States must apply for a permit. Further, § 122.21(e) prohibits the permitting authority from issuing an individual permit until and unless a prospective discharger provided a complete application. This regulation is broadly inclusive and ties back to the Clean Water Act (CWA) section 301(a) provision that, except as in compliance with the act, "…the discharge of any pollutant by any person shall be unlawful."

In most instances, the permit applicant will be the owner (e.g., corporate officer) of the facility. However, the regulations at § 122.21(b) require that when a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit. The regulations also require the application to be signed and certified by a high-ranking official of the business or activity. The signatory and certification requirements are at § 122.22.

Permits (and applications) are required for most discharges or proposed discharges to waters of the United States; however, NPDES permits are not required for some activities as specified under the *Exclusions* provision in § 122.3. Exceptions include the following:

- Discharge of dredged or fill materials into waters of the United States which are regulated under CWA section 404.
- The introduction of sewage, industrial wastes or other pollutants into publicly owned treatment works (POTWs) by indirect dischargers.
- Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to Part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances).
- Any introduction of pollutants from nonpoint source agricultural and silvicultural activities, including stormwater runoff from orchards, cultivated crops, pastures, range lands, and forest lands, but not discharges from concentrated animal feeding operations as defined in § 122.23, discharges from concentrated aquatic animal production facilities as defined in § 122.24, discharges to aquaculture projects as defined in § 122.25, and discharges from silvicultural point sources as defined in § 122.27.
- Return flows from irrigated agriculture.

- Discharges into a privately owned treatment works, except as the Director may otherwise require under § 122.44(m).

While those types of discharges have been excluded from permitting requirements under the NPDES program, they might be subject to controls under other federal or state regulatory programs.

As of the date of this manual's publication, the exclusion for certain discharges incidental to the normal operation of a vessel is still in the CFR. Similarly, discharges from the application of pesticides consistent with all relevant requirements under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) (i.e., those relevant to protecting water quality) are excluded from NPDES permit coverage in the following two circumstances: (1) the application of pesticides directly to waters of the United States to control pests, and (2) the application of pesticides to control pests that are present over waters of the United States, including near such waters, where a portion of the pesticides will unavoidably be deposited to waters of the United States to target the pests effectively. However, because of court decisions, the exclusions for vessels and pesticides are vacated as of February 6, 2009, and April 9, 2011, respectively. The effect of the *vacaturs* on the exclusions in § 122.3 is presented in Exhibit 4-1.

Exhibit 4-1 Effect of court decisions on § 122.3

Exclusion	Issue
Vessel Discharges (www.epa.gov/npdes/vessels)	The Court's ruling does not affect vessel discharge exemptions from permitting that are specifically provided for in the CWA itself. For example, § 502(6)(A) excludes from the act's definition of *pollutant* sewage from vessels (including graywater in the case of commercial vessels operating on the Great Lakes) and discharges incidental to the normal operation of a vessel of the Armed Forces within the meaning of CWA section 312. As another example, the CWA section 502(12)(B) provides that discharges from vessels (i.e., discharges other than those when the vessel is operating in a capacity other than as a means of transportation) do not constitute the, "discharge of a pollutant" when such discharges occur beyond the limit of the 3-mile territorial sea. Because both *a pollutant* and a *discharge of a pollutant* are prerequisites to the requirement to obtain an NPDES permit, those two statutory provisions have the effect of exempting the vessel discharges they address from the requirement to obtain an NPDES permit. In addition, in July 2008, Congress amended the CWA to add a new section 402(r) to the act, which excludes discharges incidental to the normal operation of a recreational vessel from NPDES permitting. For more information, see section 2.3.2.7 of this manual.
Pesticides (www.epa.gov/npdes/aquaticpesticides)	On January 7, 2009, the 6th Circuit Court vacated the final rule in *The National Cotton Council of America et al. v. United States Environmental Protection Agency*. The court held that while an NPDES permit is not required for chemical pesticide applications that leave no residuals, an NPDES permit is required for discharges (1) from chemical pesticide applications to or over, including near water, where there is a residual, or excess pesticide, in the water following the application, and (2) from all biological pesticide applications regardless of whether a residual is left. On June 8, 2009, the court granted a request from the U.S. Department of Justice for a 2-year stay of its decision, until April 9, 2011, to provide time for EPA and the states to develop and issue NPDES general permits for the discharge of pollutants from the application of pesticides. Before April 9, 2011, permits are not required for discharges from these applications when applied in accordance with the product's FIFRA label. Certain related activities continue to be exempt from permitting under the CWA (i.e., irrigation return flow and agricultural stormwater runoff).

4.2 Application Deadlines

The regulations at § 122.21(c) and (d) specify the time to apply for NPDES permits. Exhibit 4-2 summarizes the application deadline requirements for dischargers to be covered by an NPDES permit.

Exhibit 4-2 When to apply for an NPDES permit

Type of permit	Type of discharge	Schedule*
Individual	New	At least 180 days before the date on which the discharge is to commence
	Existing	At least 180 days before expiration date of existing permit
	Construction Stormwater	At least 90 days before the date on which construction is to commence
General	New	Specified in general permit
	Existing	X number of days following issuance of permit (specified in the general permit)

* Authorized states may use more stringent deadlines.

Anyone proposing a new discharge must apply to the permitting authority no later than 180 days before the expected commencement of the discharge if applying for an individual permit. Any person with an currently effective individual permit must submit an application to the permitting authority at least 180 days before the expiration of its existing individual permit unless permission for a later date has been granted in accordance with § 122.21(d). For general permits, the deadline for new dischargers to apply is specified in the general permit. A general permit also may specify a number of days after the general permit's issuance that operators of existing facilities are given to apply for coverage. Authorized states may have different schedules for permit applications, but their schedules may be no less stringent than the federal deadlines. The State Director or the Regional Administrator may allow an individual application to be submitted at dates later than those specified in the regulations, but not later than the expiration date of the existing permit.

Note that, according to § 122.6, the conditions of an expired NPDES permit remain in effect until the new permit is issued, as long as the discharger submitted a complete application in accordance with the timeframes prescribed in the regulations (or in accordance with state law, in the case of state-administered NPDES programs). If state law does not allow expired permits to remain in effect until a permit is reissued, or if the permit application is not on time and complete, the facility may be considered to be discharging without a permit from the time the permit expired until the effective date of the new permit.

4.3 Application Forms and Requirements for Individual Permits

When a facility needs an individual NPDES permit, it must submit a permit application. Application forms and requirements are specific to the type of facility and discharge. NPDES permit application requirements are in Part 122, Subpart B and identified on forms developed by the U.S. Environmental Protection Agency (EPA). Authorized states are not required to use the EPA application forms; however, any alternative form used by an authorized state must include the federal requirements at a minimum.

Exhibit 4-3 provides an overview of the types of dischargers required to submit NPDES application forms, identifies the forms that must be submitted, and references the corresponding NPDES regulatory citation. In some cases, a facility might need to file more than one application form. For example, an

existing industrial facility (i.e., renewal) discharging stormwater combined with process and non-process wastewater might need to submit Form 1, Form 2C, and Form 2F. Section 2.3 of this manual discusses the NPDES program areas that have application requirements presented below.

Exhibit 4-3 EPA application requirements for NPDES individual permits

Type of facility or program area	Status	Forms	Regulatory citations and additional application requirements (40 CFR)
Municipal facilities • POTWs with design flows greater than or equal to 0.1 million gallons per day (mgd)	New and existing	**Form 2A**, Parts A, B and C; Parts D, E, F, or G as applicable	• § 122.21(a)(2)(i)(B) • § 122.21(j)
• POTWs with design flows less than 0.1 mgd	New and existing	**Form 2A**, Parts A and C; Parts D, E, F, or G as applicable	• § 122.21(a)(2)(i)(B) • § 122.21(j)
TWTDS (sewage sludge)	New and existing	**Form 2S**	• § 122.21(a)(2)(i)(H) • § 122.21(q)
Concentrated animal production facilities • Concentrated animal feeding operations • Concentrated aquatic animal production facilities	New and existing	**Form 1** and **Form 2B**	• § 122.21(a)(2)(i)(A) and (C) • § 122.21(f) and (i)
Industrial facilities • Manufacturing facilities • Commercial facilities • Mining activities • Silvicultural activities	Existing	**Form 1** and **Form 2C**	• § 122.21(a)(2)(i)(A) and (D) • § 122.21(f) and (g)
	New (process wastewater)	**Form 1** and **Form 2D**	• § 122.21(a)(2)(i)(A) and (E) • § 122.21(f) and (k)
	New and existing (non-process wastewater)	**Form 1** and **Form 2E**	• § 122.21(a)(2)(i)(A) and (F) • § 122.21(f) and (h)
Stormwater discharges associated with industrial activities (except stormwater discharges associated with construction activity)	New and existing	**Form 1** and **Form 2F**	• § 122.21(a)(2)(i)(A) and (G) • § 122.21(f) • § 122.26(c)
Stormwater discharges associated with construction activity	New and existing	**Form 1**	• § 122.21(a)(2)(i)(A) • § 122.21(f) • § 122.26(c)(1)(ii)
Stormwater discharges from MS4s serving a population greater than 100,000	New and existing	None	• § 122.26(d)
Stormwater discharges from small MS4s	New and existing	None	• § 122.33 • § 122.21(f)
Cooling water intake structures	New and existing	None	• § 122.21(r)

4.3.1 Form 1: General Information

All facilities applying for an individual NPDES permit, with the exception of POTWs, treatment works treating domestic sewage (TWTDS), and municipal separate storm sewer systems (MS4s) applying for a municipal stormwater permit, must submit Form 1 <www.epa.gov/npdes/pubs/form_1.pdf>. The type of general facility information required by Form 1 is specified in §§ 122.21(a)(2)(i)(A) and 122.21(f) and includes the following:

- Name, mailing address, facility contact, and facility location.
- Standard industrial classification (SIC) code and a brief description of the nature of the business.
- Topographic map showing the location of the existing or proposed intake and discharge structures.

4.3.2 Form 2A: New and Existing POTWs

All new and existing POTWs must submit Form 2A <www.epa.gov/npdes/pubs/final2a.pdf>. EPA issued a final rule amending permit application requirements and application forms for POTWs and other TWTDS (64 FR 42433, August 4, 1999). The rule consolidated POTW application requirements, expanded toxic monitoring requirements for POTWs, and revised the forms used to submit permit applications. POTWs must also submit the form for permit renewals. Form 2A replaces Standard Form A and Short Form A.

POTWs with design influent flows equal to or greater than 100,000 gallons per day (gpd) (0.1 mgd) must submit Parts A, B, and C of Form 2A. POTWs with design flows of less than 100,000 gpd must submit Parts A and C of Form 2A. Parts A, B and C are referred to as Basic Application Information:

- Part A of Form 2A contains basic application information for all applicants:
  - Facility and applicant information.
  - Collection system type, areas served, and total population served.
  - Discharges and other disposal methods.
  - If the treatment works discharges effluent to waters of the United States, a description of outfalls, receiving waters, and treatment and effluent testing information.
- Part B of Form 2A collects additional information for applicants with a design flow greater than or equal to 0.1 mgd, including inflow and infiltration estimates, a topographic map, process flow diagram, and effluent testing data for additional parameters.
- Part C is a certification that all applicants must complete.

Form 2A also includes Supplemental Application Information (Parts D–G). POTWs complete these additional forms, as applicable, depending on the characteristics of the municipal discharge:

- Part D requests expanded effluent testing data for metals, volatile organic compounds, acid-extractable compounds, and base-neutral compounds. A POTW that discharges effluent to waters of the United States and meets one or more of the following criteria must complete Part D:
  - Has a design flow rate greater than or equal to 1 mgd.
  - Is required to have a pretreatment program (or has one in place).
  - Is otherwise required by the permitting authority to provide the information.

- A POTW that meets one or more of the following criteria must complete Part E (Toxicity Testing Data):
  - Has a design flow greater than or equal to 1 mgd.
  - Is required to have a pretreatment program (or has one in place).
  - Is otherwise required by the permitting authority to submit results of toxicity testing.
- A POTW that accepts process wastewater from any significant industrial users (SIUs) or receives Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or other remedial wastes must complete Part F. SIUs are defined as:
  - All industrial users subject to Categorical Pretreatment Standards under § 403.6 and 40 CFR Chapter I, Subchapter N.
  - Any other industrial user for which any of the following is true
    - Discharges an average of 25,000 gpd or more of process wastewater to the POTW (excluding sanitary, non-contact cooling, and boiler blowdown wastewater).
    - Contributes a process wastestream that makes up 5 percent or more of the average dry-weather hydraulic or organic capacity of the treatment plant.
    - Is designated an SIU by the control authority on the basis that it has a reasonable potential for adversely affecting the POTWs operation or for violating any pretreatment standard or requirement.
  - The control authority can determine that an industrial user subject to categorical pretreatment standards is a nonsignificant categorical industrial user, rather than an SIU, on a finding that it never discharges more than 100 gpd of total categorical wastewater and if:
    - Before that finding, the industrial user has consistently complied with all applicable categorical pretreatment standards and requirements.
    - The industrial user annually submits a certification statement required in § 403.12(q) and any information necessary to support the certification statement.
    - The industrial user never discharges any untreated concentrated wastewater.
  - If an industrial user meets one of the other criteria for determining that it is an SIU (i.e., discharges an average of 25,000 gpd of process wastewater), but the control authority finds that it has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standards or requirement, the control authority can determine that the industrial user is not an SIU.
- A POTW that has a combined sewer system must complete Part G. Information that must be provided in the section includes a system map and diagram, and descriptions of outfalls, combined sewer overflow (CSO) events, receiving waters, and operations.

4.3.3 Form 2S: New and Existing TWTDS

New TWTDS and TWTDS with effective NPDES permits must submit a new or renewal permit application, respectively, using new Form 2S <www.epa.gov/npdes/pubs/final2s.pdf>. Part 1 of Form 2S is to be completed by *sludge-only* facilities; that is, facilities that do not have, and are not applying for, an NPDES permit for a direct discharge to surface water. Part 1 collects background information on the facility, including identification information, quantities of sewage sludge handled, pollutant concentrations, treatment methods, and use and disposal information.

Part 2 is used by facilities that already have or are applying for an NPDES permit. It includes five sections:

- All applicants using Part 2 must complete the general information collected by **section A**.
- Applicants who either generate sewage sludge or derive a material from sewage sludge must complete **section B**.
- Applicants who either apply sewage sludge to the land or generate sewage sludge that is applied to the land by others (unless the sludge from the facility meets certain exemption criteria) must complete **section C**.
- Applicants who own or operate a surface disposal site must complete **section D**.
- Applicants who own or operate a sewage sludge incinerator must complete **section E**.

4.3.4 Form 2B: New and Existing Concentrated Animal Feeding Operations (CAFOs) and Concentrated Aquatic Animal Production (CAAP) Facilities

In addition to Form 1, owners of new and existing CAFOs (defined in § 122.23) and CAAP facilities (defined in § 122.24) must submit Form 2B <www.epa.gov/ne/npdes/2010RevisedCafoFedRegstrForm2b.pdf>. Form 2B was significantly modified as part of the final CAFO Rules (68 FR 7176, February 12, 2003, and 73 FR 70418, November 20, 2008). The type of information required by Form 2B consists of the following:

- For CAFOs
  - The name of the owner or operator.
  - The facility location and mailing addresses.
  - Latitude and longitude of the production area.
  - A topographic map of the geographic area in which the CAFO is located.
  - Specific information about the number and type of animals.
  - The type of containment and total capacity for storage (tons/gallons).
  - The total number of acres under control of the applicant available for land application.
  - Estimated amounts of manure, litter, and process wastewater generated and amounts transferred to other persons per year.
  - A nutrient management plan (NMP) that satisfies the requirements of § 122.42(e).
- For CAAP facilities
  - The maximum daily and average monthly flow from each outfall.
  - The number of ponds, raceways, and similar structures.
  - The name of the receiving water and the source of intake water.
  - For each species of aquatic animals, the total yearly and maximum harvestable weight.
  - The calendar month of maximum feeding and the total mass of food fed during that month.

Note that recent revisions to the NPDES regulations require that a CAFO seeking coverage under a permit submit its NMP with its application for an individual permit or notice of intent (NOI) to be authorized under a general permit. Permitting authorities are required to review the plan and provide the public with an opportunity for meaningful public review and comment. Permitting authorities also are required to incorporate terms of the NMP as NPDES permit conditions. For more information on the revisions to the CAFO regulations, see the Animal Feeding Operations Website <www.epa.gov/npdes/cafo>.

Sections 2.3.2.5 and 2.3.2.6 of this manual provide additional information on CAFOs and CAAP facilities, respectively.

4.3.5 Form 2C: Existing Manufacturing, Commercial, Mining, and Silvicultural Discharges

In addition to Form 1, operators of existing (i.e., currently permitted) manufacturing, commercial, mining, and silvicultural discharges must submit Form 2C <www.epa.gov/npdes/pubs/3510-2C.pdf>. The type of information required in Form 2C includes:

- Outfall locations.
- A line drawing of the water flow through the facility.
- Flow characteristics, sources of pollution, treatment technologies.
- Production information (if applicable).
- Improvements (if applicable).
- Intake and effluent characteristics for conventional, nonconventional and toxic (priority) pollutants.
- Potential discharges not covered by analysis.
- Biological testing data.
- Contract laboratory information.
- Certification and signature.

Quantitative effluent data requirements for existing industrial dischargers vary depending on the industrial category of the facility, the facility's discharge characteristics and the types of pollutants expected to be present in the discharge.

4.3.6 Form 2D: New Manufacturing, Commercial, Mining, and Silvicultural Discharges of Process Wastewater

In addition to Form 1, operators of new manufacturing, commercial, mining, and silvicultural discharges of process wastewater must submit Form 2D <www.epa.gov/npdes/pubs/3510-2D.pdf>. *New* dischargers are those that have not previously obtained permits for a discharge and have not commenced operation. The type of information required in Form 2D includes the following:

- Expected outfall locations.
- Date of expected commencement of discharge.
- Expected flow characteristics.
- Sources of pollutants.
- Treatment technologies.
- Production information (if applicable).
- Expected intake and effluent characteristics.

4.3.7 Form 2E: Manufacturing, Commercial, Mining, and Silvicultural Facilities that Discharge Only Non-Process Wastewater

In addition to Form 1, operators applying for an individual NPDES permit for manufacturing, commercial, mining, and silvicultural facilities that are not regulated by effluent limitations guidelines and standards (effluent guidelines) or new source performance standard, and that discharge only

non-process wastewaters, must submit Form 2E <www.epa.gov/npdes/pubs/3510-2E.pdf>. *Non-process wastewater* includes sanitary wastes, restaurant or cafeteria wastes, and non-contact cooling water, but it does not include stormwater. Stormwater is specifically excluded from the definition of non-process wastewater. Form 2E also may not be used for discharges by educational, medical, or commercial chemical laboratories or by POTWs. The type of information required in Form 2E includes the following:

- Outfall locations.
- Type of waste discharged.
- Effluent characteristics, including quantitative data for selected parameters.
- Flow characteristics.
- Treatment technologies.

4.3.8 Form 2F: Stormwater Discharges Associated with Industrial Activities

In addition to Form 1, operators applying for an individual NPDES permit for discharges composed entirely of stormwater associated with industrial activity must submit Form 2F <www.epa.gov/npdes/pubs/3510-2F.pdf>. Applicants whose discharge is composed of stormwater and non-stormwater must also submit Form 2C, 2D, or 2E as appropriate. The type of information required in Form 2F includes the following:

- A topographic map and estimates of impervious surface area.
- Descriptions of material management practices and control measures.
- A certification that outfalls have been evaluated for non-stormwater discharges.
- Descriptions of past leaks and spills.
- Analytical data from each outfall for several specified parameters.

EPA developed the *Guidance Manual For the Preparation of NPDES Permit Applications For Stormwater Discharges Associated With Industrial Activity*[1] <www.epa.gov/npdes/pubs/owm0241.pdf> to assist operators of facilities that discharge stormwater associated with industrial activity in complying with the requirements for applying for an NPDES permit.

4.3.9 Stormwater Discharges Associated with Construction Activity

Most stormwater discharges associated with construction activities that result in the disturbance of one acre or more are covered under a general permit issued by EPA or the authorized state. In cases that a general permit does not cover the discharge or the discharger decides that an individual permit is necessary for stormwater discharges associated with construction activity, the discharger is required to submit Form 1, along with a narrative description of the following:

- The location (including a map) and the nature of the construction activity.
- The total area of the site and the area of the site that is expected to undergo excavation during the life of the permit.
- Proposed measures, including best management practices (BMPs), to control pollutants in stormwater discharges during construction, including a brief description of applicable state and local erosion and sediment control requirements.

- Proposed measures to control pollutants in stormwater discharges that will occur after construction operations have been completed, including a brief description of applicable state or local erosion and sediment control requirements.
- An estimate of the runoff coefficient of the site and the increase in impervious area after the construction addressed in the permit application is completed, the nature of fill material and existing data describing the soil or the quality of the discharge.
- The name of the receiving water.

4.3.10 Stormwater Discharges from MS4s Serving a Population Greater than 100,000

The stormwater application regulations (55 FR 47990, November 16, 1990) require operators of large or medium MS4s to submit two-part applications. Part 1 application information was required to be submitted by large MS4s (serving a population greater than 250,000) by November 18, 1991, and by medium MS4s (serving a population greater than 100,000 but less than or equal to 250,000) by May 18, 1992. Part 2 application information was required to be submitted by large MS4s by November 16, 1992, and by medium MS4s by May 17, 1993. Those applications could be submitted on a system- or jurisdiction-wide basis. Key requirements of each part of the application include [and are further addressed in § 122.26(d)] the following:

- Part 1
  - General information (e.g., name, address).
  - Existing legal authorities to control discharges to the storm sewer system and any additional authority that might be required.
  - Source identification information (e.g., storm sewer outfalls, land use information).
  - Discharge characterization, including monthly precipitation estimates, average number of storm events, and results from dry-weather flow screening.
  - Characterization plan, including identification of 5 to 10 representative outfalls for stormwater sampling.
  - Description of existing stormwater management practices.
  - Descriptions of existing budget and resources available to complete Part 2 of the application and implement the stormwater program.
- Part 2
  - Demonstration of adequate legal authority.
  - Identification of any major storm sewer outfalls not included in Part 1 of the application.
  - Discharge characterization data from three representative storm events.
  - Proposed stormwater management program.
  - Assessment of controls, including expected reductions in pollutant loadings.
  - Fiscal analysis, including necessary capital and operation and maintenance expenditures for each year of the permit.

Under the NPDES regulations, permittees are required to reapply for a new NPDES permit before the expiration of their existing permit; however, in the case of stormwater permits for MS4s, Part 1 and Part 2 application requirements described above were intended only for the initial issuance of an MS4 permit and specific requirements for reapplication have not been defined in the regulations. On May 17, 1996, EPA issued a policy that sets forth a streamlined approach for reapplication requirements for operators of

MS4s (61 FR 41698, August 9, 1996) that allows municipalities to use recommended changes submitted in their fourth year annual report required under § 122.42(c)(2), as the principal component of their reapplication package. It also encourages changes to monitoring programs to make them appropriate and useful to stormwater management decisions. With the policy, EPA seeks to improve municipal stormwater management efforts by allowing municipalities to target their resources for the greatest environmental benefit.

4.3.11 Stormwater Discharges from Small MS4s

The application requirements for small MS4s are addressed in § 122.33. Most states have issued general permits for small MS4s; however, regulated small MS4s may seek authorization to discharge under an individual permit. The application requirements are different depending on whether the MS4 will implement a program under § 122.34 (i.e., a program that follows EPA's six minimum control measures) or a program that varies from § 122.34. EPA anticipates that most MS4s will follow the § 122.34 requirements.

Regulated small MS4s seeking an individual permit and wishing to implement a program under § 122.34 (the six minimum control measures) must submit an application to their NPDES permitting authority that includes the following:

- The information required under §§ 122.21(f) and 122.34(d).
- An estimate of square mileage served by the small MS4.
- Any additional information that the NPDES permitting authority requests.

A storm sewer map that satisfies the requirement of § 122.34(b)(3)(i) will also satisfy the map requirement in § 122.21(f)(7).

Regulated small MS4s seeking an individual permit and wishing to implement a program that is different from the program under § 122.34 must comply with the permit application requirements of § 122.26(d) (for additional information, see section 4.3.10 above). Under § 122.33, the regulated small MS4 is required to submit both parts of the application requirements in §§ 122.26(d)(1) and (2) by March 10, 2003. Small MS4s are not required to submit the information required by §§ 122.26(d)(1)(ii) and (d)(2) regarding their legal authority, unless they intend for the permit writer to take such information into account when developing their other permit conditions. Regulated small MS4s may jointly apply with another regulated entity consistent with the same requirements.

Additionally, another regulated entity may seek a modification of an existing MS4 permit to include a regulated small MS4 as a co-permittee. In such a case, the regulated small MS4 must apply consistent with § 122.26 rather than § 122.34. Application requirements of §§ 122.26(d)(1)(iii) and (iv) and (d)(2)(iii) do not apply and compliance with §§ 122.26(d)(1)(v) and (d)(2)(iv) can be met by referring to the other MS4's stormwater management program.

4.3.12 Cooling Water Intake Structures

Phase I of the CWA section 316(b) rule was finalized on December 18, 2001, in 66 FR 65256. The Phase I Rule (Part 125, Subpart I) implements CWA section 316(b) for most new facilities. The rule applies to new facilities that use cooling water intake structures to withdraw water from waters of the United States and that have or require an NPDES permit. This rule includes new facilities that have a design intake flow of greater than 2 mgd and that use at least 25 percent of water withdrawn for cooling purposes. For other

new facilities that have or require an NPDES permit but do not meet the 2-mgd intake flow threshold or use less than 25 percent of their water for cooling water purposes, the permit authority must implement CWA section 316(b) on a case-by-case basis, using best professional judgment (BPJ) (§§ 125.90(b) and 401.14).

Phase II of the CWA section 316(b) rule was finalized on July 9, 2004, in 69 FR 41576. In 2007 EPA suspended the rule following remand of a number of its provisions by the U.S. Court of Appeals for the Second Circuit. CWA section 316(b) requirements for such facilities must be developed on a case-by-case basis.

Phase III of the CWA section 316(b) rule was finalized on June 16, 2006, in 71 FR 35006. The Phase III rule (Part 125, Subpart N) implements CWA section 316(b) for new offshore oil and gas extraction facilities that use cooling water intake structures to withdraw water from waters of the United States and that have or require an NPDES permit. The rule includes facilities with a design intake flow of greater than 2 mgd and that use at least 25 percent of water withdrawn for cooling purposes.

EPA has not established national standards for existing Phase III facilities and is reevaluating its decisions in both Phase II and Phase III because of court remands. In the interim, for Phase III facilities not regulated under national categorical standards, the permitting authority must implement CWA section 316(b) on a case-by-case basis, using BPJ (§§ 125.90(b) and 401.14). For the most current information on regulatory requirements, see the Cooling Water Intake Structure Program Website <www.epa.gov/waterscience/316b/>.

4.4 Requirements for NPDES General Permits

As previously discussed in section 3.1.2 of this manual, general permits (§ 122.28) are permits developed for a specific category of dischargers within a specified geographic or political boundary. Using a general permit could simplify the permitting process for both EPA and the discharger. Owners/operators may seek coverage under a general permit only if one has been issued that is applicable to the type of facility for which coverage is sought and the permit covers the facility's activities. In addition, the permitting authority may determine that a general permit is not appropriate for a facility seeking coverage under the general permit and can require the facility to apply for an individual permit. Furthermore, a facility that otherwise qualifies for a general permit may opt to apply for an individual permit.

In most cases, a facility or activity seeking coverage under a general permit must seek coverage by submitting an NOI. The information that must be provided by the facility or activity in the NOI is specified in the general permit and must include, at a minimum, the following:

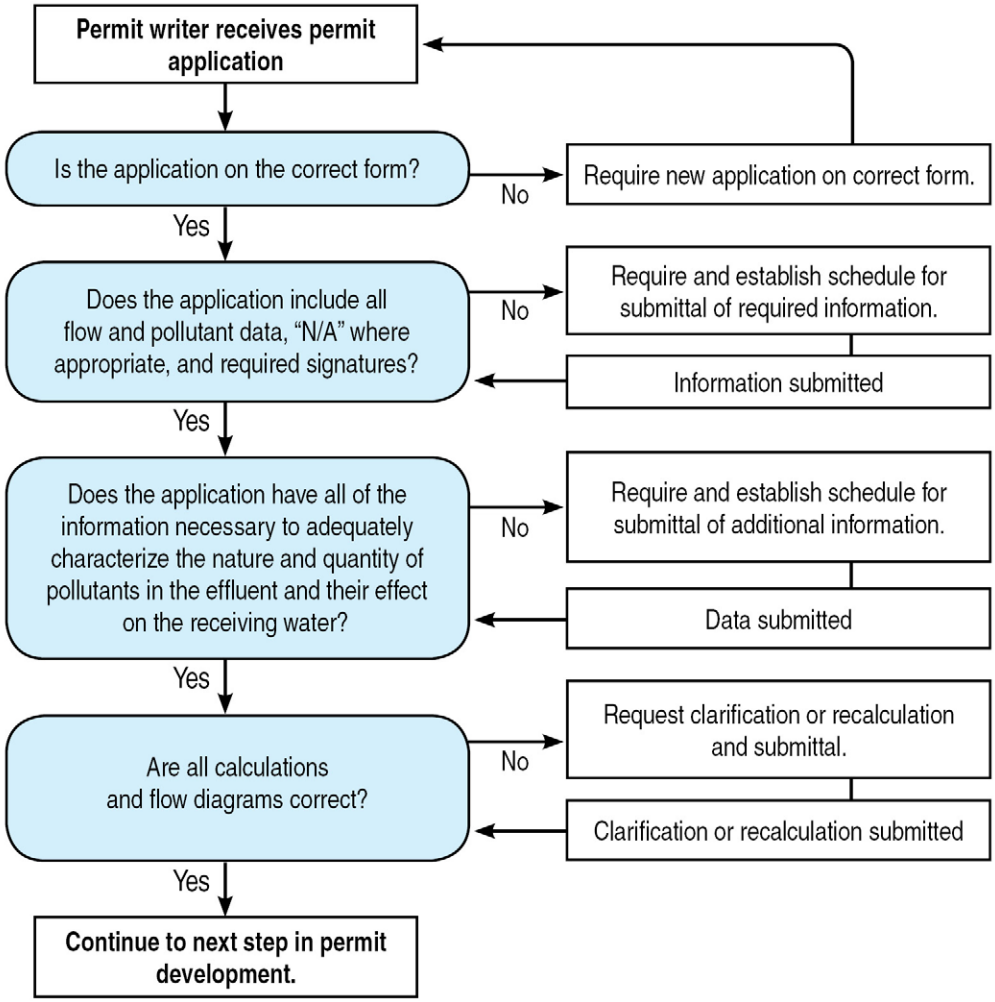
- Legal name and address of the owner or operator.
- Name and address of the facility.
- Type of facility or discharges.
- The receiving stream(s).

EPA has developed the Electronic NOI (eNOI) for construction sites and industrial facilities that need to apply for coverage under EPA's Construction General Permit (CGP) or Multi-Sector General Permit (MSGP), respectively. EPA's Electronic Stormwater Notice of Intent (eNOI) Website <www.epa.gov/npdes/stormwater/enoi> presents additional information about eNOI.

4.5 Application Review

The contents of individual NPDES permits are based, in part, on the information included in the application. Thus, the application must be complete and accurate before a permit writer can properly develop a permit. Exhibit 4-4 depicts the general process for reviewing a permit application, based on a chart provided in the *Washington Department of Ecology's Permit Writers' Manual*[2].

Exhibit 4-4 Permit application review process



After the initial application review, the permit writer may request that an applicant submit other information needed to decide whether to issue a permit and for permit development. The requested information could include the following:

- Additional information, quantitative data, or recalculated data.
- Submission of a new form (if an inappropriate form was used).
- Resubmission of the application (if incomplete or outdated information was initially submitted).

In some situations, a considerable amount of correspondence might be required before the permit writer obtains all the information that he or she believes is necessary to draft the permit.

4.5.1 The Complete Application

The regulations at § 122.21(e) state that the Director, "[must] not issue a permit before receiving a complete application..." At a minimum, the application form must have all applicable spaces filled in. Instructions for the application form state that all items must be completed and that applicants use the statement *not applicable* (N/A) to indicate that the item had been considered. Blanks on a form can occur for a number of reasons, such as the following:

- The response was inadvertently omitted.
- The applicant had difficulty determining the correct response and rather than provide misleading or incorrect information, left the space blank.
- The applicant was unwilling to provide the response.

A permit writer must obtain a response to the blank items by contacting the facility in writing or, in some cases, by telephone. Only minor changes should be handled by telephone and even minor items should be documented in writing in the permit file. Under no circumstances should a permit writer edit or modify the application, which is a legal document that has been signed and certified by the applicant. The original application, any subsequent clarifications, and any supplemental information provided by the applicant should be clearly identified in the file. The information will become part of the administrative record (§ 124.9) for the permit (see section 11.2.1 of this manual), which is critical if any legal challenges regarding permit decisions arise. If the changes or corrections to any application are extensive, the permit writer may require the permit applicant to submit a new application.

The permit writer may also require supplementary information, such as more detailed production information or maintenance and operating data for a treatment system, to process the permit. According to § 122.21(e), an application is considered complete when the permitting authority is satisfied that all required information has been submitted. Supplementary information also can be obtained later when the permit writer is actually drafting the permit. The applicant may submit additional information voluntarily or be required to do so under CWA section 308 or under a similar provision of state law.

4.5.2 Common Omissions in Applications

This section identifies some of the most common omissions and errors found in NPDES permit applications and provides examples of ways to identify missing information and verify the accuracy of certain data.

One of the most commonly omitted items from NPDES permit applications is a topographic map of the area around the discharge, which is required as an attachment to Form 1, Form 2A, and Form 2S. Other industry- or municipality-specific information is also often omitted. For example, industrial applicants sometimes fail to submit a line drawing of the water flow through the facility required by Part II-A of Form 2C. The line drawing is important for ensuring that the location and description of the outfalls and the description of processes (Parts I and II-B of Form 2C) provided by the applicant are accurate.

Sometimes applicants do not properly submit the effluent data necessary to characterize the facility. Below are some required data elements that are commonly omitted from permit applications:

- Valid whole effluent toxicity (WET) testing data, required from POTWs with design flows greater than 1 mgd or those with a pretreatment program. This requirement may be satisfied if the

expiring permit contains a requirement for effluent characterization of WET. The permit writer should note the use of this option on the fact sheet.

- Biosolids (sewage sludge) monitoring data; a description of biosolids use and disposal procedures; annual biosolids production volumes; and information on the suitability of the site and a description of the site management for land application sites from POTWs and other TWTDS. A land application plan is required for any sites not identified in the application.
- Expected toxics and other pollutants. Non-municipal dischargers categorized as *primary industries* have some mandatory testing requirements for toxic pollutants (see § 122.21, Appendix D, Table I and Table II and also listed in Application Form 2C).
- Production rates and flow data from industrial facilities that are subject to production- or flow-based effluent guidelines. Applicants must use units of measure corresponding to applicable effluent guidelines to allow calculation of effluent limitations.
- Appropriate sample types for all required pollutants and parameters being analyzed (Part 136) (see sections 8.1.4 and 8.3 of this manual for more information). For example, only grab samples or continuous monitoring may be used for pH, total residual chlorine, and temperature, and only grab samples may be used for total phenols and volatile organics.

Exhibit 4-5 presents three examples of the types of questions that the permit writer should consider to determine whether an application is complete.

Exhibit 4-5 Considerations for an application to be complete

Example 1:

A plastics processor submits Form 1 and Form 2C but fails to indicate *testing required* for any gas chromatograph/mass spectrometer (GC/MS) fractions in section V.C. of Form 2C and does not provide any data for these pollutants.

Question:
Did the applicant provide all the required data for the toxic organic pollutants in Form 2C?

Answer:
No. The plastics processor is required to indicate *testing required* (in the check box) and provide data from at least one sample for each pollutant in the volatile GC/MS fraction (Table 2C-2 in the application form instructions and § 122.21(g)(7)(v)(A) of the NPDES regulations).

Example 2:

A soap and detergent manufacturing facility in the liquid detergents subcategory submits Form 1 and Form 2C but marks thallium and beryllium as *believed absent* in section V.C. of Form 2C and did not provide any data for these pollutants.

Question:
Is it appropriate for this applicant to mark *believed absent* in this section of Form 2C?

Answer:
No. Although an applicant that manufactures liquid detergents is not expected to discharge thallium and beryllium, page 2C-3 of the application form instructions and § 122.21(g)(7)(v)(B) require testing for all listed metals by all applicants in a primary industry category, such as soap and detergent manufacturers. The indication of *believed absent* is incorrect. The applicant should have indicated *testing required* and provided the results of at least one sample per pollutant. Occasionally, unexpected contaminants could be present in a wastestream.

Exhibit 4-5 Considerations for an application to be complete (continued)

Example 3:
An integrated slaughterhouse and meat processing facility submits Form 1 and Form 2C and indicates that zinc is *believed absent* from its wastewater.

Question:
Is *believed absent* a proper indication for zinc for this wastewater?

Answer:
Possibly. After consulting the effluent guidelines development documents for the Meat and Poultry Products Point Source Category, the permit writer determines that metals, including zinc, are often used as feed additives and in sanitation products and might be present in the effluent, even though there are no effluent limitations specified for zinc in the applicable effluent guideline. The permit writer should contact the applicant and clarify whether zinc would be expected to be present in the discharge.

The comprehensive testing requirements that apply to the various categories of industry are designed to determine whether any contaminants (some expected, some unexpected) are present in significant quantities and to determine levels of pollutants that are known to be present. Exhibit 4-6 presents an example of how a permit writer makes the determination of pollutant data required in the application.

Exhibit 4-6 Example of required testing during application review

Consider the plastics processor and the liquid detergents manufacturer mentioned above, and answer the following questions:

Question:
What pollutant data are needed to characterize the industries above?
- For which toxic organic pollutants are they required to test?
- For which heavy metals are they required to test?
- Which metals would you expect to find in their wastewaters regardless of whether testing is required?

Answer:
The application form in Table 2C-2 and § 122.21(g)(7)(ii)(A) of the NPDES regulations require testing of the volatile GC/MS fraction by the plastics processor and the volatile, acid, and base/neutral fractions by the liquid detergent manufacturer. Page 2C-3 of the application instructions and § 122.21(g)(7)(ii)(B) require testing of all the metals listed in item V, Part C1 of the application form as well as cyanide and total phenols by both of these primary industry facilities. For information on which, if any, metals might be expected in wastewater discharged by these applicants, see the effluent guidelines development documents.

4.5.3 The Accurate Application

All information submitted on a permit application must be accurate. Although it might be difficult to detect certain inaccuracies, a number of common mistakes can be readily detected. When mistakes are detected, they must be corrected. Generally, any correction or edit to the application should be obtained from the applicant in writing and will become a part of the administrative record for the permit.

In most cases, errors in the application will be inadvertent because of the length and complexity of the form. Note, however, that the application certification statement indicates, "…that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." If the permit writer believes that falsification has occurred, he or she should refer the findings to the agency's enforcement staff.

Some of the most common mistakes on permit applications include failing to provide the correct long-term average and daily maximum values, reporting quantified values below known detection limits, and using misplaced decimal points or incorrect concentration units. Exhibit 4-7 presents three examples of the types of questions that the permit writer should consider while reviewing the permit application for accuracy. Additional guidance from EPA might be available to assist permit writers in reviewing applications for some of these common errors. For example, an August 23, 2007, memorandum *Analytical Methods for Mercury in National Pollutant Discharge Elimination System (NPDES) Permits*[3] <www.epa.gov/npdes/pubs/mercurymemo_analyticalmethods.pdf> describes when a method for mercury is sufficiently sensitive for purposes of permit applications and monitoring under a permit. In the memorandum, EPA strongly recommends that a permitting authority determine that a permit application that lacks effluent data analyzed with a sufficiently sensitive EPA-approved method (such as Method 1631E) is incomplete unless and until the facility supplements the original application with data analyzed with such a method.

4.6 Facility Information Review

In addition to the submitted application form, the permit writer should assemble other information that could be used to develop permit limitations and conditions.

4.6.1 Permit File Review

Before developing the draft permit and fact sheet, the permit writer should assemble and review any additional background information on the facility. If the permit writer is reissuing an existing permit, much of the information should be available in the permit file. Such information would typically include

- The current permit.
- The fact sheet or statement of basis for the current permit.
- Discharge monitoring reports (DMRs).
- Compliance inspection reports.
- Engineering reports.
- Correspondence or information on changes in plant conditions, problems, and compliance issues.

Much of this information, particularly DMR data, is stored in automated data tracking systems such as

- Permit Compliance System (PCS) or state databases.
- Integrated Compliance Information System (ICIS)-NPDES <https://icis.epa.gov>.
- Online Tracking Information System (OTIS) <www.epa.gov/idea/otis/>.
- Envirofacts Warehouse <www.epa.gov/enviro/>.

The permit writer can check with other permit writers who have permitted similar types of facilities to see if there are any special considerations related to the type of facility to be permitted. A permit writer might also wish to discuss compliance issues, changes, or history of complaints with compliance personnel who conducted previous inspections of the facility or with permit writers for other media (e.g., air, solid waste). Examples of some other sources of information that the permit writer could use for permit development include the following:

- Receiving water quality data from databases such as the EPA STOrage and RETrieval database (STORET) <www.epa.gov/STORET/>.

Exhibit 4-7 Considerations for an application to be accurate

Example 1:

An industrial applicant provides a daily maximum effluent flow value of 50,000 gpd in its permit application Form 2C. However, a review of historical water usage records and an old permit application indicate estimated wastewater flows ranged from 100,000 to 150,000 gpd. The applicant had not instituted any water use reduction measures, significantly changed its process operations, or decreased its number of employees.

Question:
Are reported values consistent with historical information?

Answer:
No. An inspection of the facility revealed two separate water meters (one for sanitary and one for process water); the applicant had overlooked the sanitary meter. Further, the process water meter was found to be defective. Subsequent flow monitoring of the actual total wastestream recorded a flow of 125,000 gpd. A new water meter was installed, and concurrent wastestream flow monitoring and water meter readings resulted in the following water balances:

- **Water In** (based on both water meter readings):
  148,000 gpd (131,000 gpd process line and 17,000 gpd sanitary line).
- **Water Out** (based on effluent flow monitoring):
  125,000 gpd total treated effluent discharged to the receiving water.
  Evaporative and consumption losses were estimated at 23,000 gpd (15% of total water usage).

The permit writer should require the applicant to submit a signed and certified letter with the revised flow estimates and a new water balance diagram or submit a revised application.

Example 2:

An applicant reported its maximum daily flow as 1.2 mgd, the maximum daily suspended solids concentration as 23 milligrams per liter (mg/L), and the maximum daily mass discharge as 690 pounds per day (lbs/day).

Question:
Do the concentration, mass, and flow values correspond?

Discussion:
No. Even in the unlikely event that the maximum daily flow and the maximum daily concentration occurred on the same day, the mass discharged would be well below the reported value of 690 lbs/day. Using the calculation below, the mass discharge that corresponds to the solids concentration (23 mg/L) and flow (1.2 mgd) would be 230 lbs/day:

$$23 \text{ mg/L} \times 1.2 \text{ mgd} \times \underbrace{8.34 \text{ (lbs)(L)/(mg)(millions of gallons)}}_{\text{(conversion factor)}} = 230 \text{ lbs/day}$$

Because the applicant reported a maximum mass discharge of 690 lbs/day, a significant discrepancy is indicated. The permit writer should contact the applicant to resolve the discrepancy. The applicant should submit a signed and certified letter clarifying the correct maximum daily mass discharge of suspended solids or submit a revised application.

Example 3:

The results submitted in the application for total cyanide are all reported as < 1,000 micrograms per liter (µg/L). When asked, the applicant indicated that total cyanide was analyzed using EPA Method 335.3 (Color, Auto).

Question:
Do concentration values correspond with published method detection limits for the method used?

Answer:
No. EPA Method 335.3 for total cyanide has a published method detection limit (MDL) of 5 µg/L. The applicant should be able to quantify results for total cyanide at values well below 1,000 µg/L using this method. The applicant has most likely used Standard Method 4500-CN (titrimetric) for total cyanide, rather than the testing procedure indicated. If total cyanide is expected to be present in the discharge and would be of concern at effluent concentrations below 1,000 µg/L, the permit writer should require the applicant to retest for total cyanide using the more sensitive method and to submit the results in a signed, certified letter.

- Supporting documentation collected by EPA for effluent guidelines and categorical pretreatment standards for a variety of industrial categories.
- Reference textbooks and technical documents that provide information about manufacturing processes and wastestreams for specific industry categories, which are available from libraries such as
  - National Technical Information Service (NTIS) <www.ntis.gov>.
  - EPA libraries <www.epa.gov/natlibra/libraries.htm>.
  - Office of Water Resource Center (OWRC) <www.epa.gov/safewater/resource/>.
  - National Service Center for Environmental Publications (NSCEP) <www.epa.gov/ncepihom/>.
- Related environmental permits that could provide site-specific background information about the types of pollutants and wastestreams at a facility, including, for example
  - RCRA permits, which regulate the management of hazardous waste by owners and operators of treatment, storage, and disposal facilities.
  - Clean Air Act permits, which regulate the discharge of atmospheric pollutants.
- EPA's *Treatability Manual*[4], which is a five-volume guidance manual that provides detailed descriptions of industrial processes, potential pollutants from each process, appropriate treatment technologies, and cost estimating procedures.
- The Toxic Release Inventory (TRI) <www.epa.gov/tri/>, which is accessible on EPA's mainframe and through a public online service. The TRI contains information on more than 300 listed toxic chemicals released by specific facilities, including chemical identification, quantity of chemicals released to various environmental media, off-site waste transfer, and waste treatment and minimization information.

If the permit writer must address special conditions in a permit for a municipal discharger to develop or implement a pretreatment program or to address discharges other than the wastewater treatment plant discharge, he or she should obtain the information needed to develop these special conditions. For example, the permit writer might need information on pretreatment program implementation, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), sewage sludge use or disposal, or stormwater discharges relevant to the facility. Such information is in

- Annual pretreatment reports, pretreatment compliance inspections and audits.
- CSO reports.
- Bypass notifications or SSO reports.
- Stormwater discharge applications or NOIs for a general permit.

4.6.2 Facility Site Visits

Facility site visits are an invaluable way to update information on manufacturing processes; obtain information about the facility's operations, equipment or management; and verify application information. A site visit also acquaints the permit writer with the people who will be operating under the permit and participating in the permit development process.

Site visits can also allow the permit writer to gain a better understanding of more complex facilities. Site visits are especially warranted if significant pollution control or treatment improvements will be required, if there have been frequent problems in complying with the existing permit, if there are known problems

with spills or leaks or with contaminated surface runoff, or if there are other unique on-site activities that could affect the characteristics of the discharge from the facility.

The site visit should include a detailed review of production processes to evaluate the types of toxic or hazardous substances that might be present in raw materials, products, and by-products. The permit writer should review the water uses, the resulting wastewater streams, and any in-process pollution controls. This review is needed to assist in selecting toxic and other pollutants to be limited and in evaluating possible in-process control improvements.

In addition, the site visit should include a review of the performance and operation and maintenance practices of wastewater treatment facilities. The review is useful in evaluating the adequacy of existing treatment performance and assessing the feasibility of improvements in performance. The permit writer should examine effluent monitoring points, sampling methods, and analytical techniques to identify any needed changes to monitoring requirements and to evaluate the quality of DMR data.

Raw material and product storage and loading areas, sludge storage and disposal areas, hazardous waste management facilities, including on-site disposal areas, and all process areas should be observed to determine the need for controls on surface runoff and specific BMPs. Information from other environmental programs (e.g., CERCLA or RCRA) might be important in this regard.

While on-site, the permit writer should note any housekeeping problems or the need for spill prevention actions, which are not usually detectable from permit applications. If allowed, photographs of problem areas should be taken for future use during permit preparation. If necessary, the permit writer should meet with management to ask questions or clarify information provided on the permit application. If any inaccuracies in the application were found because of the site visit, that is the time for the permit writer to request corrected information.

The time required to conduct a site visit will vary according to the complexity of the facility. For facilities with only a few basic processes, one main waste treatment system, limited in-process controls, few surface runoff outfalls, and limited on-site management of sludge or hazardous wastes, an adequate site visit can most likely be completed in one day. Visits to complex, larger plants with several treatment systems, numerous outfalls, and extensive ancillary activities may require several days.

Time spent on site visits often results in time savings during permit preparation. However, time and travel resources might not be adequate to allow visits to all facilities to be permitted. In such cases, the permit writer might be able to obtain much of the desired information from facility compliance inspections and should try to coordinate the timing of compliance inspections with the timing of permit development.

Aerial photographs may provide much of the needed information on the potential for contamination of surface runoff and on ancillary activities without a site visit or inspection. In addition, comparing aerial photographs with site and process diagrams provided with the application can provide the permit writer with a complete visual description of the facility. Aerial photographs are available from a variety of sources, including the U.S. Geological Survey Earth Resources Observation and Science Center <eros.usgs.gov/#/Find_Data>; TerraServer <www.terraserver.com>; Google Earth <earth.google.com>; and other private contractors.

4.7 Confidential Information

In accordance with Part 2, information submitted to EPA pursuant to the NPDES permitting regulations under Part 122 may be claimed as confidential; however, EPA has determined that the following information will not be held confidential (§ 122.7):

- Name and address of the applicant.
- Permit applications and information submitted with applications.
- Permits.
- Effluent data.

Information that may be claimed as confidential includes material related to manufacturing processes unique to the applicant, or information that might adversely affect the competitive position of the applicant if released to the public. Under such circumstances, the permit writer will be required to treat the information as confidential in accordance with the requirements in Part 2. Any claims of confidentiality must be made at the time of submission or the information will not be considered confidential.

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[1] U.S. Environmental Protection Agency. 1991. *Guidance Manual For the Preparation of NPDES Permit Applications For Stormwater Discharges Associated With Industrial Activity.* EPA-505/8-91-002. U.S. Environmental Protection Agency, Office of Water, Washington DC, <www.epa.gov/npdes/pubs/owm0241.pdf>.

[2] Bailey, Gary. 2008. *Water Quality Program Permit Writer's Manual*. Publication Number 92-109. Washington State Department of Ecology, Water Quality Program, Olympia, WA. <www.ecy.wa.gov/pubs/92109.pdf>

[3] Hanlon, James A. 2007. *Analytical Methods for Mercury in National Pollutant Discharge Elimination System (NPDES) Permits.* U.S. Environmental Protection Agency, Office of Wastewater Management. Memorandum, August 23, 2007. <www.epa.gov/npdes/pubs/mercurymemo_analyticalmethods.pdf>.

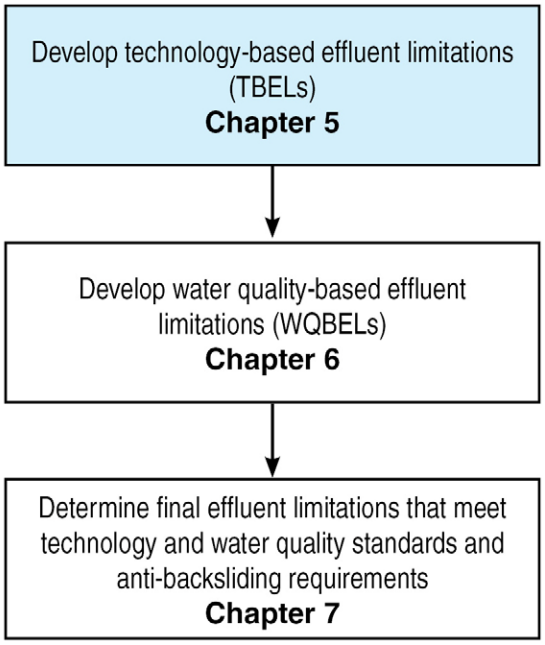
[4] U.S. Environmental Protection Agency. 1980. *Treatability Manual: Vol. I. Treatability Data* (EPA-600/8-80-042a) publications available on NEPIS Website <www.epa.gov/nscep/> as document 600880042A*; Vol. II. Industrial Descriptions* (EPA-600/8-80-042b) as document 600880024B*; Vol. III. Technologies* (EPA-600/8-80-042c) as document 600880024C*; Vol. IV. Cost Estimating* (EPA-600/8-80-042d) as document 600880042d; *Vol. V. Summary* (EPA-600/8-80-042e) as document 600880024E. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.

CHAPTER 5. Technology-Based Effluent Limitations

One of the major strategies of the Clean Water Act (CWA) in making "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" is to require effluent limitations based on the capabilities of the technologies available to control those discharges. Technology-based effluent limitations (TBELs) aim to prevent pollution by requiring a minimum level of effluent quality that is attainable using demonstrated technologies for reducing discharges of pollutants or pollution into the waters of the United States. TBELs are developed independently of the potential impact of a discharge on the receiving water, which is addressed through water quality standards and water quality-based effluent limitations (WQBELs). The NPDES regulations at Title 40 of the *Code of Federal Regulations* (CFR) 125.3(a) require NPDES permit writers to develop technology-based treatment requirements, consistent with CWA section 301(b), that represent the minimum level of control that must be imposed in a permit. The regulation also indicates that permit writers must include in permits additional or more stringent effluent limitations and conditions, including those necessary to protect water quality. As described in Chapter 7 of this manual, the permit writer might also need to apply anti-backsliding requirements to determine the final effluent limitations for the NPDES permit.

This chapter discusses development of TBELs for publicly owned treatment works (POTWs) and industrial (non-POTW) dischargers. Chapter 6 discusses development of WQBELs. Exhibit 5-1 illustrates the relationship between TBELs and WQBELs in an NPDES permit and the determination of final effluent limitations.

Exhibit 5-1 Developing effluent limitations



5.1 Technology-based Effluent Limitations for POTWs

The largest category of dischargers requiring individual NPDES permits is POTWs. The federal regulations at § 403.3(q) define a POTW as a treatment works (as defined in CWA section 212) that is owned by a state or municipality [as defined in CWA section 502(4)]. Under § 403.3(q), that definition includes "any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature." The definition also includes "sewers, pipes, and other conveyances only if they convey wastewater to a POTW Treatment Plant," as defined in § 403.3(r). Under § 403.3(q), the term POTW "also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works."

CWA section 304(d) required the U.S. Environmental Protection Agency (EPA) to publish information on the degree of effluent reduction attainable through the application of secondary treatment. Under CWA section 301(b)(1)(B), in general, POTWs in existence on July 1, 1977, were required to meet discharge limitations based on secondary treatment (or any more stringent limitations established under state law, including those necessary to meet state water quality standards). On the basis of those statutory provisions, EPA developed secondary treatment regulations, which are specified in Part 133. Later amendments to CWA section 304(d) called for EPA to develop alternative standards for certain types of POTWs. Those standards are referred to as "equivalent to secondary treatment" standards.

5.1.1 Secondary and Equivalent to Secondary Treatment Standards

Several regulations implement the statutory requirements for developing standards and discharge limitations based on secondary treatment. EPA has promulgated regulations in Part 133 establishing secondary treatment standards, equivalent to secondary treatment standards, and a number of special considerations applied on a case-by-case basis. In addition, § 122.44(a)(1) requires that NPDES permits include applicable technology-based limitations and standards, while regulations at § 125.3(a)(1) state that TBELs for POTWs must be based on secondary treatment standards (which includes the "equivalent to secondary treatment standards") specified in Part 133.

5.1.1.1 Secondary Treatment Standards

In Part 133, EPA published secondary treatment standards based on an evaluation of performance data for POTWs practicing a combination of physical and biological treatment to remove biodegradable organics and suspended solids. The regulation applies to all POTWs and identifies the technology-based performance standards achievable based on secondary treatment for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH. Exhibit 5-2 summarizes the standards.

Exhibit 5-2 Secondary treatment standards

Parameter	30-day average	7-day average
BOD_5	30 mg/L (or 25 mg/L $CBOD_5$)	45 mg/L (or 40 mg/L $CBOD_5$)
TSS	30 mg/L	45 mg/L
BOD_5 and TSS removal (concentration)	not less than 85%	--
pH	within the limits of 6.0–9.0*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0

mg/L = milligrams per liter

The regulation also includes an alternate set of standards that apply to certain facilities employing waste stabilization ponds or trickling filters as the principal process. Those standards are called equivalent to secondary treatment standards.

5.1.1.2 Equivalent to Secondary Treatment

Some biological treatment technologies, such as trickling filters or waste stabilization ponds, are capable of achieving significant reductions in BOD_5 and TSS but might not consistently achieve the secondary treatment standards for these parameters. Congress recognized that unless alternate limitations were set for facilities with trickling filters or waste stabilization ponds, which often are in small communities, such facilities could be required to construct costly new treatment systems to meet the secondary treatment standards even though their existing treatment technologies could achieve significant biological treatment. To prevent requiring upgrades where facilities were achieving their original design performance levels, Congress included provisions in the 1981 amendments to the Clean Water Act Construction Grants program (*Public Law 97-117, Section 23*) that required EPA to make allowances for alternative biological treatment technologies, such as a trickling filters or waste stabilization ponds. In response to that requirement, in 1984, EPA promulgated regulations at § 133.105 that include alternative standards that apply to facilities using "equivalent to secondary treatment." A facility must meet the criteria in § 133.101(g) to qualify for application of those alternative standards.

Equivalent to Secondary Standards

The equivalent to secondary treatment standards, as specified in § 133.105, are shown in Exhibit 5-3.

Exhibit 5-3 Equivalent to secondary treatment standards

Parameter	30-day average	7-day average
BOD_5	not to exceed 45 mg/L (or not to exceed 40 mg/L $CBOD_5$)	not to exceed 65 mg/L (or not to exceed 60 mg/L $CBOD_5$)
TSS	not to exceed 45 mg/L	not to exceed 65 mg/L
BOD_5 and TSS removal (concentration)	not less than 65%	--
pH	within the limits of 6.0–9.0*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0

Criteria to Qualify for Equivalent to Secondary Standards

To be eligible for discharge limitations based on equivalent to secondary standards, a POTW must meet all three of the following criteria:

Criterion #1—Consistently Exceeds Secondary Treatment Standards: The first criterion that must be satisfied to qualify for the equivalent to secondary standards is demonstrating that the BOD_5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the secondary treatment standards set forth in §§ 133.102(a) and (b). The regulations at § 133.101(f) define "effluent concentrations consistently achievable through proper operation and maintenance" as

- (f)(1): For a given pollutant parameter, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions.
- (f)(2): A 7-day average value equal to 1.5 times the value derived under paragraph (f)(1).

Some facilities might meet this criterion only for the BOD_5 limitations or only for the TSS limitations. EPA believes that it is acceptable for the permit writer to adjust the limitations for only one parameter (BOD_5 or TSS) if the effluent concentration of only one of the parameters is demonstrated to consistently exceed the secondary treatment standards.

Criterion #2—Principal Treatment Process: The second criterion that a facility must meet to be eligible for equivalent to secondary standards is that its principal treatment process must be a trickling filter or waste stabilization pond (i.e., the largest percentage of BOD and TSS removal is from a trickling filter or waste stabilization pond system).

Criterion #3—Provides Significant Biological Treatment: The third criterion for applying equivalent to secondary standards is that the treatment works provides significant biological treatment of municipal wastewater. The regulations at § 133.101(k) define *significant biological treatment* as using an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of at least 65 percent removal of BOD_5.

A permit writer should consider each facility on a case-by-case basis to determine whether it meets those three criteria. To apply the criteria, the permit writer should assemble enough influent, effluent, and flow data from the facility to adequately characterize the facility's performance or require the discharger to provide an appropriate analysis. If the facility has made substantial changes in its operations or treatment processes during the current permit term, the permit writer, using his or her best professional judgment (BPJ), may elect to use data for a period that is representative of the discharge at the time the permit is being drafted. Facilities that do not meet all three criteria do not qualify as equivalent to secondary treatment facilities. For such facilities, the secondary treatment standards apply. EPA noted in its December 1985 *Draft Guidance for NPDES Permits and Compliance Personnel—Secondary Treatment Redefinition*[1] that a treatment works operating beyond its design hydraulic or organic loading limit is not eligible for application of equivalent to secondary standards. If overloading or structural failure is causing poor performance, the solution to the problem is construction, not effluent limitations adjustment.

5.1.2 Adjustments to Equivalent to Secondary Standards

In addition to providing secondary treatment standards and equivalent to secondary treatment standards, the federal regulations allow states to make adjustments to the standards and to apply those adjusted standards on a case-by-case basis.

5.1.2.1 Adjusted TSS Requirements for Waste Stabilization Ponds

In accordance with regulations adopted by EPA in 1977 and revised in 1984, states can adjust the maximum allowable TSS concentration for waste stabilization ponds upward from those specified in the equivalent to secondary treatment standards to conform to TSS concentrations achievable with waste stabilization ponds. The regulation, found at § 133.103(c), defines "SS concentrations achievable with waste stabilization ponds" as the effluent concentration achieved 90 percent of the time within a state or

appropriate contiguous geographical area by waste stabilization ponds that are achieving the levels of effluent quality for BOD_5 specified in § 133.105(a)(1) (45 milligrams per liter [mg/L] as a 30-day average). To qualify for an adjustment up to as high as the maximum concentration allowed, a facility must use a waste stabilization pond as its principal process for secondary treatment and its operations and maintenance data must indicate that it cannot achieve the equivalent to secondary standards. EPA has published approved alternate TSS requirements in 49 *Federal Register* (FR) 37005, September 20, 1984. Exhibit 5-4 is a summary from the FR notice of the adjusted TSS requirements for each state.

Exhibit 5-4 State-specific adjusted TSS requirements*

Location	Alternate TSS limitation (30-day average) (mg/L)	Location	Alternate TSS limitation (30-day average) (mg/L)
Alabama	90	Nebraska	80
Alaska	70	North Carolina	90
Arizona	90	North Dakota	
Arkansas	90	• North and east of Missouri R.	60
California	95	• South and west of Missouri R.	100
Colorado		Nevada	90
• Aerated ponds	75	New Hampshire	45
• All others	105	New Jersey	None
Connecticut	None	New Mexico	90
Delaware	None	New York	70
District of Columbia	None	Ohio	65
Florida	None	Oklahoma	90
Georgia	90	Oregon	
Guam	None	• East of Cascade Mountains	85
Hawaii	None	• West of Cascade Mountains	50
Idaho	None	Pennsylvania	None
Illinois	37	Puerto Rico	None
Indiana	70	Rhode Island	45
Iowa		South Carolina	90
• Controlled discharge, 3 cell	Case-by-case but not greater than 80	South Dakota	120
• All others	80	Tennessee	100
Kansas	80	Texas	90
Kentucky	None	Utah	None
Louisiana	90	Vermont	55
Maine	45	Virginia	
Maryland	90	• East of Blue Ridge Mountains	60
Massachusetts	None	• West of Blue Ridge Mountains	78
Michigan: Controlled seasonal discharge		• East slope counties: Loudoun, Fauquier, Rappahannock, Madison, Green, Albemarle, Nelson, Amherst, Bedford, Franklin, Patrick.	Case-by-case application of 60/78 limits
• Summer	70	Virgin Islands	None
• Winter	40	Washington	75
Minnesota	40	West Virginia	80
Mississippi	None	Wisconsin	80
Missouri	80	Wyoming	100
Montana	100	Trust Territories and N. Marianas	None

* (49 FR 37005, September 20, 1984)

5.1.2.2 Alternative State Requirements (ASRs)

To further address the potential variations in facility performance arising from geographic, climatic, or seasonal conditions in different states, the revised secondary treatment regulations (adopted in 1984) also included provisions in § 133.105(d) for ASRs. The ASR provisions give states flexibility to modify the maximum allowable concentrations of both BOD_5 and TSS for trickling filter facilities and for BOD_5 for waste stabilization pond facilities. ASRs are set at levels consistently achievable through proper operation and maintenance [§ 133.101(f)] by the median facility in a representative sample of facilities within a state or appropriate continuous geographical area that meet the definition of facilities eligible for treatment equivalent to secondary treatment. Qualifying facilities are eligible to receive limitations up to the concentrations specified by the ASRs.

5.1.3 Applying Secondary Treatment Standards, Equivalent to Secondary Treatment Standards, and Adjusted Standards

Determining whether secondary treatment standards or equivalent to secondary standards apply to a POTW and determining the specific discharge limitations for the facility based on either set of standards and any other special considerations that might apply can be a complex process. Permit writers should remember that compliance with limitations must be measurable and percent removal limitations require influent monitoring (for more on establishing monitoring conditions, see section 8.1 of this manual). This section presents a step-by-step procedure to establishing technology-based effluent limitations for POTWs as shown in Exhibit 5-5.

Exhibit 5-5 Steps to establish technology-based discharge limitations for POTWs

Step 1.	Determine whether secondary treatment standards or equivalent to secondary treatment standards or adjusted standards apply
Step 2.	Calculate effluent limitations based on secondary treatment standards or
Step 3.	Calculate effluent limitations based on equivalent to secondary standards or
Step 4.	Calculate effluent limitations based on adjusted standards
Step 5.	Apply special considerations for further adjustments
Step 6.	Document the application of secondary or equivalent to secondary treatment standards or adjusted standards and all special considerations in the fact sheet

5.1.3.1 Step 1: Determine Whether Secondary Treatment Standards or Equivalent to Secondary Treatment Standards or Adjusted Standards Apply

The first step for permit writers to develop TBELs for municipal dischargers is to determine whether secondary treatment standards (discussed in section 5.1.1 above), equivalent to secondary standards (discussed in section 5.1.1.2 above), or some adjustments to the equivalent to secondary standards (discussed in section 5.1.2 above) apply to the POTW.

An important consideration for permitting authorities is how to treat new POTW discharges that use a waste stabilization pond or trickling filter, or a combination of the two. New facilities or new discharges from trickling filters or waste stabilization ponds often are capable of achieving secondary treatment standards. In the preamble to the secondary treatment regulation (49 FR 37002, September 20, 1984) and in § 133.105(f)(2), EPA noted that when developing permits for new trickling filter and waste

stabilization pond facilities, permitting authorities should consider the ultimate design capability of the treatment process, geographical and climatic conditions, and the performance capabilities of recently constructed facilities in similar situations.

After determining whether secondary treatment standards or equivalent to secondary treatment standards apply to a facility or a discharge, the permit writer applies the appropriate standards to develop effluent limitations. Section 5.1.3.2 below (Step 2) details development of effluent limitations for facilities or discharges where secondary treatment standards apply; section 5.1.3.3 below (Step 3) details development of limitations for facilities that qualify for equivalent to secondary standards; and section 5.1.3.4 below (Step 4) details development of limitations for facilities where adjusted standards apply. It is possible that a facility with multiple biological treatment processes could have limitations based on a combination of the standards (see section 5.1.3.5 below [Step 5]); therefore, those sections are presented as separate steps.

5.1.3.2 Step 2: Calculate Effluent Limitations Based on Secondary Treatment Standards

If the facility being permitted is subject to the secondary treatment standards, the permit writer should complete Step 2. Otherwise, he or she should move to Step 3 in section 5.1.3.3 below.

Applying the secondary treatment standards in NPDES permits is straightforward. Where secondary treatment standards apply, the permit should include effluent limitations in the permit as presented in Exhibit 5-6 below, consistent with the secondary treatment standards and the regulatory requirements in § 122.45(d)(2).

Exhibit 5-6 Effluent limitations calculated from secondary treatment standards

Parameter	Average monthly limitation	Average weekly limitation
BOD_5	30 mg/L (or 25 mg/L $CBOD_5$)	45 mg/L (or 40 mg/L $CBOD_5$)
TSS	30 mg/L	45 mg/L
BOD_5 and TSS removal (concentration)	not less than 85%	N/A
pH	Within the range of 6.0–9.0 standard units at all times (or expressed as instantaneous minimum and maximum limitations)*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0

Certain provisions in the EPA regulations warrant some clarification.

First, the secondary treatment standards are stated as 30-day and 7-day averages, whereas § 122.45(d)(2) requires that effluent limitations for POTWs be expressed, unless impracticable, as average monthly and average weekly limitations. The NPDES regulations in § 122.2 define average monthly and average weekly limitations on a calendar period basis. Therefore, EPA recommends that permit writers apply the 30-day and 7-day average secondary treatment standards directly as average monthly (calendar month) and average weekly (calendar week) discharge limitations.

Second, § 122.45(f)(1) requires that all permit limitations, standards, or prohibitions be expressed in terms of mass except in any of the following cases:

- For pH, temperature, radiation or other pollutants that cannot appropriately be expressed by mass limitations.

- When applicable standards and limitations are expressed in terms of other units of measure.
- If in establishing permit limitations on a case-by-case basis under § 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation, and permit conditions ensure that dilution will not be used as a substitute for treatment.

The first condition applies to pH requirements established by secondary treatment standards. In addition, because the 30-day and 7-day average requirements for BOD_5 and TSS, including percent removal, are expressed in terms of concentration, the second condition applies to the standards. Thus, mass-based discharge limitations are not specifically required to implement secondary treatment standards; however, permit writers can choose to include mass-based limitations in a permit. In general, regulations at § 122.45(b)(1) require using the design flow rate of the POTW to calculate limitations. To calculate a mass-based limitation for a POTW (in pounds per day [lbs/day]) a permit writer would use the equation and follow the example calculations in Exhibit 5-7.

Exhibit 5-7 POTW mass based limitation calculation equation and example calculations

POTW design flow in million gallons per day (mgd)	x	**Concentration-based limitation** in milligrams per liter (mg/L)	x	**Conversion factor** 8.34 with units of (lbs)(L) / (mg)(millions of gallons)

A POTW with a design flow of 2.0 mgd would have mass-based limitations calculated from secondary treatment standards as follows:

Mass-based limitation*	=	**POTW design flow** x **Concentration-based limitation** x **Conversion factor**		
BOD_5				
Average monthly	=	2.0 mgd x 30 mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**500 lbs/day**
Average weekly	=	2.0 mgd x 45 mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**750 lbs/day**
TSS				
Average monthly	=	2.0 mgd x 30mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**500 lbs/day**
Average weekly	=	2.0 mgd x 45mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**750 lbs/day**

* calculated to 2 significant figures

5.1.3.3 Step 3: Calculate Effluent Limitations Based on Equivalent to Secondary Standards

If a facility being permitted is subject to the equivalent to secondary standards without any further adjustments by the state (e.g., ASRs), the permit writer should complete Step 3. Otherwise, he or she should move to Step 4 in section 5.1.3.4 below.

For facilities that qualify for equivalent to secondary standards, effluent limitations must meet the requirements specified in § 133.105 and summarized above in Exhibit 5-3 (not accounting for any further approved adjustments). It is important to note that the equivalent to secondary standards specify the maximum allowable discharge concentration of BOD_5 and TSS and a minimum percent removal requirement for qualified facilities. The regulations at § 133.105(f) require a permitting authority to include more stringent limitations when it determines that the 30-day average and 7-day average BOD_5 and TSS concentrations are achievable through proper operation and maintenance of the treatment works

(based on an analysis of the past performance for an existing facility or considering the design capability of the treatment process and geographical and climatic conditions for a new facility) would enable the treatment works to achieve more stringent limitations than the least stringent effluent quality allowed by the equivalent to secondary standards. As noted above, the regulations at § 133.101(f) define, "effluent concentrations consistently achievable through proper operation and maintenance" as the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions. The 7-day average value is set equal to 1.5 times the 30-day average value.

If an existing facility does not have sufficient data to establish past performance, the permit writer could include the limitations from the previous permit in the new permit and require monitoring to generate the necessary data. In addition, the permit writer could choose to include a provision allowing the permitting authority to reopen and, if necessary, modify the permit after reviewing the additional data collected by the discharger.

As with limitations based on secondary treatment standards (shown in Exhibit 5-6 above), limitations based on equivalent to secondary standards are expressed as average monthly (calendar month) and average weekly (calendar week) limitations. Mass-based limitations can be calculated using the procedures outlined above.

5.1.3.4 Step 4: Calculate Effluent Limitations Based on Adjusted Standards

If a facility being permitted is subject to the adjusted standards as described in section 5.1.2 above, the permit writer should complete Step 4. Otherwise, he or she should move to section 5.1.3.5 below (Step 5).

As discussed in sections 5.1.2.1 and 5.1.2.2 above, the federal regulations at § 133.103(c) allow states to adjust the maximum allowable discharge concentration of TSS for waste stabilization ponds upward from what would otherwise be required by the equivalent to secondary standards, and the regulations at § 133.105(d) give states flexibility to adopt ASRs that modify equivalent to secondary requirements for both BOD_5 and TSS for trickling filter facilities and BOD_5 requirements for waste stabilization pond facilities. Where one or more of the adjusted standards apply, average monthly limitation(s) generally should be set at the lower of the following:

- The 30-day average concentration of the pollutant that could be achievable through proper operation and maintenance of the treatment works.
- The maximum concentration of the pollutant that would be allowed under the adjusted standard.

Permit writers should note, however, that if the state has developed an adjusted TSS standard for waste stabilization ponds consistent with § 133.103(c), the regulations would allow uniform application of that standard to POTWs where waste stabilization ponds are the principal process used for secondary treatment and operation and maintenance data indicate that the equivalent to secondary treatment standards for TSS cannot be achieved.

The average weekly limitation can be set equal to 1.5 times the average monthly limitation and mass-based limitations may be calculated using the procedures outlined above.

5.1.3.5 Step 5: Apply Special Considerations for Further Adjustments

Part 133 allows a permit writer to make further adjustments when calculating effluent limitations derived from secondary treatment standards or equivalent to secondary standards based on several special considerations. The permit writer should determine whether any of the special considerations outlined in this section apply and, as appropriate, make any further adjustments to the concentration limitations or percent removal requirements. The calculated limitations, after making such adjustments, are the final technology-based effluent limitations for the POTW.

Substitution of $CBOD_5$ for BOD_5

Wastewater contains carbonaceous oxygen demanding substances and nitrogenous oxygen demanding substances. A $CBOD_5$ test measures the 5-day carbonaceous biochemical oxygen demand while the BOD_5 test measures the both carbonaceous biochemical oxygen demand and nitrogenous biochemical oxygen demand. During nitrification, nitrifying bacteria use a large amount of oxygen to consume nitrogenous oxygen demanding substances (unoxidized nitrogen and ammonia-nitrogen) and convert these to oxidized nitrate. For wastewaters with significant nitrogen content, basing permit limitations on $CBOD_5$ instead of BOD_5 eliminates the impact of nitrification on discharge limitations and compliance determinations. EPA recognizes that the $CBOD_5$ test can provide accurate information on treatment plant performance in many cases and, in Part 133, allows permit writers to use $CBOD_5$ limitations in place of BOD_5 limitations to minimize false indications of poor facility performance as a result of nitrogenous oxygen demand.

EPA has established $CBOD_5$ standards for cases where secondary treatment standards or equivalent to secondary treatment standards are applied:

- **Secondary Treatment:** The $CBOD_5$ secondary treatment performance standards specified by the regulations are as follows:
  - 25 mg/L as a 30-day average.
  - 40 mg/L as a 7-day average.
- The EPA-approved test procedures in Part 136 include a $CBOD_5$ (nitrogen inhibited) test procedure. Subject to any state-specific requirements, a permit writer can specify these $CBOD_5$ limitations along with $CBOD_5$ monitoring requirements in any POTW permit requiring performance based on secondary treatment standards [§ 133.102(a)(4)].
- **Equivalent to Secondary Treatment:** The $CBOD_5$ equivalent to secondary treatment performance standards specified by the regulations are as follows:
  - No greater than 40 mg/L as a 30-day average.
  - No greater than 60 mg/L as a 7-day average.
- Where data are available to establish $CBOD_5$ limitations, and subject to any state-specific requirements, a permit writer may substitute $CBOD_5$ for BOD_5 and specify $CBOD_5$ limitations and monitoring requirements when applying equivalent to secondary standards.

Substitution of COD or TOC for BOD_5

Chemical oxygen demand (COD) and total organic carbon (TOC) laboratory tests can provide an accurate measure of the organic content of wastewater in a shorter time frame than a BOD_5 test (i.e., several hours versus five days). The regulations at § 133.104(b) allow a permit writer to set limitations for COD or TOC instead of BOD_5 if a long-term BOD_5:COD or BOD_5:TOC correlation has been demonstrated.

Adjustments for Industrial Contributions

Under § 133.103(b), treatment works receiving wastes from industrial categories with effluent limitations guidelines and standards (effluent guidelines) requirements or new source performance standards for BOD_5 or TSS, which are less stringent than the secondary treatment standards or, if applicable, the equivalent to secondary treatment standards in Part 133, can qualify to have their 30-day BOD_5 or TSS limitations adjusted upward provided that the following are true:

- The adjusted 30-day limitations are not greater than the limitations in effluent guidelines or new source performance standards, as applicable, for the industrial category.
- The flow or loading of BOD_5 or TSS introduced by the industrial category exceeds 10 percent of the design flow or loading to the POTW.

When making this adjustment, the Part 133 values for BOD_5 and TSS should be adjusted proportionately. Accordingly, a permit writer should make the adjustment using a flow-weighted or loading-weighted average of the two concentration limitations (i.e., the limitations developed from effluent guidelines for the industrial facility and the secondary or equivalent to secondary limitations).

Adjustments to Percent Removal Requirements

The 85 percent removal requirement (for a 30-day average) in secondary treatment standards was originally established to achieve two basic objectives:

- To encourage municipalities to remove high quantities of infiltration and inflow (I/I) from their sanitary sewer systems.
- To prevent intentional dilution of influent wastewater.

In facilities with dilute influent that is not attributable to high quantities of I/I or intentional dilution, the percent removal requirement could result in forcing *advanced treatment* rather than the intended secondary treatment. Advanced treatment generally refers to treatment processes following secondary treatment (e.g., filtration, chemical addition, or two-stage biological treatment). Advanced treatment can achieve significantly greater pollutant removals than secondary treatment processes but at a higher cost.

The regulations at §§ 133.103(a), (d) and (e) provide that, under certain circumstances, permit writers may set less stringent limitations for BOD_5 and TSS percent removal. The specific circumstances and the potential adjustments to the percent removal requirement are as follows:

- **Treatment works that receive less concentrated wastes from combined sewer systems** are eligible to have less stringent monthly percent removal limitations during wet-weather events [§ 133.103 (a)] and, under certain conditions, less stringent percent removal requirements or a mass loading limitation instead of a percent removal requirement during dry weather [§ 133.103 (e)]. The permit writer must determine on a case-by-case basis whether any attainable percentage removal level can be defined during wet weather and, if so, what the level should be. To qualify for a less stringent percent removal requirement or substitution of a mass limitation during dry weather, the discharger must satisfactorily demonstrate the following:

  1. <u>The facility is consistently meeting, or will consistently meet, its permit effluent concentration limitations, but cannot meet its percent removal limitations because of less concentrated influent</u>. A permitting authority should consider establishing criteria for

documenting what constitutes consistently meeting concentration limitations and what constitutes being unable to meet percent removal limitations because of less concentrated influent.

2. To meet the percent removal requirements, the facility would have to achieve significantly more stringent effluent concentrations than would otherwise be required by the concentration-based standards. Each permitting authority also should consider establishing criteria for demonstrating that this condition is met (e.g., because of dilute influent, X percent of the time a discharger would be forced to meet concentration requirements that are X percent more stringent than the concentration limitations otherwise applicable to satisfy the percent removal requirements).

3. The less concentrated influent wastewater does not result from either excessive infiltration or clear water industrial discharges during dry weather periods. The determination of whether the less concentrated wastewater results from excessive infiltration is discussed in regulations at § 35.2005(b)(28). This regulation defines nonexcessive infiltration as the quantity of flow that is less than 120 gallons per capita per day (domestic base flow and infiltration) or the quantity of infiltration that cannot be economically and effectively eliminated from a sewer system as determined in a cost-effectiveness analysis. The regulations at § 133.103(e) include the additional criterion that either 40 gallons per capita per day or 1,500 gallons per inch diameter per mile of sewer may be used as the threshold value for that portion of dry-weather base flow attributed to infiltration. If the less concentrated influent wastewater is the result of clear water industrial discharges, then the treatment works must control such discharges pursuant to Part 403.

- **Treatment works that receive less concentrated wastes from separate sewer systems** can qualify to have less stringent percent removal requirement or receive a mass loading limitation instead of the percent removal requirement provided the treatment plant demonstrates all of the following [§ 133.103(d)]:

  1. The facility is consistently meeting or will consistently meet its permit effluent concentration limitations but cannot meet its percent removal limitations because of less concentrated influent wastewater. For additional detail on this criterion, see discussion above for combined sewers during dry weather.

  2. To meet the percent removal requirements, the facility would have to achieve significantly more stringent limitations than would otherwise be required by the concentration-based standards. For additional detail on this criterion, see the discussion above for combined sewers during dry weather.

  3. The less concentrated influent wastewater does not result from excessive infiltration and inflow (I/I). The regulation indicates that the determination of whether the less concentrated wastewater is the result of excessive I/I will use the definition of excessive I/I at § 35.2005(b)(16), plus the additional criterion that flow is nonexcessive if the total flow to the POTW (i.e., wastewater plus inflow plus infiltration) is less than 275 gallons per capita per day. The regulation at § 35.2005(b)(16) defines excessive I/I as the quantities of I/I that can be economically eliminated from a sewer system as determined in a cost-effectiveness analysis that compares the costs for correcting the I/I conditions to the total costs for

transportation and treatment of the I/I. This regulation also refers to definitions of nonexcessive I/I in §§ 35.2005(b)(28) and 35.2005(b)(29).

Secondary Treatment Variance for Ocean Discharge—CWA Section 301(h) Variance

CWA section 301(h) provides for variances from secondary treatment standards for POTWs that discharge into ocean waters if the modified requirements do not interfere with attainment or maintenance of water quality. Permit writers should note that the deadline to apply for a CWA section 301(h) variance (December 29, 1982) has passed, thus no new facilities may apply for this variance.

Eligible POTW applicants meeting the set of environmentally stringent criteria in CWA section 301(h) receive a modified NPDES permit waiving the secondary treatment requirements for the conventional pollutants of BOD_5, TSS, and pH. EPA issued regulations, developed the *Amended Section 301(h) Technical Support Document*[2], and prepared a website titled Amendments to Regulations Issued, the Clean Water Act Section 301 (h) Program <www.epa.gov/owow/oceans/discharges/301h.html>. EPA has promulgated specific regulations pertaining to CWA section 301(h) that are provided in Part 125, Subpart G.

All CWA section 301(h) variance modified permits must contain the following specific permit conditions:

- Effluent limitations and mass loadings that will assure compliance with Part 125, Subpart G.
- Requirements for pretreatment program development, a nonindustrial toxics control program, and control of combined sewer overflows.
- Monitoring program requirements that include biomonitoring, water quality, and effluent monitoring.
- Reporting requirements that include the results of the monitoring programs.

No new or substantially increased discharges from the point source of the affected pollutant can be released above that volume of discharge specified in the permit.

5.1.3.6 Step 6: Document the Application of Secondary or Equivalent to Secondary Treatment Standards and all Adjustments and Considerations in the Fact Sheet

Permit writers need to document their application of secondary or equivalent to secondary treatment standards in the NPDES permit fact sheet for municipal facilities. The permit writer should clearly identify the data and information used to determine whether secondary treatment standards or equivalent to secondary treatment standards or adjusted standards apply and how that information was used to derive effluent limitations for the permit. The permit writer should also note all adjustments and special considerations in the fact sheet. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the NPDES permit properly incorporates secondary treatment standards.

5.2 Technology-Based Effluent Limitations for Industrial (Non-POTW) Dischargers

EPA is required to promulgate technology-based limitations and standards that reflect pollutant reductions that can be achieved by categories, or subcategories, of industrial point sources using specific

technologies (including process changes) that EPA identifies as meeting the statutorily prescribed level of control under the authority of CWA sections 301, 304, 306, 307, 308, 402, and 501 (33 *United States Code* [U.S.C.] 1311, 1314, 1316, 1318, 1342, and 1361). Those national industrial wastewater controls are called effluent limitations guidelines and standards (effluent guidelines). Unlike other CWA tools, such as water quality standards, effluent guidelines are national in scope and establish performance standards for all facilities within an industrial category or subcategory.

For point sources that introduce pollutants directly into the waters of the United States (direct dischargers), the effluent guidelines promulgated by EPA are implemented through NPDES permits as authorized in CWA sections 301(a), 301(b), and 402. For sources that discharge to POTWs (indirect dischargers), EPA promulgates pretreatment standards that apply directly to those sources and are enforced by POTWs and state and federal authorities as authorized in CWA sections 307(b) and (c).

When developing TBELs for industrial (non-POTW) facilities, the permit writer must consider all applicable technology standards and requirements for all pollutants discharged. Without applicable effluent guidelines for the discharge or pollutant, permit writers must identify any needed TBELs on a case-by-case basis, in accordance with the statutory factors specified in CWA sections 301(b)(2) and 304(b). The site-specific TBELs reflect the BPJ of the permit writer, taking into account the same statutory factors EPA would use in promulgating a national effluent guideline regulation, but they are applied to the circumstances relating to the applicant. The permit writer also should identify whether state laws or regulations govern TBELs and might require more stringent performance standards than those required by federal regulations. In some cases, a single permit could have TBELs based on effluent guidelines, BPJ, and state law, as well as WQBELs based on water quality standards.

Sections 5.2.1 and 5.2.2 below provide an overview of effluent guidelines and development of TBELs in NPDES permits using the effluent guidelines. Section 5.2.3 below discusses the development of TBELs in the absence of effluent guidelines (i.e., case-by-case limitations developed using BPJ).

5.2.1 Effluent Guidelines

Congress saw the creation of a single national pollution control requirement for each industrial category, based on the best technology the industry could afford, as a way to reduce the potential creation of *pollution havens* and to attain a high-level water quality in the nation's waters. Consequently, EPA's goal in establishing effluent guidelines is to ensure that industrial facilities with similar characteristics will meet similar effluent limitations representing the best pollution control technologies or pollution prevention practices regardless of their location or the nature of the receiving water into which the discharge is made. In establishing the effluent guidelines, EPA must consider the industry-wide economic achievability of implementing the technology and the incremental costs in relation to the pollutant-reduction benefits.

Effluent guidelines can include numeric and narrative limitations, including best management practices (BMPs), to control the discharge of pollutants from categories of point sources. The limitations are based on data characterizing the performance of technologies available and, in some cases, from modifying process equipment or the use of raw materials. Although the regulations do not require the use of any particular treatment technology, they do require facilities to achieve effluent limitations that reflect the proper operation of the *model* technologies selected as the basis for the effluent guidelines and from which the performance data were obtained to generate the limitations. Therefore, each facility has the

discretion to select any technology design and process changes necessary to meet the performance-based discharge limitations and standards specified by the effluent guidelines.

As of the date of this manual's publication, EPA has issued effluent guidelines for 56 industrial categories, which apply to between 35,000 and 45,000 facilities that discharge directly to waters of the United States and another 12,000 facilities that discharge into POTWs. The regulations prevent the discharge of more than 1.2 billion pounds of toxic (priority) and nonconventional pollutants each year. EPA's Effluent Guidelines Program Website <www.epa.gov/guide/> provides information on existing effluent guidelines, current effluent guidelines rulemaking, and the effluent guidelines planning process.

5.2.1.1 Statutory Foundation for Effluent Guidelines

The CWA directs EPA to promulgate effluent guidelines reflecting pollutant reductions that can be achieved by existing facilities in categories or subcategories of industrial point sources using specific control technologies. In addition, EPA is required to develop effluent guidelines for new sources. Those levels of control are summarized below and in Exhibit 5-8.

Exhibit 5-8 Summary of CWA technology levels of control

Type of sites regulated	BPT	BCT	BAT	NSPS	PSES	PSNS
Existing Direct Dischargers	X	X	X			
New Direct Dischargers				X		
Existing Indirect Dischargers					X	
New Indirect Dischargers						X
Pollutants regulated	**BPT**	**BCT**	**BAT**	**NSPS**	**PSES**	**PSNS**
Conventional Pollutants	X	X		X		
Nonconventional Pollutants	X		X	X	X	X
Toxic (Priority) Pollutants	X		X	X	X	X

Best Practicable Control Technology Currently Available (BPT)

BPT is the first level of technology-based effluent controls for direct dischargers and it applies to all types of pollutants (conventional, nonconventional, and toxic). The Federal Water Pollution Control Act (FWPCA) amendments of 1972 require that when EPA establishes BPT standards, it must consider the industry-wide cost of implementing the technology in relation to the pollutant-reduction benefits. EPA also must consider the age of the equipment and facilities, the processes employed, process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate [CWA section 304(b)(1)(B)]. Traditionally, EPA establishes BPT effluent limitations on the basis of the average of the best performance of well-operated facilities in each industrial category or subcategory. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if the Agency determines that the technology can be practically applied. See CWA sections 301(b)(1)(A) and 304(b)(1)(B).

Best Conventional Pollutant Control Technology (BCT)

The 1977 CWA requires EPA to identify effluent reduction levels for conventional pollutants associated with BCT for direct discharges from existing industrial point sources. As with BPT, when establishing BCT the Agency considers the age of the equipment and facilities, the processes employed, process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate [CWA section 304(b)(4)(B)]. In addition, EPA also considers a two-part *cost reasonableness* test, as required by CWA section 304(b)(4)(B), which includes (1) consideration of the reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived and (2) a comparison of the cost and level of reduction of such pollutants from the discharge from POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources. EPA explained its methodology for developing BCT limitations in detail in 51 FR 24974, July 9, 1986 <www.epa.gov/npdes/pubs/fr_bct_1986.pdf>. See CWA sections 301(b)(2)(E) and 304(b)(4).

Best Available Technology Economically Achievable (BAT)

For the direct discharge of toxic and non-conventional pollutants, EPA promulgates effluent guidelines based on BAT. The FWPCA amendments of 1972 require EPA to consider the cost of achieving effluent reductions when defining BAT; however, they do not specifically require EPA to balance the cost of implementation against the pollution reduction benefit. The technology selected for BAT must be economically achievable [CWA section 301(b)(2)(A)]. EPA generally defines BAT on the basis of the performance associated with the best control and treatment measures that facilities in an industrial category are capable of achieving. Like BPT and BCT, other factors EPA must consider in assessing BAT include the age of equipment and facilities involved, the process employed, process changes, non-water quality environmental impacts, including energy requirements, and other such factors as the EPA Administrator deems appropriate [CWA section 304(b)(2)(B)]. The Agency retains considerable discretion in assigning the weight accorded to these factors. BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. Where existing performance is uniformly inadequate, BAT may reflect a higher level of performance than is currently being achieved within a subcategory on the basis of technology transferred from a different subcategory or category. BAT may be based on process changes or internal controls, even when those technologies are not common industry practice. See CWA sections 301(b)(2)(A), (C), (D) and (F) and 304(b)(2).

New Source Performance Standards (NSPS)

NSPS reflect effluent reductions that are achievable by direct dischargers based on the best available demonstrated control technology. New sources have the opportunity to install the best and most efficient production processes and wastewater treatment technologies at the time of construction. As a result, NSPS should represent the most stringent controls attainable through the application of the best available demonstrated control technology for all pollutants (i.e., conventional, nonconventional, and toxic pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements. See CWA section 306.

Pretreatment Standards for Existing Sources (PSES)

PSES are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs, including incompatibility with the POTW's chosen biosolids (sewage sludge) disposal methods. The categorical pretreatment standards for existing indirect dischargers are technology-based and are analogous to BAT. The general pretreatment regulations, which set forth the framework for the implementation of national pretreatment standards, are at Part 403. See CWA section 307(b).

Pretreatment Standards for New Sources (PSNS)

Like PSES, PSNS are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. PSNS are to be issued at the same time as NSPS. New indirect dischargers have the opportunity to incorporate into their facilities the best available demonstrated technologies at the time of construction. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS. See CWA section 307(c).

EPA typically does not establish pretreatment standards for conventional pollutants (e.g., BOD_5, TSS, oil and grease) because POTWs are designed to treat such pollutants, but EPA has exercised its authority to establish categorical pretreatment standards for conventional pollutants as surrogates for toxic or nonconventional pollutants or to prevent interference. For example, EPA established categorical pretreatment standards for new and existing sources with a one-day maximum concentration of 100 mg/L oil and grease in the Petroleum Refining Point Source Category in Part 419 based on "the necessity to minimize [the] possibility of slug loadings of oil and grease being discharged to POTWs."[3]

The final statutory deadline for meeting BPT requirements was July 1, 1977, and the final statutory deadline for meeting BCT and BAT requirements was March 31, 1989. When applying applicable effluent guidelines, permit writers should note that they do not have the authority to extend the statutory deadlines in an NPDES permit; thus, all applicable technology-based requirements (i.e., effluent guidelines and case-by-case limitations based on BPJ) must be applied in NPDES permits without the benefit of a compliance schedule. In addition, though NSPS do not have specific dates as compliance deadlines, they are effective on the date the new source begins discharging. The facility must demonstrate compliance with NSPS within 90 days of discharge [see § 122.29(d)]. For more information on determining whether a discharge is subject to NSPS, see Appendix D of this manual. For additional information on the statutory and regulatory history of the NPDES program, see section 1.2 of this manual.

5.2.1.2 EPA's Development of Effluent Guidelines

EPA establishes national effluent guidelines for a specific industrial sector by regulation after considering an in-depth engineering and economic analysis of the industrial sector. EPA's Industrial Regulations Website <www.epa.gov/guide/industry.html> provides development documents for some specific industry categories (e.g., Iron and Steel Manufacturing and Metal Products and Machinery). Those documents contain additional information on how EPA develops effluent guidelines.

For each industrial sector, EPA assesses the performance and availability of the best pollution control technologies and pollution prevention practices that are available for an industrial category or subcategory. The effluent guidelines are promulgated for various industrial categories in 40 CFR, Chapter I, Subchapter N - Effluent Guidelines and Standards - Parts 400-471 <www.epa.gov/lawsregs/search/40cfr.html>.

In promulgating effluent guidelines, EPA may divide an industrial point source category into groupings of subcategories to provide a method for addressing variations between products, raw materials, processes, and other factors that result in distinctly different characteristics. Regulation of an industrial category using subcategories allows each subcategory to have a uniform set of requirements that take into account technological achievability and economic impacts unique to that subcategory. Grouping similar facilities into subcategories increases the likelihood that the regulations are practicable and diminishes the need to address variations between facilities within a category through a variance process. For more on variances, see section 5.2.2.7 below. EPA considers a number of different subcategorization factors during an effluent guidelines rulemaking, including the following:

- Manufacturing products and processes.
- Raw materials.
- Wastewater characteristics.
- Facility size.
- Geographical location.
- Age of facility and equipment.
- Wastewater treatability.

For each possible treatment technology option for an industry, EPA conducts an analysis of industry-wide incremental compliance costs, pollutant loadings and removals, and related non-water quality effects. The Agency also performs an economic analysis to assess the financial impact on the industry of implementing each option. That entire process involves data collection, rigorous data review, engineering analysis, and public comment. EPA selects a technology to serve as the *model* technology for pollutant removal for each required level of control (i.e., BPT, BCT, BAT, NSPS, PSES, and PSNS). Limitations and other requirements in the effluent guidelines for each level of control are based on application of the model technology to the category or subcategory of facilities.

Effluent guidelines are not always established for every pollutant present in a point source discharge. In many instances, EPA promulgates effluent guidelines for an *indicator* pollutant. Industrial facilities that comply with the effluent guidelines for the indicator pollutant will also control other pollutants (e.g., pollutants with a similar chemical structure). For example, EPA may choose to regulate only one of several metals present in the effluent from an industrial category, and compliance with the effluent guidelines will ensure that similar metals present in the discharge are adequately controlled. Additionally, for each industry sector EPA typically considers whether a pollutant is present in the process wastewater at treatable concentrations and whether the model technology for effluent guidelines effectively treats the pollutant. For example, see Figure 6-1 Pollutant of Concern Methodology <www.epa.gov/guide/cwt/final/develop/ch6.pdf> on page 6-4 of the *Centralized Waste Treatment category Technical Development Document*.

The CWA requires EPA to annually review existing effluent guidelines for both direct and indirect dischargers. CWA section 304(m) also requires EPA to publish an effluent guidelines program plan every 2 years. As part of the development of the biennial plan, the public is provided an opportunity to comment on a *preliminary* plan before it is finalized. The preliminary plan is published in odd-numbered years, and the final plan is published in even-numbered years. EPA encourages permit writers to participate in the effluent guidelines planning process and comment on the preliminary effluent guidelines program plans presented on the Effluent Guidelines Biennial Plan Website <www.epa.gov/guide/304m/index.html>.

5.2.1.3 Types of Limitations in Effluent Guidelines

Although the requirements in effluent guidelines generally are numeric limitations on the mass or concentration of a pollutant that can be discharged directly into waters of the United States, CWA section 502(11) defines *effluent limitation* broadly. This section describes several types of possible expressions for the limitations found in effluent guidelines. The permit writer should note that the limitations in effluent guidelines might need to be translated into an appropriate form to be included as effluent limitations in an NPDES permit. That process is discussed further in section 5.2.2 below.

Mass- or Concentration-based Numeric Limitations

Limitations in effluent guidelines generally are expressed as numeric values, which are upper bounds of the amount of pollutant that may be discharged. For most pollutants, these limitations are mass-based or concentration-based values. They are, in effect, measures of how well the production, wastewater treatment, and pollution prevention processes must be operated. In the course of developing effluent guidelines regulations, EPA uses data on a number of different pollutants from facilities with the selected model technologies to determine the appropriate numeric limitations. The limitations generally consist of upper bounds (maximum values) established for both the daily discharge and for the average monthly discharge.

In developing numeric limitations in effluent guidelines, EPA first determines an average performance level (the *long-term average*) that a facility with well-designed and operated model technologies reflecting the appropriate level of control is capable of achieving. That long-term average is calculated from data taken from facilities using the model technologies that were selected as a basis for the limitations. EPA expects that all facilities subject to the limitations will design and operate their treatment systems to achieve the long-term average performance level consistently because facilities with well-designed and operated model technologies have demonstrated that it can be done. The technical development document for the effluent guidelines usually identifies the long-term average for the model technologies; however, they generally are not part of the limitations in the effluent guidelines or TBELs in the permit. The limitations generally are expressed as *maximum daily* and *average monthly limitations* (see definitions in Exhibit A-2 in Appendix A of this document) that include an allowance for variability around the long-term average.

EPA acknowledges that process and treatment systems have inherent variability and, therefore, incorporates an allowance for this variation into the limitations specified in the effluent guidelines. That allowance is based on statistical analysis of the data from facilities using the model technologies. The limitations included in effluent guidelines incorporate all components of variability including shipping, sampling, storage, and analytical variability. By accounting for those reasonable excursions above the long-term average, the limitations in effluent guidelines generally are well above the actual long-term averages. If a facility operates its treatment system to meet the long-term average, EPA expects the facility will be able to meet the limitations specified in the effluent guidelines based on that long-term average.

EPA has different objectives in establishing maximum daily and average monthly limitations in effluent guidelines. In establishing maximum daily limitations, EPA's objective is to restrict the discharges on a daily basis at a level that is achievable for a facility that targets its treatment at the long-term average. In establishing average monthly limitations, EPA's objective is to provide an additional restriction to help

ensure that facilities target their average discharges in a manner that will achieve the long-term average. The average monthly limitation requires continuous dischargers to provide ongoing control on a monthly basis that complements controls imposed by the maximum daily limitation. To meet the average monthly limitation, a facility must counterbalance a value near the maximum daily limitation with one or more values well below the maximum daily limitation. To achieve compliance, the values must result in an average monthly value at or below the average monthly limitation. As explained below, EPA uses a smaller percentile basis for the average monthly limitation than the maximum daily limitation to encourage facilities to target their systems to a value closer to the long-term average.

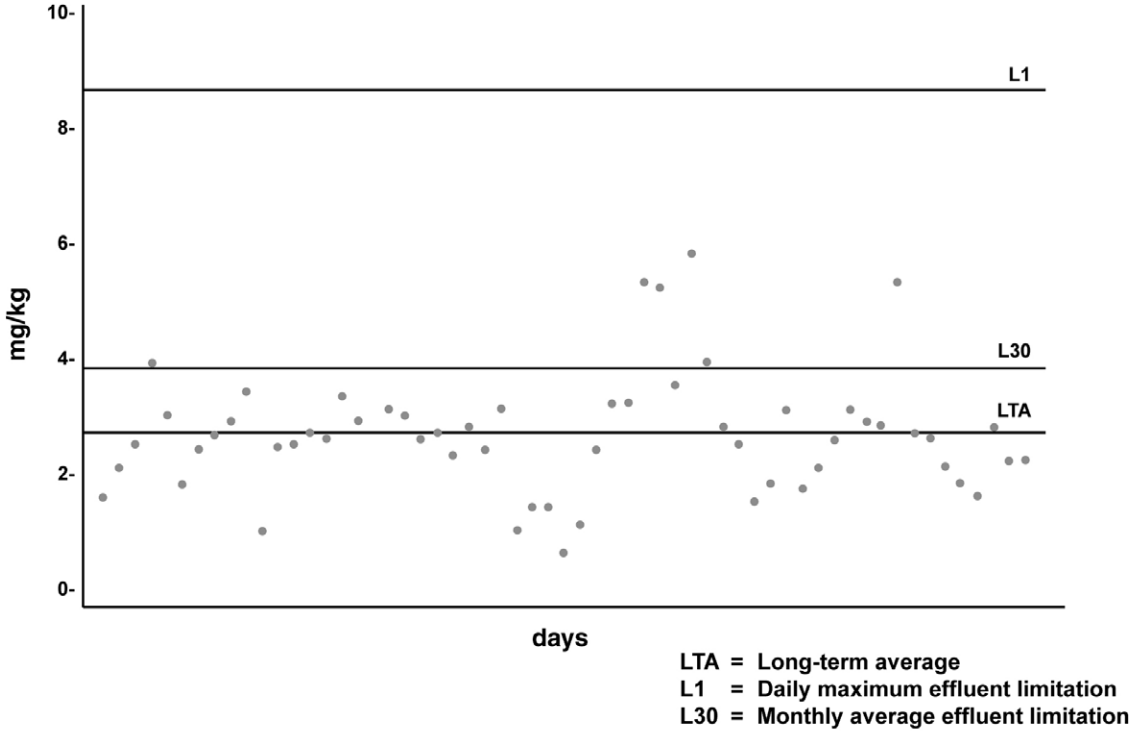
EPA generally uses statistical procedures to determine the values of the limitations specified in the effluent guidelines. Those procedures involve fitting effluent data to distributions and using estimated upper percentiles of the distributions. EPA defines the maximum daily limitation as an estimate of the 99th percentile of the distribution of the daily measurements. The average monthly limitation is an estimate of the 95th percentile of the distribution of the monthly averages of the daily measurements. EPA bases its limitations on percentiles chosen with the intention that they be high enough above the long-term average to accommodate reasonably anticipated variability within control of the facility. In conjunction with the statistical methods, EPA performs an engineering review to verify that the limitations are reasonable on the basis of the design and expected operation of the control technologies and the facility process conditions. Such limitations are translated into effluent limitations in a facility's NPDES permit. Facilities must comply with the effluent limitations in their permits at all times. EPA has prevailed in several judicial challenges to its selection of percentiles and on other issues related to limitations specified in effluent guidelines. [See, for example, *Chemical Manufacturers Association v. U.S. Environmental Protection Agency*, 870 F.2d 177, 230 (5th Cir. 1989) and *National Wildlife Federation, et al v. Environmental Protection Agency*, 286 F.3d 554 (D.C. Cir. 2002)]

Exhibit 5-9 depicts an example of TSS data for a facility that is operating around a required long-term average level for TSS. The dots represent daily measurements, and the reference lines show the values for the long-term average (LTA), the maximum daily limitation (L1), and the average monthly limitation (L30). The facility has demonstrated compliance with both the maximum daily and average monthly limitations. Daily measurements include values both above and below the long-term average; however, all the data values are below the maximum daily limitation. Some individual daily values exceed the average monthly limitation; however, within each month, the average of the daily values is less than the average monthly limitation.

EPA generally exercises four basic alternatives in setting mass- or concentration-based numeric limitations specified in effluent guidelines:

- Mass-based, production-normalized limitations (e.g., the pollutant discharge is not to exceed 1 pound per 1,000 pounds of production).
- Mass-based, flow-normalized limitations (e.g., the pollutant discharge is not to exceed the mass determined by multiplying the process wastewater flow subject to the effluent guideline by the concentration requirement in the guideline).
- Concentration-based limitations (e.g., the pollutant discharge is not to exceed 1 mg of pollutant per liter of wastewater).
- Limitations requiring *zero discharge* of specific pollutants or all pollutants.

Exhibit 5-9 Visual example of TSS LTA, maximum daily limitation and average monthly limitation



Except where a limitation requiring *zero discharge* of pollutants is applicable, EPA generally prefers setting production-normalized, mass-based limitations specified in effluent guidelines, where feasible, because production normalized limitations can reflect some expectation that the facility will conserve water and can reduce any potential for substituting dilution for treatment. EPA generally establishes concentration-based effluent guidelines when production and achievable wastewater flow cannot be correlated nationally. For example, in the Metal Finishing point source Category (Part 433), the Agency considered but decided against expressing the effluent guidelines as production-normalized mass-based effluent guidelines, "With the wide range of operations, product quality requirements, existing process configurations, and difficulties in measuring production, no consistent production normalizing relationship could be found. Concentration-based limits, however, can be consistently attained throughout the industry." [See 47 FR 38465, 31 August 1982.]

Numeric Limitations Established at Minimum Levels

Using percentile estimates to set limitations in effluent guidelines is not a requirement under the CWA. In some cases, the model technology for treating a pollutant might be capable of removing that pollutant to levels that cannot be reliably measured with existing analytical methods. EPA sometimes sets a requirement in the effluent guidelines that the concentration of a pollutant in the discharge must be below a *minimum level* or ML. The ML is the lowest level at which the entire analytical system must give a recognizable signal and an acceptable calibration point for the pollutant being analyzed. Where a limitation in the effluent guidelines is set at *less than the ML*, the value of the ML is specified in the effluent guidelines regulation on the basis of the analytical methods that EPA used to chemically analyze wastewaters in developing the regulation. For example, in the Pulp, Paper, and Paperboard point source

category (Part 430) the Daily Maximum BAT effluent guideline for the Tetrachlorodibenzofuran (TCDF) congener of dioxin is expressed as <*ML* for papergrade sulfite (Subpart E) mills, which means "less than the minimum level specified in part 430.01(i)" (i.e., 10 picograms/liter for TCDF). If, in the future, analytical methods become more sensitive with lower MLs, EPA would determine whether the technologies for reducing the amount of the pollutant in the discharge are capable of achieving more stringent limitations and, thus, whether it would be appropriate to modify the requirements of the effluent guideline.

EPA has not established average monthly limitations in effluent guidelines when the maximum daily limitation is an ML limitation. The purpose of an average monthly limitation is to require continuous dischargers to provide better control, on a monthly basis, than required by the maximum daily limitation. However, for these pollutants, the data were determined by analytical methods that could not measure below the ML specified in the regulations. Thus, even if a permitting authority requires monitoring for the pollutants more frequently than once a month, average monthly limitations would still be expressed as *less than the ML* or < *ML*.

Other Expressions for Numeric Limitations

EPA also promulgates effluent guidelines for pollutants that cannot be expressed in terms of mass or concentration (e.g., pH, temperature, radiation) or are better expressed through other means (e.g., unitless ratios). For example, pH is generally expressed as an acceptable range (e.g., 6.0–9.0 standard pH units).

Nonnumeric Effluent Limitations

In some cases, EPA includes nonnumeric or narrative effluent limitations rather than, or in addition to, numeric limitations in effluent guidelines. Nonnumeric effluent limitations might include specific BMPs or requirements to minimize or eliminate discharges. CWA sections 304(e), 308(a), 402(a), and 501(a) authorize the Administrator to prescribe BMPs as part of effluent guidelines and as part of an NPDES permit. CWA section 304(e) authorizes EPA to include supplemental BMPs in effluent guidelines for toxic or hazardous pollutants for the purpose of controlling "plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage." Several effluent guidelines include BMPs as requirements. Some effluent guidelines, such as the Concentrated Aquatic Animal Production point source category (Part 451), include the BMPs requirement exclusively. Section 9.1.2 of this manual further discusses BMPs.

CWA section 402(a)(1) and (2) and the NPDES regulations at § 122.44(k) also authorize BMPs in NPDES permits to control or abate the discharge of pollutants when numeric effluent limitations are infeasible, or when the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

Once EPA establishes effluent guidelines, the permit writer is responsible for translating the limitations and other requirements of the effluent guidelines into TBELs and other conditions appropriate for inclusion in an NPDES permit. Section 5.2.2 below discusses a step-by-step approach for applying effluent guidelines through NPDES permits.

5.2.2 Applying Effluent Guidelines through NPDES Permits

Permit writers need to have a detailed knowledge of the industrial facility applying for a new or reissued NPDES permit to identify applicable effluent guidelines and know how to use them to derive TBELs. This section provides a step-by-step procedure for applying effluent guidelines to direct discharges through NPDES permits as shown in Exhibit 5-10.

Exhibit 5-10 Steps for applying effluent guidelines to direct discharges

Step 1.	Learn about the industrial discharger
Step 2.	Identify the applicable effluent guidelines category(ies)
Step 3.	Identify the applicable effluent guidelines subcategory(ies)
Step 4.	Determine whether existing or new source standards apply
Step 5.	Calculate TBELs from the effluent guidelines
Step 6.	Account for overlapping or multiple effluent guidelines requirements
Step 7.	Apply additional regulatory considerations in calculating TBELs
Step 8.	Apply additional effluent guidelines requirements
Step 9.	Document the application of effluent guidelines in the fact sheet

5.2.2.1 Step 1: Learn About the Industrial Discharger

To write a defensible permit, the permit writer should have a solid understanding of the facility's operations. The permit writer should gather sufficient information to identify applicable effluent guidelines and derive TBELs. Facility-specific information the permit writer is likely to need includes the following:

- Industrial processes and raw materials.
- Products and services.
- Amount of manufacturing production or servicing.
- Number of production and non-production days.
- Current pollution prevention practices and wastewater treatment technology(ies).
- Discharge location of the wastewater pollutants and potential compliance sampling points.
- The source and characteristics of the wastewaters (including flow) and pollutants that are being discharged or have the potential to be discharged from the facility.

Sources of information include the facility's permit application, the current permit and fact sheet (if the facility is permitted), discharge monitoring reports, site visits, site inspections (such as compliance evaluation inspections for an existing permit), and other information submitted by the facility. The permit writer also should identify any information that would assist in determining whether the facility or part of the facility is considered a new source (e.g., age of facility and equipment).

5.2.2.2 Step 2: Identify the Applicable Effluent Guidelines Category(ies)

As noted above, EPA's effluent guidelines are at 40 CFR, Chapter I, Subchapter N - Effluent Guidelines and Standards, Parts 400–471 <www.epa.gov/lawsregs/search/40cfr.html>. A summary of promulgated effluent guidelines is presented on EPA's Industrial Regulations Website <www.epa.gov/guide/industry.html> and in Exhibit 5-11 below.

Exhibit 5-11 Table of existing point source categories (June 2010)

Industry category (listed alphabetically)	40 CFR Part	Industry category (listed alphabetically)	40 CFR Part
Aluminum Forming	467	Meat and Poultry Products	432
Asbestos Manufacturing	427	Metal Finishing	433
Battery Manufacturing	461	Metal Molding and Casting	464
Canned and Preserved Fruits and Vegetable Processing	407	Metal Products and Machinery	438
Canned and Preserved Seafood Processing	408	Mineral Mining and Processing	436
Carbon Black Manufacturing	458	Nonferrous Metals Forming and Metal Powders	471
Cement Manufacturing	411	Nonferrous Metals Manufacturing	421
Centralized Waste Treatment	437	Oil and Gas Extraction	435
Coal Mining	434	Ore Mining and Dressing	440
Coil Coating	465	Organic Chemicals, Plastics, and Synthetic Fibers	414
Concentrated Animal Feeding Operations (CAFOs)	412	Paint Formulating	446
Concentrated Aquatic Animal Production	451	Paving and Roofing Materials (Tars and Asphalt)	443
Copper Forming	468	Pesticide Chemicals	455
Dairy Products Processing	405	Petroleum Refining	419
Electrical and Electronic Components	469	Pharmaceutical Manufacturing	439
Electroplating*	413	Phosphate Manufacturing	422
Explosives Manufacturing	457	Photographic	459
Ferroalloy Manufacturing	424	Plastic Molding and Forming	463
Fertilizer Manufacturing	418	Porcelain Enameling	466
Glass Manufacturing	426	Pulp, Paper, and Paperboard	430
Grain Mills	406	Rubber Manufacturing	428
Gum and Wood Chemicals	454	Soaps and Detergents Manufacturing	417
Hospitals	460	Steam Electric Power Generating	423
Ink Formulating	447	Sugar Processing	409
Inorganic Chemicals	415	Textile Mills	410
Iron and Steel Manufacturing	420	Timber Products Processing	429
Landfills	445	Transportation Equipment Cleaning	442
Leather Tanning and Finishing	425	Waste Combustors	444

* This category contains only categorical pretreatment standards (no effluent guidelines for direct dischargers).

The following sources of information might be helpful in identifying applicable effluent guidelines for a facility:

- **CFR titles and applicability section of the effluent guidelines**. This is first place to look for information for identifying applicable effluent guidelines. Each effluent guidelines regulation includes an applicability section for the category or each subcategory of the industry. The applicability section gives a general description of the types of facilities regulated by the effluent guidelines. The applicability sections often define certain industrial operations or other criteria (e.g., production or process wastewater flow thresholds) that identify whether a facility is regulated by the effluent guidelines.

- **North American Industry Classification System (NAICS) and Standard Industrial Classification (SIC)**. The current NAICS <www.census.gov/epcd/www/naics.html> and former SIC codes <www.census.gov/epcd/www/naicstab.htm> could be helpful to determine the appropriate industrial category(ies) for a facility. NAICS and SIC codes were developed and are maintained by the federal government as a way to classify establishments by type of activity for comparing economic and other types of facility-specific data. Although SIC codes provide a helpful starting point for categorizing a facility, permit writers should be cautious of relying exclusively on SIC codes for determining the appropriate industrial category. SIC codes were not developed using EPA's industrial classification scheme, or vice versa, and, therefore, the codes might not always correspond exactly with the categorization process. In addition, more than one SIC code might apply to a single facility. Item V-II of NPDES Application Form l requires that the applicant provide the SIC code for the activity covered by the permit application. In some instances, the SIC code will identify both the industrial category and the subcategory of a facility. Sometimes the SIC code might identify the appropriate industrial category but not the subcategory. Exhibit 5-12 presents two examples of how a permit writer might identify the applicable effluent guidelines using the facilities SIC codes.

Exhibit 5-12 Examples of identifying applicable effluent guidelines using SIC codes

Example 1

A facility that performs the primary smelting and refining of copper reports SIC code 3331 in its NPDES permit application. By scanning the list of industrial point source categories, the permit writer can determine that the facility is regulated by effluent guidelines in the Nonferrous Metals Manufacturing point source category (Part 421). In this case, the SIC code also indicates that the facility is likely regulated by effluent guidelines in the Primary Copper Smelting Subcategory.

Example 2

A facility that manufactures ethyl acrylate and 2-ethylhexyl acrylate (acrylic acid esters) reports the SIC code 2869 (Industrial Organic Chemicals, Not Elsewhere Classified) in its NPDES permit application. By scanning the list of industrial point source categories, the permit writer can determine that facility is likely regulated by effluent guidelines in the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) category (Part 414).

- **EPA's Development Documents and Compliance Guides**. EPA produces a number of documents that will aid permit writers in identifying applicable effluent guidelines and incorporating them into NPDES permits. In particular, development documents summarize the data and information EPA used to develop the effluent guidelines. Such documents are extremely useful in identifying the applicability of the effluent guidelines and how to incorporate the effluent guidelines into NPDES permits. EPA may also publish a compliance guide for permit writers and industry. EPA's Effluent Guidelines Website <www.epa.gov/guide/> provides available documents for specific industrial categories.

- **FR Notices**. The preamble text to the FR notices containing the proposed and final effluent guidelines rulemakings also provide additional insight into applicability of the effluent guidelines. EPA's Effluent Guidelines Website <www.epa.gov/guide/> provides FR notices for specific industrial categories. For example, the preambles to recently promulgated effluent guidelines typically list the SIC and NAICS codes for the potentially regulated facilities. Each Part in the CFR identifies the relevant FR notices. For example, § 419.11 (i.e., specialized definitions for

Subpart [subcategory] A for the Petroleum Refining point source category) identifies 47 FR 46446, October 18, 1982, as amended at 50 FR 28522, July 12, 1985, as its source.

- **EPA Industry Experts**. EPA has a number of subject matter experts <www.epa.gov/guide/contacts.html> at its headquarters office in Washington, D.C. that are available to answer questions on specific effluent guidelines. EPA's NPDES Contacts in Regional Offices <www.epa.gov/npdes/regionalcontacts> also offer assistance in sorting through the different effluent guidelines and NPDES regulations.

- **EPA's Effluent Guidelines Planning Support Documents.** EPA's Effluent Guidelines Biennial Plan Website <http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/> provides technical support documents and other information supporting EPA's biennial effluent guidelines program plans.

- **EPA's Sector Notebooks.** EPA's Sector Notebooks <www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html> describe specific U.S. industries and governments and provide a holistic approach by integrating processes, applicable regulations, and other relevant environment information.

- **Other Sources**. Other sources of information include resources identified below in Exhibit 5-23, BPJ Permitting Tools. Permit and fact sheet and information from similar facilities might aid in identifying applicable effluent guidelines. However, the permit writer should not assume that a similar facility was correctly categorized in its permit and should examine the rationale for how the other permit writer identified any applicable effluent guidelines before relying on another permit to identify the applicable category.

Permit writers should be aware that effluent guidelines from two or more industrial point source categories might apply to a single facility. Step 6 below, provides additional information on overlapping or multiple effluent guidelines requirements.

5.2.2.3 Step 3: Identify the Applicable Effluent Guidelines Subcategory(ies)

In promulgating effluent guidelines, EPA may divide an industrial point source category into groupings called *subcategories* to provide a method for addressing variations between products, raw materials, processes, and other factors that result in distinctly different effluent characteristics or treatment options. Some effluent guidelines categories cover a variety of industrial sectors (e.g., the Nonferrous Metals Manufacturing point source category has 31 subcategories). It is important for the permit writer to correctly identify the applicable subcategory to derive TBELs.

The process of identifying the applicable effluent guidelines requires close review and comparison of information obtained from Step 1 and Step 2 above. Just as effluent guidelines from two or more industrial categories can apply to a single facility, it also is true that requirements from two or more subcategories could apply to a single facility.

Exhibit 5-13 presents two examples of how a permit writer can identify the subcategory containing the applicable effluent guidelines using information from the NPDES permit application.

Exhibit 5-13 Examples of identifying the subcategory with the applicable effluent guidelines

Example 1

A permit writer has identified the facility from Example 2 in Exhibit 5-12 above as potentially regulated by the effluent guidelines in the OCPSF point source category (Part 414) <www.epa.gov/guide/ocpsf/>. The permit writer can determine from a further review of the industrial categorization discussion in the *OCPSF Development Document* and the guidance document that the facility is likely subject to effluent guidelines in Subpart G (Bulk Organic Chemicals). Specifically, the applicability criteria section in Subpart G (§ 414.70) states, "The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of the following: SIC 2865 and 2869 bulk organic chemicals and bulk organic chemical groups." Further, acrylic acid esters are listed in § 414.70 as an OCPSF product group.

Example 2

A large poultry slaughterhouse annually produces 200 million pounds of whole, halved, quarter or smaller meat cuts and reports SIC Code 2015 in its NPDES permit application. The permit writer reviewed the list of effluent guidelines and identified that the facility is likely regulated by effluent guidelines in the Meat and Poultry Products point source category (Part 432) <www.epa.gov/guide/mpp/>. The permit writer reviewed the preamble to the final effluent guidelines rule and the rule's development document. In that effluent guidelines regulation, EPA used NAICS codes to assist in applicability decisions. See 69 FR 54475, September 8, 2004. The permit writer used the U.S. Census Bureau's SIC to NAICS crosswalk website <www.census.gov/epcd/www/naicstab.htm> to identify the NAICS code (311615). Using the NAICS code, the permit writer can narrow the list of potentially applicable subcategories to the Poultry First Processing (Subpart K) or the Poultry Further Processing (Subpart L) subcategories. After reviewing the applicability criteria of both subcategories, the permit writer determined that only the effluent guidelines in Subpart K are likely applicable because the facility performs slaughtering operations, which are not regulated by Subpart L. Finally, the permit writer also needed to compare the average annual production of the facility (200 million pounds) with the production threshold in the effluent guidelines (100 million pounds per year). Because the facility produces more than the production threshold, the effluent guidelines in Subpart K are applicable to this facility. See §§ 432.112 and 432.113. In this example the permit writer would use the effluent guidelines for ammonia (as N), BOD_5, fecal coliform, oil and grease (as HEM), TSS, and total nitrogen to derive effluent limitations as detailed in section 5.2.2.5 below.

5.2.2.4 Step 4: Determine whether Existing or New Source Standards Apply

Section 5.2.1.1 above defines the different control technologies that apply to direct dischargers: BPT, BCT, BAT, and NSPS. The first three apply to existing direct dischargers, and the fourth to new sources. To determine whether existing source standards (i.e., BPT, BCT, and BAT) or NSPS apply to the facility, the permit writer must determine whether the facility or any part of the facility is a new source. A new source is defined in § 122.2 as a building, structure, facility, or installation that discharges pollutants or could discharge pollutants and for which construction began after promulgation of the applicable effluent guidelines or after proposal of the applicable effluent guidelines, but only if the effluent guidelines are promulgated within 120 days. Thus, the discharger's entire facility could be subject to new source standards (e.g., a brand new facility). Permit writers should note that the new source date for indirect dischargers is the date on which the pretreatment standard for new sources is proposed. See §403.3(m)(1).

Additional criteria for determining whether a discharge is a new source are defined in § 122.29(b) to cover situations where a facility is adding a new building or process line that results in a discharge to the waters of the United States. Such an addition would result in a new source if any of the following is true for the source:

- Is constructed at a site at which no other source is located.
- Totally replaces the process causing the discharge from an existing source.
- Has processes that are substantially independent of an existing source at the same site.

Furthermore, some effluent guidelines, such as the effluent guidelines for the Pulp, Paper, and Paperboard Point Source Category in Part 430, include additional criteria for making new source determinations. See § 430.01(j).

Appendix D of this manual provides the applicable new source dates used in making new source determinations by effluent guideline category as provided in Appendix B of the EPA memorandum *New Source Dates for Direct and Indirect Dischargers*[4] <www.epa.gov/npdes/pubs/newsource_dates.pdf> sent by the directors of the Water Permits Division and the Engineering and Analysis Division to the Regional Water Division Directors. Permit writers can use Appendix D of this manual to find the date for determining whether a facility or part of a facility is subject to NSPS.

Where a new source is the result of a new installation of process equipment at an existing facility, part of the facility might be subject to existing source standards and other parts of the facility subject to new source standards. Permit writers should identify whether the facility has installed any process equipment after the last issuance of the NPDES permit and apply the criteria from § 122.29(b) on a case-by-case basis to new construction or new processes, while applying existing source requirements to the existing portions of the facility. Sometimes it can be difficult to distinguish between a new source and a modification or alteration of an existing source, especially when modifications have occurred slowly over time. The permit writer should consult the effluent guidelines regulation to determine if it defines more specifically what constitutes a new source.

It is important to remember that after the effective date of a new source standard, the CWA stipulates that it is unlawful for any owner or operator to operate such a source in violation of those standards. See 33 U.S.C. 1316(e) and 1317(d). EPA's regulations specify that a new source "[must] install and have in operating condition, and [must] *start up* all pollution control equipment" required to meet applicable standards before beginning to discharge. The regulations also indicate that the owner or operator of a new source must meet all applicable standards within "the shortest feasible time (not to exceed 90 days)." See § 122.29(d)(4).

In addition to the requirement to meet NSPS upon beginning to discharge, an EPA-issued NPDES permit for a new source is a federal action subject to the requirements of the National Environmental Policy Act (NEPA), 33 U.S.C. 1371(c)(1). For more information on NEPA and the NPDES program, see section 11.1.2 of this manual.

For existing facilities and existing sources (where NSPS do not apply), existing source standards (i.e., BPT, BCT, BAT) apply. The permit writer would use the more stringent technology level of control for each pollutant. For example, the BPT level of control in the Veneer Subcategory of the Timber Products Processing category (Part 429, Subpart B) allows a discharge of process wastewater and identifies effluent guidelines for BOD_5 and pH, while the BAT level of control bans the direct discharge of process wastewater. Consequently, the NPDES permit for a facility regulated by the Veneer Subcategory must use the more stringent BAT requirements and prohibit the direct discharge of process wastewater. The effluent guidelines for the Renderers subcategory of the Meat and Poultry Products point source category (Subpart J, Part 432) provide another example. In those effluent guidelines, the BCT requirements for BOD_5, oil and grease, and TSS are more stringent than the corresponding BPT requirements. Accordingly, the permit writer would use the more stringent BCT requirements, rather than the BPT requirements, to derive numeric permit limitations for an existing renderer.

5.2.2.5 Step 5: Calculate TBELs from the Effluent Guidelines

Once a permit writer has identified the effluent guidelines that apply to a facility, he or she then uses those effluent guidelines to calculate applicable TBELs.

EPA's regulations at § 122.45(f)(1) stipulate that all pollutants limited in permits must have limitations, standards or prohibitions expressed in terms of mass except under any of the following conditions:

- For pH, temperature, radiation, or other pollutants that cannot appropriately be expressed by mass limitations.
- When applicable standards or limitations are expressed in terms of other units of measure.
- If in establishing technology-based permit limitations on a case-by-case basis, limitations based on mass are infeasible because the mass or pollutant cannot be related to a measure of production (e.g., discharges of TSS from certain mining operations). The permit conditions must ensure that dilution will not be used as a substitute for treatment.

Thus, the type of limitation (i.e., mass, concentration, or other units) calculated for a specific pollutant at a facility will depend on the type of pollutant and the way limitations are expressed in the applicable effluent guideline. Generally, effluent guidelines include both maximum daily and monthly average limitations for most pollutants. Though the effluent guidelines use different terms for monthly effluent limitations (e.g., monthly average, maximum for monthly average, average of daily values for 30 consecutive days), the requirements are expressed in NPDES permits as average monthly limitations as defined in § 122.2.

As stated in Steps 1 and 2 above, the permit writer would use many sources of information to calculate TBELs. From those sources, the permit writer should identify the source and characteristics of the wastewaters (including flow) and pollutants being discharged, or that have the potential to be discharged, and whether and how those pollutants are regulated by effluent guidelines. In particular, the permit writer should identify the following:

- The appropriate permit compliance point(s) (which might be specified in the effluent guidelines).
- Wastewaters subject to the applicable effluent guidelines and whether they are commingled with other wastewaters not regulated by effluent guidelines (e.g., sanitary wastewaters before the permit compliance point).
- Reasonable measure of the facility's actual long-term daily production and average number of production days per year regulated by effluent guidelines (necessary for derived effluent limitations from production-normalized effluent guidelines).
- Average daily facility flows at the compliance point(s) regulated by effluent guidelines.
- Average daily facility flows at the compliance point(s) not regulated by effluent guidelines.

That information is used in conjunction with the effluent guidelines for TBEL calculations as discussed below.

Calculating Mass-based TBELs from Production-Normalized Effluent Guidelines

Most effluent guidelines requirements are mass-based and expressed in terms of allowable pollutant discharge per unit of production or some other measure of production (i.e., production normalized). Permit writers incorporate such production-normalized effluent guidelines into NPDES permits as mass-based TBELs by using a reasonable measure of the permittee's actual long-term daily production. The objective in determining the production for a facility is to develop a single estimate of the long-term average daily production that can reasonably be expected to prevail during the next term of the permit (i.e., not the design production rate). Permit writers may establish such a production rate using the past 3 to 5 years of facility data. For example, the permit writer might wish to use the average daily production rate calculated using the highest annual production from the previous 3 to 5 years. Whatever value is selected, the permit writer should ensure that the production rate used in deriving mass-based effluent limitations is representative of the actual production likely to prevail during the next term of the permit.

The examples in Exhibit 5-14 illustrate the application of production-based effluent guidelines using the approach where annual production data are available. In Example 1 in Exhibit 5-14, the highest annual production rate during the past 5 years was used as the estimate of production. If historical trends, market forces, company plans to decrease production, or plant designs and capital expenditures for an increase in production indicated that a different level of production would prevail during the permit term, the permit writer could consider a different basis for estimating production or establish tiered discharge limitations, as discussed in section 5.2.2.7 below.

Calculating Mass-based TBELs from Flow-Normalized Effluent Guidelines

In some cases, permit writers are directed to calculate mass-based TBELs from flow-normalized effluent guidelines that are expressed as concentrations. For example, the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) effluent guidelines <www.epa.gov/waterscience/guide/ocpsf/> in Part 414 state that facilities "must achieve discharges not exceeding the quantity (mass) determined by multiplying the process wastewater flow subject to [the effluent guideline] times the concentration listed in the [effluent guideline]…" The *Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category*[5] <www.epa.gov/waterscience/guide/ocpsf/#guidance> directs the permit writer to "use a reasonable estimate of process wastewater discharges and the concentration limitations [in the effluent guideline] to develop mass limitations for the NPDES permit." Thus, the process for calculating the TBELs is similar to the process used with production-normalized effluent guidelines, but rather than using a reasonable measure of the actual daily production, the permit writer would use a reasonable measure of the actual daily flow rate as the basis for calculating the TBELs.

As with estimating production to calculate TBELs, the objective in determining a flow estimate for a facility is to develop a single estimate of the actual daily flow rate (in terms of volume of process wastewater per day), which can reasonably be expected to prevail during the next term of the permit (i.e., not the design flow rate). Permit writers can establish that flow rate using the past 3 to 5 years of facility data in a manner similar to the method used to determine production. For example, the permit writer might wish to use the highest average daily flow rate from the average daily flows calculated for each of the past 3 to 5 years. The value selected should be representative of the actual flow likely to prevail during the next term of the permit.

Exhibit 5-14 Example of calculating mass-based effluent limitation from production-normalized effluent guidelines[6]

Example 1

Facility A has produced 331,000 tons, 301,500 tons, 321,500 tons, 330,000 tons, and 331,500 tons of product per year for the previous 5 years operating 255 days per year.

Question:
What would be a reasonable measure of production for permitting purposes?

Answer:
Using the highest year of production (331,500 tons per year) might be an appropriate and reasonable measure of production, if this figure is representative of the actual production expected to occur over the next term of the permit. Permit writers also should check to see if the maximum yearly value is within a certain percentage (e.g., 20 percent–see section 5.2.2.7 below) of the average value. In evaluating gross production figures, the number of production days should be considered. If the number of production days per year is not comparable, the permit writer would need to convert the numbers to production per day before comparing them. In this example, all the yearly production figures were based on 255 days per year of production, so they may be compared directly. The 331,500 tons per year figure is the maximum for the past 5 years, which is only 2.6 percent above the average annual production of 323,100 tons. Therefore, 331,500 tons is a reasonable measure of the annual production for the facility.

Example 2

For the same facility in Example 1 above with an annual production of 331,500 tons, the production-normalized effluent guidelines for zinc are 0.1 lbs/1,000 lbs as monthly average and 0.15 lbs/1,000 lbs as daily maximum.

Question:
What are the resulting zinc technology-based effluent limitations for the NPDES permit?

Answer:
The annual production would be converted to an average daily production rate to apply the effluent guidelines. To convert from the annual production rate to an average daily rate, divide the annual production rate by the number of production days per year. To determine the number of production days, subtract the total number of normally scheduled non-production days from the total days in a year. Because Company A normally has 255 production days per year, the annual production rate of 331,500 tons per year would yield an average production daily rate of 1,300 tons per day.

Monthly average discharge limitation for zinc*:

1,300 tons/day	x	2,000 lbs/ton	x	0.10 lbs/1,000 lbs	=	**260 lbs/day**

Daily maximum discharge limitation for zinc*:

1,300 tons/day	x	2,000 lbs/ton	x	0.15 lbs/1,000 lbs	=	**390 lbs/day**

* calculated to 2 significant figures

Calculating TBELs from Concentration-based Effluent Guidelines

Permit writers might want to develop mass-based limitations for facilities with concentration-based effluent guidelines (e.g., for a facility does not have adequate water conservation practices). Mass-based permit effluent limitations encourage water conservation (e.g., minimize the potential for diluting process wastewaters by non-process wastewater, more efficient use of water) and pollution prevention (e.g., reduce waste loads to wastewater treatment facilities by physically collecting solid materials before using water to clean equipment and facilities). Additionally, for facilities with on-site wastewater treatment systems, the combination of water-reduction technologies and practices and well-operated wastewater treatment will reduce the volume and mass of discharged wastewater pollution (i.e., after treatment). Another benefit of mass-based permit effluent limitations is that they provide the permittee with more flexibility. Permittees may elect to control their wastewater discharges through more efficient wastewater control technologies and pollution-prevention practices that result in lower pollutant concentrations in the

discharged wastewater, or more efficient water conservation practices that result in less wastewater volume discharged from industrial operations), or both.

"EPA strongly supports water conservation and encourages all sectors, including municipal, industrial, and agricultural, to achieve efficient water use. EPA does not intend for its regulations to present a barrier to efficient water use in any industrial sector." See final 2006 Effluent Guidelines Program Plan in 71 FR 76655, December 21, 2006.

When calculating mass-based effluent limitations, the permit writer should use a conversion factor and document in the fact sheet the conversion factors used to calculate the permit limitations (e.g., concentration [mg/L] × flow [mgd] × 8.34 [conversion factor] = permit limitation [lbs/day]).

Additionally, guidance for implementing concentration-based limitations in effluent guidelines may direct permit writers to develop mass-based TBELs. For example, the *Permit Guidance Document Transportation Equipment Cleaning Point Source Category (40 CFR 442)*[7] industry states:

> The effluent limitations guidelines and standards for the TEC industry are concentration-based and adhere to the *building block* concept. Each regulated wastestream in an outfall is typically assigned a mass-based discharge allowance based on a calculation of its applicable concentration-based limitation and annual average flow. The sum of the allowances is the total mass discharge allowance for the outfall. In other words, the applicable permit limitations for facilities in more than one subcategory is the sum of the mass loadings based upon production in each subcategory and the respective subcategory effluent limitations guidelines. Mass-based limitations for unregulated or dilution wastewater streams at direct discharging facilities are established using [BPJ].

Where a permit writer cannot determine a reasonable measure of actual flow for a regulated discharge, concentration-based TBELs may be determined by directly applying the concentration-based limitations in effluent guidelines to the regulated flow and accounting for non-regulated flows at the point of compliance for the TBELs.

Supplementing Mass-based TBELs with Concentration Limitations

Even where effluent guidelines require permit writers to calculate mass-based TBELs, a permit writer may determine that it is beneficial to include concentration-based limitations to supplement the mass-based limitations. Where effluent limitations are expressed in terms of mass, a provision at § 122.45(f)(2) allows the permit writer, at his or her discretion, to express limitations in additional units (e.g., concentration units). Where limitations are expressed in more than one unit, the permittee must comply with both. The permit writer may determine that expressing limitations in terms of both concentration and mass encourages the proper operation of a treatment facility at all times.

Supplementing mass-based limitations with concentration-based limitations may be especially appropriate where the requirements in the effluent guidelines are flow-normalized (i.e., the effluent guidelines includes a concentration requirement but directs the permit writer to calculate a mass-based TBEL using the concentration requirement and the wastewater flow). The permit writer may determine that if the permit includes only mass-based limitations derived from the concentration-based limitations in the effluent guidelines, a permittee could increase its effluent pollutant concentrations above the applicable concentration requirements during low flow periods (i.e., reduce the efficiency of the wastewater

treatment) and still meet its mass-based permit limitations. Supplementing the mass-based TBELs with concentration limitations would discourage the reduction in treatment efficiency during low-flow periods and require proper operation of treatment units at all times.

Incorporating Narrative Requirements from Effluent Guidelines

The permit writer should also ensure that any applicable narrative effluent guidelines controls or requirements are included in the permit. For example, the effluent guidelines for Concentrated Aquatic Animal Production facilities (Part 451) consist of narrative requirements implemented through BMPs. Another example, related to monitoring and compliance rather than effluent limitations, is found in the Metal Finishing effluent guidelines. The effluent guidelines allow a facility to make a statement regarding total toxic organics (TTO) in lieu of monitoring for toxic organics. Exhibit 5-15 provides an example narrative requirement representing BPT performance standards for Concentrated Aquatic Animal Production facilities, Subpart A (flow through and recirculating systems) § 455.11(a).

Exhibit 5-15 Example narrative requirement from the Concentrated Aquatic Animal Production effluent guideline—Subpart A [§ 455.11(a)]

Except as provided in [§§] 125.30 through 125.32, any existing point source subject to this subpart must meet the following requirements, expressed as practices (or any modification to these requirements as determined by the permitting authority based on its exercise of its best professional judgment) representing the application of BPT:

(a) Solids control. The permittee must:

(1) Employ efficient feed management and feeding strategies that limit feed input to the minimum amount reasonably necessary to achieve production goals and sustain targeted rates of aquatic animal growth in order to minimize potential discharges of uneaten feed and waste products to waters of the [United States]

(2) In order to minimize the discharge of accumulated solids from settling ponds and basins and production systems, identify and implement procedures for routine cleaning of rearing units and off-line settling basins, and procedures to minimize any discharge of accumulated solids during the inventorying, grading and harvesting aquatic animals in the production system.

(3) Remove and dispose of aquatic animal mortalities properly on a regular basis to prevent discharge to waters of the [United States], except in cases where the permitting authority authorizes such discharge in order to benefit the aquatic environment.

5.2.2.6 Step 6: Account for Overlapping or Multiple Effluent Guidelines Requirements

There are instances when one facility includes both new and existing sources, produces multiple products or services, or includes production or services belonging to more than one category or subcategory. In such cases, the permit writer must examine the applicable effluent guidelines closely to ensure that (1) one guideline does not supersede another; and (2) the effluent guidelines are properly applied.

Superseding Effluent Guidelines

EPA tries to minimize the overlap of different effluent guidelines by providing exclusions in the applicability sections. The effluent guidelines in the Metal Finishing point source category (Part 433) are an example of where EPA has tried to minimize the overlap of multiple effluent guidelines for certain wastewater discharges. Exhibit 5-16 presents the applicability section in Part 433 [§ 433.10(b)], which specifically excludes certain wastewaters from the Metal Finishing effluent guidelines. Another example

is the preamble to the OCPSF effluent guidelines. The preamble identifies numerous circumstances where the OCPSF regulations are superseded by effluent guidelines for other industrial categories. Exhibit 5-17 presents excerpts from the preamble (52 FR 42523, November 5, 1987) to illustrate the point.

Exhibit 5-16 Exclusion of wastewaters in metal finishing effluent guidelines

In some cases, effluent limitations and standards for the following industrial categories might be effective and applicable to wastewater discharges from the metal finishing operations listed above [in paragraph (a)]. In such cases these Part 433 limitations shall not apply and the following regulations shall apply: [emphasis added]

- Nonferrous metal smelting and refining (40 CFR part 421)
- Coil coating (40 CFR Part 465)
- Porcelain enameling (40 CFR Part 466)
- Battery manufacturing (40 CFR Part 461)
- Iron and steel (40 CFR Part 420)
- Metal casting foundries (40 CFR Part 464)
- Aluminum forming (40 CFR Part 467)
- Copper forming (40 CFR Part 468)
- Plastic molding and forming (40 CFR Part 463)
- Nonferrous forming (40 CFR Part 471)
- Electrical and electronic components (40 CFR Part 469)

Exhibit 5-17 Excerpts from preamble to OCPSF effluent guidelines regarding applicability of effluent guidelines

- For the purposes of this regulation, OCPSF process wastewater discharges are defined as discharges from all establishments or portions of establishments that manufacture products or product groups listed in the applicability sections of this regulation, and are included within the following U.S. Department of Commerce Bureau of the Census Standard Industrial Classification (SIC) major groups:
  - SIC 2865: Cyclic Crudes and Intermediates, Dyes, and Organic Pigments.
  - SIC 2869: Industrial Organic Chemicals, not Elsewhere Classified.
  - SIC 2821: Plastic Materials, Synthetic Resins, and Nonvulcanizable Elastomers.
  - SIC 2823: Cellulosic Man-Made Fibers.
  - SIC 2824: Synthetic Organic Fibers, Except Cellulosic.

  The OCPSF regulation does not apply to process wastewater discharges from the manufacture of organic chemical compounds solely by extraction from plant and animal raw materials or by fermentation processes.
- The OCPSF regulation does not apply to discharges from OCPSF product/process operations [that] are covered by the provisions of other categorical industry effluent limitations guidelines and standards if the wastewater is treated in combination with the non-OCPSF industrial category regulated wastewater. (Different processes manufacture some products or product groups and some processes with slight operation condition variations give different products. EPA uses the term *product/process* to mean different variations of the same basic process to manufacture different products as well as to manufacture the same product using different processes.)
- The process wastewater discharges by petroleum refineries and pharmaceutical manufacturers from production of organic chemical products specifically covered by 40 CFR Part 419 Subparts C and E and Part 439 Subpart C, respectively, that are treated in combination with other petroleum refinery or pharmaceutical manufacturing wastewater, respectively, are not subject to the OCPSF regulation no matter what SIC code they use to report their products.
- Today's OCPSF category regulation applies to plastics molding and forming processes when plastic resin manufacturers mold or form crude intermediate plastic material for shipment off-site. The regulation also applies to the extrusion of fibers. Plastics molding and forming processes, other than those described above are regulated by the Plastics Molding and Forming effluent guidelines and standards (40 CFR Part 463).

Exhibit 5-17 Excerpts from preamble to OCPSF effluent guidelines regarding applicability of effluent guidelines (continued)

- Public comments requested guidance relating to the coverage of OCPSF research and development facilities, standalone OCPSF research and development, pilot plant, technical service, and laboratory bench scale-operations are not covered by the OCSPF regulation. However, wastewater from such operations conducted in conjunction with and related to existing OCPSF manufacturing operations at OCPSF facilities is covered by the OCPSF regulation because these operations would most likely generate wastewater with characteristics similar to the commercial manufacturing facility. Research and development, pilot plant technical service, and laboratory operations [that] are unrelated to existing OCPSF plant operations, even though conducted on-site, are not covered by the OCPSF regulation because they may generate wastewater with characteristic dissimilar to that from the commercial OCPSF manufacturing facility.
- Finally, as described in the following paragraphs, this regulation does not cover certain production that has historically been reported to the Bureau of Census under a non-OCPSF SIC subgroup heading, even if such production could be reported under one of the five SIC code groups covered by today's regulation.

Multiple Effluent Guidelines Requirements

NPDES permit writers often find that a facility employs multiple processes each with its own effluent guidelines requirement. In addition, sometimes effluent guidelines from multiple categories and subcategories apply to wastewaters for a single facility. When a facility is subject to effluent guidelines for two or more processes in a subcategory or to effluent guidelines from two or more categories or subcategories, the permit writer must apply each of the applicable effluent guidelines to derive TBELs. In applying multiple effluent guidelines, the permit writer should use measures of actual production or flow that are reasonable with respect to operation of multiple processes at the same time. For example, if maximum production for one process can occur only when there is reduced production for a second process, it might not be reasonable to assume maximum production levels for both processes at the same time when applying the effluent guidelines. If all wastewaters regulated by effluent guidelines are treated separately but are combined before the discharge, the permit writer may establish internal outfalls and separately apply the effluent guidelines at the respective internal outfall as discussed in § 122.45(h) and in Step 7 below.

More commonly, wastewater streams regulated by effluent guidelines are combined during or before treatment. In such a case, the permit writer combines the allowable pollutant loadings from each set of requirements or from each set of effluent guidelines to arrive at a single TBEL for the facility using a *building block* approach. The building block approach as applied to a facility with multiple processes in the Primary Tungsten subcategory of the Primary Nonferrous Metals Manufacturing point source category (Part 421, Subpart J) is presented in Exhibit 5-18. The same principles illustrated in the exhibit would apply to a facility with processes subject to requirements from multiple subcategories or categories that are combined before or during treatment.

Exhibit 5-18 Building block approach for applying effluent guidelines

A facility is subject to Part 421, Subpart J (Primary Tungsten). The facility uses a tungstic acid rinse, an acid leach wet air pollution control system, and an alkali leach wash in its manufacturing process.

The Maximum daily production rate for the facility is:
4.7 million pounds per day of Tungstic Acid (as W)
3.5 million pounds per day of Sodium Tungstate (as W)

Question:
What is the technology-based effluent limit for lead at the facility?

Answer:
BPT calculation for lead (§ 421.102):

a) **Tungstic acid rinse:**
(4.7 million lbs/day) × (17.230 lbs/million lbs) = 80.981 lbs/day

b) **Acid leach wet air pollution control:**
(4.7 million lbs/day) × (15.040 lbs/million lbs) = 70.688 lbs/day

c) **Alkali leach wash:**
(3.5 million lbs/day) × (0.000 lbs/million lbs) = 0.000 lbs/day

d) **Total allowable discharge** = 80.981 + 70.688 + 0.000 = 151.669 = **152 lbs/day**

BAT calculation for lead (§ 421.103):

a) **Tungstic acid rinse:**
(4.7 million lbs/day) × (11.490 lbs/million lbs) = 54.003 lbs/day

b) **Acid leach wet air pollution control:**
(4.7 million lbs/day) × (1.003 lbs/million lbs) = 4.7141 lbs/day

c) **Alkali leach wash:**
(3.5 million lbs/day) × (0.000 lbs/million lbs) = 0.000 lbs/day

d) **Total allowable discharge** = 54.003 + 4.7141 + 0.000 = 58.7171 = **59 lbs/day***

The technology-based maximum daily limitation for lead at the facility is the BAT limitation of **59 lbs/day**. That value is compared with the water quality-based effluent limitation for lead, to ensure that all applicable standards are implemented through the final effluent limitations.

* calculated to 2 significant figures

The building block approach is applied in other circumstances as well, such as

- **Mixture of mass-based and concentration-based requirements:** The limitations in effluent guidelines for some pollutants are mass-based, production-normalized limitations in some subparts and concentration-based limitations in other subparts. When all the wastewater streams go to the same treatment system, the permit writer would need to convert the concentration-based limitations to mass-based limitations so they could be combined with the mass-based, production-normalized limitations and applied to the combined wastewater streams.
- **Mixture of different concentration-based requirements:** Some facilities could have multiple operations that are each subject to different concentration-based requirements for the same pollutant but with wastewater streams that combine before treatment. In such a case, the permit writer can establish a flow-weighted concentration-based limitation as the TBEL for the combined wastewater streams or convert the concentration-based requirements to equivalent mass-based requirements using flow data and then combine the mass-based requirements into a single limitation for the combined wastewater streams.

- **Mixture of regulated and unregulated wastewater streams:** In some cases, wastewater streams containing a pollutant regulated by the applicable effluent guidelines requirements can combine with other wastewater streams that do not have effluent guidelines requirements that regulate the pollutant. In such a case, the permit writer could use BPJ to establish a TBEL for the unregulated wastewater stream(s) (see section 5.2.3 below) and, as appropriate, calculate a final TBEL for the combined wastewater streams. For example, if one of the wastewater streams contributing to an industrial facility's discharge is sanitary wastewater, the permit writer might use BPJ to apply the treatment standards for domestic wastewater and calculate BOD_5 limitations for that wastewater stream. The secondary treatment standards, discussed in section 5.1 above, could be used to calculate mass-based limits for the sanitary wastewater using the concentration-based requirements and an estimate of flow rate that is expected to represent the flow rate during the proposed permit term. A final TBEL for BOD_5 could be calculated for the combined sanitary and process wastewater streams by combining the two mass limitations using the building block approach.
- **Mixture of wastewater streams containing a pollutant with wastewater streams not containing the pollutant:** If a wastewater stream that does not contain a pollutant is combined with another wastewater stream that contains the pollutant (and has applicable requirements in the effluent guidelines or requirements determined by the permit writer using BPJ), the permit writer must ensure that the non-regulated waste stream does not dilute the regulated waste stream to the point where the pollutant is not analytically detectable. If that occurs, the permit writer will most likely need to establish internal outfalls, as allowed under § 122.45(h) and in Step 7 below.

For examples of addressing combined wastewater streams, see section 15.3.3 on page 15-10 of EPA's *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432)*[8] <www.epa.gov/waterscience/guide/mpp/final/tdd15.pdf>.

Facilities with Both New and Existing Sources

Finally, as noted above, if effluent guidelines are applicable to an existing facility, and that facility adds a new production line, which becomes a *new source*, the permit writer should calculate TBELs for the subsequent permit using BPT, BCT, and BAT standards for the existing production line and NSPS for the new production line, as discussed in section 5.2.2.4 above.

5.2.2.7 Step 7: Apply Additional Regulatory Considerations in Calculating TBELs

The permit writer must consider several additional requirements when deriving TBELs from effluent guidelines. Those additional requirements consist of evaluating or accounting for the following:

- Expected significant increases or decreases in production during the permit term for tiered discharger limitations.
- Internal outfalls.
- Requests for a variance from effluent guidelines.

The following sections provide an overview of those topics.

Tiered Discharge Limitations

If production rates are expected to change significantly during the life of the permit, the permit writer can include tiered (alternate) TBELs as allowed by § 122.45(b)(2)(ii)(A)(i). Tiered TBELs would apply to mass-based effluent limitations and would become effective when production or flow (or some other measure of production) exceeded a threshold value, such as during seasonal production variations. Generally, up to a 20 percent fluctuation in production is considered to be within the range of normal variability, while changes in production higher than 20 percent could warrant consideration of tiered limitations. Exhibit 5-19 illustrates application of tiered limitations.

Exhibit 5-19 Example of tiered discharge limitations

Plant B produced approximately 40 tons per day of product during spring and summer months (i.e., March through August) and 280 tons per day during fall and winter months during the previous 5 years. Production during the fall and winter months is significantly higher than during the off-season, and the discharger has made a plausible argument that production is expected to continue at that level. The effluent guidelines requirements for Pollutant Z are 0.08 lbs/1,000 lbs for the average monthly limitation and 0.14 lbs/1,000 lbs for the maximum daily limitation.

Question:
What are appropriate tiered effluent limitations for Plant B?

Answer:
The first tier or lower limitations would be based on a production rate of 40 tons per day. The limitations would apply between March and August.

Monthly average limitation:
40 tons/day × 2,000 lbs/ton x 0.08 lbs/1,000 lbs = **6.4 lbs/day***

Daily maximum limitation:
40 tons/day × 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 11.2 lbs/day = **11 lbs/day***

The second tier or higher limitations would be based on a production rate of 280 tons per day. Those limitations would apply between September and February.

Monthly average limitation:
280 tons/day × 2,000 lbs/ton x 0.08 lbs/1,000 lbs = 44.8 lbs/day = **45 lbs/day***

Daily maximum limitation
280 tons/day × 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 78.4 lbs/day = **78 lbs/day***

* calculated to 2 significant figures

Permit writers should include tiered limitations in a permit only after careful consideration of production data and only when a substantial increase or decrease in production is likely to occur. In the example above, the lower limitations would be in effect when production was at low levels (March through August). During periods of significantly higher production (September through February), the higher limitations would be in effect. In addition, a tiered or alternate set of limitations might be appropriate in the case of special processes or product lines that operate during certain times only.

Permit writers could base thresholds for tiered limitations on an expected increase in production during the term of the permit that will continue through the duration of the permit term. For example, if a facility plans to add a process line and significantly expand production in year 3 of the permit term, the permit could specify a higher tier of limitations that go into effect when the facility reports reaching a production level specified in the permit.

Permit writers must detail in the permit the thresholds and time frames when each tier applies, measures of production, and special reporting requirements. Special reporting requirements include provisions such as the following:

- The facility notifying the permitting authority a specified number of business days before the month it expects to be operating at a higher level of production and the duration this level of production is expected to continue.
- The facility reporting, in the discharge monitoring report, the level of production and the limitation and standards applicable to that level.

A detailed discussion of the rationale and requirements for any tiered limitations should be provided in the fact sheet for the permit.

Internal Outfalls

The NPDES regulations at § 122.45(h) give NPDES permit writers the authority to identify internal outfalls when effluent limitations at the final outfall are impractical or infeasible. These internal compliance points might be necessary to ensure proper treatment of persistent, bioaccumulative, and toxic pollutants that are discharged in concentrations below analytic detection levels at the final effluent outfall or other pollutants that may be diluted by flows (e.g., cooling water) not containing the pollutant. Some effluent guidelines may *require* the use of internal outfalls unless the effluent limitations are adjusted based on the dilution ratio of the process wastewater to the wastewater flow at the compliance point. Examples of effluent guidelines with required internal compliance points include the Metal Finishing effluent guidelines (Part 433) and the Pulp, Paper, and Paperboard effluent guidelines (Part 430). Accordingly, the permit writer should identify any internal outfall monitoring that might be required by the applicable effluent guidelines and include monitoring requirements in the final permit.

Effluent Guidelines Variances

The CWA and federal regulations provide limited mechanisms for variances from requirements in effluent guidelines. An NPDES permit applicant must meet very specific data and variance application deadline requirements before a variance may be granted. A variance provides a unique exception to a particular requirement, and the permit writer should not expect to routinely receive variance requests. Nevertheless, the permit writer should be aware of the major types of variances and the basic requirements for each, because the permit writer will most likely be the person to conduct the initial reviews of such requests before submitting them for review to the State Director (if applicable) or to EPA.

Variance applications are submitted by the NPDES permit applicant and must be submitted before the close of the public comment period of the permit, except for Fundamentally Different Factors (FDF) variance requests, which must be requested by the NPDES permit applicant within 180 days of the effluent guidelines publication. The permit writer should consult § 124.62 for the specific procedures for decisions regarding various types of variances. Exhibit 5-20 lists the available variances from effluent guidelines.

Exhibit 5-20 Variances from effluent guidelines

Legislation (CWA section)	Type	Regulation (40 CFR)	Approval authority	Application deadline
301(g)	Nonconventional Pollutant	Part 125, Subpart F (Reserved)	EPA Region HQ delegated authority	During permit comment period
301(n)	Fundamentally Different Factors (FDF)	Part 125, Subpart D	EPA Region HQ delegated authority	180 days from the date the limitation or standard is published in the FR
—	Net Intake or Net/Gross	§ 122.45(g)	NPDES state or EPA Region in absence of approved state NPDES program	During permit comment period

The following paragraphs further discuss the variances listed in Exhibit 5-20 and the factors that are considered in a technical review of a variance request.

Nonconventional Pollutant—CWA Section 301(g) Variance

CWA section 301(g) and the regulations at § 122.21(m)(2) provide for a variance from new or revised BAT effluent guidelines for certain nonconventional pollutants because of local environmental factors, so long as the discharger demonstrates that it is meeting BPT and that the discharge does not prevent attainment of water quality standards and would not result in additional requirements on other point or nonpoint sources. The pollutants for which a facility may request a CWA section 301(g) variance are ammonia, chlorine, color, iron, and phenols (as measured by the colorimetric 4-aminoantipyrine [4AAP] method). The CWA also provides a process to petition to include additional pollutants on this list. Industries with facilities that have applied for CWA section 301(g) variances include Iron and Steel Manufacturing (Part 420), Steam Electric Power Generating (Part 423), Inorganic Chemicals Manufacturing (Part 415), Nonferrous Metals Manufacturing (Part 421), Aluminum Forming (Part 467), and Pesticides Chemicals (Part 455) facilities.

In addition to meeting the application deadline, the discharger must file a variance application that meets the following requirements:

- The proposed modified requirements must result in compliance with BPT and water quality standards of the receiving stream.
- No additional treatment will be required of other point or nonpoint source dischargers as a result of the variance approval.
- The modified requirements will not interfere with attainment or maintenance of water quality to protect public water supplies, or with protection and propagation of a balanced population of shellfish, fish, and wildfowl, and will allow recreational activities in and on the water.
- The modified requirements will not result in quantities of pollutants that can reasonably be anticipated to pose an unacceptable risk to human health or the environment, cause acute or chronic toxicity, or promote synergistic properties.

The permit writer should review the request to ensure that it complies with each of the requirements for this type of variance. This variance request can involve a great deal of water quality assessment, including aquatic toxicity, mixing zone and dilution model analysis, and possible site-specific criterion development. In addition, it might be necessary to assess many complex human health effects, including carcinogenicity, teratogenicity, mutagenicity, bioaccumulation, and synergistic propensities. Permit writers may use EPA's *Draft Technical Guidance Manual for the Regulations Promulgated Pursuant to Section 301(g) of the Clean Water Act of 1977 40 CFR Part 125 (Subpart F)* <www.epa.gov/npdes/pubs/owm0008.pdf> to assess a completed variance request.

Fundamentally Different Factors—FDF Variance

Alternative effluent limitations or standards different from the otherwise applicable requirements in effluent guidelines may be authorized by EPA if an individual facility is fundamentally different with respect to factors considered in establishing the limitations or standards otherwise applicable to that facility's industrial category. Such a modification is known as a *fundamentally different factors* (FDF) variance.

Facilities must submit all FDF variance applications to the appropriate Director, as defined at § 122.2, no later than 180 days from the date the limitations or standards are published in the FR [see CWA section 301(n)(2) and § 122.21(m)(1)(i)(B)(2)]. An FDF variance is not available to a new source subject to NSPS.

EPA regulations at Part 125, Subpart D, authorizing the EPA Regional Administrators to establish alternative limitations and standards, further detail the substantive criteria used to evaluate FDF variance requests for direct dischargers. The regulations at § 125.31(d) identify six factors that may be considered in determining if a facility is fundamentally different:

- Nature or quality of pollutants contained in the raw process wastewater.
- Volume of the process wastewater and effluent discharged.
- Non-water quality environmental impact of control and treatment of the raw wasteload.
- Energy requirements of the application of control and treatment technology.
- Age, size, land availability, and configurations of discharger's equipment or facilities as well as processes employed, process changes, and engineering aspects of the application of control technology.
- Cost of compliance with required control technology.

The Agency must determine whether, on the basis of one or more of those six factors, the facility in question is fundamentally different from the facilities and factors considered by EPA in developing the nationally applicable effluent guidelines. The regulation also lists four other factors that may not provide a basis for an FDF variance:

- Infeasibility of installation within the time allowed by the CWA.
- Assertion that the national limitations cannot be achieved with the appropriate waste treatment facilities installed (if the assertion is not based on one or more of the six FDF factors above).
- A discharger's ability to pay for the required water treatment.

- The impact of a discharge on local receiving water quality.

In addition, under § 125.31(b)(3), a request for limitations less stringent than the national limitation may be approved only if compliance with the national limitations would result in either of the following:

- Removal cost wholly out of proportion to the removal cost considered during development of the national limitations.
- Non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limitations.

The conditions for approval of a request to modify applicable pretreatment standards and factors considered are the same as those for direct dischargers.

The legislative history of CWA section 301(n) underscores the necessity for the FDF variance applicant to establish eligibility for the variance. EPA's regulations at § 125.32(b)(1) are explicit in imposing that burden on the applicant. The applicant must show that the factors relating to the discharge controlled by the applicant's permit, which are claimed to be fundamentally different are, in fact, fundamentally different from those factors considered by the EPA in establishing the applicable effluent guidelines. The pretreatment regulations incorporate a similar requirement at § 403.13(h)(9).

Intake Allowance or Net/Gross Variance

Some facilities might be unable to comply with effluent guidelines because of pollutants in their intake water. Under certain circumstances, the NPDES regulations allow credit for pollutants in intake water. Specifically, permit writers are authorized to grant net credits for the quantity of pollutants in the intake water where (1) the applicable effluent guidelines specify that the guidelines are to be applied on a net basis; or (2) the pollution control technology would, if properly installed and operated, meet applicable effluent guidelines without the pollutants in the intake waters. The following requirements are included in § 122.45(g) for establishing net limitations:

- Credit for conventional pollutants, such as BOD_5 or TSS, are only authorized where the constituents resulting in the effluent BOD_5 and the TSS are similar between the intake water and the discharge.
- Credit is authorized only up to the extent necessary to meet the applicable limitation or standard, with a maximum value equal to the influent concentration.
- Intake water must be taken from the same body of water into which the discharge is made.
- Net credits do not apply to the discharge of raw water clarifier sludge generated during the treatment of intake water.

Permit writers must include influent monitoring in the permit when this type of variance is granted.

Thermal Discharge—CWA Section 316(a) Variance

CWA section 316(a) and the regulations at § 122.21(m)(6) provide for variances from thermal effluent limitations in NPDES permits. EPA has only promulgated thermal limitations in effluent guidelines for two industrial sectors: Beet Sugar Processing Subcategory of the Sugar Processing Point Source Category (Part 409 Subpart A) and the Cement Manufacturing Point Source Category (Part 411, Subparts A and B).

Most thermal limitations are based on water quality standards, so most thermal variances actually are not true *technology-based* variances. Dischargers must apply for a thermal discharge variance with its permit application if the thermal effluent limitation is based on an effluent guideline or during the permit comment period if the thermal effluent limitation is based on a WQBEL.

Regulations for submitting and reviewing thermal discharge variance requests are promulgated at Part 125, Subpart H. The approval authority for a thermal discharge variance request is the state permitting authority or the EPA Region if there is no approved state NPDES program. Less stringent alternative thermal effluent limitations may be included in permits if the discharger properly demonstrates that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made, taking into account the cumulative impact of its thermal discharge together with all other significant impacts on the species affected. Once a variance is granted, the discharger must still reapply for the variance each permit term. The majority of thermal variance requests are from power plants seeking relief from water-quality based effluent limitations.

Climate Change Considerations

Evaluation of requests for variances under CWA section 316(a) requires consideration of the change to the ambient water temperature because of an effluent discharge. The studies provided by applicants to support their requests frequently include historical thermal data for the receiving water. Permitting authorities should be aware that the effects of global climate change could alter the thermal profile of some receiving waters making the historical record of thermal conditions less representative of future conditions. Where appropriate, water quality models should take these potential changes into account.

5.2.2.8 Step 8: Apply Additional Requirements in Effluent Guidelines

The effluent guidelines could provide additional requirements for permit writers to consider when applying them in NPDES permits.

Industrial Stormwater

Industrial stormwater is sometimes regulated by effluent guidelines. In particular, effluent guidelines often regulate stormwater for industrial activities that are unsheltered (e.g., mining, outdoor processing, outside storage of product materials). Examples of contaminated stormwater regulated by effluent guidelines include the Concentrated Animal Feeding Operations (Part 412), Fertilizer Manufacturing (Part 418), Petroleum Refining (Part 419), Iron and Steel Manufacturing (Part 420), Pulp, Paper, and Paperboard (Part 430), Metal Products and Machinery (Part 438), and Ore Mining and Dressing (Part 440) point source categories. The permit writer should identify any specific stormwater controls that may be required by the applicable effluent guidelines accordingly.

Stormwater not regulated by effluent guidelines that is commingled with process wastewater will require the adjustment of the effluent limitations as discussed in Step 6 above. Section 2.3.2.3 of this manual provides additional information about stormwater discharges associated with industrial activities.

Identify the Analytical Methods for Measuring Compliance with TBELs

The permit writer should ensure that the permit specifies the use of the correct analytical methods for demonstrating compliance with TBELs derived from effluent guidelines. The effluent guidelines often require specific analytical methods. For example, the *General Definitions* section of the Meat and Poultry Products effluent guidelines [§ 432.2(l)] states, "The approved methods of analysis for the following six parameters [Ammonia (as N), BOD_5, Oil and Grease (O&G), O&G as hexane extractable material (HEM), Total Nitrogen, TSS] are found in Table 1B in [§] 136.3. The nitrate/nitrite part of total nitrogen may also be measured by EPA Method 300.0 (incorporated by reference, see § 432.5)." Section 8.3 of this manual provides additional information on analytical methods in the NPDES permitting process.

Documentation and Recordkeeping Requirements

Specific documentation and recordkeeping requirements (e.g., solvent management plans, BMP plans, alternative monitoring requirements) may be included in the applicable effluent guidelines. The permit writer should ensure that the documentation and recordkeeping requirements are included in the NPDES permit. For example, to use the alternative monitoring compliance method for controlling toxic organics in the Metal Finishing effluent guidelines, the NPDES permit applicant must not only make a certification statement (see Exhibit 5-15), but must also "submit a solvent management plan that specifies to the satisfaction of the permitting authority (or, in the case of indirect dischargers, the control authority) the toxic organic compounds used; the method of disposal used instead of dumping, such as reclamation, contract hauling, or incineration; and procedures for ensuring that toxic organics do not routinely spill or leak into the wastewater" as required by § 433.12(b). Other examples of such documentation and recordkeeping requirements include the BMP Plans used in the Oil and Gas Extraction (Part 435) and the Concentrated Aquatic Animal Production effluent guidelines (Part 451), the pollution prevention alternative in the Pesticide Chemicals effluent guidelines (Part 455), and alternative monitoring requirements (e.g., certification in lieu of monitoring for chloroform, in the Pulp, Paper, and Paperboard effluent guidelines (Part 430).

5.2.2.9 Step 9: Document the Application of Effluent Guidelines in the Fact Sheet

Permit writers need to document their application of effluent guidelines in the NPDES permit fact sheet. The permit writer should clearly identify the data and information used to determine the applicable effluent guidelines and how that information was used to derive effluent limitations for the permit. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the NPDES permit properly incorporates effluent guidelines.

Similarly, permit writer should also document the rationale for concluding that there are no applicable effluent guidelines for a discharge or pollutant. In such cases, TBELs may be determined by the permit writer on a case-by-case basis as discussed in section 5.2.3 below.

5.2.3 Case-by-Case TBELs for Industrial Dischargers

As previously stated, § 125.3(a) indicates that technology-based treatment requirements under CWA section 301(b) represent the minimum level of control that must be imposed in an NPDES permit.

Where EPA-promulgated effluent guidelines are not applicable to a non-POTW discharge, such requirements are established on a case-by-case basis using BPJ.

5.2.3.1 Legal Authority to Establish Case-by-Case TBELs

Case-by-case TBELs are developed pursuant to CWA section 402(a)(1), which authorizes the EPA Administrator to issue a permit that will meet either all applicable requirements developed under the authority of other sections of the CWA (e.g., technology-based treatment standards, water quality standards, ocean discharge criteria) or, before taking the necessary implementing actions related to those requirements, "such conditions as the Administrator determines are necessary to carry out the provisions of this Act." The regulation at § 125.3(c)(2) specifically cites this section of the CWA, stating that technology-based treatment requirements may be imposed in a permit "on a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable." Further, § 125.3(c)(3) indicates that "where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case-by-case basis to carry out the provisions of the Act." When establishing case-by-case effluent limitations using BPJ, the permit writer should cite in the fact sheet or statement of basis both the approach used to develop the limitations, which is discussed further below, and how the limitations carry out the intent and requirements of the CWA and the NPDES regulations.

5.2.3.2 Identifying the Need for Case-by-Case TBELs

As noted above, case-by-case TBELs are established in situations where EPA promulgated effluent guidelines are inapplicable. That includes situations such as the following:

- When EPA has not yet promulgated effluent guidelines for the point source category to which a facility belongs (e.g., a facility that produced distilled and blended liquors [SIC code 2085] and is part of the miscellaneous foods and beverages category, which does not now have any applicable effluent guidelines).
- When effluent guidelines are available for the industry category, but no effluent guidelines are available for the facility subcategory (e.g., discharges from coalbed methane wells are not now regulated by effluent guidelines; however, EPA considers the coalbed methane industrial sector as a potential new subcategory of the existing Oil and Gas Extraction point source category [Part 435] because of the similar industrial operations performed [i.e., drilling for natural gas extraction]).
- When effluent guidelines are available for the industry category but are not applicable to the NPDES permit applicant (e.g., facilities that do not perform the industrial operation triggering applicability of the effluent guidelines or do not meet the production or wastewater flow cutoff applicability thresholds of the effluent guidelines). For example, assume that the poultry slaughterhouse in Example 2 of Exhibit 5-13 above produces 50 million pounds of whole, halved, quarter or smaller meat cuts annually. In that case, any TBELs for the facility would be case-by-case limitations developed using BPJ because the facility is below the annual production threshold of 100 million pounds listed in the effluent guideline (Part 432, Subpart K).
- When effluent guidelines are available for the industry category, but no effluent guidelines requirements are available for the pollutant of concern (e.g., a facility is regulated by the effluent guidelines for Pesticide Chemicals [Part 455] but discharges a pesticide that is not regulated by

these effluent guidelines). The permit writer should make sure that the pollutant of concern is not already controlled by the effluent guidelines and was not considered by EPA when the Agency developed the effluent guidelines.

Generally, case-by-case limitations are appropriate when at least one of the conditions listed above applies and the pollutant is present, or expected to be present, in the discharge in amounts that can be treated or otherwise removed (e.g., implementation of pollution prevention measures). The resources listed in sections 5.2.2.2 above and 5.2.3.4 below will help the permit writer in making such determinations. For example, EPA's effluent guidelines planning support documents on EPA's Effluent Guidelines Biennial Plan Website <http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/> identify facilities and industrial sectors that currently are not regulated by effluent guidelines.

5.2.3.3 Factors Considered When Developing Case-by-Case TBELs

The NPDES regulations at § 125.3(c)(2) require that permit writers developing case-by-case effluent limitations consider the following:

- The appropriate technology for the category class of point sources of which the applicant is a member, based on all available information.
- Any unique factors relating to the applicant.

The regulations also require that, in setting case-by-case limitations, the permit writer consider several specific factors established in § 125.3(d) to select a model treatment technology and derive effluent limitations on the basis of that treatment technology. That process and the factors considered by the permit writer are the same factors required to be considered by EPA in developing effluent guidelines and, therefore, are often referred to as the CWA section 304(b) factors. The factors are summarized below in Exhibit 5-21. The permit writer evaluates case-by-case limitations based on BPT, BCT, and BAT and uses the more stringent technology level of control for each pollutant of concern.

Exhibit 5-21 Summary of factors considered when developing case-by-case TBELs

For BPT requirements (all pollutants)
- The age of equipment and facilities involved*
- The process(es) employed*
- The engineering aspects of the application of various types of control techniques*
- Process changes*
- Non-water quality environmental impact including energy requirements*
- The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application

For BCT requirements (conventional pollutants)
- All items in the BPT requirements indicated by an asterisk (*) above
- The reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits
- The comparison of the cost and level of reduction of such pollutants from the discharge of POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources

For BAT requirements (toxic and non-conventional pollutants)
- All items in the BPT requirements indicated by an asterisk (*) above
- The cost of achieving such effluent reduction

The CWA also gives the permit writer the authority to consider process changes to evaluate case-by-case limitations. As previously stated, technology-based controls in NPDES permits are performance-based measures. EPA incorporates technology-based controls in NPDES permits that correspond to the application of an identified technology (including process changes) but does not require dischargers to install the identified technology. Therefore, EPA leaves to each facility the discretion to select the technology design or process changes necessary to meet the TBELs specified in the NPDES permit.

The permit writer might need to establish a monitoring-only requirement in the current NPDES permit to identify pollutants of concern and potential case-by-case limitations for the subsequent NPDES permit renewal.

5.2.3.4 Resources for Developing Case-by-Case TBELs

There are numerous resources for identifying candidates for model technologies or process changes and developing case-by-case TBELs using BPJ. Exhibit 5-22 lists some example references that permit writers can use to derive such limitations.

5.2.3.5 Statistical Considerations When Establishing Case-by-Case TBELs

The quality of the effluent from a treatment facility will normally vary over time. If, for example, BOD_5 data for a typical treatment plant were plotted against time, one would observe day-to-day variations of effluent concentrations. Some of that behavior can be described by constructing a frequency-concentration plot. From the plot, one could observe that for most of the time, BOD_5 concentrations are near some average value. Any treatment system can be described using the mean concentration of the parameter of interest (i.e., the long-term average) and the variance (or coefficient of variation) and by assuming a particular statistical distribution (usually lognormal).

When developing a case-by-case limitation, permit writers can use an approach consistent with the statistical approach EPA has used to develop effluent guidelines. Specifically, the maximum daily limitation could be calculated by multiplying the long-term average achievable by implementation of the model technology or process change by a daily variability factor determined from the statistical properties of a lognormal distribution. The average monthly limitation can be calculated similarly except that the variability factor corresponds to the distribution of monthly averages instead of daily concentration measurements. The daily variability factor is a statistical factor defined as the ratio of the estimated 99th percentile of a distribution of daily values divided by the mean of the distribution. Similarly, the monthly variability factor is typically defined as the estimated 95th percentile of the distribution of monthly averages divided by the mean of the distribution of monthly averages.

A modified delta-lognormal distribution could be fit to concentration data and variability factors computed for the facility distribution. The modified delta-lognormal distribution models the data as a mixture of measured values and observations recorded as values less than the detectable level. This distribution often is selected because the data for many analytes consist of such a mixture of measured values and results below the detectable level. The modified delta-lognormal distribution assumes that all non-detected results have a value equal to the detection limitations and that the detected values follow a lognormal distribution.

Exhibit 5-22 Tools for developing case-by-case TBELs using BPJ

Permit file information
- Current and previous NPDES application forms.
- Previous NPDES permit and fact sheet.
- Discharge monitoring reports.
- Compliance inspection reports.

Information from existing facilities and permits
- NPDES Individual and General Permits for other NPDES permits issued to facilities in the same region or state, or that include case-by-case limitations for the same pollutants.
- Toxicity reduction evaluations for selected industries.
- Other media permit files (e.g., Resource Conservation and Recovery Act [RCRA] permit applications and Spill Prevention Countermeasure and Control [SPCC] plans.
- ICIS-NPDES <https://icis.epa.gov/icis> data.
- Literature (e.g., technical journals and books).

Effluent guidelines development and planning information
- Industry experts within EPA headquarters, EPA Regions, and states <www.epa.gov/guide/contacts.html>.
- Development Documents, CWA section 308 questionnaires, screening and verification data, proposed and final regulations, contractor's reports, and project officer contacts <www.epa.gov/guide>.
- EPA's Technical Support Documents <http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/> and records supporting EPA's biennial effluent guidelines program plans also provide additional useful information. In particular, such resources provide a sample of the current limitation and latest developments in industrial pollutant prevention, water conservation, and wastewater treatment. The Technical Support Documents also identify industrial sectors not currently regulated by effluent guidelines.

Statistical guidance
- Effluent Guidelines Technical Development Support Documents, such as the Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category <www.epa.gov/guide/>.

Economics guidance
- *Protocol and Workbook for Determining Economic Achievability for NPDES Permits*[9] <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf>.
- *BCT Cost Test Guidance* <www.epa.gov/npdes/pubs/owm0009.pdf>.

Guidance for BMP-based limitations
- *Guidance Manual for Developing Best Management Practices (BMPs)*[10] <www.epa.gov/npdes/pubs/owm0274.pdf>.
- *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs*[11] <www.epa.gov/npdes/pubs/contents_indguide.pdf>.
- National Menu of Stormwater Best Management Practices <www.epa.gov/npdes/stormwater/menuofbmps>.

For more details on EPA's use of statistical methods for developing effluent guidelines, refer to *Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category* <www.epa.gov/guide/ironsteel/reg/tdd.htm>.

5.2.3.6 Documenting Case-by-Case TBELs in the Permit Fact Sheet

Permit writers will need to document the development of case-by-case limitations in the NPDES permit fact sheet. The permit writer should clearly identify the data and information used in developing these effluent limitations and how that information was used. The permit writer also should document the rationale for concluding that there are no applicable effluent guidelines for the industrial wastewater or pollutant discharge. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the BPJ limitations comply with the CWA and EPA regulations.

[1] U.S. Environmental Protection Agency. 1985. *Draft Guidance for NPDES Permits and Compliance Personnel—Secondary Treatment Redefinition.* U.S. Environmental Protection Agency. Office of Water Enforcement and Permits. Washington, DC.

[2] U.S. Environmental Protection Agency. 1994. *Amended Section 301(h) Technical Support Document*. EPA-842-B-94-007. U.S. Environmental Protection Agency. Office of Wetlands Oceans and Watersheds, Washington, DC.

[3] U.S. Environmental Protection Agency. 1977. *Interim Final Supplement for Pretreatment to the Development Document for the Petroleum Refining Industry Existing Point Source Category*, EPA-440-1-76-083A. Page 92. U.S. Environmental Protection Agency, Office of Water and Hazardous Materials, Washington, DC. Publication available on NEPIS Website <www.epa.gov/nscep/> as document 440176083A.

[4] Boornazian, Linda and Mary Smith. 2006. *New Source Dates for Direct and Indirect Dischargers*. U.S. Environmental Protection Agency, Office of Water Memorandum. September 28, 2006. <www.epa.gov/npdes/pubs/newsource_dates.pdf>.

[5] U.S. Environmental Protection Agency. 1987. *Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category*. EPA 440-1-87-009. Page IX-9. <www.epa.gov/waterscience/guide/ocpsf/#guidance>.

[6] Jordan, J.W. 1984. *Calculations of Production-Based Effluent Limits*. U.S. Environmental Protection Agency, Office of Water, Washington, DC. Memorandum, December 18, 1984. <www.epa.gov/npdes/pubs/owm0427.pdf>.

[7] U.S. Environmental Protection Agency. 2001. *Permit Guidance Document: Transportation Equipment Cleaning Point Source Category (40 CFR 442)*, p. 30. EPA-821-R-01-021. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/guide/teci/tecguid.pdf>.

[8] U.S. Environmental Protection Agency. 2004. *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432),* EPA-821-R-04-011. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/guide/mpp/final/tdd15.pdf>.

[9] Putnam, Hayes and Bartlett, Inc. 1982. *Protocol and Workbook for Determining Economic Achievability for National Pollutant Discharge Elimination System Permits*. U.S. Environmental Protection Agency, Permits Division, Washington, DC. <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf.> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf>

[10] U.S. Environmental Protection Agency. 1993. *Guidance Manual for Developing Best Management Practices (BMP)*. EPA 833-B-93-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0274.pdf>.

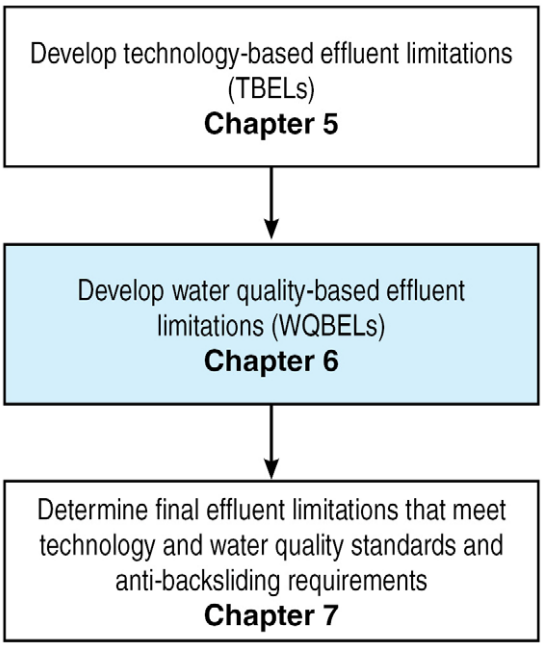
[11] U.S. Environmental Protection Agency. 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs*. EPA 832-R-92-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/contents_indguide.pdf>.

CHAPTER 6. Water Quality-Based Effluent Limitations

When drafting a National Pollutant Discharge Elimination System (NPDES) permit, a permit writer must consider the impact of the proposed discharge on the quality of the receiving water. Water quality goals for a waterbody are defined by state water quality standards. By analyzing the effect of a discharge on the receiving water, a permit writer could find that technology-based effluent limitations (TBELs) alone will not achieve the applicable water quality standards. In such cases, the Clean Water Act (CWA) and its implementing regulations require development of water quality-based effluent limitations (WQBELs). WQBELs help meet the CWA objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters and the goal of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water (*fishable/swimmable*).

WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water. On the basis of the requirements of Title 40 of the *Code of Federal Regulations* (CFR) 125.3(a), additional or more stringent effluent limitations and conditions, such as WQBELs, are imposed when TBELs are not sufficient to protect water quality. Exhibit 6-1 illustrates the relationship between TBELs and WQBELs in an NPDES permit, as well as the determination of final effluent limitations.

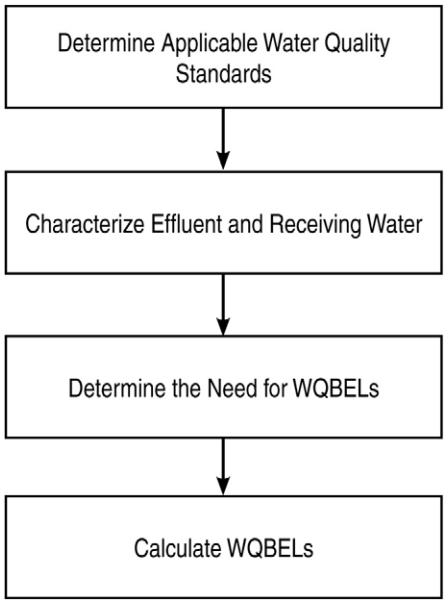
Exhibit 6-1 Developing effluent limitations



CWA section 301(b)(1)(C) requires that permits include any effluent limitations necessary to meet water quality standards. As illustrated above, to satisfy that requirement, permit writers implement a process to determine when existing effluent limitations (e.g., TBELs) and existing effluent quality are not sufficient to comply with water quality standards and to, where necessary, develop WQBELs. Exhibit 6-2 illustrates the four basic parts of the *standards-to-permits* process used to assess the need for and develop WQBELs.

After completing that process, the permit writer determines the final effluent limitations, includes any compliance schedules and interim effluent limitations, as appropriate, and documents all his or her decisions and calculations.

Exhibit 6-2 Standards-to-permits process



This chapter provides basic information on the standards-to-permits process. For more detailed information on water quality standards and water quality-based permitting, and some of the specific topics discussed in this chapter, refer to the NPDES Website <www.epa.gov/npdes> and Water Quality Standards Website <www.epa.gov/waterscience/standards>.

6.1 Determine Applicable Water Quality Standards

CWA section 303(c) and Part 131 establish the framework for water quality standards. The CWA and implementing regulations require states to develop and, from time to time, revise water quality standards applicable to waters of the United States, or segments of such waterbodies, that are in the jurisdiction of the state. States must review their water quality standards at least once every 3 years and revise them as appropriate. Wherever attainable, water quality standards should protect water quality that provides for the protection and propagation of fish, shellfish and wildlife, and recreation in and on the water (i.e., the CWA section 101(a)(2) *fishable/swimmable* goal). In establishing standards, states must consider the use and value of their waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation. The U.S. Environmental Protection Agency (EPA) has provided information regarding procedures for developing water quality standards in the Water Quality Standards Regulation at Part 131 and EPA's *Water Quality Standards Handbook: Second Edition*[1] <www.epa.gov/waterscience/library/wqstandards/handbook.pdf.> (hereafter *WQS Handbook*). Under CWA section 510, states may develop water quality standards that are more stringent than those required by the CWA.

EPA Regions review and approve or disapprove new and revised water quality standards adopted by states. The purpose of EPA's review is to ensure that the new and revised water quality standards meet the requirements of the CWA and the Water Quality Standards Regulation. Water quality standards adopted and submitted to EPA after May 30, 2000, must be approved by EPA before they may be used to implement the CWA (e.g., used in NPDES permitting). If an EPA Region disapproves a submitted new or revised state water quality standard, and the state does not adopt the necessary changes within 90 days of notification of the disapproval, EPA must promptly propose and promulgate a replacement standard [see § 131.22(a)].

When writing an NPDES permit, the permit writer must identify and use the state water quality standards in effect for CWA purposes. EPA maintains a compilation of current state water quality standards on the Water Quality Standards: State, Tribal, & Territorial Standards Website <www.epa.gov/waterscience/standards/wqslibrary/>. In addition, EPA's Water Quality Standards: Laws and Regulations Website <www.epa.gov/waterscience/standards/rules/> provides federally promulgated standards applicable to specific states. The remainder of this section provides permit writers with a general overview of water quality standards and how they are implemented in NPDES permits.

6.1.1 Components of Water Quality Standards

Water quality standards comprise three parts:

- Designated uses.
- Numeric and/or narrative water quality criteria.
- Antidegradation policy.

Each of those three components, along with general policies that also may be included in state water quality standards, is described below.

6.1.1.1 Designated Uses (§ 131.10)

The first part of a state's water quality standards is a classification system for waterbodies based on the expected uses of those waterbodies. The uses in this system are called *designated uses*. The regulations at § 131.10(a) describe various uses of waters that are considered desirable and that must be considered when establishing water quality standards. Those uses include public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. The regulations allow states to designate more specific uses (e.g., cold water aquatic life) [see § 131.10(c)] or uses not specifically mentioned in the CWA, with the exception of waste transport and assimilation, which are not acceptable designated uses [see § 131.10(a)]. States must also consider and ensure the attainment and maintenance of the water quality standards of downstream waters when establishing designated uses [see § 131.10(b)].

The regulations in § 131.10(j) effectively establish a *rebuttable presumption* that the uses in CWA section 101(a)(2) (fishable/swimmable) are attainable. If a state fails to designate a given waterbody for such uses, or wishes to remove such uses, it must provide appropriate documentation demonstrating why such uses are not attainable. This analysis is commonly called a *Use Attainability Analysis* (UAA) (see § 131.3(g) and section 6.1.2.1 below).

6.1.1.2 Water Quality Criteria (§ 131.11)

The second part of a state's water quality standards is the set of water quality criteria sufficient to support the designated uses of each waterbody. EPA's Water Quality Standards Regulation at § 131.11(a) requires states to adopt water quality criteria using sound scientific rationale and to include sufficient parameters or constituents to protect the designated use. If a waterbody has multiple use designations, the criteria must support the most sensitive use. The regulation at § 131.11(b) allows states to adopt both numeric and narrative water quality criteria. Numeric water quality criteria are developed for specific parameters to protect aquatic life and human health and, in some cases, wildlife from the deleterious effects of pollutants. States establish narrative criteria where numeric criteria cannot be established, or to supplement numeric criteria. Criteria newly adopted or revised on or after May 30, 2000, do not become effective for purposes of the CWA until approved by EPA [see § 131.21(c)].

CWA section 304(a) directs EPA to develop, publish, and, from time to time, revise criteria for water quality accurately reflecting the latest scientific knowledge on the following:

- The kind and extent of all identifiable effects on health and welfare, including effects on aquatic life and recreational uses, that may be expected from the presence of pollutants in any body of water.
- The concentration and dispersal of pollutants or their byproducts through biological, physical, and chemical processes.
- The effects of pollutants on biological community diversity, productivity, and stability.

EPA's recommended criteria developed under CWA section 304(a) assist states in developing their water quality standards. EPA's numeric criteria are ambient levels of individual pollutants or parameters or they describe conditions of a waterbody that, if met, generally will protect the CWA section 101(a)(2) fishable and swimmable uses. EPA's recommended criteria developed under CWA section 304(a) do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water. EPA provides a table of the nationally recommended CWA section 304(a) criteria on the National Recommended Water Quality Criteria Website <www.epa.gov/waterscience/criteria/wqctable/>. The regulation at § 131.11(b)(1) indicates that, in establishing numeric criteria, states may (1) adopt EPA's recommended criteria published under CWA section 304(a), (2) adopt those criteria modified to reflect site-specific conditions, or (3) adopt criteria based on other scientifically defensible methods.

CWA section 303(c)(2)(B) specifically requires states to adopt numeric criteria for CWA section 307(a) toxic (priority) pollutants for which EPA has published recommended criteria if the discharge or presence of the pollutant can reasonably be expected to interfere with designated uses. Furthermore, § 131.11(a)(2) requires states to review water quality data and information on discharges to identify specific water bodies where toxic pollutants might be adversely affecting water quality or attainment of designated uses or where levels of toxic pollutants would warrant concern and to adopt criteria for such toxic pollutants applicable to the waterbody that are sufficient to protect the designated use. As discussed in section 1.2 and presented in Exhibit C-1 in Appendix C of this manual, the CWA section 307(a) list contains 65 compounds and families of compounds, which EPA has interpreted to include 126 toxic (priority) pollutants.

Numeric Criteria—Aquatic Life

Numeric criteria for the protection of aquatic life are designed to protect aquatic organisms, including both plants and animals. EPA's aquatic life criteria address both short-term (acute) and long-term (chronic) effects on both freshwater and saltwater species. Each of those criteria generally consists of three components:

- **Magnitude:** The level of pollutant (or pollutant parameter), usually expressed as a concentration, that is allowable.
- **Duration:** The period (averaging period) over which the in-stream concentration is averaged for comparison with criteria concentrations.
- **Frequency:** How often criteria may be exceeded.

Are criteria and effluent limitations expressed in the same terms?

Generally, criteria and effluent limitations are not expressed in the same terms. As discussed above, criteria are generally expressed as a magnitude, duration and frequency. Effluent limitations in NPDES permits are generally expressed as a magnitude (e.g., milligrams per liter, micrograms per liter) and an averaging period (e.g., maximum daily, average weekly, average monthly). A permit writer should be aware of the procedures used by his or her permitting authority to appropriately reflect the magnitude, duration, and frequency components of aquatic life criteria when determining the need for and calculating effluent limitations for NPDES permits. Typically, the components of the criteria are addressed in water quality models through the use of statistically derived receiving water and effluent flow values that ensure that criteria are met under *critical conditions* (see section 6.2 below).

Exhibit 6-3 is an example of freshwater aquatic life criteria for cadmium from the National Recommended Water Quality Criteria Website <www.epa.gov/waterscience/criteria/wqctable/> and at 66 FR 18935, April 12, 2001, Notice of Availability of 2001 Update: Aquatic Life Criteria Document for Cadmium <www.epa.gov/EPA-WATER/2001/April/Day-12/w9056.htm>.

Exhibit 6-3 Aquatic life criteria example: Cadmium (dissolved)

Except possibly where a locally important species is unusually sensitive, freshwater aquatic organisms and their uses should not be affected unacceptably if

Chronic criterion:
The 4-day average concentration (in micrograms per liter [µg/L]) does not exceed the numerical value given by $e^{(0.7409[\ln(\text{hardness})]-4.719)}$ (1.101672 – [(ln hardness)(0.041838)]) more than once every 3 years on average.

Acute criterion:
The 24-hour average concentration (in µg/L) does not exceed the numerical value given by $e^{(1.0166[\ln(\text{hardness})]-3.924)}$ (1.136672 – [(ln hardness)(0.041838)]) more than once every 3 years on average.

It is apparent that the acute and chronic aquatic life criteria for cadmium are not simply single numbers. Rather, they are expressed as a magnitude, a duration (4-day average or 24-hour average), and a frequency (not more than once every 3 years). Furthermore, the magnitude is expressed by a formula that is hardness-dependent, as is the case for most criteria for metals.

The magnitude of other aquatic life criteria can vary according to other conditions in the water or even based on the presence or absence of certain aquatic life. For example, EPA's 1999 recommended ammonia criteria vary according to pH, temperature, the presence or absence of salmonid species, and the presence or absence of early life stages of fish. A permit writer must be aware of the applicable criteria and any state regulations, policies, and procedures for interpreting numeric criteria and for implementing the criteria in NPDES permits. The durations of aquatic life criteria vary as well. For example, EPA's criteria recommendations for ammonia include a 30-day average chronic criterion. Also, many acute criteria for toxic pollutants are expressed as a 1-hour average. The frequency component of most aquatic life criteria specifies that they should be exceeded no more than once every three years.

Some states have adopted numeric criteria for nutrients as part of their water quality standards. EPA has developed nutrient criteria recommendations that are numeric values for both causative (phosphorus and nitrogen) and response (chlorophyll *a* and turbidity) variables associated with the prevention and assessment of eutrophic conditions. EPA's recommended nutrient criteria are different from most of its other recommended criteria, such as the criteria for cadmium and ammonia. First, EPA's recommended nutrient criteria are *ecoregional* rather than nationally applicable criteria, and they can be refined and localized using nutrient criteria technical guidance manuals. Second, the recommended nutrient criteria represent conditions of surface waters that have minimal impacts caused by human activities rather than values derived from laboratory toxicity testing. Third, the recommended nutrient criteria are do not include specific duration or frequency components; however, the ecoregional nutrient criteria documents indicate that states may adopt seasonal or annual averaging periods for nutrient criteria instead of the 1-hour, 24-hour, or 4-day average durations typical of aquatic life criteria for toxic pollutants. The ecoregional nutrient criteria documents, technical guidance manuals, and other information on EPA's nutrient criteria recommendations, are available on the Water Quality Criteria for Nitrogen and Phosphorus Pollution Website <www.epa.gov/waterscience/criteria/nutrient/>.

Water quality standards also typically include aquatic life criteria for parameters such as temperature and pH that are not chemical constituents. Criteria for pH generally are expressed as an acceptable pH range in the waterbody. Temperature criteria might be expressed as both *absolute temperature values* (e.g., temperature may not exceed 18 degrees Celsius [°C]) and restrictions on causing *changes in temperature* in the waterbody (e.g., discharges may not warm receiving waters by more than 0.5 °C).

In addition to criteria for individual pollutants or pollutant parameters, many states include in their water quality standards criteria for dissolved oxygen. Often, criteria for dissolved oxygen are addressed by modeling and limiting discharges of oxygen-demanding pollutants such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), and nutrients (phosphorus and nitrogen).

Finally, states could also include in their water quality standards numeric criteria to address the effect of mixtures of pollutants. For example, whole effluent toxicity (WET) criteria protect the waterbody from the aggregate and synergistic toxic effects of a mixture of pollutants. WET is discussed in detail later in this chapter.

Numeric Criteria—Human Health

Human health criteria for toxic pollutants are designed to protect people from exposure resulting from consumption of fish or other aquatic organisms (e.g., mussels, crayfish) or from consumption of both water and aquatic organisms. These criteria express the highest concentrations of a pollutant that are not

expected to pose significant long-term risk to human health. Exhibit 6-4 is an example of human health criteria for dichlorobromomethane.

Exhibit 6-4 Human health criteria example: Dichlorobromomethane

For the protection of human health from the potential carcinogenic effects of dichlorobromomethane through ingestion of water and contaminated aquatic organisms, the ambient water criterion is determined to be 0.55 µg/L.
For the protection of human health from the potential carcinogenic effects of dichlorobromomethane through ingestion contaminated aquatic organisms alone, the ambient water criterion is determined to be 17 µg/L.
These values were calculated based on a national default freshwater/estuarine fish consumption rate of 17.5 grams per day.

Other criteria for protection of human health (e.g., bacteria criteria) consider a shorter-term exposure through uses of the waterbody such as contact recreation. EPA's current bacteria criteria recommendations use enterococci and *Escherichia coli* bacteria as indicators and include two components: a geometric mean value and a single sample maximum value. EPA has developed information on implementing those criteria in water quality standards on the Microbial (Pathogen) Water Quality Criteria Website <www.epa.gov/waterscience/criteria/humanhealth/microbial/>.

Other Numeric Criteria

In addition to aquatic life and human health criteria, some state water quality standards include other forms of numeric criteria, such as wildlife, sediment, and biocriteria.

Wildlife criteria are derived to establish ambient concentrations of chemicals that, if not exceeded, will protect mammals and birds from adverse impacts resulting from exposure to those chemicals through consumption of aquatic organisms and water. EPA established four numeric criteria to protect wildlife in the Great Lakes system in its *Final Water Quality Guidance for the Great Lakes System* <www.epa.gov/EPA-WATER/1995/March/Day-23/pr-82.html> (60 FR 15387, March 23, 1995).

In a healthy aquatic community, sediments provide a habitat for many living organisms. Controlling the concentration of pollutants in the sediment helps to protect bottom-dwelling species and prevents harmful toxins from moving up the food chain and accumulating in the tissue of animals at progressively higher levels. For more information on this topic, see EPA's Suspended and Bedded Sediments Website <www.epa.gov/waterscience/criteria/sediment/>.

The presence, condition and numbers of types of fish, insects, algae, plants, and other organisms are data that, together, provide direct, accurate information about the health of specific bodies of water. Biological criteria (biocriteria) are narrative or numeric expressions that describe the reference biological integrity (structure and function) of aquatic communities inhabiting waters of a given designated aquatic life use. Biocriteria are based on the numbers and kinds of organisms present and are regulatory-based biological measurements. They are used as a way of describing the qualities that must be present to support a desired condition in a waterbody, and they serve as the standard against which biological assessment results are compared. EPA's Biocriteria: Uses of Data in NPDES Permits Website <www.epa.gov/waterscience/biocriteria/watershed/npdes.html> provides more information on the use of bioassessment information.

Narrative Criteria

All states have adopted narrative water quality criteria to supplement numeric criteria. Narrative criteria are statements that describe the desired water quality goal for a waterbody. Narrative criteria, for example, might require that discharges be "free from toxics in toxic amounts" or be "free of objectionable color, odor, taste, and turbidity." Narrative criteria can be the basis for limiting specific pollutants for which the state does not have numeric criteria [§ 122.44(d)(1)(vi)] or they can be used as the basis for limiting toxicity using WET requirements where the toxicity has not yet been traced to a specific pollutant or pollutants [§ 122.44(d)(1)(v)]. For toxic pollutants, EPA's Water Quality Standards Regulation at § 131.11(a)(2) requires states to develop implementation procedures for toxics narrative criteria that address how the state intends to regulate point source discharges of toxic pollutants to water quality limited segments.

6.1.1.3 Antidegradation Policy (§ 131.12)

The third part of a state's water quality standards is its antidegradation policy. Each state is required to adopt an antidegradation policy consistent with EPA's antidegradation regulations at § 131.12. A state's antidegradation policy specifies the framework to be used in making decisions about proposed activities that will result in changes in water quality. Antidegradation policies can play a critical role in helping states protect the public resource of water whose quality is better than established criteria levels and ensure that decisions to allow reductions in water quality are made in a public manner and serve the public good. Along with developing an antidegradation policy, each state must identify the method it will use to implement the policy. It is important for permit writers to be familiar with their state's antidegradation policy and how that policy is to be implemented in NPDES permits.

A state's antidegradation policy provides three levels of protection from degradation of existing water quality:

- **Tier 1:** This tier requires that existing uses, and the level of water quality necessary to protect the existing uses, be maintained and protected.
- **Tier 2:** Where the quality of waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (sometimes referred to as *high-quality waters*), Tier 2 requires that this level of water quality be maintained and protected unless the state finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area where the waters are located. In allowing any such degradation or lower water quality, the state must assure water quality adequate to protect existing uses fully and must assure that there will be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
- **Tier 3:** This tier requires that the water quality of *outstanding national resources waters* (ONRWs) be maintained and protected.

States take a variety of approaches to implementing antidegradation policies. Some states designate their waters as Tier 1, Tier 2 (high-quality water) or Tier 3 waters in their antidegradation implementation methods, while others designate a waterbody as a Tier 2 or high-quality water only when activities that would degrade water quality are proposed. In some cases, states may have classified the waterbody as

receiving a tier of protection for all pollutant-related parameters, whereas in other cases, tiers of protection have been determined on a parameter-by-parameter basis.

6.1.1.4 General Policies (§ 131.13)

In addition to the three required components of water quality standards, states may, at their discretion, include in their standards policies that generally affect how the standards are applied or implemented. Examples of such policies include mixing zone policies, critical low flows at which criteria must be achieved, and the availability of variances. Some general policies are discussed in more detail later in this chapter. As with the other components of water quality standards, general policies are subject to EPA review and approval if they are deemed to be new or revised water quality standards (i.e., if they constitute a change to designated use(s), water quality criteria, antidegradation requirements, or any combination).

Additional and more detailed information on water quality standards is available in the WQS Handbook.

6.1.2 Water Quality Standards Modifications

Permit writers should be aware of several types of modifications to water quality standards that could permanently or temporarily change the standards and, thus, change the fundamental basis of WQBELs. Those modifications, described below, are as follows:

- Designated use reclassification.
- Site-specific water quality criteria modification.
- Water quality standard variance.

6.1.2.1 Designated Use Reclassification

Once a use has been designated for a particular waterbody or segment, that use may not be removed from the water quality standards except under specific conditions. To remove a designated use, the state demonstrates that attaining that use is not feasible because of any one of the six factors listed in § 131.10(g). The regulations at § 131.10(j) specifically require a state to conduct a UAA if the designated uses for a waterbody do not include the uses in CWA section 101(a)(2) (i.e., fishable/swimmable uses); if the state wishes to remove designated uses included in CWA section 101(a)(2) from its water quality standards; or if the state wishes to adopt subcategories of CWA section 101(a)(2) uses with less stringent criteria. The WQS Handbook discusses UAAs and removing designated uses in detail. Reclassifying a waterbody's designated uses, as supported by a UAA, is a permanent change to both the designated use(s) and the water quality criteria associated with that (those) use(s).

States may conduct a UAA and remove a designated use but not if it is an existing use. Existing uses are defined in § 131.3 as those uses actually attained in the waterbody on or after November 28, 1975 (the date of EPA's initial water quality standards regulation at 40 *Federal Register* 55334, November 28, 1975). At a minimum, uses are deemed attainable if they can be achieved by the implementing effluent limits required under CWA sections 301(b) and 306 and by implementing cost effective and reasonable best management practices (BMPs) for nonpoint source control. EPA's Water Quality Standards: UAA Website <www.epa.gov/waterscience/standards/uses/uaa/index.htm> provides additional information and some example UAAs.

6.1.2.2 Site-Specific Water Quality Criteria Modification

As noted above, CWA sections 303(a)–(c) require states to adopt water quality criteria sufficient to protect applicable designated uses. In some cases, a state might find that the criteria it has adopted to protect a waterbody or segment of a waterbody do not adequately account for site-specific conditions. In such cases, states have the option of modifying water quality criteria on a site-specific basis. Setting site-specific criteria might be appropriate where, for example, a state has adopted EPA's CWA section 304(a) criteria recommendations and finds that physical or chemical properties of the water at a site affect the bioavailability or toxicity of a chemical, or the types of local aquatic organisms differ significantly from those actually tested in developing the EPA-recommended criteria. Site-specific criteria modifications change water quality criteria permanently while continuing to support the current designated uses.

Development of site-specific criteria for aquatic life is discussed in section 3.7 of the WQS Handbook for cases when (1) there might be relevant differences in the toxicity of the chemical in the water at the site and laboratory dilution water (Water-Effect Ratio Procedure) and (2). the species at the site are more or less sensitive than those used in developing the natural criteria (Species Recalculation Procedure). EPA's Office of Science and Technology (OST) has developed the Interim Guidance on Determination and Use of Water-Effect Ratios for Metals <www.epa.gov/waterscience/standards/handbook/handbookappxL.pdf> in Appendix L of the WQS Handbook and the *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*[2] <www.epa.gov/waterscience/criteria/copper/copper.pdf>. In addition, pages 90-97 of Appendix L provide guidance for using the Species Recalculation Procedure. States may also consider establishing aquatic life criteria based on *natural background* conditions. Further information can be found in the memo *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background*[3] <www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf>.

6.1.2.3 Water Quality Standard Variance

Water quality standard variances are changes to water quality standards and have similar substantive and procedural requirements as what are required to remove a designated use. Unlike use removal, variances are time-limited and do not permanently remove the current designated use of a waterbody. Variances are usually discharger- and pollutant-specific, though some states have adopted *general variances*. Where a state has adopted a general variance, the analyses necessary for the variance have been completed on a watershed-wide or statewide basis and, therefore, the process of obtaining a variance is simplified for individual dischargers in that watershed or state.

A variance might be appropriate where the state believes that the existing standards are ultimately attainable and that, by retaining the existing standards rather than changing them, the state would ensure that further progress is made in improving the water quality toward attaining the designated uses while the variance is in effect. State-adopted variances have been approved by EPA where, among other things, the state's standards allow variances and the state demonstrates that meeting the applicable criteria is not feasible on the basis of one or more of the factors outlined in § 131.10(g). A variance typically is granted for a specified period and must be reevaluated at least once every 3 years as reasonable progress is made toward meeting the standards [see section 5.3 of the WQS Handbook and § 131.20(a)].

Modifications of water quality standards could affect effluent limitations in permits in several ways. Specifically, the modifications can change the fundamental basis for WQBELs, potentially affecting an assessment of the need for WQBELs and possibly resulting in either more or less stringent WQBELs than

would otherwise be required. It is the permit writer's responsibility to ensure that any EPA-approved modification of water quality standards is properly reflected in an affected NPDES permit.

6.1.3 Water Quality Standards Implementation

As previously noted, CWA section 301(b)(1)(C) requires NPDES permits to establish effluent limitations as necessary to meet water quality standards. Effluent limitations and other conditions in NPDES permits may be based on a parameter-specific approach or a WET testing approach to implementing water quality standards. A third approach to implementing water quality standards, using biocriteria or bioassessment, is not directly accomplished through NPDES permit effluent limitations but can lead to effluent limitations for specific parameters or for WET. Each of those approaches to implementing water quality standards is discussed briefly below.

What procedures should permit writers use to implement water quality standards?

The terminology used and procedures described in this manual when discussing both assessing the need for and calculating WQBELs are based on the procedures in EPA's *Technical Support Document for Water Quality-Based Toxics Control*[4] <www.epa.gov/npdes/pubs/owm0264.pdf> (hereafter *TSD*). Those procedures were developed specifically to address toxic pollutants but have been appropriately used to address a number of conventional and nonconventional pollutants as well. Permit writers should be aware that most permitting authorities have developed their own terminology and procedures for water quality-based permitting, often derived from, but with variations on, EPA's guidance. For example, EPA itself promulgated *Final Water Quality Guidance for the Great Lakes System* (60 FR 15387, March 23, 1995) with minimum water quality criteria, antidegradation policies, and implementation procedures, including permitting procedures based on the TSD. Under the CWA, Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin were required to adopt procedures for the Great Lakes system that are consistent with that guidance. Permit writers should always consult the applicable permitting regulations, policy, and guidance for the approved water quality-based permitting procedures in their state.

6.1.3.1 Parameter-Specific Approach

The parameter-specific approach uses parameter-specific criteria for protection of aquatic life, human health, wildlife, and sediments, as well as any other parameter-specific criteria adopted into a state's water quality standards. The criteria are the basis for analyzing an effluent, deciding which parameters need controls, and deriving effluent limitations that will control those parameters to the extent necessary to achieve water quality standards in the receiving water. Parameter-specific WQBELs in NPDES permits involve a site-specific evaluation of the discharge (or proposed discharge) and its potential effect on the receiving water or an evaluation of the effects of multiple sources of a pollutant on the receiving water (e.g., through a total maximum daily load [TMDL] analysis). The parameter-specific approach allows for controlling individual parameters, (e.g., copper, BOD, total phosphorus) before a water quality impact has occurred or for helping return water quality to a level that will meet designated uses.

6.1.3.2 Whole Effluent Toxicity (WET) Approach

WET requirements in NPDES permits protect aquatic life from the aggregate toxic effect of a mixture of pollutants in the effluent. WET tests measure the degree of response of exposed aquatic test organisms to an effluent. The WET approach is useful for complex effluents where it might be infeasible to identify

and regulate all toxic pollutants in the effluent or where parameter-specific effluent limitations are set, but the combined effects of multiple pollutants are suspected to be problematic. The WET approach allows a permit writer to implement numeric criteria for toxicity included in a state's water quality standards or to be protective of a narrative "no toxics in toxic amounts" criterion. Like the parameter-specific approach, the WET approach allows permitting authorities to control toxicity in effluents before toxic impacts occur or may be used to help return water quality to a level that will meet designated uses.

6.1.3.3 Bioassessment Approach

The biocriteria approach is used to assess the overall biological integrity of an aquatic community. As discussed in section 6.1.1.2 above, biocriteria are numeric values or narrative statements that describe the biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use. When incorporated into state water quality standards, biocriteria and aquatic life use designations serve as direct endpoints for determining aquatic life use attainment. Once biocriteria are developed, the biological condition of a waterbody can be measured through a biological assessment, or bioassessment.

A bioassessment is an evaluation of the biological condition of a waterbody using biological surveys and other direct measurements of resident biota in surface waters. A biological survey, or biosurvey, consists of collecting, processing, and analyzing representative portions of a resident aquatic community to determine the community structure and function. The results of biosurveys can be compared to the reference waterbody to determine if the biocriteria for the designated use of the waterbody are being met. EPA issued guidance on this approach in *Biological Criteria: National Program Guidance for Surface Waters*[5] <www.epa.gov/bioindicators/html/biolcont.html>. As previously discussed, biocriteria generally are not directly implemented through NPDES permits but could be used in assessing whether a waterbody is attaining water quality standards. Nonattainment of biocriteria could lead to parameter-specific effluent limitations where the permitting authority is able to identify specific pollutant(s) and source(s) contributing to that nonattainment (see EPA's Biocriteria: Uses of Data – Identify Stressors to a Waterbody Website <www.epa.gov/waterscience/biocriteria/uses/stressors.html>) or could lead to WET limitations where the permitting authority identifies sources of toxicity to aquatic life. EPA's Biocriteria: Uses of Data - NPDES <www.epa.gov/waterscience/biocriteria/watershed/npdes.html> provides examples on the use of bioassessment information in the NPDES permitting process.

Sections 6.2–6.4 below discuss, in detail, implementing water quality standards using the parameter-specific approach to assess the need for and develop effluent limitations in NPDES permits. Section 6.5 below provides additional detail on WET requirements in NPDES permits.

6.2 Characterize the Effluent and the Receiving Water

After identifying the most current, approved, water quality standards that apply to a waterbody, a permit writer should characterize both the effluent discharged by the facility being permitted and the receiving water for that discharge. The permit writer uses the information from those characterizations to determine whether WQBELs are required (section 6.3 below) and, if so, to calculate WQBELs (section 6.4 below). Characterizing the effluent and receiving water can be divided into five steps as shown in Exhibit 6-5 and discussed in detail below.

Exhibit 6-5 Steps for characterizing the effluent and receiving water

Step 1.	Identify pollutants of concern in the effluent
Step 2.	Determine whether water quality standards provide for consideration of a dilution allowance or mixing zone
Step 3.	Select an approach to model effluent and receiving water interactions
Step 4.	Identify effluent and receiving water critical conditions
Step 5.	Establish an appropriate dilution allowance or mixing zone

6.2.1 Step 1: Identify Pollutants of Concern in the Effluent

There are several sources of information for and methods of identifying pollutants of concern for WQBEL development. For some pollutants of concern, the permit writer might not need to conduct any further analysis and could, after characterizing the effluent and receiving water, proceed directly to developing WQBELs (section 6.4 below). For other pollutants of concern, the permit writer uses the information from the effluent and receiving water characterization to assess the need for WQBELs (section 6.3 below). The following subsections identify five categories of pollutants of concern for WQBEL development.

6.2.1.1 Pollutants with Applicable TBELs

One category of pollutants of concern includes those pollutants for which the permit writer has developed TBELs based on national or state technology standards or on a case-by-case basis using best professional judgment. By developing TBELs for a pollutant, the permit writer has already determined that there will be some type of final limitations for that pollutant in the permit and must then determine whether more stringent limitations than the applicable TBELs are needed to prevent an excursion above water quality standards in the receiving water (see Exhibit 6-1 above). A permit writer can determine whether the TBELs are sufficiently protective by either proceeding to calculate WQBELs as described in section 6.4 below and comparing them to the TBELs or by assuming that the maximum daily TBEL calculated is the maximum discharge concentration in the water quality assessments described in section 6.3 below.

6.2.1.2 Pollutants with a Wasteload Allocation from a TMDL

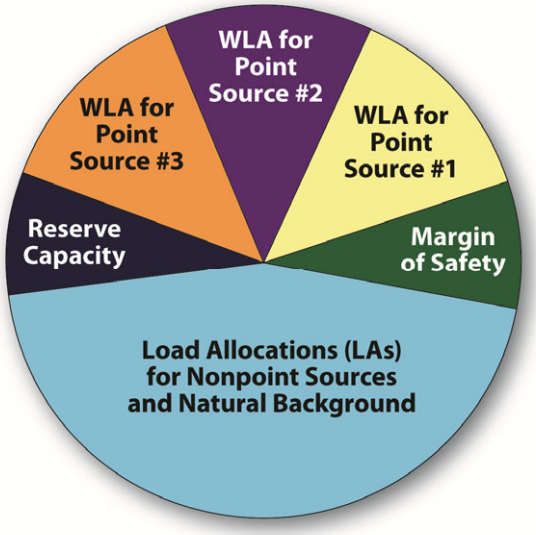
Pollutants of concern include those pollutants for which a *wasteload allocation* (WLA) has been assigned to the discharge through a TMDL. Under CWA section 303(d), states are required to develop lists of impaired waters. Impaired waters are those that do not meet the water quality standards set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that those jurisdictions establish priority rankings for waters on their CWA section 303(d) list and develop TMDLs for those waters.

What is a WLA?

The term WLA refers to the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution [see § 130.2(h)]. The WLA could be allocated through an EPA-approved TMDL, an EPA or state watershed loading analysis, or a facility-specific water quality modeling analysis.

A TMDL is a calculation of the maximum amount of a single pollutant that a waterbody can receive and still meet water quality standards and an allocation of that amount to the pollutant's sources. The portions of the TMDL assigned to point sources are WLAs, and the portions assigned to nonpoint sources and background concentrations of the pollutant are called *load allocations* (LAs). The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes designated in the water quality standards, to provide for the uncertainty in predicting how well pollutant reduction will result in meeting water quality standards, and to account for seasonal variations. A TMDL might also include a reserve capacity to accommodate expanded or new discharges in the future. Exhibit 6-6 depicts the parts of a TMDL.

Exhibit 6-6 Parts of a TMDL



TMDL = ΣWLA + ΣLA + Margin of Safety + Reserve Capacity

The NPDES regulations at § 122.44(d)(1)(vii)(B) require that NPDES permits include effluent limitations developed consistent with the assumptions and requirements of any WLA that has been assigned to the discharge as part of an approved TMDL. Thus, any pollutant for which a WLA has been assigned to the permitted facility through a TMDL is a pollutant of concern.

Permit writers might also choose to consider any pollutant associated with an impairment of the receiving water a pollutant of concern, regardless of whether an approved TMDL has been developed for that pollutant, a WLA has been assigned to the permitted facility, or the permitted facility has demonstrated that the pollutant is present in its effluent. Permitting authorities might consider monitoring requirements to collect additional data related to the presence or absence of the impairing pollutant in a specific discharge to provide information for further analyses.

6.2.1.3 Pollutants Identified as Needing WQBELs in the Previous Permit

Another category of pollutants of concern includes those pollutants that were identified as needing WQBELs in the discharger's previous permit. Permit writers must determine whether the conditions leading to a decision to include WQBELs for the pollutant in the previous permit continue to apply. Where those conditions no longer apply, the permit writer would need to complete an anti-backsliding

analysis to determine whether to remove the WQBELs from the reissued permit. Chapter 7 of this manual provides additional information on anti-backsliding requirements of the CWA and NPDES regulations. In addition, the permit writer might need to conduct an antidegradation analysis if the revised limitation would allow degradation of the quality of the receiving water.

6.2.1.4 Pollutants Identified as Present in the Effluent through Monitoring

Pollutants of concern also include any pollutants identified as present in the effluent through effluent monitoring. Effluent monitoring data are reported in the discharger's NPDES permit application, discharge monitoring reports and special studies. In addition, the permitting authority might collect data itself through compliance inspection monitoring or other special study. Permit writers can match information on which pollutants are present in the effluent to the applicable water quality standards to identify parameters that are candidates for WQBELs.

6.2.1.5 Pollutants Otherwise Expected to be Present in the Discharge

A final category of pollutants of concern includes those pollutants that are not in one of the other categories but are otherwise expected to be present in the discharge. There might be pollutants for which neither the discharger nor the permitting authority have monitoring data but, because of the raw materials stored or used, products or by-products of the facility operation, or available data and information on similar facilities, the permit writer has a strong basis for expecting that the pollutant could be present in the discharge. Because there are no analytical data to verify the concentrations of these pollutants in the effluent, the permit writer must either postpone a quantitative analysis of the need for WQBELs and generate, or require the discharger to generate, effluent monitoring data, or base a determination of the need for WQBELs on other information, such as the effluent characteristics of a similar discharge. A discussion on determining the need for WQBELs without effluent monitoring data is provided in section 6.3.3 below.

6.2.2 Step 2: Determine Whether Water Quality Standards Provide for Consideration of a Dilution Allowance or Mixing Zone

Many state water quality standards have general provisions allowing some consideration of mixing of effluent and receiving water when determining the need for and calculating WQBELs. Depending on the state's water quality standards and implementation policy, such a mixing consideration could be expressed in the form of a *dilution allowance* or *regulatory mixing zone*. A dilution allowance typically is expressed as the flow of a river or stream, or a portion thereof. A regulatory mixing zone generally is expressed as a limited area or volume of water in any type of waterbody where initial dilution of a discharge takes place and within which the water quality standards allow certain water quality criteria to be exceeded. Section 6.2.5 below discusses dilution allowances and mixing zones in greater detail.

State water quality standards or implementation policies might indicate specific locations or conditions (e.g., breeding grounds for aquatic species or bathing beaches) or water quality criteria (e.g., pathogens, pH, bioaccumulative pollutants, or narrative criteria) for which consideration of a dilution allowance or mixing zone is not allowed or is otherwise considered inappropriate.

6.2.3 Step 3: Select an Approach to Model Effluent and Receiving Water Interactions

Where consideration of a dilution allowance or mixing zone is not permitted by the water quality standards or is not appropriate, the relevant water quality criterion must be attained at the point of discharge. In such cases, there is no need for a water quality model to characterize the interaction between the effluent and receiving water. In this situation effluent limitations are based on attaining water quality criteria at the "end of the pipe."

Where a dilution allowance or mixing zone is permitted, however, characterizing the interaction between the effluent and receiving water generally requires using a water quality model. In the majority of situations, and in all of the examples provided in this manual, permit writers will use a steady-state water quality model to assess the impact of a discharge on its receiving water. Steady-state means that the model projects the impact of the effluent on the receiving water under a single or *steady* set of design conditions. Because the model is run under a single set of conditions, those conditions generally are set at *critical conditions* for protection of receiving water quality as discussed in section 6.2.4 below. The permit writer would determine the amount of the dilution allowance or the size of the mixing zone that is available under these critical conditions as provided in section 6.2.5 below.

6.2.4 Step 4: Identify Effluent and Receiving Water Critical Conditions

Where steady-state models are used for water quality-based permitting, an important part of characterizing the effluent and receiving water is identifying the critical conditions needed as inputs to the water quality model. Permit writers should discuss selection of critical conditions with water quality modelers or other water quality specialists. Identifying the right critical conditions is important for appropriately applying a water quality model to assess the need for WQBELs and to calculate WQBELs. Some key effluent and receiving water critical conditions are summarized below.

What if I am not a water quality modeler?

Permit writers are not always water quality modelers, nor do they necessarily need to be experts in this field. Many permitting authorities have a team of water quality specialists who model point source discharges to provide data required for permit writers to assess the need for and develop WQBELs. In some cases, this team might even calculate WQBELs directly for the permit writers, who then only need to compare them to TBELs and determine the final effluent limitations for the NPDES permit. Permit writers should, at a minimum, familiarize themselves with water quality modeling concepts presented in this manual, particularly the identification of critical conditions input to a steady-state water quality model, and should consult water quality modelers or other water quality specialists as needed in the process of NPDES permit development.

6.2.4.1 Effluent Critical Conditions

In most any steady-state water quality model there will be at least two basic critical conditions related to the effluent: flow and pollutant concentration.

Effluent Flow

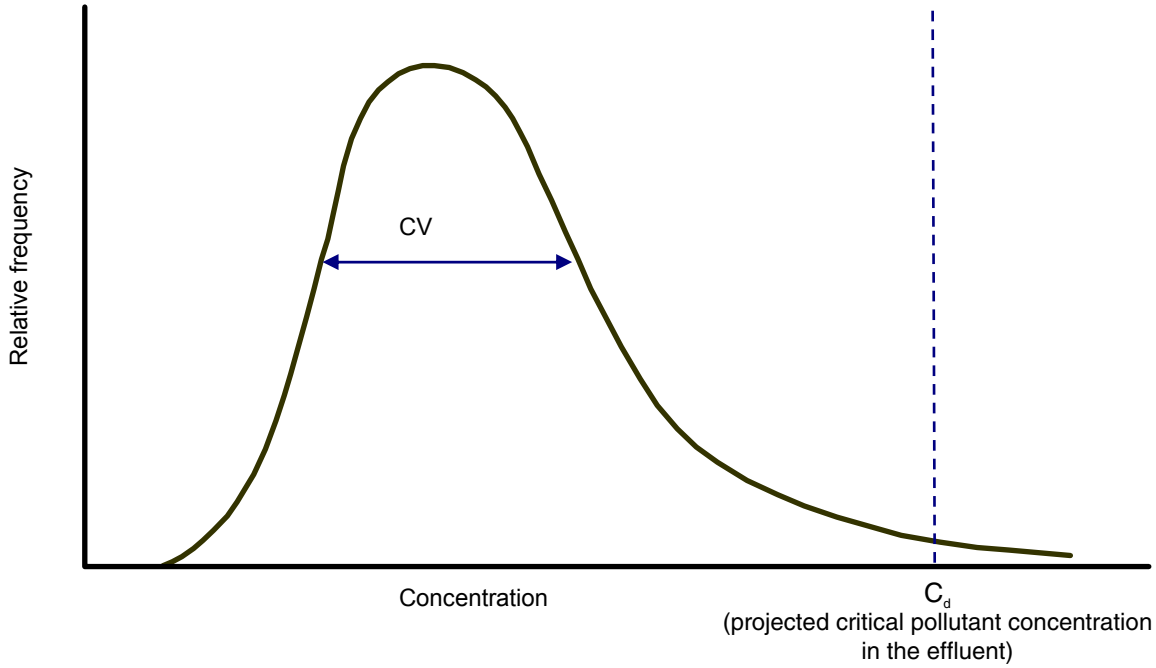
Effluent flow (designated Q_d in the water quality modeling equations used in this manual) is a critical design condition used when modeling the impact of an effluent discharge on its receiving water. A permit writer should be able to obtain effluent flow data from discharge monitoring reports or a permit application. Permitting authority policy or procedures might specify which flow measurement to use as the critical effluent flow value(s) in various water quality-based permitting calculations (e.g., the maximum daily flow reported on the permit application, the maximum of the monthly average flows from discharge monitoring reports for the past three years, the facility design flow). Permit writers should follow existing policy or procedures for determining critical effluent flow or, if the permitting authority does not specify how to determine this value, look at past permitting practices and strive for consistency.

Effluent Pollutant Concentration

Permit writers can determine the critical effluent concentration of the pollutant of concern (designated C_d) by gathering effluent data representative of the discharge. To establish the critical effluent pollutant concentration from the available data, EPA has recommended considering a concentration that represents something close to the maximum concentration of the pollutant that would be expected over time. In most cases, permit writers have a limited effluent data set and, therefore, would not have a high degree of certainty that the limited data would actually include the maximum potential effluent concentration of the pollutant of concern. In addition, the NPDES regulations at § 122.44(d)(1)(ii) require that permit writers consider the variability of the pollutant in the effluent when determining the need for WQBELs. To address those concerns, EPA developed guidance for permit writers on how to characterize effluent concentrations of certain types of pollutants using a limited data set and accounting for variability. This guidance is detailed in EPA's TSD.

By studying effluent data for numerous facilities, EPA determined that daily pollutant measurements of many pollutants follow a *lognormal distribution*. The TSD procedures allow permit writers to project a critical effluent concentration (e.g., the 99th or 95th percentile of a lognormal distribution of effluent concentrations) from a limited data set using statistical procedures based on the characteristics of the lognormal distribution. These procedures use the number of available effluent data points for the measured concentration of the pollutant and the coefficient of variation (or CV) of the data set, which is a measure of the variability of data around the average, to predict the critical pollutant concentration in the effluent. Exhibit 6-7 provides an example of a lognormal distribution of effluent pollutant concentrations and projection of a critical effluent pollutant concentration (C_d). For additional details regarding EPA's guidance, see Chapter 3 of the TSD. Many permitting authorities have developed procedures for estimating a critical effluent pollutant concentration that are based on or derived from those procedures. For pollutants with effluent concentrations that *do not* follow a lognormal distribution, permit writers would rely on alternative procedures developed by their permitting authority for determining the critical effluent pollutant concentration.

Exhibit 6-7 Example of lognormal distribution of effluent pollutant concentrations and projection of critical concentration (C_d)



6.2.4.2 Receiving Water Critical Conditions

As with the effluent, flow (for rivers and streams) and pollutant concentration are receiving water critical conditions used in steady-state water quality models. In addition, depending on the waterbody and pollutant of concern, there could be additional receiving water characteristics that permit writers need to consider in a water quality model.

Receiving Water Upstream Flow

For rivers and streams, an important critical condition is the stream flow upstream of the discharge (designated Q_s). That critical condition generally is specified in the applicable water quality standards and reflects the duration and frequency components of the water quality criterion that is being addressed. For most pollutants and criteria, the critical flow in rivers and streams is some measure of the low flow of that river or stream; however, the critical condition could be different (for example, a high flow, where wet weather sources are a major problem). If a discharge is controlled so that it does not cause water quality criteria to be exceeded in the receiving water at the critical flow condition, the discharge controls should be protective and ensure that water quality criteria, and thus designated uses, are attained under all receiving water flow conditions.

Examples of typical critical hydrologically based low flows found in water quality standards include the 7Q10 (7-day average, once in 10 years) low flow for chronic aquatic life criteria, the 1Q10 low flow for acute aquatic life criteria, and the harmonic mean flow for human health criteria for toxic organic pollutants. The permit writer might examine stream flow data from the state or the U.S. Geological

Survey to determine the critical flow at a point upstream of the discharge. The permit writer might also account for any additional sources of flow or diversions between the point where a critical low flow has been calculated and the point of discharge. EPA also has developed a biologically based flow method that directly uses the durations and frequencies specified in the water quality criteria.

Climate Change Considerations

As noted in this section, the receiving water upstream flow is an important factor in modeling the interaction between the effluent discharge and a river or stream. In most instances, state water quality standards or implementation policies establish the critical low flows that should be used in modeling this interaction. The most common source of upstream flow data for water quality modelers is historical flow gage data available through the U.S. Geological Survey. Modelers should be aware that the effects of climate change could alter historical flow patterns in rivers and streams, making these historical flow records less accurate in predicting current and future critical flows. Where appropriate, water quality modelers should consider alternate approaches to establishing critical low flow conditions that account for these climatic changes.

Receiving Water Background Pollutant Concentration

In addition to determining the critical effluent concentration of the pollutant of concern, the permit writer also should determine the critical background concentration of the pollutant of concern in the receiving water before the discharge (designated C_s) to ensure that any pollutant limitations derived are protective of the designated uses. Permitting authority policies or procedures often address how to determine that critical background concentration value for the pollutant. For example, using ambient data or working with the discharger to obtain reliable ambient data, the permit writer might use the maximum measured background pollutant concentration or, perhaps, an average of measured concentrations as the critical condition. Ambient data will provide the most reliable characterization of receiving water background pollutant concentration. EPA encourages permitting authorities to collect and use actual ambient data, where possible. Where data are not available, however, the state might have other procedures, such as establishing that without valid and representative ambient data, no dilution or mixing will be allowed (i.e., criteria end-of-pipe), or using a percentage of an applicable water quality criterion or a detection, quantitation, or other reporting level. The permit writer should consult the permitting authority's policies and procedures or, if there are no policies or procedures available, look at past permitting practices and maintain consistency with those practices when determining the critical receiving water background concentrations.

Other Receiving Water Characteristics

For waterbodies other than free-flowing rivers and streams, there might be critical environmental conditions that apply rather than flow (e.g., tidal flux, temperature). In addition, depending on the pollutant of concern, the effects of biological activity and reaction chemistry might be important in assessing the impact of a discharge on the receiving water. In such situations, additional critical receiving water conditions that might be used in a steady-state water quality model include conditions such as pH, temperature, hardness, or reaction rates, and the presence or absence of certain fish species or life stages of aquatic organisms, to name a few.

Sections 6.3 and 6.4 below provide further discussion of how critical conditions are applied in a water quality model to determine the need for and calculate WQBELs.

6.2.5 Step 5: Establish an Appropriate Dilution Allowance or Mixing Zone

Following verification of whether the applicable water quality standards allow any consideration of effluent and receiving water mixing and, for a steady-state modeling approach, the critical conditions that apply to the effluent and receiving water, permit writers can determine how the effluent and the receiving water mix under critical conditions. Based on this determination, permit writers can then establish the maximum dilution allowance or mixing zone allowed by the water quality standards for each pollutant of concern.

6.2.5.1 Type of Mixing Under Critical Conditions

On the basis of requirements in the water quality standards, the dilution allowance or mixing zone used in water quality models and calculations are likely to vary depending on whether there is rapid and complete mixing or incomplete mixing of the effluent and receiving water under critical conditions. Thus, the permit writer needs to understand something about *how* the effluent and receiving water mix under critical conditions.

Rapid and complete mixing is mixing that occurs when the lateral variation in the concentration of a pollutant in the direct vicinity of the outfall is small. The applicable water quality standards might specify certain conditions under which a permit writer could *assume* that rapid and complete mixing is occurring, such as the presence of a diffuser. Some standards may also allow a *demonstration* of rapid and complete mixing in cases where the conditions for simply assuming rapid and complete mixing are not met. For example, the applicable water quality standards might specify a distance downstream of a discharge point by which the pollutant concentration across the stream width must vary by less than a certain percentage to assume that there is rapid and complete mixing.

If the permit writer cannot assume rapid and complete mixing and there has been no demonstration of rapid and complete mixing, the permit writer should assume that there is incomplete mixing. Under incomplete mix conditions, mixing occurs more slowly and higher concentrations of pollutants are present in-stream near the discharge as compared to rapid and complete mixing. Thus, an assumption of incomplete mixing is more conservative than an assumption of rapid and complete mixing. For waterbodies other than rivers and streams (e.g., lakes, bays, and the open ocean) the permit writer usually would assume incomplete mixing.

6.2.5.2 Maximum Dilution Allowance or Mixing Zone Size

Once a permit writer determines whether the applicable water quality standards allow consideration of some ambient dilution or mixing and determines the type of mixing taking place (rapid and complete mixing versus incomplete mixing), he or she would again consult the water quality standards to determine the maximum size of the dilution allowance or mixing zone that may be considered in water quality modeling calculations.

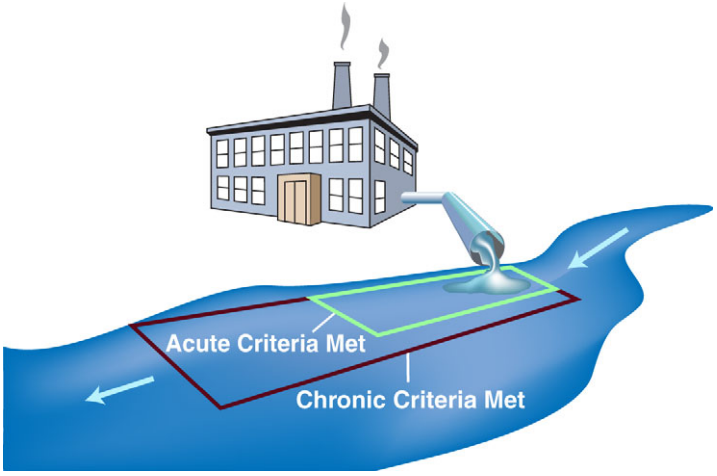
Dilution Allowances in Rapid and Complete Mix Situations

The maximum permissible dilution allowance for rivers and streams under conditions of rapid and complete mixing should be indicated in the water quality standards or standards implementation policy. For example, some water quality standards allow a permit writer to use up to 100 percent of the critical low flow of a river or stream as a dilution allowance in water quality models and calculations when there is rapid and complete mixing. In some cases, water quality standards implement a factor of safety by permitting only a percentage of the critical low flow to be used as a dilution allowance, even when there is rapid and complete mixing under critical conditions. Water quality standards might incorporate such a factor of safety to account for any uncertainty related to other conditions in the waterbody or to ensure that some assimilative capacity is retained downstream of the discharge being permitted. Recall as well that for some pollutants (e.g., pathogens in waters designated for primary contact recreation, bioaccumulative pollutants), the water quality standards or implementing procedures might not authorize any dilution allowance, even where the effluent and receiving water mix rapidly and completely.

Dilution Allowances and Regulatory Mixing Zones in Incomplete Mix Situations

In an incomplete mixing situation, the water quality standards or implementation policies might allow some consideration of ambient dilution. Rather than permitting as much as 100 percent of the critical low flow as a dilution allowance, however, they will likely specify either a limited dilution allowance (such as a percentage of the critical low flow) or the maximum size of a regulatory mixing zone. A regulatory *mixing zone* is a limited area or volume of water where initial dilution of a discharge takes place and within which the water quality standards allow certain water quality criteria to be exceeded. While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody as a whole will not be impaired and such that all designated uses are maintained as discussed in section 6.2.5.3 below. Exhibit 6-8 is a diagram illustrating the concept of a regulatory mixing zone. The mixing zone often is a simple geometric shape inside of which a water quality criterion may be exceeded. The geometric shape does not characterize how mixing actually occurs. Actual mixing is described using field studies and a water quality model.

Exhibit 6-8 Regulatory mixing zones for aquatic life criteria



Note that Exhibit 6-8 above illustrates two different mixing zones, one for an acute aquatic life criterion and one for a chronic aquatic life criterion. The water quality standards could specify different maximum mixing zones sizes for different pollutants, different types of criteria, and different waterbody types. Exhibit 6-9 provides examples of different maximum mixing zone sizes and dilution allowances.

Exhibit 6-9 Examples of maximum mixing zone sizes or dilution allowances under incomplete mixing conditions by waterbody type*

For rivers and streams:
- Mixing zones cannot be larger than 1/4 of the stream width and 1/4 mile downstream
- Mixing must be less than 1/2 stream width with a longitudinal limit of 5 times the stream width
- Dilution cannot be greater than 1/3 of the critical low flow

For lakes and the ocean:
- Mixing zones for lakes cannot be larger than 5% of the lake surface
- A maximum of 4:1 dilution is available for lake discharges
- A maximum of 10:1 dilution is available for ocean discharges
- The maximum size mixing zone for the ocean is a 100-foot radius from the point of discharge

* Examples were adapted from state standards and procedures and do not reflect EPA guidance or recommendations.

Permit writers should always check the applicable water quality standards to see if mixing zones are permitted and determine the maximum mixing zone size for the waterbody type, pollutant of concern, and specific criterion being considered.

6.2.5.3 Restrictions on Dilution Allowance or Mixing Zone Size

In addition to specifying the maximum dilution allowance or mixing zone size allowed under both rapid and complete mixing conditions and incomplete mixing conditions, the water quality standards or implementation policies generally include constraints that could further limit the available dilution allowance or mixing zone size to something less than the absolute maximum allowed. For example, one restriction on the size of the acute mixing zone could be that it must be small enough to ensure that the potential time of exposure of aquatic organisms to a pollutant concentration above the acute criterion is very short, and organisms passing through that acute mixing zone will not die from exposure to the pollutant. Such a restriction might lead the permitting authority to give a discharger an acute mixing zone for a specific pollutant that is smaller than the maximum size allowed by the water quality standards or to not allow any acute mixing zone at all. Other possible restrictions on dilution and mixing zone size include preventing impairment of the integrity of the waterbody as a whole and preventing significant risks to human health. For example, a permitting authority might restrict the size of a mixing zone for a human health criterion to prevent the mixing zone from overlapping a drinking water intake.

6.3 Determine the Need for WQBELs

After determining the applicable water quality standards and characterizing the effluent and receiving water, a permit writer determines whether WQBELs are needed. This section provides an overview of that process.

6.3.1 Defining Reasonable Potential

EPA regulations at § 122.44(d)(1)(i) state, "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level that will *cause*, have the *reasonable potential to cause*, or *contribute* to an excursion above any [s]tate water quality standard, including [s]tate narrative criteria for water quality." [emphasis added] Because of that regulation, EPA and many authorized NPDES states refer to the process that a permit writer uses to determine whether a WQBEL is required in an NPDES permit as a *reasonable potential analysis*. Wording the requirements of the regulation another way, a reasonable potential analysis is used to determine whether a discharge, alone or in combination with other sources of pollutants to a waterbody and under a set of conditions arrived at by making a series of reasonable assumptions, could lead to an excursion above an applicable water quality standard. The regulation also specifies that the reasonable potential determination must apply not only to numeric criteria, but also to narrative criteria (e.g., *no toxics in toxic amounts*, *presence of pollutants or pollutant parameters in amounts that would result in nuisance algal blooms*). A permit writer can conduct a reasonable potential analysis using effluent and receiving water data and modeling techniques, as described above, or using a non-quantitative approach. Both approaches are discussed below.

6.3.2 Conducting a Reasonable Potential Analysis Using Data

When determining the need for a WQBEL, a permit writer should use any available effluent and receiving water data as well as other information pertaining to the discharge and receiving water (e.g., type of industry, existing TBELs, compliance history, stream surveys), as the basis for a decision. The permit writer might already have data available from previous monitoring or he or she could decide to work with the permittee to generate data before permit issuance or as a condition of the new permit. EPA recommends that monitoring data be generated before effluent limitation development whenever possible. Monitoring should begin far enough in advance of permit development to allow sufficient time to conduct chemical analyses. Where data are generated as a condition of the permit (for example for a new permittee), it might be appropriate for the permit writer to include a reopener condition in the permit to allow the incorporation of a WQBEL if the monitoring data indicate that a WQBEL is required.

A reasonable potential analysis conducted with available data can be divided into four steps as shown in Exhibit 6-10 and discussed in detail below.

Exhibit 6-10 Steps of a reasonable potential analysis with available data

Step 1.	Determine the appropriate water quality model
Step 2.	Determine the expected receiving water concentration under critical conditions
Step 3.	Answer the question, "Is there reasonable potential?"
Step 4.	Document the reasonable potential determination in the fact sheet

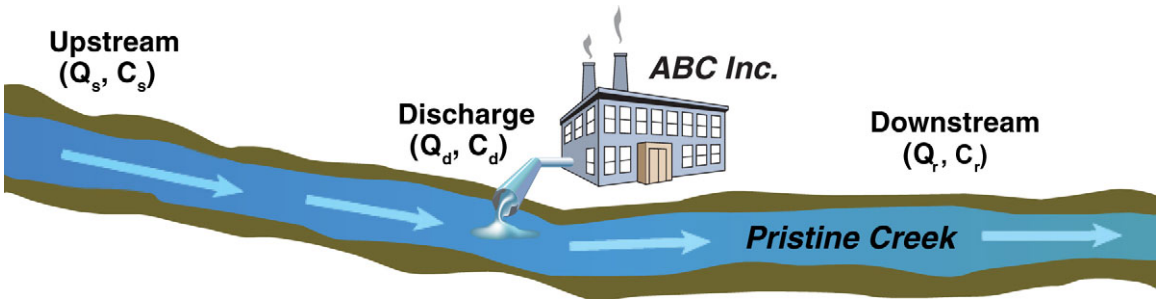
6.3.2.1 Step 1: Determine the Appropriate Water Quality Model

Steady-state or dynamic water quality modeling techniques can be used in NPDES permitting. As discussed in section 6.2.3 above, the examples in this manual consider only steady-state modeling techniques, which consider the impact of a discharge on the receiving water modeled under a single set of critical conditions.

The specific steady-state model used will depend on the pollutant or parameter of concern and whether there is rapid and complete mixing or incomplete mixing of the effluent and the receiving water under critical conditions. For example, to model dissolved oxygen in a river, the permit writer might choose the Streeter-Phelps equation. For modeling heavy metals in an incomplete mix situation, the permit writer might choose the CORMIX model. For pollutants such as BOD, nutrients, or non-conservative parameters, the effects of biological activity and reaction chemistry should be modeled, in addition to the effects of dilution, to assess possible impacts on the receiving water. This manual focuses only on dilution of a pollutant discharged to the receiving water and does not address modeling biological activity or reaction chemistry in receiving waters. For additional information, permit writers should discuss modeling that accounts for biological activity or reaction chemistry with water quality modelers or other water quality specialists as needed and consult EPA's Water Quality Models and Tools Website <www.epa.gov/waterscience/models/>.

For many pollutants such as most toxic (priority) pollutants, conservative pollutants, and pollutants that can be treated as conservative pollutants when near-field effects are of concern, if there is rapid and complete mixing in a river or stream, the permit writer could use a simple mass-balance equation to model the effluent and receiving water. The simple mass-balance equation as applied to a hypothetical facility, ABC, Inc., discharging Pollutant Z to a free-flowing stream called Pristine Creek is presented in Exhibit 6-11 below.

Exhibit 6-11 Simple mass-balance equation



Mass = **Flow** (Q) in million gallons per day (mgd) or cubic feet per second (cfs) X **Pollutant concentration** (C) in milligrams per liter (mg/L)

$$Q_sC_s + Q_dC_d = Q_rC_r$$

where

Q_s	=	stream flow in mgd or cfs above point of discharge
C_s	=	background in-stream pollutant concentration in mg/L
Q_d	=	effluent flow in mgd or cfs
C_d	=	effluent pollutant concentration in mg/L
Q_r	=	resultant in-stream flow, after discharge in mgd or cfs
C_r	=	resultant in-stream pollutant concentration in mg/L (after complete mixing occurs)

6.3.2.2 Step 2: Determine the Expected Receiving Water Concentration under Critical Conditions

When using a steady-state model, the permit writer, or water quality modeler, determines the impact of the effluent discharge on the receiving water under critical conditions. This step examines how this steady-state analysis is conducted in situations where there is incomplete mixing and then provides a detailed discussion of this analysis for situations where there is rapid and complete mixing.

How are *critical conditions* defined?

When using a steady-state water quality model, permit writers generally input values that reflect critical conditions. State permitting procedures should guide permit writers in this task. When characterizing the effluent and receiving water for water quality-based permitting, the permit writer should follow the permitting authority's policies and procedures for selecting the critical conditions to use in a steady-state model. The discussion in section 6.2.4 above provides a discussion of how those values might be selected.

Permit writers generally would input into a steady-state model for a reasonable potential analysis the critical conditions identified in the effluent and receiving water characterization discussed in section 6.2.4 above. Recall that critical conditions include the following:

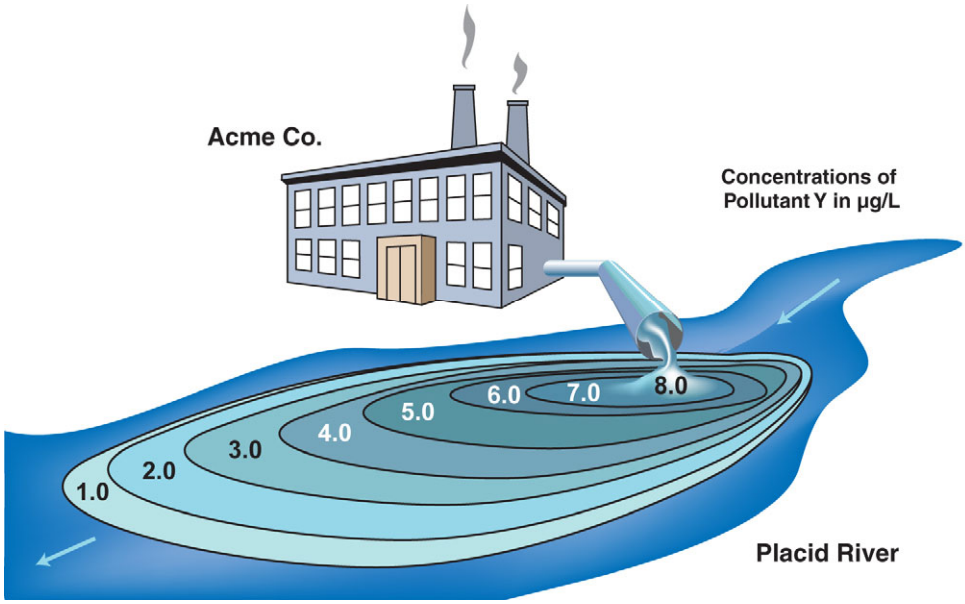
- Effluent critical conditions
  - Flow.
  - Pollutant concentration.
- Receiving water critical conditions
  - Flow (for rivers and streams).
  - Pollutant concentration.
  - Other receiving water characteristics such as tidal flux, temperature, pH, or hardness (depending on the waterbody and pollutant of concern)

As discussed in section 6.2.4.1 above, EPA and other permitting authorities have developed guidance for determining those critical conditions. Permit writers should rely on their permit authority's policies and procedures or past practices to determine values for all other critical conditions.

Expected Receiving Water Concentration in an Incomplete Mixing Situation

Exhibit 6-12 illustrates a situation where there is incomplete mixing of a discharge from a hypothetical facility, Acme Co., with the receiving water, the Placid River. The concentration of the pollutant of concern discharged by Acme Co. (Pollutant Y) is highest nearest the point of discharge and gradually decreases until the pollutant is completely mixed with the receiving water. To determine expected receiving water concentrations resulting from the Acme Co.'s discharge of Pollutant Y to the Placid River, the permit writer, or water quality modeler, would use the appropriate incomplete mixing model, calibrated to actual observations from field studies or dye studies, to simulate mixing under critical conditions. In Step 3 below, the concentrations of the pollutant of concern in the receiving water, as predicted by the water quality model, will be overlaid by a regulatory mixing zone established by the applicable water quality standard to determine whether WQBELs are needed.

Exhibit 6-12 Example of receiving water concentrations in an incomplete mixing situation determined using an incomplete mixing water quality model



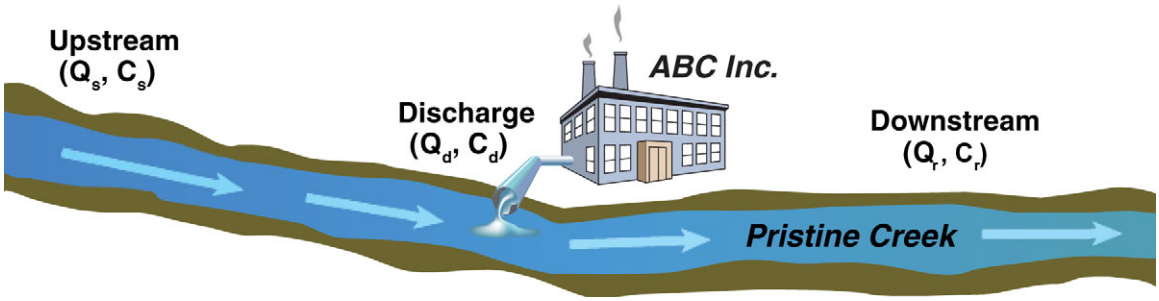
Expected Receiving Water Concentration in Rapid and Complete Mixing Situation

For many pollutants, if there is rapid and complete mixing in a river or stream, the permit writer could use the simple mass-balance equation presented in Exhibit 6-11 above to determine the expected receiving water concentration of the pollutant of concern under critical conditions. As noted previously, the simple mass-balance equation is a very basic steady-state model that can be used for most toxic pollutants, conservative pollutants, and other pollutants for which near-field effects are the primary concern. In Exhibit 6-13, that equation is applied to ABC Inc.'s, discharge of Pollutant Z (a conservative pollutant) to Pristine Creek under conditions of rapid and complete mixing. The mass-balance equation is rearranged to show how it would be used in a reasonable potential analysis.

To use the simple mass-balance equation to predict receiving water impacts for a reasonable potential analysis, the permit writer needs to input one value for each variable and solve the equation for C_r, the downstream concentration of the pollutant. Because this model, like other steady-state models, uses a single value for each variable, the permit writer should be sure that the values selected reflect critical conditions for the discharge and the receiving water. In Exhibit 6-14, those critical conditions have been identified and the equation has been solved for C_r.

It is important for permit writers to remember that, in some situations, the selected steady-state model could be more complex than the simple mass-balance equation shown. For example, there could be other pollutant sources along the stream segment; the pollutant might not be conservative (e.g., BOD); or the parameter to be modeled might be affected by multiple pollutants (e.g., dissolved oxygen affected by BOD and nutrients). For illustrative purposes, this example focuses on a situation where using a simple mass-balance equation is sufficient (i.e., rapid and complete mixing of a conservative pollutant in a river or stream under steady-state conditions).

Exhibit 6-13 Mass-balance equation for reasonable potential analysis for conservative pollutant under conditions of rapid and complete mixing



The mass-balance equation can be used to determine whether the discharge from ABC Inc., would cause, have the reasonable potential to cause, or contribute to an excursion above the water quality standards applicable to Pristine Creek. The equation is used to predict the concentration of Pollutant Z, a conservative pollutant, in Pristine Creek under critical conditions. The predicted concentration can be compared to the applicable water quality criteria for Pollutant Z. Assume the discharge mixes rapidly and completely with Pristine Creek.

Mass	=	**Flow** (Q) in million gallons per day (mgd) or cubic feet per second (cfs)	X	**Pollutant concentration** (C) in milligrams per liter (mg/L)

$$Q_sC_s + Q_dC_d = Q_rC_r$$

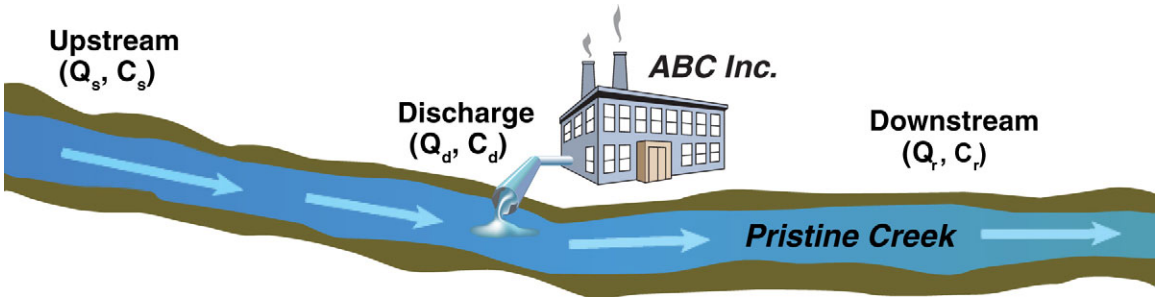
where

Q_s	=	critical stream flow in mgd or cfs above point of discharge
C_s	=	critical background in-stream pollutant concentration in mg/L
Q_d	=	critical effluent flow in mgd or cfs
C_d	=	critical effluent pollutant concentration in mg/L
Q_r	=	resultant in-stream flow, after discharge in mgd or cfs ($Q_r = Q_s + Q_d$)
C_r	=	resultant in-stream pollutant concentration in mg/L (after complete mixing occurs)

Rearrange the equation to determine the concentration of Pollutant Z in the waterbody downstream of a discharge under critical conditions:

$$C_r = \frac{(Q_d)(C_d) + (Q_s)(C_s)}{Q_r}$$

Exhibit 6-14 Example of applying mass-balance equation to conduct reasonable potential analysis for conservative pollutant under conditions of rapid and complete mixing



Mass-Balance Equation: $Q_sC_s + Q_dC_d = Q_rC_r$

Dividing both sides of the mass-balance equation by Q_r gives the following:

$$C_r = \frac{(Q_d)(C_d) + (Q_s)(C_s)}{Q_r}$$

where C_r is the receiving water concentration downstream of the discharge

The following values are known for ABC Inc. and Pristine Creek:

Q_s = critical upstream flow (water quality standards allow a dilution allowance of up to 100% of 1Q10 low flow for rapid and complete mixing)	= 1.20 cfs
C_s = critical upstream concentration of Pollutant Z in Pristine Creek	= 0.75 mg/L
Q_d = critical discharge flow	= 0.55 cfs
C_d = statistically projected critical discharge concentration of Pollutant Z	= 2.20 mg/L
Q_r = downstream flow = Q_d + Q_s	= 0.55 + 1.20 = 1.75 cfs
Acute aquatic life water quality criterion for Pollutant Z in Pristine Creek	= 1.0 mg/L

Find the projected downstream concentration (C_r) by inserting the given values into the equation as follows:

$$C_r = \frac{(0.55\,\text{cfs})(2.20\,\text{mg/L}) + (1.20\,\text{cfs})(0.75\,\text{mg/L})}{(1.75\,\text{cfs})}$$

C_r = 1.2 mg/L of Pollutant Z*

* calculated to 2 significant figures

6.3.2.3 Step 3: Answer the Question, Is There Reasonable Potential?

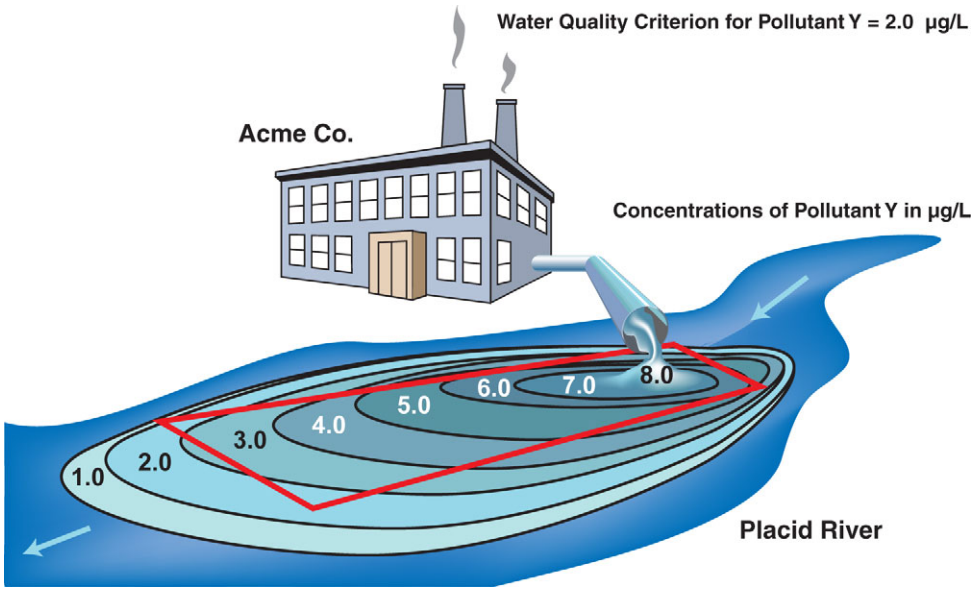
The next step in the reasonable potential analysis is to consider the results of water quality modeling to answer the question, *Is there reasonable potential?*

- For most pollutants, if the receiving water pollutant concentration projected by a steady-state model (e.g., a simple mass-balance equation or a more complex model) exceeds the applicable water quality criterion, there is *reasonable potential*, and the permit writer must calculate WQBELs. (Note that for dissolved oxygen, reasonable potential would occur if the water quality model indicates that the projected effluent concentration of the oxygen-demanding pollutants would result in depletion of dissolved oxygen below acceptable values in the receiving water).
- If the projected concentration is equal to or less than the applicable criterion, there is no reasonable potential and, thus far, there is no demonstrated need to calculate WQBELs.

Reasonable Potential Determination in an Incomplete Mixing Situation

To determine whether there is reasonable potential in an incomplete mixing situation, the permit writer would compare the projected concentration of the pollutant of concern at the edge of the regulatory mixing zone or after accounting for the available dilution allowance, with the applicable water quality criterion. Exhibit 6-15 illustrates the reasonable potential determination for Acme Co. in a situation where the regulatory mixing zone is described by a geometric shape. In the example, the water quality criterion for Pollutant Y being considered is 2.0 micrograms per liter (µg/L). The illustration shows that at many points along the edge of the regulatory mixing zone specified by the water quality standards, which is represented by the rectangle, the concentration of Pollutant Y exceeds 2.0 µg/L. Therefore, there is reasonable potential, and the permit writer must calculate WQBELs for Pollutant Y for Acme Co.

Exhibit 6-15 Reasonable potential determination in an incomplete mixing situation



Reasonable Potential Determination in a Rapid and Complete Mixing Situation

In the rapid and complete mixing example for ABC, Inc., shown in Exhibit 6-14 above, a projected downstream concentration (C_r) of 1.2 mg/L of Pollutant Z was calculated. The permit writer would compare the calculated concentration to the acute aquatic life water quality criterion of 1.0 mg/L for Pollutant Z in Pristine Creek presented in Exhibit 6-14. Because 1.2 mg/L > 1.0 mg/L, the projected downstream concentration exceeds the water quality criterion; therefore, there is a reasonable potential for the water quality criterion to be exceeded, and the permit writer must calculate WQBELs for Pollutant Z.

A permit writer should repeat the reasonable potential analysis for all applicable criteria for the pollutant of concern and must remember that the critical conditions could differ depending on the criterion being evaluated. For example, the critical stream flow used when considering the acute aquatic life criterion might be the 1Q10 low flow, whereas the critical stream flow used when considering the chronic aquatic life criterion might be the 7Q10 low flow. If calculations demonstrate that the discharge of a pollutant of concern would cause, have the reasonable potential to cause, or contribute to an excursion of *any one* of the applicable criteria for that pollutant, the permit writer must develop WQBELs for that pollutant.

In addition, it is important for permit writers to remember that they must repeat the reasonable potential analysis for each pollutant of concern and calculate WQBELs where there is reasonable potential. For each pollutant for which there is no reasonable potential, the permit writer should consider whether there are any existing WQBELs in the previous permit and whether they should be retained. The permit writer would complete an anti-backsliding analysis (see Chapter 7 of this manual) to determine whether it is possible to remove any existing WQBELs from the reissued permit.

6.3.2.4 Step 4: Document the Reasonable Potential Determination in the Fact Sheet

As a final step, permit writers need to document the details of the reasonable potential analysis in the NPDES permit fact sheet. The permit writer should clearly identify the information and procedures used to determine the need for WQBELs. The goal of that documentation is to provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how each pollutant was evaluated, including the basis (i.e., reasonable potential analysis) for including or not including a WQBEL for any pollutant of concern.

6.3.3 Conducting a Reasonable Potential Analysis without Data

State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available. For example, as noted in section 6.2.1.2 above, where there is a pollutant with a WLA from a TMDL, a permit writer must develop WQBELs or other permit requirements consistent with the assumptions of the TMDL. Even without a TMDL, a permitting authority could, at its own discretion, determine that WQBELs are needed for any pollutant associated with impairment of a waterbody. A permitting authority might also determine that WQBELs are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBELs for pathogens in all permits for POTWs discharging to contact recreational waters).

Types of information that the permit writer might find useful in a qualitative approach to determining reasonable potential include the following:

- Effluent variability information such as history of compliance problems and toxic impacts.
- Point and nonpoint source controls such as existing treatment technology, the type of industry, POTW treatment system, or BMPs in place.
- Species sensitivity data including in-stream data, adopted water quality criteria, or designated uses.
- Dilution information such as critical receiving water flows or mixing zones.

The permit writer should always provide justification for the decision to require WQBELs in the permit fact sheet or statement of basis and *must* do so where required by federal and state regulations. A thorough rationale is particularly important when the decision to include WQBELs is not based on an analysis of effluent data for the pollutant of concern.

After evaluating all available information characterizing the nature of the discharge without effluent monitoring data for the pollutant of concern, if the permit writer is not able to decide whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a water

quality criterion, he or she may determine that effluent monitoring should be required to gather additional data. The permit writer might work with the permittee to obtain data before permit issuance, if sufficient time exists, or could require the monitoring as a condition of the newly issued or reissued permit. The permit writer might also include a clause in the permit that would allow the permitting authority to reopen the permit and impose an effluent limitation if the required monitoring establishes that there is reasonable potential that the discharge will cause or contribute to an excursion above a water quality criterion.

6.4 Calculate Parameter-specific WQBELs

If a permit writer has determined that a pollutant or pollutant parameter is discharged at a level that will cause, have reasonable potential to cause, or contribute to an excursion above any state water quality standard, the permit writer must develop WQBELs for that pollutant parameter. This manual presents the approach recommended by EPA's TSD for calculating WQBELs for toxic (priority) pollutants. Many permitting authorities apply those or similar procedures to calculate WQBELs for toxic pollutants and for a number of conventional or nonconventional pollutants with effluent concentrations that tend to follow a lognormal distribution. Permit writers should consult permitting authority policies and procedures to determine the methodology specific to their authorized NPDES permitting program, including the approach for pollutants with effluent concentrations that do not follow a lognormal distribution.

6.4.1 Calculating Parameter-specific WQBELs from Aquatic Life Criteria

The TSD process for calculating WQBELs from aquatic life criteria follows five steps as shown in Exhibit 6-16 and discussed in detail below.

Exhibit 6-16 Calculating parameter-specific WQBELs from aquatic life criteria

Step 1.	Determine acute and chronic WLAs
Step 2.	Calculate long-term average (LTA) concentrations for each WLA
Step 3.	Select the lowest LTA as the performance basis for the permitted discharger
Step 4.	Calculate an average monthly limitation (AML) and a maximum daily limitation (MDL)
Step 5.	Document the calculation of WQBELs in the fact sheet.

6.4.1.1 Step 1: Determine Acute and Chronic WLAs

Before calculating a WQBEL, the permit writer will first need to determine the appropriate WLAs for the point source discharge based on both the acute and chronic criteria. A WLA may be determined from a TMDL or calculated for an individual point source directly. Where an EPA-approved TMDL has been developed for a particular pollutant, the WLA for a specific point source discharger is the portion of that TMDL that is allocated to that point source, as discussed in section 6.2.1.2 above. Where no TMDL is available, a water quality model generally is used to calculate a WLA for the specific point source discharger. The WLA is the loading or concentration of pollutant that the specific point source may discharge while still allowing the water quality criterion to be attained downstream of that discharge. Of course, the WLA calculation should take into account any reserve capacity, safety factor, and contributions from other point and nonpoint sources as might be required by the applicable water quality standards regulations or implementation policies.

When a WLA is not given as part of a TMDL or where a separate WLA is needed to address the near-field effects of a discharge on water quality criteria, permit writers will, in many situations, use a steady-state water quality model to determine the appropriate WLA for a discharge. As discussed in section 6.3 above, steady-state models generally are run under a single set of critical conditions for protection of receiving water quality. If a permit writer uses a steady-state model with a specific set of critical conditions to assess reasonable potential, he or she generally may use the same model and critical conditions to calculate a WLA for the same discharge and pollutant of concern.

As with the reasonable potential assessment, the type of steady-state model used to determine a WLA depends on the type of mixing that occurs in the receiving water and the type of pollutant or parameter being modeled. As discussed in section 6.3.2 above, permit writers can use the mass-balance equation as a simple steady-state model for many pollutants, such as most toxic (priority) pollutants or any pollutant that can be treated as a conservative pollutant when considering near-field effects, if there is rapid and complete mixing in the receiving water. For pollutants or discharge situations that do not have those characteristics (e.g., non-conservative pollutants, concern about effects on a downstream waterbody), a water quality model other than the mass-balance equation would likely be more appropriate.

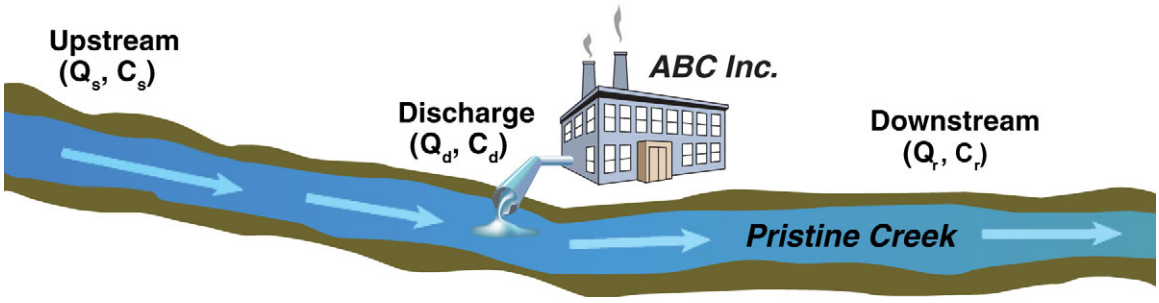
The mass-balance equation is presented again in Exhibit 6-17. In the exhibit, the equation is rearranged to show how it would be used to calculate a WLA for a conservative pollutant discharged to a river or stream under conditions of rapid and complete mixing.

6.4.1.2 Step 2: Calculate LTA Concentrations for Each WLA

The requirements of a WLA generally must be interpreted in some way to be expressed as an effluent limitation. The goal of the permit writer is to derive effluent limitations that are enforceable, adequately account for effluent variability, consider available receiving water dilution, protect against acute and chronic impacts, account for compliance monitoring sampling frequency, and assure attainment of the WLA and water quality standards. In developing WQBELs, the permit writer develops limitations that require a facility to perform in such a way that the concentration of the pollutant of concern in the effluent discharged is nearly always below the WLA.

To accomplish that goal, EPA has developed a statistical permit limitation derivation procedure to translate WLAs into effluent limitations *for pollutants with effluent concentration measurements that tend to follow a lognormal distribution*. EPA believes that this procedure, discussed in Chapter 5 of the TSD, results in defensible, enforceable, and protective WQBELs for such pollutants. In addition, a number of states have adopted procedures based on, but not identical to, EPA's guidance that also provide defensible, enforceable, and protective WQBELs. Permit writers should always use the procedures adopted by their permitting authority. In addition, permit writers should recognize that alternative procedures would be used to calculate effluent limitations for pollutants with effluent concentrations that cannot generally be described using a lognormal distribution.

Exhibit 6-17 Example of applying mass-balance equation to calculate WLAs for conservative pollutant under conditions of rapid and complete mixing



Mass Balance Equation: $Q_sC_s + Q_dC_d = Q_rC_r$

where

Q_s	=	background stream flow in mgd or cfs above point of discharge
C_s	=	background in-stream pollutant concentration in mg/L
Q_d	=	effluent flow in mgd or cfs
C_d	=	effluent pollutant concentration in mg/L **= WLA**
Q_r	=	resultant in-stream flow, after discharge in mgd or cfs
C_r	=	resultant in-stream pollutant concentration in mg/L (after complete mixing occurs)

Rearrange the equation to determine the WLA (C_d) for ABC Inc., necessary to achieve the acute water quality criterion for Pollutant Z in Pristine Creek (C_r) downstream of the discharge:

$$C_d = \frac{Q_rC_r - Q_sC_s}{Q_d}$$

The following values are known for ABC Inc., and Pristine Creek:

Q_s = critical upstream flow (water quality standards allow a dilution allowance of up to 100% of 1Q10 low flow for rapid and complete mixing)	= 1.20 cfs
C_s = upstream concentration of Pollutant Z in Pristine Creek	= 0.75 mg/L
Q_d =discharge flow	= 0.55 cfs
Q_r = downstream flow = $Q_d + Q_s$	= 0.55 + 1.20 = 1.75 cfs
C_r = acute water quality criterion for Pollutant Z in Pristine Creek	= 1.0 mg/L

Determine the WLA for ABC Inc., by inserting the given values into the equation as follows:

$$\text{WLA for ABC Inc.} = C_d = \frac{(1.75\ \text{cfs})(1.0\ \text{mg/L}) - (1.20\ \text{cfs})(0.75\ \text{mg/L})}{(0.55\ \text{cfs})}$$

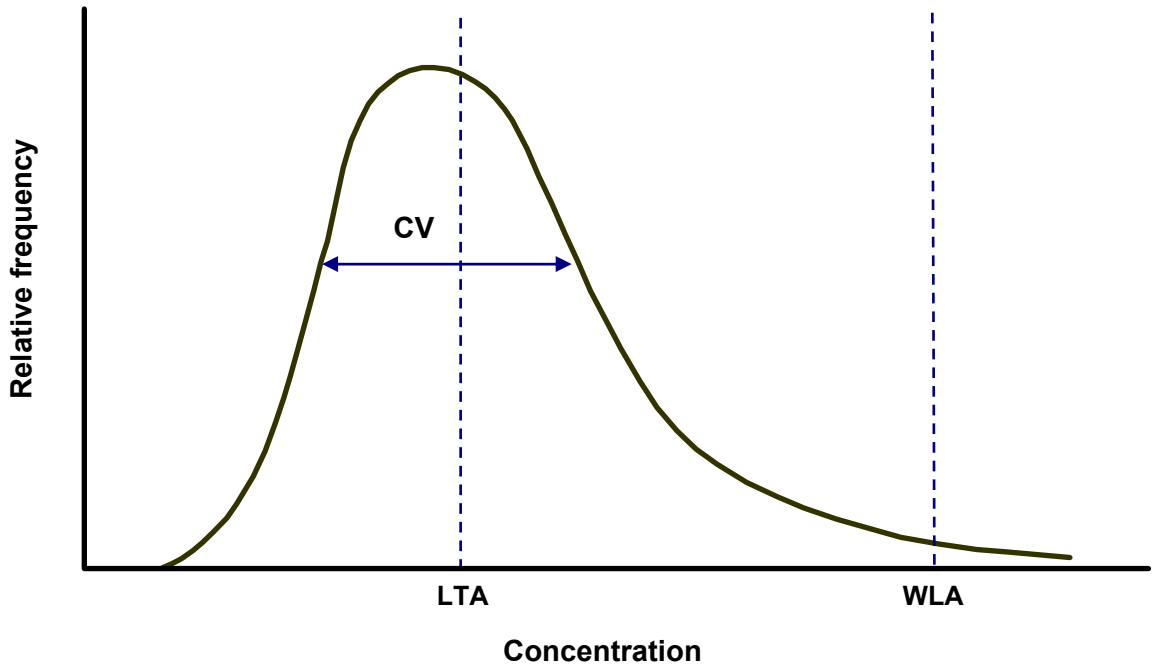
C_d = 1.5 mg/L of Pollutant Z*

* calculated to 2 significant figures

For those pollutants with effluent concentrations that do follow a lognormal distribution, the distribution can be described by determining a long-term average (or LTA) that ensures that the effluent pollutant concentration remains nearly always below the WLA and by the CV, a measure of the variability of data around the LTA. Exhibit 6-18 illustrates a lognormal distribution with the LTA, CV, and WLA highlighted.

When applying aquatic life criteria, a permit writer generally establishes a WLA based on the acute aquatic life criterion and a WLA based on the chronic aquatic life criterion. Thus, the permit writer determines two LTAs—one that would ensure that an effluent concentration is nearly always below the acute WLA and one that would ensure that an effluent concentration nearly always below the chronic WLA. Each LTA, acute and chronic, would represent a different performance expectation for the discharger.

Exhibit 6-18 Example of lognormal distribution of effluent pollutant concentrations and calculation of LTA



6.4.1.3 Step 3: Select the Lowest LTA as the Performance Basis for the Permitted Discharger

EPA recommends that WQBELs be based on a single performance expectation for a facility; therefore, once a permit writer has calculated LTA values for each WLA, he or she would select only one of those LTAs to define the required performance of the facility and serve as the basis for WQBELs. Because WQBELs must assure attainment of all applicable water quality criteria, the permit writer would select the lowest LTA as the basis for calculating effluent limitations. Selecting the lowest LTA would ensure that the facility's effluent pollutant concentration remains below all the calculated WLAs nearly all the time. Further, because WLAs are calculated using critical receiving water conditions, the limiting LTA would also ensure that water quality criteria are fully protected under nearly all conditions.

6.4.1.4 Step 4: Calculate an Average Monthly Limitation (AML) and a Maximum Daily Limitation (MDL)

The NPDES regulations at § 122.45(d) require that all effluent limitations be expressed, unless impracticable, as both AMLs and MDLs for all discharges other than POTWs and as both AMLs and average weekly limitations (AWLs) for POTWs. The AML is the highest allowable value for the average of daily discharges over a calendar month. The MDL is the highest allowable daily discharge measured during a calendar day or 24-hour period representing a calendar day. The AWL is the highest allowable value for the average of daily discharges over a calendar week. For pollutants with limitations expressed in units of mass, the daily discharge is the total mass discharged over the day. For limitations expressed in other units, the daily discharge is the average measurement of the pollutant over the period of a day.

In the TSD, EPA recommends establishing an MDL, rather than an AWL, for discharges of toxic pollutants from POTWs. That approach is appropriate for at least two reasons. First, the basis for the AWL for POTWs is the secondary treatment requirements discussed in section 5.1.1.1 of this manual and is not related to the need for assuring attainment of water quality standards. Second, an AWL, which could be the average of up to seven daily discharges, could average out peak toxic concentrations and, therefore, the discharge's potential for causing acute toxic effects might be missed. An MDL would be more likely to identify potential acutely toxic impacts.

Chapter 5 of the TSD includes statistical tools for calculating MDLs and AMLs from the LTA value selected in Step 3 above. Again, note that those procedures apply to *pollutants with effluent concentration measurements that tend to follow a lognormal distribution*. EPA has not developed guidance on procedures for calculating effluent limitations for pollutants with effluent concentrations that generally cannot be described using a lognormal distribution. For such pollutants, permit writers should use other procedures as recommended by their permitting authority in its policies, procedures, or guidance.

Whether using the TSD procedures or other procedures for calculating WQBELs, the objective is to establish limitations calculated to require treatment plant performance levels that, after considering acceptable effluent variability, would have a very low statistical probability of exceeding the WLA and, therefore, would comply with the applicable water quality standards under most foreseeable conditions.

6.4.1.5 Step 5: Document Calculation of WQBELs in the Fact Sheet

Permit writers should document in the NPDES permit fact sheet the process used to develop WQBELs. The permit writer should clearly identify the data and information used to determine the applicable water quality standards and how that information, or any applicable TMDL, was used to derive WQBELs and explain how the state's antidegradation policy was applied as part of the process. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the permit writer properly derived WQBELs for the NPDES permit.

6.4.2 Calculating Chemical-specific WQBELs based on Human Health Criteria for Toxic Pollutants

Developing WQBELs for toxic pollutants affecting human health is somewhat different from calculating WQBELs for other pollutants because (1) the exposure period of concern is generally longer (e.g., often a lifetime exposure) and (2) usually the average exposure, rather than the maximum exposure, is of concern. EPA's recommended approach for setting WQBELs for toxic pollutants for human health protection is to set the AML equal to the WLA calculated from the human health toxic pollutant criterion and calculate the MDL from the AML. Section 5.4.4 of the TSD describes statistical procedures used for such calculations for pollutants with effluent concentrations that follow a lognormal distribution. Once again, for pollutants with effluent concentrations that do not follow a lognormal distribution, permit writers should use other procedures as specified by their permitting authority.

If the permit writer calculates chemical-specific WQBELs from human health criteria, he or she should compare the limitations to any other calculated WQBELs (e.g., WQBELs based on aquatic life criteria) and TBELs and apply antidegradation and anti-backsliding requirements to determine the final limitations that meet all technology and water quality standards. As discussed above, that process should be documented in the fact sheet for the NPDES permit.

6.5 Calculate Reasonable Potential and WQBELs for WET

WET tests measure the degree of response of exposed aquatic test organisms to an effluent mixed in some proportion with control water (e.g., laboratory water or a non-toxic receiving water sample). WET testing is used as a second approach, in addition to the chemical-specific approach, to implementing water quality standards in NPDES permits. This section provides a brief introduction to WET testing and WET limitations.

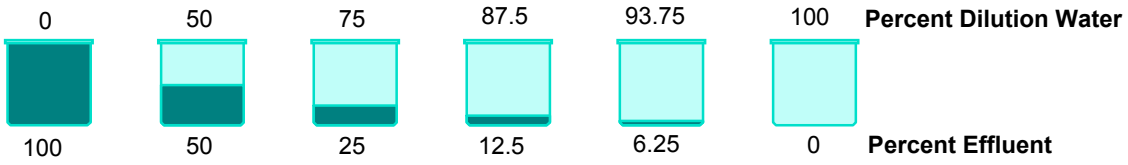
Test of Significant Toxicity (TST)

At the time of the writing of this guidance manual, EPA had recently published a new statistical approach that assesses the whole effluent toxicity (WET) measurement of wastewater effects on specific test organisms' ability to survive, grow, and reproduce. This new approach is called the Test of Significant Toxicity (TST) and is a statistical method that uses hypothesis testing techniques based on research and peer-reviewed publications. The hypothesis test under the TST approach examines whether an effluent, at the critical concentration (e.g., in-stream waste concentration [IWC]), and the control within a WET test differ by an unacceptable amount (the amount that would have a measured detrimental effect on the ability of aquatic organisms to thrive and survive). The TST implementation document and the TST technical document are available at the NPDES WET Website <www.epa.gov/npdes/wet>.

6.5.1 Types of WET Tests

In many WET tests, the effluent and control water are mixed in varying proportions to create a dilution series. Exhibit 6-19 is an example of a typical dilution series used in WET testing.

Exhibit 6-19 Example of typical dilution series



There are two types of WET tests: acute and chronic. An acute toxicity test usually is conducted over a short time, generally 96 hours or less, and the endpoint measured is mortality. The endpoint for an acute test is often expressed as an LC_{50} (i.e., the percent of effluent that is lethal to 50 percent of the exposed test organisms). A chronic toxicity test is usually conducted during a critical life phase of the organism and the endpoints measured are mortality and sub-lethal effects, such as changes in reproduction and growth. A chronic test can occur over a matter of hours or days, depending on the species tested and test endpoint. The endpoint of a chronic toxicity test often is expressed in one of the following ways:

- No observed effect concentration (NOEC), the highest concentration of effluent (i.e., highest percent effluent) at which no adverse effects are observed on the aquatic test organisms.
- Lowest observed effect concentration (LOEC), the lowest concentration of effluent that causes observable adverse effects in exposed test organisms.

- Inhibition concentration (IC), a point estimate of the effluent concentration that would cause a given percent reduction in a biological measurement of the test organisms.
- Effect concentration (EC), a point estimate of the effluent concentration that would cause an observable adverse effect in a given percentage of test organisms.

For additional information on WET monitoring and WET test methods, see section 8.2.4 of this manual.

6.5.2 Expressing WET Limitations or Test Results

There are two options for expressing WET limitations or test results. First, WET limitations or test results can be expressed directly in terms of the WET test endpoints discussed above (e.g., LC_{50}, NOEC, and IC_{25}). Alternatively, the limitations or test results can be expressed in terms of *toxic units* (TUs). A TU is the inverse of the sample fraction, calculated as 100 divided by the percent effluent. Exhibit 6-20 presents example TUs for expressing acute and chronic test results.

Exhibit 6-20 Example of toxic units

If an **acute test** result is a LC_{50} of 60 percent, that result can be expressed as

$$\frac{100}{60} = 1.7 \text{ acute toxic units} = 1.7 \text{ } TU_a$$

If a **chronic test** result is an IC_{25} of 40 percent effluent, that result can be expressed as

$$\frac{100}{40} = 2.5 \text{ chronic toxic units} = 2.5 \text{ } TU_c$$

It is important to distinguish acute TUs (TU_a) from chronic TUs (TU_c). The difference between TU_a and TU_c can be likened to the difference between miles and kilometers. Both miles and kilometers are used to measure distance, but a distance of 1.0 mile is not the same as a distance of 1.0 kilometer. Likewise, both TU_a and TU_c are expressions of the toxicity of an effluent, but 1.0 TU_a is not the same as 1.0 TU_c. It is possible, however, to determine the relationship between the acute toxicity of an effluent and the chronic toxicity of that same effluent, just as it is possible to determine the relationship between miles and kilometers (i.e., through a conversion factor). Unlike the conversion between miles and kilometers that remains constant, the conversion factor between acute and chronic toxic units varies from effluent to effluent.

For an effluent, the permit writer could develop a conversion factor that would allow conversion of TU_a into equivalent TU_c or vice versa. This conversion factor is known as an acute-to-chronic ratio (ACR) for that effluent. The ACR for an effluent may be calculated where there are at least 10 sets of paired acute and chronic WET test data available. The ACR is determined by calculating the mean of the individual ACRs for each pair of acute and chronic WET tests. Where there are not sufficient data to calculate an ACR for an effluent (i.e., less than 10 paired sets of acute and chronic WET test data), EPA recommends a default value of ACR = 10. Exhibit 6-21 presents examples showing how the ACR converts TU_a into TU_c, how to calculate an ACR from existing data, and how, once an ACR is calculated, a permit writer could estimate the chronic toxicity of an effluent sample from its measured acute toxicity or vice versa.

Exhibit 6-21 Using the ACR

The ACR is expressed

$$ACR = \frac{\text{Acute Endpoint}}{\text{Chronic Endpoint}} = \frac{LC_{50}}{IC_{25}}$$

A TU is the inverse of the sample fraction. Therefore, by definition

$$TU_a = \frac{100}{LC_{50}} \qquad TU_c == \frac{100}{IC_{25}}$$

Consequently, toxicity as percent sample, may be expressed

$$LC_{50} = \frac{100}{TU_a} \qquad IC_{25} = \frac{100}{TU_c}$$

Substituting into the original equation gives

$$ACR = \frac{LC_{50}}{IC_{25}} = \frac{\frac{100}{TU_a}}{\frac{100}{TU_c}} = \frac{TU_c}{TU_a}$$

Example 1
Given: LC_{50} = 28%, IC_{25} = 10%

$$ACR = \frac{LC_{50}}{IC_{25}} = \frac{28\%}{10\%} = 2.8$$

Example 2
Given: TU_a = 3.6, TU_c = 10.0

$$ACR = \frac{TU_c}{TU_a} = \frac{10.0}{3.6} = 2.8$$

Example 3
Given: Toxicity data for a facility's effluent for *C. dubia*. as presented in the table to the right.

The ACR in the third column is calculated using the following equation:

$$ACR = \frac{LC_{50}}{IC_{25}}$$

LC_{50} (% effluent)	IC_{25} (% effluent)	ACR
62	10	6.2
18	10	1.8
68	25	2.7
61	10	6.1
63	25	2.5
70	25	2.8
17	5	3.4
35	10	3.5
35	10	3.5
35	25	1.4
47	10	4.7
Mean		**3.5**

Example 4
Given: TU_a = 1.8, ACR = 3.5

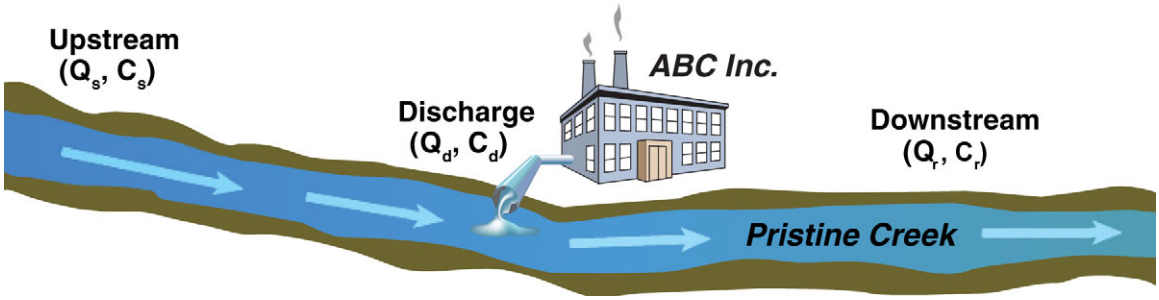
$$ACR = \frac{TU_c}{TU_a} \qquad TU_c = ACR \times TU_a$$

$$\text{Estimated } TU_c = ACR \times TU_a = 3.5 \frac{TU_c}{TU_a} \times 1.8\ TU_a = 6.3\ TU_c$$

6.5.3 Determining the Need for WET Limitations

If a state has numeric criteria for WET, a permit writer could use the results of WET tests to project acute or chronic toxicity in the receiving water after accounting for the applicable dilution allowance or mixing zone made available in the water quality standards. The permit writer would compare the projected toxicity of the receiving water to the applicable water quality criterion for WET. If the projected toxicity exceeds the applicable numeric water quality criterion for WET, the discharge would cause, have the reasonable potential to cause, or contribute to an excursion above the applicable water quality standards, and the permit writer must develop a WQBEL for WET [see § 122.44(d)(1)(iv)]. In that way, numeric criteria for WET can be treated similarly to chemical-specific criteria. Exhibit 6-22 provides an example of how the mass-balance equation is used to conduct a reasonable potential analysis for WET.

Exhibit 6-22 Example of mass-balance equation for a WET reasonable potential analysis



The mass-balance equation can be used to determine whether the discharge from ABC Inc. would cause, have the reasonable potential to cause, or contribute to toxicity in Pristine Creek that exceeds the numeric water quality criteria for acute or chronic toxicity. Assume the discharge mixes rapidly and completely with Pristine Creek.

Mass-Balance Equation: $Q_sC_s + Q_dC_d = Q_rC_r$

Dividing both sides of the mass-balance equation by Q_r gives the following:

$$C_r = \frac{(Q_d)(C_d) + (Q_s)(C_s)}{Q_r}$$

The following values are known for ABC Inc. and Pristine Creek:

Q_s = Critical upstream flow (1Q10 for acute protection)	= 23.6 cfs
(7Q10 for chronic protection)	= 70.9 cfs
C_s = Upstream toxicity in Pristine Creek (acute)	= 0 TU_a
(chronic)	= 0 TU_c
Q_d = Discharge flow	= 7.06 cfs
C_d = Discharge toxicity (acute)	= 2.50 TU_a
(chronic)	= 8.00 TU_c
Q_r = Downstream flow	= Q_d + Q_s
Acute Water Quality Criterion in Pristine Creek	= 0.3 TU_a
Chronic Water Quality Criterion in Pristine Creek	= 1.0 TU_c

Find the downstream concentration (C_r) by inserting the given values into the equation as follows:

For acute toxicity:

$$C_r = \frac{(7.06\ \text{cfs})(2.5\ TU_a) + (23.6\ \text{cfs})(0\ TU_a)}{7.06\ \text{cfs} + 23.6\ \text{cfs}} = 0.58\ TU_a$$

The downstream concentration (C_r) exceeds the water quality criterion for acute toxicity of 0.3 TU_a.

For chronic toxicity:

$$C_r = \frac{(7.06\ \text{cfs})(8.00\ TU_c) + (70.9\ \text{cfs})(0\ TU_c)}{7.06\ \text{cfs} + 70.9\ \text{cfs}} = 0.72\ TU_c$$

The downstream concentration (C_r) does not exceed the water quality criterion for chronic toxicity of 1.0 TU_c.

In Exhibit 6-22 above, the downstream concentration under critical conditions for the acute water quality criterion (C_r = 0.58 TU_a) exceeds the water quality criterion for acute toxicity (0.3 TU_a); therefore there is reasonable potential and WET limitations are required. WET limitations would be calculated in much the same way as limitations on specific chemicals. The limitations would be calculated to ensure that WET criteria are not exceeded after any available dilution or at the edge of the applicable mixing zone.

Where state water quality standards do not include numeric criteria for WET, a permit writer could evaluate the need for WQBELs for WET on the basis of narrative criteria; specifically, a narrative criterion stating that waterbodies must be free from *toxics in toxic amounts*. To make it easier for a permit writer to readily establish WET limitations in this situation, the permitting authority should have a policy for implementing the narrative criterion. Following the permitting authority's policy, if the permit writer determines that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion, the regulations at § 122.44(d)(1)(v) require that the permit include WQBELs for WET unless the permit writer demonstrates that parameter-specific limitations for the effluent are sufficient to attain and maintain applicable numeric and narrative water quality criteria. In other words, the permit must include WET limitations unless the permit writer is able to determine the specific pollutants that are the source of toxicity and include parameter-specific limitations for those pollutants that assure, and will continue to assure, attainment of water quality standards. If there are no criteria in the state water quality standards for the specific parameters causing the toxicity, the permit writer can establish WQBELs using one of three approaches outlined in § 122.44(d)(1)(vi):

- Use EPA's national recommended criteria.
- Calculate a numeric criterion that will attain and maintain the applicable narrative criterion.
- Control the pollutant using an indicator parameter for the pollutant of concern.

A permit also could include a requirement to conduct a toxicity identification evaluation and toxicity reduction evaluation (TIE/TRE) as a special condition in an NPDES permit. (Chapter 9 of this manual presents more information on special conditions.) A TIE/TRE is a site-specific study designed to systematically investigate and identify the causes of effluent toxicity problems, isolate the sources of that toxicity, identify and implement appropriate toxicity control options, and confirm the effectiveness of those control options and the reduction in toxicity. The permit writer might require a TIE/TRE when WET limitations are exceeded or, if there are no WET limitations in the permit, where WET testing demonstrates an unacceptable level of effluent toxicity. Because WET testing indicates the degree of toxicity of an effluent, but does not specifically identify the cause of that toxicity or ways to reduce toxicity, a TIE/TRE is necessary to achieve compliance with effluent limitations or other effluent toxicity requirements in NPDES permits. If a TIE/TRE is not required through the special conditions section of the permit, it could be required via a CWA section 308 letter, a CWA section 309 administrative order, or a consent decree.

6.6 Antidegradation Review

Early in the permit development process, a permit writer should check the state's antidegradation policy and implementation methods to determine what tier(s) of protection, if any, the state has assigned to the proposed receiving water for the parameter(s) of concern. The regulations concerning antidegradation and each of the tiers are described above in section 6.1.1.3. The tier of antidegradation protection is important for determining the required process for developing the water quality-based permit limits and conditions. In some cases, where a waterbody is classified as Tier 3 for antidegradation purposes, the permit writer might find that it is not possible to issue a permit for the proposed activity.

If the state has not specified the tier, the permit writer will need to evaluate, in accordance with the state's implementation procedures, whether the receiving waterbody is of high water quality for the parameters of concern, and thus will require Tier 2 protection. After identifying the tier(s) of protection for the

proposed receiving waterbody and parameter(s) of concern, the permit writer should consult the state's antidegradation implementation procedures relevant to the tier(s).

The following sections provide methods permit writers should consider for implementing, through the WQBEL development process, the three levels of protection typically found in a state's antidegradation policy. Implementation of the state's antidegradation policy could have a significant effect on the calculation of WQBELs.

6.6.1 Tier 1 Implementation

All waterbodies receive at least Tier 1 protection. Tier 1 protection means that the permit writer must include limits in the permit sufficient to maintain and protect water quality necessary to protect existing uses. In practice, for a Tier 1 receiving waterbody, the permit writer typically calculates the WQBELs on the basis of the applicable criteria because the state's designated uses and criteria to protect those uses must be sufficient to protect the existing uses. If a Tier 1 waterbody is impaired for a parameter that would be present in the proposed discharge, the permit writer should identify and consult any relevant TMDLs to determine what quantity of pollutant (if any) is appropriate.

6.6.2 Tier 2 Implementation

For new or increased discharges that could potentially lower water quality in high-quality waters, Tier 2 protection provides the state with a framework for making decisions regarding the degree to which it will protect and maintain the high water quality. A new or expanded discharge permit application typically triggers a Tier 2 antidegradation review. Depending on the outcome of the review, the permit could be written to maintain the existing high water quality or could be written to allow some degradation.

Each state's antidegradation policy or implementation procedures should describe the Tier 2 antidegradation review process. Though the process varies among states, EPA's antidegradation regulation at § 131.12 outlines the common elements of the process. To permit a new or increased discharge that would lower water quality, the state is required to make a finding on the basis of the following:

- The state must find that allowing lower water quality is necessary for important social or economic development in the area in which the waters are located.
  - The state would perform an alternatives analysis to evaluate whether the proposed discharge is actually *necessary* (i.e., whether there are less degrading feasible alternatives) and that might include consideration of a wide range of alternatives (e.g. non-discharging options, relocation of discharge, alternative processes, and innovative treatments).
  - The state should provide a justification of important social or economic development (or both) that would occur as a result of permitting the proposed discharge.
- The state's finding must be made after full satisfaction of its own intergovernmental coordination and public participation provisions.
- The state must assure that the highest statutory and regulatory requirements for all new and existing point sources will be achieved.
- The state must assure that all cost-effective and reasonable BMPs for nonpoint source control will be achieved.

- The state must assure that water quality will still protect existing uses.

If, after fulfilling the above conditions of the Tier 2 antidegradation review process, the state makes a determination to allow a new or increased discharge that would lower water quality, the permit writer may include such limitations in the NPDES permit for that discharge provided the limitations meet all other applicable technology and water quality standards.

6.6.3 Tier 3 Implementation

States identify their own ONRWs for Tier 3 protection, which requires that the water quality be maintained and protected. This is the most stringent level of protection. ONRWs often include waters in national or state parks, wildlife refuges, and waters of exceptional recreational or ecological significance. Waterbodies can be given Tier 3 protection regardless of their existing level of water quality. Some states implement Tier 3 by prohibiting any new or increased discharges to ONRWs or their tributaries that would result in lower water quality, with the exception of some limited activities such as those that would result in temporary changes in water quality ultimately resulting in restoration. Some states allow increased discharges as long as they are offset by equivalent or greater reductions elsewhere in the waterbody.

In addition to Tiers 1, 2, and 3, some states have a class of waters considered outstanding to the state and for which the state might have specific antidegradation requirements. Such waterbodies are sometimes referred to as *Tier 2 ½* waters because implementation of the antidegradation policy for them affords a greater degree of protection than Tier 2 but more flexibility than Tier 3.

Chapter 4 of EPA's WQS Handbook and the *Water Quality Standards Regulation Advance Notice of Proposed Rulemaking* (64 FR 36742, July 7, 1998) include additional information on implementing antidegradation policies. The permit writer should clearly explain the antidegradation analysis and how it affects calculation of WQBELs in the fact sheet or statement of basis for the permit.

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[1] U.S. Environmental Protection Agency. 1994. *Water Quality Standards Handbook: Second Edition* (WQS Handbook). EPA 823-B-94-005a. U.S. Environmental Protection Agency, Office of Water, Washington DC. <www.epa.gov/waterscience/standards/handbook/>.

[2] U.S. Environmental Protection Agency. 2001. *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*. EPA-822-R-01-005. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <www.epa.gov/waterscience/criteria/copper/copper.pdf>.

[3] Davies, Tudor T. 1997. *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background.* U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf>.

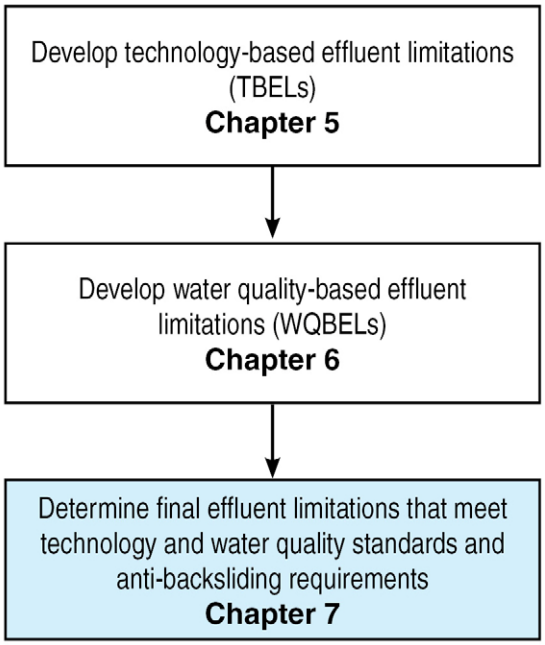
[4] U.S. Environmental Protection Agency. 1991. *Technical Support Document for Water Quality-Based Toxics Control* (TSD). EPA-505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0264.pdf>.

[5] U.S. Environmental Protection Agency. 1990. *Biological Criteria: National Program Guidance for Surface Waters*. EPA-440/5-91-004. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <www.epa.gov/bioindicators/html/biolcont.html>.

CHAPTER 7. Final Effluent Limitations and Anti-backsliding

As illustrated in Exhibit 7.1, after calculating applicable technology-based effluent limitations (TBELs) and water quality-based effluent limitations (WQBELs), the permit writer must determine the final effluent limitations that will be included in the National Pollutant Discharge Elimination System (NPDES) permit for each pollutant or pollutant parameter. For reissued permits, that determination must also include an assessment of whether the revised effluent limitations are consistent with the Clean Water Act (CWA) requirements and NPDES regulations related to anti-backsliding.

Exhibit 7-1 Developing effluent limitations



7.1 Determining Final Effluent Limitations

When determining the final effluent limitations, the permit writer must ensure that all applicable statutory and regulatory requirements, including technology and water quality standards, are fully implemented.

- The permit writer determines the calculated limitations (TBELs, WQBELs, or some combination of the calculated limitations) that will ensure that all applicable CWA standards are met.
- As noted above, for reissued permits, if any of the limitations are less stringent than limitations on the same pollutant in the previous NPDES permit, the permit writer then conducts an anti-backsliding analysis and, if necessary, revises the limitations accordingly. A detailed discussion of the anti-backsliding provisions of the CWA and the NPDES regulations is included below in Section 7.2.

In addition, the permit writer should clearly explain in the fact sheet for the permit how the final limitations in the permit were determined and how those limitations meet both technology and water quality standards (including antidegradation) and, where appropriate, how an anti-backsliding analysis was applied to the final effluent limitations.

7.2 Applying Anti-backsliding Requirements

As noted in Section 7.1, after selecting the calculated effluent limitations for a pollutant that ensure that all CWA standards are met, the permit writer applies anti-backsliding requirements, as necessary, to determine the final effluent limitations. In general, the term anti-backsliding refers to statutory and regulatory provisions that prohibit the renewal, reissuance, or modification of an existing NPDES permit that contains effluent limitations, permit conditions, or standards less stringent than those established in the previous permit. There are, however, exceptions to the prohibition, and determining the applicability and circumstances of the exceptions requires familiarity with both the statutory and regulatory provisions that address anti-backsliding.

7.2.1 Anti-backsliding Statutory Provisions

Clean Water Act (CWA) section 402(o) expressly prohibits backsliding from certain existing effluent limitations. CWA section 402(o) consists of three main parts: (1) a prohibition on specific forms of backsliding, (2) exceptions to the prohibition, and (3) a *safety clause* that provides an absolute limitation on backsliding.

7.2.1.1 Statutory Prohibition Against Backsliding

First, CWA section 402(o)(1) prohibits the relaxation of effluent limitations for two situations:

- To revise an existing TBEL that was developed on a case-by-case basis using best professional judgment (BPJ) to reflect subsequently promulgated effluent limitations guidelines and standards (effluent guidelines) that would result in a less stringent effluent limitation.
- Relaxation of an effluent limitation that is based on state standards, such as water quality standards or treatment standards, unless the change is consistent with CWA section 303(d)(4). Section 303(d)(4) may be applied independently of section 402(o).

The prohibition against relaxation of effluent limitations is subject to the exceptions in CWA section 402(o)(2) and, for limitations based on state standards, the provisions of CWA section 303(d)(4). Those exceptions are outlined further in the following sections.

7.2.1.2 Exceptions for Case-by-Case TBELs

CWA section 402(o)(2) outlines specific exceptions to the general prohibition against revising an existing TBEL that was developed on a case-by-case basis using BPJ to reflect subsequently promulgated, less stringent effluent guidelines in a renewed, reissued, or modified permit. CWA section 402(o)(2) provides that relaxed limitations may be allowed where

- There have been material and substantial alternations or additions to the permitted facility that justify the relaxation.

- New information (other than revised regulations, guidance, or test methods) is available that was not available at the time of permit issuance and that would have justified a less stringent effluent limitation. If the effluent limitation was based on water quality standards, any changes must result in a decrease in pollutants discharged.
- Technical mistakes or mistaken interpretations of the law were made in issuing the permit under CWA section 402(a)(1)(b).
- Good cause exists because of events beyond the permittee's control (e.g., natural disasters) and for which there is no reasonably available remedy.
- The permit has been modified under CWA sections 301(c), 301(g), 301(h), 310(i), 301(k), 301(n), or 316(a).
- The permittee has installed and properly operated and maintained required treatment facilities but still has been unable to meet the effluent limitations (relaxation may be allowed only to the treatment levels actually achieved).

7.2.1.3 Exceptions for Limitations Based on State Standards

EPA has consistently interpreted CWA section 402(o)(1) to allow relaxation of WQBELs and effluent limitations based on state standards if the relaxation is consistent with the provisions of CWA section 303(d)(4) or if one of the exceptions in CWA section 402(o)(2) is met. The two provisions constitute independent exceptions to the prohibition against relaxation of effluent limitations. If either is met, relaxation is permissible.

CWA section 303(d)(4) has two parts: paragraph (A), which applies to *nonattainment waters*, and paragraph (B), which applies to *attainment waters*.

- **Nonattainment water:** CWA section 303(d)(4)(A) allows the establishment of a less stringent effluent limitation when the receiving water has been identified as not meeting applicable water quality standards (i.e., a *nonattainment water*) if the permittee meets two conditions. First, the existing effluent limitation must have been based on a total maximum daily load (TMDL) or other wasteload allocation (WLA) established under CWA section 303. Second, relaxation of the effluent limitation is only allowed if attainment of water quality standards will be ensured or the designated use not being attained is removed in accordance with the water quality standards regulations. This subsection does not provide an exception for establishing less stringent limitations where the original limitation was based on state permitting standards (e.g., state treatment standards) and was not based on a TMDL or WLA.
- **Attainment water:** CWA section 303(d)(4)(B) applies to waters where the water quality equals or exceeds levels necessary to protect the designated use, or to otherwise meet applicable water quality standards (i.e., an *attainment water*). Under CWA section 303(d)(4)(B), a limitation based on a TMDL, WLA, other water quality standard, or any other permitting standard may only be relaxed where the action is consistent with state's antidegradation policy.

Although the statute also identifies six exceptions in section 402(o)(2) where effluent limitations otherwise subject to the prohibition in section 402(o)(1) may be relaxed, the exceptions for technical mistakes or mistaken interpretations and permit modification, which are described above, would not apply to WQBELs.

7.2.1.4 Exception Safety Clause

CWA section 402(o)(3) is a *safety clause* that provides an absolute limitation on backsliding. This section of the CWA prohibits the relaxation of effluent limitations in all cases if the revised effluent limitation would result in a violation of applicable effluent guidelines or water quality standards, including antidegradation requirements. Thus, even if one or more of the backsliding exceptions outlined in the statute is applicable and met, CWA section 402(o)(3) acts as a floor and restricts the extent to which effluent limitations may be relaxed. The requirement affirms existing provisions of the CWA that require effluent limitations, standards, and conditions to ensure compliance with applicable technology and water quality standards.

7.2.2 Anti-backsliding Regulatory Provisions

Anti-backsliding regulations are found at Title 40 of the *Code of Federal Regulations* (CFR) 122.44(l). The regulations do not specifically address backsliding where a permittee seeks relaxation of an effluent limitation that is based on a state treatment standard or water quality standard [i.e., based on CWA section 301(b)(1)(C), 303(d) or 303(e)]. They do, however, address all other forms of backsliding.

First, the regulations at § 122.44(l)(1) restrict the relaxation of *final effluent limitations* and the relaxation of *standards or conditions* contained in existing permits. Thus, this regulation, in effect, addresses all types of backsliding not addressed in the CWA provisions (e.g., backsliding from limitations derived from effluent guidelines, from new source performance standards, from existing case-by-case limitations to new case-by-case limitations, and from conditions such as monitoring requirements that are not effluent limitations). Under the regulation, a permittee must meet one of the causes for modification under § 122.62 for the reissued permit to allow relaxation of such limitations, standards, or conditions.

Second, the regulations at § 122.44(l)(2)(i) directly reflect the specific prohibition imposed by CWA section 402(o) on backsliding where a permittee seeks to revise an existing case-by-case TBEL developed using BPJ to reflect a subsequently promulgated effluent guideline that is less stringent than the case-by-case requirement. The regulations include the same exceptions to this prohibition that are in CWA section 402(o)(2) and the same *safety clause* in CWA section 402(o)(3).

Thus, if the permit condition being considered for relaxation is either a case-by-case effluent limitation developed using BPJ or is any other limitation, standard, or condition other than an effluent limitation based on a state standard, the permit writer can apply the requirements in § 122.44(l). For effluent limitations based on state standards, the permit writer should apply the provisions of CWA sections 402(o) and 303(d)(4) directly. Exhibit 7-2 illustrates the process of applying the statutory and regulatory provisions addressing anti-backsliding.

Exhibit 7-2 Application of anti-backsliding requirements

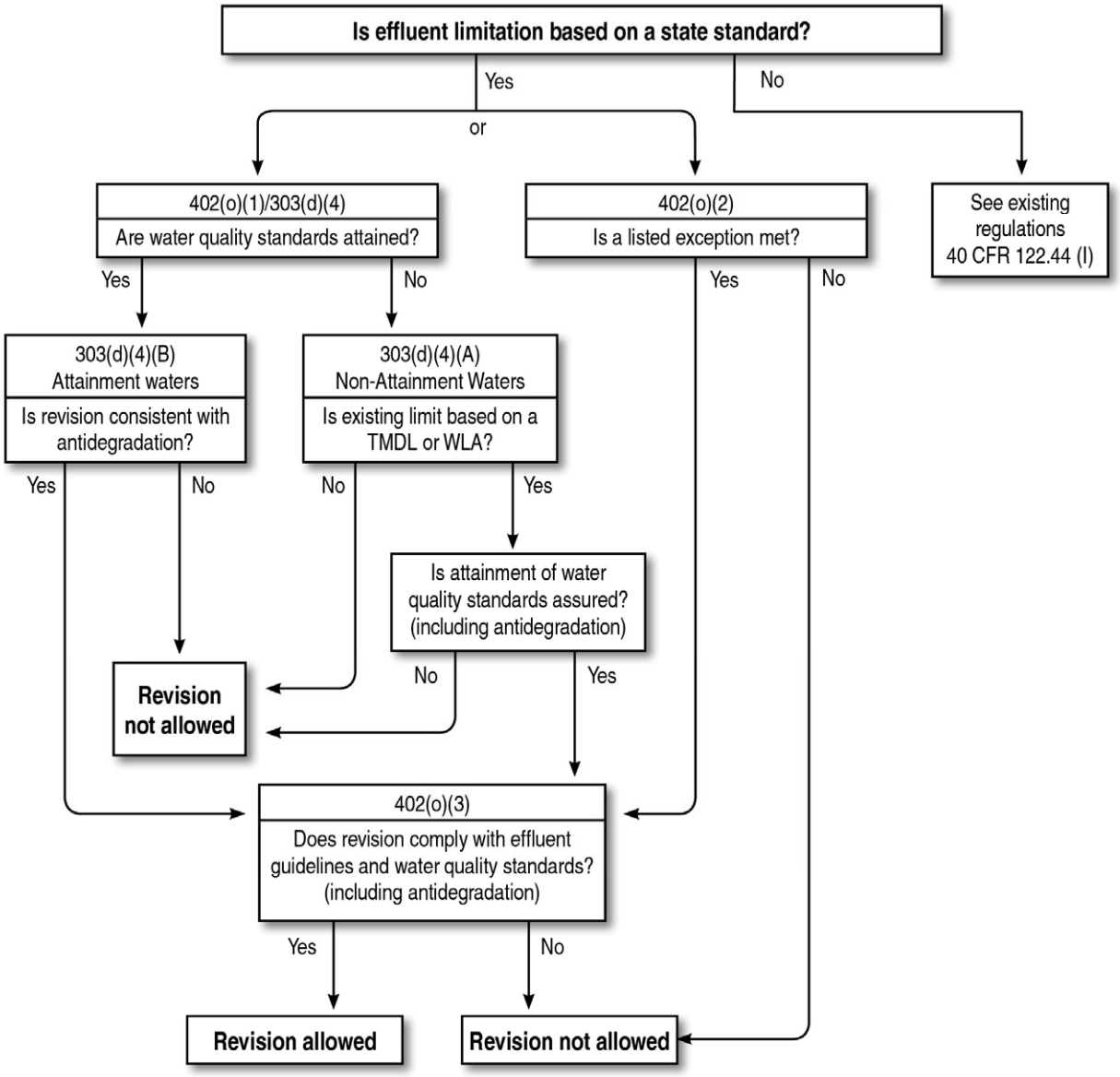


Exhibit 7-3 presents some examples of situations when backsliding might be a factor in effluent limitation development.

Exhibit 7-3 Backsliding examples

Example 1

- A publicly owned treatment works (POTW) seeks to relax its WQBEL for Pollutant X
- The current effluent limitation for Pollutant X is based on a TMDL and WLA for the POTW developed in accordance with § 130.7.
- The POTW is in compliance with its existing effluent limitation, and the applicable water quality standards for Pollutant X are attained.
- The POTW has developed new models with new river flow information. The models indicate that the water quality standards for Pollutant X would be maintained with a relaxed permit limitation.

Question:
May the effluent limitation for Pollutant X be relaxed?

Answer:
Possibly. Under the interpretation discussed above, WQBELs may be relaxed where one of the exceptions in CWA sections 402(o)(1) or (2) are met. In this case, although the new information from the models might meet the exception requirements criteria under CWA section 402(o)(2)(B)(i), CWA section 402(o)(2) will not justify the request unless the state reduces the pollutant loadings from other point sources or nonpoint sources of pollution. That is because, as discussed in Section 7.1 above, CWA section 402(o)(2) restricts the use of new information to cases where there is a decrease in the amount of pollutants being discharged.

The CWA section 402(o)(1) exceptions, on the other hand, might justify the request. In this case, the reference to CWA section 303(d)(4)(B) in CWA section 402(o)(1) is the relevant exception. CWA section 303(d)(4)(B) provides that, for receiving waters that meet water quality standards, permit limitations based on a TMDL or other WLA or other permit standard may be relaxed if the state's antidegradation policy requirements are met.

Example 2

- The state has established a technology-based treatment standard for fecal coliform pursuant to CWA section 301(b)(1)(C).
- The state later relaxes the standard in a revised regulation.
- A POTW, which has been in violation of its effluent limitation for fecal coliform based on the old standard, requests a revision of the limitation to reflect the new standard.
- Water quality standards for fecal coliform are not being attained.
- There was no TMDL or WLA developed. The basis of the effluent limitation was a state technology-based treatment standard.

Question:
May the fecal coliform effluent limitation be relaxed?

Answer:
No. Under CWA section 402(o)(1), the applicable provision is CWA section 303(d)(4)(A). This subsection does not authorize backsliding in this case (i.e., nonattainment waters) because it applies only to permit limitations based on a TMDL or other WLA. Here, the limitation in question is based on a state technology-based treatment standard.

Furthermore, if the permit sought to apply the exceptions in CWA section 402(o)(2), the new information provision would not allow the revision. For purposes of this section of the CWA, new information does not include *revised regulations*.

Exhibit 7-3 Backsliding examples (continued)

Example 3

- The state has a narrative water quality criterion of *no toxics in toxic amounts*.
- On the basis of WET testing data or other information, the state found that the discharge would cause, have the reasonable potential to cause, or contribute to an excursion of the water quality standards in the receiving water—specifically the narrative water quality criterion.
- The permitting authority imposed a WET limitation under § 122.44(d)(1)(v).
- The permittee determines that Pollutant Z is the cause of WET measured in its discharge.
- The permittee can demonstrate through sufficient data (including WET testing data) that an effluent limitation for Pollutant Z will assure compliance with the narrative water quality criterion as well as the state's numeric criteria for Pollutant Z, as required by § 122.44(d)(1)(v).

Question:
May the state modify the permit to delete the WET limitation and to add the effluent limitation for Pollutant Z?

Answer:
Possibly. CWA section 303(d)(4) might justify the action. The applicable provision is CWA section 303(d)(4)(B) because the narrative water quality criterion is currently attained. The permittee is complying with the existing WET limitation to attain and maintain the criterion. Under CWA section 303(d)(4)(B), the existing effluent limitation may be relaxed as long as antidegradation requirements are met and the relaxed limitation will not cause a violation of any effluent guidelines or water quality standards applicable to the discharge. In this case, it appears likely that a relaxation would be permissible because the permittee can demonstrate that the new limitation for Pollutant Z will assure compliance with both the narrative and numeric water quality criteria; however, the permit writer might consider continuing WET monitoring to identify other potential sources of toxicity in the future.

Example 4

- An industrial permittee seeks to revise its WQBEL of 60 mg/L for total suspended solids (TSS) to 100 mg/L, which is its actual discharge level.
- The current effluent limitation is based on a WLA from a TMDL developed in accordance with § 130.7.
- The water quality standards are not being attained. The ambient concentration of TSS exceeds the applicable water quality criteria.
- An effluent limitation of 100 mg/L is consistent with applicable effluent guidelines.
- New modeling information shows that the water quality standards will be attained with an effluent limitation of 75 mg/L TSS.

Question:
May the effluent limitation for TSS be revised from 60 mg/L to 100 mg/L?

Answer:
No; however, the effluent limitation could be relaxed to 75 mg/L under either CWA sections 402(o)(1) or (2) exceptions.

The water quality standards are not being attained because of TSS. Therefore, under CWA section 402(o)(1), the applicable exception is CWA section 303(d)(4)(A). In this case, the permitting authority may allow backsliding to 75 mg/L because the existing effluent limitation is based on a WLA from a TMDL, and the data show that attainment of the water quality standards is assured with an effluent limitation of 75 mg/L (but not with a limitation of 100 mg/L).

CHAPTER 8. Monitoring and Reporting Conditions

This chapter describes the monitoring and reporting conditions that a permit writer establishes in a National Pollutant Discharge Elimination System (NPDES) permit. The monitoring and reporting conditions require the permittee to conduct routine or episodic self-monitoring of permitted discharges and internal operations (where applicable) and report the analytical results to the permitting authority with the information necessary to evaluate discharge characteristics and compliance status. Periodic monitoring and reporting establish an ongoing record of the permittee's compliance status and, where violations are detected, create a basis for any necessary enforcement actions.

The monitoring and reporting conditions section of an NPDES permit generally includes specific requirements for the following items:

- Monitoring locations.
- Monitoring frequencies.
- Sample collection methods.
- Analytical methods.
- Reporting and recordkeeping requirements.

The following sections provide an overview of the considerations involved in determining appropriate monitoring, reporting, and recordkeeping requirements, and how to properly incorporate the appropriate requirements in an NPDES permit.

8.1 Establishing Monitoring Conditions

The NPDES regulations require facilities discharging pollutants to waters of the United States to periodically evaluate compliance with the effluent limitations established in their permits and provide the results to the permitting authority. A permit writer should consider several factors when determining the specific requirements to be included in the NPDES permit. Inappropriate or incomplete monitoring requirements can lead to inaccurate compliance determinations. Factors that could affect sampling location, sampling method, and sampling frequency include the following:

- Applicability of effluent limitations guidelines and standards (effluent guidelines).
- Wastestream and process variability.
- Access to sample locations.
- Pollutants discharged.
- Effluent limitations.
- Discharge frequencies (e.g., continuous versus intermittent).
- Effect of flow or pollutant load or both on the receiving water.
- Characteristics of the pollutants discharged.
- Permittee's compliance history.

8.1.1 Purposes of Monitoring

Monitoring is performed to determine compliance with effluent limitations established in NPDES permits, establish a basis for enforcement actions, assess treatment efficiency, characterize effluents and characterize receiving water.

Regulations requiring the establishment of monitoring and reporting conditions in NPDES permits are at Title 40 of the *Code of Federal Regulations* (CFR) 122.44(i) and 122.48. Regulations at § 122.44(i) require permittees to monitor pollutant mass (or other applicable unit of measure) and effluent volume and to provide other measurements (as appropriate) using the test methods established at Part 136. That subpart also establishes that NPDES permits (with certain specific exceptions as discussed in section 8.1.3 below) must require permittees to monitor for all limited pollutants and report data at least once per year.

Regulations at § 122.48 stipulate that all permits must specify requirements concerning the proper use, maintenance, and installation of monitoring equipment or methods (including biological monitoring methods when appropriate). NPDES permits must also specify the monitoring type, intervals, and frequency sufficient to yield data that are representative of the activity. The following sections focus on developing permit monitoring conditions that properly address these regulatory requirements.

8.1.2 Monitoring Location

The permit writer should specify the appropriate monitoring location in an NPDES permit to ensure compliance with the permit limitations and provide the necessary data to determine the effects of an effluent on the receiving water. The NPDES regulations do not prescribe exact monitoring locations; rather, the permit writer is responsible for determining the most appropriate monitoring location(s) and indicating the location(s) in the permit. Ultimately, the permittee is responsible for providing a safe and accessible sampling point that is representative of the discharge [§ 122.41(j)(1)].

The permit writer should consider the following questions when selecting a monitoring location:

- Is the monitoring location on the facility's property?
- Is the monitoring location accessible to the permittee and the permitting authority?
- Will the results be representative of the targeted wastestream?
- Is monitoring at internal points needed?

Permit writers should establish monitoring locations where the wastewater is well mixed, such as near a Parshall flume or at a location in a sewer with hydraulic turbulence. Weirs tend to enhance the settling of solids immediately upstream and the accumulation of floating oil or grease immediately downstream. Such locations should be avoided for sampling.

The permit writer can specify monitoring locations with either a narrative description or a diagram of the permittee's facility. Exhibit 8-1 provides examples of how to specify monitoring locations in a permit either by narrative or by diagram.

Exhibit 8-1 Examples of specifying monitoring locations in permits

Narrative

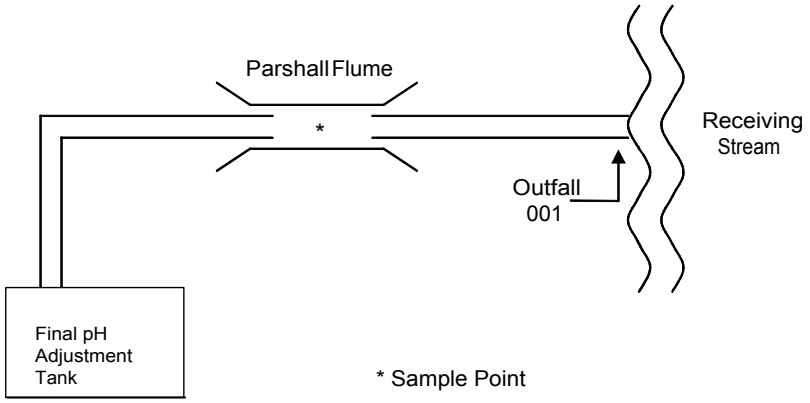
A. Monitoring Locations

1. Discharge from the Chemistry-Fine Arts Building must be sampled at the Parshall flume before the discharge point for Outfall 001.
2. Discharge from the Physics Building must be sampled at the Parshall flume before the discharge point for Outfall 002.
3. Discharge from the Research Lab No. 1 must be sampled at the Parshall flume before the discharge point for Outfall 003.

Diagram

A. Monitoring Locations

Outfall	Description
001	Discharge Pipe: Discharge of wastewater generated by all regulated metal finishing processes at the facility. Samples must be collected at the point indicated on the diagram below.



The monitoring location will vary depending on the type of monitoring required. The following sections discuss monitoring location considerations for each monitoring type.

8.1.2.1 Influent and source water monitoring locations

Influent monitoring is monitoring of a wastestream before that wastestream receives treatment. The permit writer should require influent monitoring when a characterization of the influent is needed to determine compliance with a permit condition, such as the 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) percent removal limitations required by the secondary treatment standards for publicly owned treatment works (POTWs).

Source water monitoring is the monitoring of source water before use as process water (e.g., river water used as contact cooling water). The permit writer should require source water monitoring if intake credits are established as specified in § 122.45(g).

Influent and source water monitoring locations should ensure a representative sample of raw intake water before any processes or treatment that could alter the properties of the intake water.

8.1.2.2 Internal monitoring locations

Internal monitoring is the monitoring of wastestreams at a location within the facility before discharge to waters of the United States. The NPDES regulations at § 122.45(h) allow internal monitoring points to be established when needed to determine compliance with a standard and in cases where setting an external monitoring location is not feasible. The permit writer may require internal monitoring to determine compliance with technology-based effluent limitations (TBELs) for a wastestream before commingling with other process or non-process wastestreams. Internal monitoring is generally not appropriate for determining compliance with water quality-based effluent limitations (WQBELs) unless final effluent monitoring is impractical (e.g., the final discharge point is submerged or inaccessible).

Examples of reasons for requiring designation of internal monitoring locations include the following:

- **Ensuring compliance with effluent guidelines (at non-POTW facilities):** When non-process wastewaters dilute process wastewaters subject to effluent guidelines, monitoring the combined discharge might not accurately allow determination of whether the facility is complying with the effluent guidelines. Under such circumstances, the permit writer might consider requiring monitoring for compliance with TBELs before the process wastewater is combined with non-process wastewater.
- **Ensuring compliance with secondary treatment standards (for POTWs only):** Some POTWs include treatment processes that do not address pollutants regulated by secondary treatment standards and that could interfere with the ability to accurately monitor for compliance with secondary treatment standards. Under such circumstances, the permit writer could consider requiring monitoring for compliance with limitations derived from secondary treatment standards before such processes. For example, the permit could require effluent monitoring for compliance with limitations derived from secondary treatment standards after secondary clarification but before disinfection.
- **Allowing detection of a pollutant:** Instances could arise where the combination of process and non-process wastewaters result in dilution of a pollutant of concern such that it would not be detectable using approved analytical methods. Internal monitoring would enable characterization of the pollutant before dilution with other wastewaters.

Where the permit writer determines that internal monitoring is necessary, § 122.45(h)(2) states that limitations on internal wastestreams may be imposed only where the permit fact sheet sets forth the exceptional circumstances requiring application of limitations at those locations.

8.1.2.3 Effluent monitoring locations

Effluent monitoring is monitoring of the final effluent after all treatment processes. The permit writer should require effluent monitoring to determine compliance with final effluent limitations established in the permit. Effluent monitoring also can be used to provide data to assess the possible impact of the discharge on the receiving water.

Effluent monitoring locations should provide a representative sample of the effluent being discharged into the receiving water. Effluent monitoring locations should be established after all industrial uses and treatment processes. Most importantly, the point where a final effluent limitation applies and the point

where monitoring is required must be the same. A logical effluent monitoring point is just before discharge to the receiving water. This is particularly true for ensuring compliance with WQBELs.

8.1.3 Monitoring Frequency

The permit writer should establish monitoring frequencies sufficient to characterize the effluent quality and to detect events of noncompliance, considering the need for data and, as appropriate, the potential cost to the permittee. Monitoring frequency should be determined on a case-by-case basis, and decisions for setting monitoring frequency should be described in the fact sheet. Some states have their own monitoring guidelines that can help a permit writer determine an appropriate monitoring frequency.

To establish a monitoring frequency, the permit writer should consider the variability of the concentration of various parameters by reviewing effluent data for the facility (e.g., from discharge monitoring reports [DMRs]) or, without actual data, information from similar dischargers. A highly variable discharge should require more frequent monitoring than a discharge that is relatively consistent over time (particularly in terms of flow and pollutant concentration). Other factors that should be considered when establishing appropriate monitoring frequencies include the following:

- **Design capacity of the treatment facility.** The monitoring frequency might need to be increased at facilities where the treatment facility is nearing design capacity. For example, at equivalent average flow rates, a large lagoon system that is not susceptible to bypasses would require less frequent monitoring than an overloaded treatment facility that experiences fluctuating flow rates from infiltration or large batch discharges from an industrial user system. The lagoon should have a relatively low variability compared to the facility receiving batch discharges.
- **Treatment method used.** The monitoring frequency will be similar for similar treatment processes. The type of wastewater treatment used by the facility might affect the frequency of effluent monitoring. An industrial facility employing biological treatment would have a similar monitoring frequency as a secondary treatment plant with the same units used for wastewater treatment. If the treatment method is appropriate and achieving high pollutant removals on a consistent basis, monitoring could be less frequent than for a plant with little or insufficient treatment.
- **Compliance history.** The monitoring frequency might need to be adjusted to reflect the compliance history of the facility. A facility with problems achieving compliance generally should be required to perform more frequent monitoring to characterize the source or cause of the problems or to detect noncompliance.
- **Cost of monitoring relative to permittee's capabilities.** The monitoring frequency should not be excessive and should be what is necessary to provide sufficient information about the discharge.
- **Location of the discharge.** The monitoring frequency could be increased if the discharge is to sensitive waters or is near a public water supply.
- **Nature of the pollutants.** To accurately characterize the discharge, the monitoring frequency might be increased for wastewaters with highly toxic pollutants or where the nature of the pollutants varies.

- **Frequency of the discharge.** The monitoring frequency for a wastewater discharged in batches infrequently should differ from that for a continuous discharge of highly concentrated wastewater or a wastewater containing a pollutant that is found infrequently and at very low concentrations. The production schedule of the facility (e.g., seasonal, daily), the plant washdown schedule, and other similar factors should be considered.
- **Number of monthly samples used in developing effluent limitations.** When establishing monitoring frequency, the permit writer should consider the number of monthly samples used in developing average monthly WQBELs. If the discharger monitors less frequently than the monthly monitoring frequency assumed when developing applicable effluent guidelines or in calculating a WQBEL, it could be more difficult for the discharger to comply with its average monthly effluent limitations. For example, if an average monthly limitation is established assuming a monitoring frequency of four times per month (i.e., the limit is the expected average of four samples taken during a month), a discharger taking only one sample per month would statistically have a greater chance of exceeding its average monthly limit than if it sampled at least four times per month.
- **Tiered limitations.** The monitoring frequency requirements should correspond to the applicable tiers in cases where the permit writer has included tiered limitations. If a facility has seasonal discharge limitations, it might be appropriate to increase the monitoring frequency during the higher production season, and reduce the frequency during the off-season.
- **Other Considerations.** To ensure representative monitoring, permit conditions could be included to require monitoring on the same day, week, or month for parameters that might be correlated in some way. For example, coordinating the monitoring requirements for parameters such as pathogens and chlorine or metals and pH can provide information for both compliance assessment and determination of treatment efficacy.

A permit writer could also establish a tiered monitoring schedule that reduces or increases the monitoring frequency during a permit cycle. Tiered monitoring might be appropriate for discharges where the initial sampling shows compliance with effluent limitations, justifying a reduction in monitoring frequency over time. Conversely, if problems are found during the initial sampling, more frequent sampling and more comprehensive monitoring can be applied. This step-wise approach could lead to lower monitoring costs for permittees while still providing the data needed to demonstrate compliance with effluent limitations.

In 1996 EPA issued *Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies* <www.epa.gov/npdes/pubs/perf-red.pdf>. Under the guidance, NPDES reporting and monitoring requirements may be reduced on the basis of a demonstration of excellent historical performance. Facilities can demonstrate that historical performance by meeting a set of compliance and enforcement criteria and by demonstrating their ability to consistently discharge pollutants below the levels necessary to meet their existing NPDES permit limitations. Reductions are determined parameter-by-parameter, on the basis of the existing monitoring frequency and the percentage below the limitation at which the parameter is being discharged. The reductions are incorporated when the permit is reissued. To remain eligible for the reductions, permittees are expected to maintain the parameter performance levels and good compliance on which the reductions were based.

8.1.4 Sample Collection

The permit writer must specify the sample collection method for all parameters required to be monitored in the permit. The permit writer should determine the sample collection method on the basis of the characteristics of each specific discharge. Certain sample collection and storage requirements are identified as part of the analytical methods specified in Part 136. (Section 8.3 below presents more on analytical methods.) The two most frequently used sampling methods are grab and composite. For more detailed information on sample collection methods, permit writers should refer to Chapter 5 (Sampling) of the NPDES Compliance Inspection Manual[1] <www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesmanual.html>.

8.1.4.1 Grab Samples

Grab samples are individual samples collected over a period not exceeding 15 minutes and that are representative of conditions at the time the sample is collected. Grab samples are appropriate when the flow and characteristics of the wastestream being sampled are relatively constant. The sample volume depends on the type and number of analyses to be performed. A grab sample is appropriate when a sample is needed to

- Monitor an effluent that does not discharge on a continuous basis.
- Provide information about instantaneous concentrations of pollutants at a specific time.
- Allow collection of a variable sample volume.
- Corroborate composite samples.
- Monitor parameters not amenable to compositing (e.g., temperature).

Grab samples can also be used to determine the spatial variability of a parameter or information on variability over a short period. They also are useful for monitoring intermittent wastewater flows from well-mixed batch process tanks.

8.1.4.2 Composite Samples

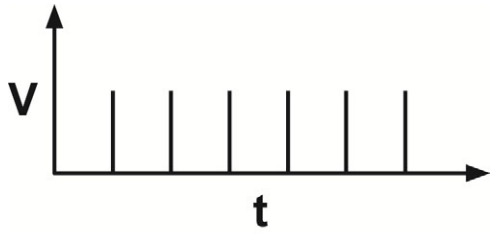
Composite samples are collected over time, either by continuous sampling or by mixing discrete samples, and represent the average characteristics of the wastestream during the sample period. Composite samples might provide a more representative measure of the discharge of pollutants over a given period than grab samples, and are used when any of the following is true:

- A measure of the average pollutant concentration during the compositing period is needed.
- A measure of mass loadings per unit of time is needed.
- Wastewater characteristics are highly variable.

Composite samples can be discrete samples (see discussion of sequential sampling in section 8.1.4.3 below) or a single combined sample and are collected either manually or with automatic samplers. There are two general types of composite sampling: time-proportional and flow-proportional. The permit writer should clearly express which type is required in the permit.

Time-proportional composite sample: This method collects a fixed volume (V) of discrete sample aliquots in one container at constant time intervals (t) as shown in Exhibit 8-2.

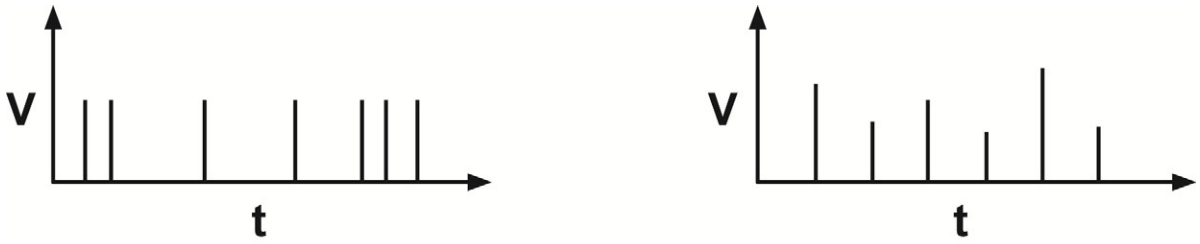
Exhibit 8-2 Visual interpretation of time-proportional composite monitoring



Time-proportional composite monitoring is appropriate when the flow of the sampled stream is constant (flow rate does not vary more than ±10 percent of the average flow rate) or when flow-monitoring equipment is not available. Automatically timed composited samples are usually preferred over manually collected composites. Composite samples collected by hand are appropriate for infrequent analyses and screening or if the subsamples have a fixed volume at equal time intervals.

Flow-proportional composite sample: There are two methods used for this type of sample: constant-volume when the interval time varies between samples, or constant-time when the interval volume collected varies between samples as shown in Exhibit 8-3.

Exhibit 8-3 Visual interpretation of flow-proportional composite monitoring



The constant-volume, flow-proportional, composite monitoring method collects a constant sample volume at varying time intervals proportional to stream flow (e.g., 200 milliliters sample collected for every 5,000 gallons of flow). The constant-time, flow-proportional, composite monitoring method collects the sample by adjusting the volume of each aliquot as the flow varies, while maintaining a constant time interval between the aliquots.

Flow-proportional composite sampling is usually preferred over time-proportional composite sampling when the effluent flow volume varies appreciably over time. If there is no flow-measuring device, effluent samples can be manually composited using the influent flow measurement without any correction for time lag. The error in the influent and effluent flow measurement is insignificant except in those cases where large volumes of water are impounded, as in equalization basins.

If a sampling protocol is not specified in the regulations, the permit writer should establish the duration of the compositing period and frequency of aliquot collection. The permit writer should also establish the time frame within which the sample is to be collected and the number of individual aliquots in the composite.

There are instances where composite samples are inappropriate. For example, the permit application regulations at § 122.21(g)(7) indicate that grab samples must be used for sampling several parameters that may change during the time it takes to composite the sample. Composite samples can be used for whole effluent toxicity (WET) testing; however, if there is concern that there are toxicity spikes or that the toxicant is a parameter for which composite sampling is not appropriate, grab samples for WET testing could be specified in the permit.

8.1.4.3 Sequential and Continuous Monitoring

Sequential monitoring refers to collecting discrete samples in individual containers in regular succession, such as timed intervals or discharge increments. Sequential grab samples provide a characteristic of the wastestream over a given time. Automatic sequential monitoring may be done with a special type of automatic sampling device that collects relatively small amounts of a sampled wastestream with the interval between sampling proportioned based on either time or effluent flow. Unlike a combined composite sampler, the sequential sampling device automatically retrieves a sample and holds it in a bottle separate from other automatically retrieved samples. Many individual samples can be stored separately in the unit rather than combining aliquots in a common bottle.

Continuous monitoring is another option for a limited number of parameters such as flow, total organic carbon (TOC), temperature, pH, conductivity, residual chlorine, fluoride, and dissolved oxygen. When establishing continuous monitoring requirements, the permit writer should be aware that the NPDES regulations concerning pH limitations allow for a period of excursion when the effluent is being continuously monitored (§ 401.17). The reliability, accuracy, and cost of continuous monitoring vary with the parameter monitored. The permit writer should consider the environmental significance of the variation of any of these parameters in the effluent and the cost of continuous monitoring before establishing continuous monitoring requirements in the permit.

8.2 Additional Monitoring Requirements and WET Testing

A variety of discharges other than traditional POTW or industrial wastewater discharges, including biosolids (sewage sludge), combined sewer and sanitary sewer overflows, and stormwater, are regulated under the NPDES permit program. In addition, many permits include requirements for WET testing. As discussed in this section, a permit writer should account for such unique discharges and testing requirements in establishing monitoring requirements.

8.2.1 Biosolids (Sewage Sludge)

The purpose of monitoring sewage sludge is to ensure safe use or disposal of the sludge. Sewage sludge regulations specified in Part 503 require monitoring of sewage sludge that is applied to land, placed on a surface disposal site, or incinerated. The frequency of monitoring is based on the annual amount of sewage sludge that is used or disposed of by those methods. POTWs that provide the sewage sludge to another party for further treatment (such as composting) must provide that party with the information necessary to comply with regulations at Part 503. Sewage sludge disposed of in a municipal solid waste landfill unit must meet the criteria for municipal solid waste landfills in the regulations at Part 258.

Exhibit 8-4 shows the minimum monitoring requirements established in Part 503 for sewage sludge before use and disposal. More frequent monitoring for any of the required or recommended parameters is appropriate when the POTW has any of the following:

- A highly variable influent load of toxics or organic solids.
- A significant industrial load.
- A history of process upsets due to toxics, or of adverse environmental impacts due to sludge use or disposal activities.

Exhibit 8-4 Minimum requirements for sewage sludge monitoring, based on method of sludge use or disposal

Method	Monitoring requirements	Frequency	Citation (40 CFR)
Land application	• Sludge weight and percent total solids • Metals: As, Cd, Cu, Pb, Hg, Mo, Ni, Se, and Zn • Pathogen Density • Vector Attraction Reduction	Based on dry weight of sludge in metric tons per year: • > zero but < 290: annually • = or > 290 but < 1,500: quarterly • = or > 1,500 but < 15,000: bimonthly • = or > 15,000: monthly	§ 503.16
Co-disposal in municipal solid waste landfill	• Sludge weight and percent total solids • Passes Paint-Filter Liquid Test • Suitability of sludge used as cover • Characterize in accordance with hazardous waste rules	Monitoring requirements or frequency not specified by Part 503. Determined by local health authority or landfill owner/operator.	Part 258
Surface disposal: lined sites with leachate collection and unlined sites	• Sludge weight and percent total solids • Metals: As, Cr, Ni (Unlined sites only) • Pathogen Density • Vector Attraction Reduction	Based on dry weight of sludge in metric tons per year: • > zero but < 290: annually • = or > 290 but < 1,500: quarterly • = or > 1,500 but < 15,000: bimonthly • = or > 15,000: monthly	§ 503.26
	• Methane gas	• Continuously	
Incineration	• Sludge weight and percent total solids • Metals: As, Cd, Cr, Pb, and Ni	Based on dry weight of sludge in metric tons per year: • > zero but < 290: annually • = or > 290 but < 1,500: quarterly • = or > 1,500 but < 15,000: bimonthly • = or > 15,000: monthly	§ 503.46
	• Be and Hg (National Emissions Standards)	• As required by permitting authority (local air authority)	
	• THC or O_2, moisture, combustion temperatures	• Continuously	
	• Air pollution control device operating parameters	• As required by permitting authority	

Notes:
Monitoring frequencies required by Part 503 may be reduced after 2 years of monitoring, but in no case may be less than once per year.
A successful land application program could necessitate sampling for other constituents of concern (such as nitrogen) in determining appropriate agronomic rates. The permit writer will determine additional monitoring requirements.

The sampling and analysis methods specified in § 503.8 and Part 136 should be followed for monitoring the required parameters. Without any specific methods in Part 503, guidance on appropriate methods is in the following documents:

- *Part 503 Implementation Guidance*[2] <www.epa.gov/npdes/pubs/owm0237.pdf>.
- *POTW Sludge Sampling and Analysis Guidance Document*[3] <www.epa.gov/npdes/pubs/owm012.pdf>.
- *Control of Pathogens and Vector Attraction in Sewage Sludge*[4] <www.epa.gov/ORD/NRMRL/pubs/625r92013/625r92013.htm>.

8.2.2 Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs)

EPA's Combined Sewer Overflow (CSO) Control Policy (59 FR 18688, April 19, 1994) requires monitoring to characterize the combined sewer system, assist in developing a Long-Term Control Plan (LTCP), and show compliance with permit requirements. The permit writer should ensure the following:

- Monitoring is done to develop an initial system characterization as part of the nine minimum controls to reduce CSOs and their effect on receiving water quality. Such monitoring includes analyzing existing data on precipitation events, on the combined sewer system and CSOs, on water quality, and conducting field inspections.
- As part of the LTCP, a permittee is required to develop a more complete characterization of the sewer system through monitoring and modeling.
- To show compliance with the permit requirements and ultimately the attainment of water quality standards, the permittee is required to conduct a post-construction compliance monitoring program. Specific monitoring requirements of the post-construction compliance monitoring program will be unique to each permittee's LTCP and should be established as specific monitoring conditions in the individual NPDES permit.

These monitoring conditions should require monitoring of certain key parameters during a representative number of CSOs from a representative number of wet-weather events along with ambient water quality monitoring to ascertain attainment of water quality standards. EPA has prepared a guidance manual on monitoring entitled *Combined Sewer Overflows: Guidance for Monitoring and Modeling*[5] <www.epa.gov/npdes/pubs/sewer.pdf>.

A facility's permit might also contain monitoring requirements for sanitary sewer overflows (SSOs). SSO monitoring requirements would be developed on a case-by-case basis.

8.2.3 Stormwater Monitoring Considerations

Stormwater monitoring requirements vary according to the type of permit regulating the stormwater discharge and the activity. Municipal separate storm sewer systems (MS4s) serving more than 100,000 people (and some serving less than 100,000) are typically issued individual NPDES permits with monitoring requirements that are specific to the MS4. Smaller MS4s regulated under the stormwater Phase II rule are typically not required to conduct water quality monitoring as a condition in their NPDES general permit, though evaluation of measurable goals may include monitoring. EPA's multi-sector general permit (MSGP) for stormwater discharges from industrial facilities includes analytical monitoring requirements based on the type of industrial activity. Finally, operators of construction activity regulated under the

construction general permit are typically not required to conduct water quality monitoring; however, some states and EPA Regions do require monitoring if the construction activity will discharge to a water impaired by sediment.

Specific monitoring conditions for the federal general stormwater permits are detailed in the most recent Construction General Permit or MSGP issued by EPA (available on the EPA Stormwater Program Website <www.epa.gov/npdes/stormwater>). Additional documents on stormwater monitoring are:

- *Urban Stormwater BMP Performance: A Guidance Manual for Meeting the National Stormwater BMP Database Requirements*[6] <www.epa.gov/npdes/pubs/montcomplete.pdf>.
- *Guidance Manual for the Monitoring and Reporting Requirements of the NPDES Stormwater Multi-Sector General Permit (MSGP)*[7] <www.epa.gov/npdes/pubs/dmr-fin.pdf>.

8.2.4 WET Monitoring

The use of WET testing to evaluate the toxicity in a receiving stream is discussed in section 6.4 of this manual and on the NPDES WET Website <www.epa.gov/npdes/wet>. The WET (or biomonitoring) test procedures were promulgated in § 136.3 (60 FR 53529, October 16, 1995). EPA revised the WET methods in 67 FR 69951, November 19, 2002. WET monitoring conditions included in permits should specify the particular biomonitoring test to be used, the test species, required test endpoints, and quality assurance/quality control procedures.

To support permitting agencies in implementing WET methods, EPA has revised and published manuals for toxicity test protocols:

- *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*. 5th ed.[8] <www.epa.gov/waterscience/WET/disk2/atx.pdf>.
- *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*. 4th ed.[9] <www.epa.gov/waterscience/WET/disk3/ctf.pdf>.
- *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*. 3rd ed.[10] <www.epa.gov/waterscience/WET/disk1/ctm.pdf>.
- *NPDES Compliance Monitoring Inspector Training: Biomonitoring*[11] (No Link).

WET testing samples could be composite or grab samples. Twenty-four hour composite samples are suggested except when any of the following are true:

- The effluent is expected to be more toxic at a certain time of day.
- Toxicity may be diluted during compositing.
- The size of the sample needed exceeds the composite sampler volume.

WET tests are relatively expensive compared to single parameter tests. Therefore, a permit writer should carefully consider the appropriate frequency for WET testing. A discharge with highly variable flow or observed toxicity should have more frequent monitoring than a discharge that is relatively consistent over time. As with other parameters, factors that a permit writer should consider when establishing appropriate WET monitoring frequencies include the following:

- Type of treatment process.

- Environmental significance and nature of the toxicity.
- Past compliance record or history.
- Cost of monitoring relative to financial capabilities.
- Number of monthly samples used in developing the permit limitation.
- The frequency of intermittent discharges.

Samples should be evenly spaced throughout the year so that seasonal variability can be ascertained.

8.3 Analytical Methods

The permit writer must specify the analytical methods to be used for monitoring. EPA's Office of Science and Technology's Clean Water Act Analytical Methods Website <www.epa.gov/waterscience/methods/> contains information about analytical methods.

The standard conditions of the permit [§§ 122.41(j)(4) and 122.44(i)] require that, when available, permittees use test procedures specified in Part 136 <www.epa.gov/waterscience/methods/basic.htm>. The analytical methods contained in Part 136 are established for conventional, toxic (priority), and some nonconventional pollutants. Without analytical methods for a parameter, the permit writer should specify the analytical method to be used. There are also procedures to apply for approval of alternative test methods in accordance with § 136.4.

While Part 136 identifies the analytical methods approved for use in the NPDES program, additional methods information is available through the National Environmental Methods Index (NEMI) <www.nemi.gov/>. NEMI is a Web-based, searchable clearinghouse of methods supported by the U.S. Geological Survey and EPA's Office of Water. NEMI contains summaries of more than 1,100 methods and describes them by their performance characteristics and their regulatory status, relative cost, detection level, detection level type, accuracy, precision, spiking level, instrumentation, lab equipment, and the *greenness* of analytic methods. Permit writers might find that information useful in comparing the features of Part 136 methods that will be used for assessing compliance with the calculated effluent limitations.

When establishing effluent limitations for a specific parameter (based on technology or water quality regulatory requirements), it is possible for the value of the calculated limit to fall below the method detection limit (MDL) and the minimum level (ML) established by the approved analytical method(s). Regardless of whether current analytical methods are available to detect and quantify the parameter at the concentration of the calculated limitation, the limitation must be included in the permit as calculated.

In some instances, there might be two or more approved Part 136 analytical methods available for the analysis of a parameter. In such cases, the permit should determine whether there is a need to select one of the approved methods and to include a requirement in the permit mandating the use of only the selected method. That approach might be necessary where an effluent limit is established at a level that is quantifiable by one approved method but is below the ML of another approved method.

Such a situation often occurs where a permit contains a WQBEL for mercury. To clarify the EPA's position with respect to effluent monitoring for mercury, EPA developed a memo *Analytical Methods for Mercury in National Pollutant Discharge Elimination System (NPDES) Permits*[12] <www.epa.gov/npdes/pubs/mercurymemo_analyticalmethods.pdf>.

***Sufficiently Sensitive* Methods**

At the time of the writing of this manual, EPA had proposed regulations at §§ 122.21(e), 122.44(i), and Part 136, to require the use of sufficiently sensitive methods for analyses conducted for NPDES permit applications and for compliance monitoring (75 FR 35712, June 23, 2010). To ensure that appropriate analytical methods are required and performed, see the most current version of these federal regulations and applicable state analytical method regulations and policy.

8.4 Reporting Monitoring Results

The NPDES regulations require the permittee to maintain records and periodically report on monitoring activities. The regulations at § 122.41(l)(4)(i) require that monitoring results must be reported on a DMR <www.epa.gov/npdes/pubs/dmr.pdf>. Data reported include both data required by the permit and any additional data the permittee has collected consistent with permit requirements. All facilities must submit reports (on discharges and sludge use or disposal) at least annually, as required by § 122.44(i)(2). POTWs with pretreatment programs must submit a pretreatment report at least annually as required by § 403.12(i). However, the NPDES regulation states that monitoring frequency and reporting should be dependent on the nature and effect of the discharge or sludge use or disposal. Thus, the permit writer can require reporting more frequent than annually.

8.5 Recordkeeping Requirements

Generally, the permit writer is required by § 122.41(j) to include in the permit the requirement to retain records for at least three years, subject to extension by the State Director. Recordkeeping requirements for sewage sludge [§ 122.41(j)] and the CAFO program [§ 122.42(e)(2)] require records be kept five years or longer if required by the State Director. The permit writer should designate in the permit where records should be kept.

Monitoring records must include the following:

- Date, place, time of sampling.
- Name of sampler.
- Date of analysis.
- Name of analyst.
- Analytical methods used.
- Analytical results.

According to § 122.41(j), monitoring records must be representative of the discharge. Monitoring records, which must be retained, include continuous strip chart recordings, calibration data, copies of all reports for the permit, and copies of all data used to compile reports and applications.

Sewage sludge regulations under §§ 503.17, 503.27, and 503.47 establish recordkeeping requirements that vary depending on the use and disposal method for the sewage sludge. The same recordkeeping requirements should be applied to other sludge monitoring parameters not regulated by the Part 503 rule.

[1] U.S. Environmental Protection Agency. 2004. *NPDES Compliance Inspection Manual*. EPA-305-X-03-001. U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Washington, DC. <www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesinspect.pdf>.

[2] U.S. Environmental Protection Agency. 1995. *Part 503 Implementation Guidance*. EPA 833-R-95-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0237.pdf>.

[3] U.S. Environmental Protection Agency. 1989. *POTW Sludge Sampling and Analysis Guidance Document*. EPA-833-B-89-100. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm012.pdf>.

[4] U.S. Environmental Protection Agency. 1992. *Control of Pathogens and Vector Attraction in Sewage Sludge*. EPA-625/R-92-013. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC. <www.epa.gov/ORD/NRMRL/pubs/625r92013/625r92013.htm>.

[5] U.S. Environmental Protection Agency. 1999. *Combined Sewer Overflows–Guidance for Monitoring and Modeling*. EPA-832-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/sewer.pdf>.

[6] U.S. Environmental Protection Agency. 2002. *Urban Stormwater BMP Performance: A Guidance Manual for Meeting the National Stormwater BMP Database Requirements*. EPA-821-B-02-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/montcomplete.pdf>.

[7] U.S. Environmental Protection Agency. 1999. *Guidance Manual for the Monitoring and Reporting Requirements of the NPDES Stormwater Multi-Sector General Permit (MSGP)*. U.S. Environmental Protection Agency, Office of Water, NPDES Program Branch, Washington, DC. <www.epa.gov/npdes/pubs/dmr-fin.pdf>.

[8] U.S. Environmental Protection Agency. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition.* EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, DC <www.epa.gov/waterscience/WET/disk2/atx.pdf>.

[9] U.S. Environmental Protection Agency. 2002. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition*. EPA-821-R-02-013. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/WET/disk3/ctf.pdf>.

[10] U.S. Environmental Protection Agency. 1994. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition*. EPA821-R-02-014. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/WET/disk1/ctm.pdf>.

[11] U.S. Environmental Protection Agency. 1990. *NPDES Compliance Monitoring Inspector Training: Biomonitoring*. U.S. Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, DC. NTIS # PB91-145854. (No Link)

[12] Hanlon, James A. 2007. *Analytical Methods for Mercury in National Pollutant Discharge Elimination System (NPDES) Permits.* U.S. Environmental Protection Agency, Office of Wastewater Management. Memorandum, August 23, 2007. <www.epa.gov/npdes/pubs/mercurymemo_analyticalmethods.pdf>.

CHAPTER 9. Special Conditions

Special conditions in National Pollutant Discharge Elimination System (NPDES) permits supplement numeric effluent limitations and require the permittee to undertake activities designed to reduce the overall quantity of pollutants being discharged to waters of the United States, to reduce the potential for discharges of pollutants, or to collect information that could be used in determining future permit requirements.

There are many different reasons to incorporate special conditions into a permit including:

- To address unique situations, such as facilities discharging pollutants for which data are absent or limited, making development of technology- or water quality-based effluent limitations (TBELs or WQBELs) more difficult or impossible.
- To incorporate preventive requirements, such as requirements to install process control alarms, containment structures, good housekeeping practices, and the like.
- To address foreseeable changes to discharges, such as planned changes to process, products, or raw materials that could affect discharge characteristics.
- To incorporate compliance schedules to provide the time necessary to comply with permit conditions.
- To incorporate other NPDES programmatic requirements (e.g., pretreatment, sewage sludge).
- To impose additional monitoring requirements that provide the permit writer with data to evaluate the need for changes in permit limitations.
- To increase or decrease monitoring requirements, depending on monitoring results or changes in processes or products.
- To impose requirements for special studies such as ambient stream surveys, toxicity identification evaluations (TIEs) and toxicity reduction evaluations (TREs), bioaccumulation studies, sediment studies, mixing or mixing zone studies, pollutant reduction evaluations, or other such information-gathering studies.

Section 9.1 below addresses several types of special conditions that apply to both municipal and non-municipal facilities. Section 9.2 addresses special conditions unique to municipal facilities.

9.1 Special Conditions Potentially Applicable to Any Type of Discharger

This section discusses several types of special conditions that could be included in any NPDES permit (i.e., municipal or non-municipal). Those special conditions can be thought of as the *ABCs* of special conditions and include the following:

- **A**dditional monitoring and special studies.
- **B**est management practices (BMPs).
- **C**ompliance schedules.

A summary of the use of those special conditions follows.

9.1.1 Additional Monitoring and Special Studies

Additional monitoring requirements, beyond those required under the effluent limitations section of the permit, and special studies are useful for collecting data that were not available to the permit writer for consideration during permit development. Additional monitoring requirements and special studies generally are used to supplement numeric effluent limitations or support future permit development activities. Examples of the types of special studies that could be required in an NPDES permit include the following:

- **Treatability studies:** Might be required in a permit when insufficient treatability information for a pollutant or pollutants would hinder a permit writer from developing defensible TBELs. Treatability studies can also be required when the permit writer suspects that a facility might not be able to comply with an effluent limitation.
- **Toxicity identification evaluation/toxicity reduction evaluation (TIE/TRE):** Could be required in a permit when wastewater discharges are found to be toxic using whole effluent toxicity (WET) tests. The purpose of those evaluations is to identify and control the sources of toxicity in an effluent. Further guidance related to U.S. Environmental Protection Agency (EPA) recommended TIE/TRE procedures and requirements is found in the following guidance manuals:
  - *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*[1] <www.epa.gov/npdes/pubs/tre.pdf>.
  - *Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program*[2] <www.epa.gov/npdes/pubs/owmfinaltretie.pdf>.
  - *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations*[3] (No link—see the endnote for ordering instructions).
  - *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures*. 2nd ed[4] <www.epa.gov/npdes/pubs/owm0330.pdf>.
  - *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I*[5] <www.epa.gov/npdes/pubs/owm0255.pdf>.
  - *Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity*[6] <www.epa.gov/npdes/pubs/owm0343.pdf>.
  - *Methods for Aquatic Toxicity Identification Evaluations: Phase III Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity*[7] <www.epa.gov/npdes/pubs/owm0341.pdf>.
- **Mixing or mixing zone studies:** Might be required in a permit to assist in determining how effluent and receiving water mix and in establishing a regulatory mixing zone that can be applied when developing WQBELs.
- **Sediment monitoring:** Could be included in a permit if a permit writer suspects that pollutants contained in wastewater discharges accumulate in the sediments of the receiving water.
- **Bioaccumulation studies:** Might be required in a permit to determine whether pollutants contained in wastewater discharges bioaccumulate in aquatic organisms (e.g., fish, invertebrates). Such studies could be required when water quality criteria are expressed in terms of fish tissue levels. Additional guidance related to evaluating the bioaccumulation potential of a pollutant can

be found in the *EPA Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors*[8] (No link—see the endnote for ordering instructions).

When establishing additional monitoring or special studies, permit writers must ensure that any requirements related to the study (e.g., special sampling or analytical procedures) are specified in the appropriate permit condition. In addition, permit writers should establish a reasonable schedule for completion and submission of the study or monitoring program. If the anticipated timeline is longer than one year, an interim progress report during the study is advisable.

9.1.2 Best Management Practices (BMPs)

In general, BMPs are actions or procedures to prevent or reduce the discharge of pollution to waters of the United States. Title 40 of the *Code of Federal Regulations* (CFR) section 122.2 includes the following in the definition of BMPs:

- Schedules of activities.
- Prohibitions of practices.
- Maintenance procedures.
- Treatment requirements.
- Operating procedures and practices to control
  - Plant site runoff.
  - Spillage or leaks.
  - Sludge or waste disposal.
  - Drainage from raw material storage areas.

9.1.2.1 When to Use BMPs

Clean Water Act (CWA) section 304(e) authorizes EPA to require BMPs as part of effluent limitations guidelines and standards (effluent guidelines) to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage that it determines are associated with or ancillary to the industrial manufacturing or treatment process and can contribute significant amounts of pollutants to navigable waters. Where effluent guidelines require specific control measures, including BMPs or development of a BMP plan, permit writers must include such requirements in permits. In addition, CWA section 402(p)(3)(B)(iii) states that permits for discharges from municipal storm sewers must require controls, including management practices, to reduce the discharge of pollutants. Finally, CWA sections 402(a)(1) and (2) give the permitting authority the ability to include BMPs in permits on a case-by-case basis to carry out the provisions of the CWA.

The NPDES regulations at § 122.44(k) track the statutory provisions cited above. This section of the regulations provides that permits must contain BMPs (when applicable) to control or abate the discharge of pollutants when any of the following are true:

- They are authorized under CWA section 304(e).
- They are authorized under CWA section 402(p) for the control of stormwater discharges.
- Numeric effluent limitations are infeasible.
- The practices are necessary to achieve effluent limitations and standards or carry out the purpose and intent of the CWA.

Circumstances under which numeric effluent limitations might be infeasible include the following:

- Regulating a pollutant for which limited treatability or aquatic impact data are available to allow development of numeric TBELs or WQBELs.
- Regulating discharges when the types of pollutants vary greatly over time.

In addition, a permit writer should consider using BMPs under any of the following circumstances:

- When chemical analyses are inappropriate or impossible.
- When there is a history of leaks and spills or when housekeeping is sloppy.
- When a complex facility lacks data for a pollutant or pollutants.

9.1.2.2 BMPs in NPDES Permits

Permit writers include BMP requirements in permits using two approaches: (1) site-, process-, or pollutant-specific BMPs, or (2) a requirement to develop a BMP plan. Site-, process-, or pollutant-specific BMPs might be appropriate in the case of an individual permit where a permit writer has the opportunity to review the circumstances at the facility. On the other hand, it might not be appropriate to include site-, process-, or pollutant-specific BMPs as conditions in a general permit, a permit for a particularly complex facility, or a permit for a facility with operations not familiar to the permit writer. Instead, complicated facilities and discharges covered under a general permit could be required to develop a BMP plan that requires the permittee to determine appropriate BMPs on the basis of circumstances at its facility.

Specific BMPs

Specific BMPs are designed to address conditions particular to a type of facility or to a specific site, process, or pollutant. Specific BMPs might be used in a permit when

- They are needed to address ancillary activities that could result in the discharge of pollutants to waters of the United States.
- Numeric effluent limitations for a specific process are otherwise infeasible and BMPs serve as effluent limitations for that process.
- They are required to supplement and ensure compliance with effluent limitations in the permit.

To select a specific BMP, the permit writer could

- Review the industry profiles or the specific facility to determine the applicable and appropriate management practices.
- Evaluate whether the BMP would help to achieve effluent limitations or other environmental objectives for that facility.
- Use information from other permits, pollution prevention sources, and EPA guidance documents to identify applicable and appropriate BMPs.

Specific BMPs frequently are required for certain types of dischargers such as concentrated animal feeding operations (CAFOs), combined sewer overflows (CSOs), and stormwater discharges.

BMP Plans

The *Guidance Manual for Developing Best Management Practices*[9] <www.epa.gov/npdes/pubs/owm0274.pdf> describes the activities and materials at an industrial or municipal facility that are best addressed by BMPs. The manual also describes how BMPs work and gives examples of types of BMPs.

If a permit writer requires a BMP plan, it is the facility's responsibility to develop, implement, and evaluate the success or shortfalls of its own plan. Often, a BMP committee (i.e., a group of individuals within the plant organization) is responsible for developing the BMP plan and assisting the plant management in implementing and updating the BMP plan.

EPA has identified several recommended components of effective BMP plans and detailed each component in the *Guidance Manual for Developing Best Management Practices*. The minimum suggested components of a general BMP plan are presented below:

- General Provisions
  - Name and location of facility.
  - Statement of BMP policy and objective.
  - Review by plant manager.
- Specific Provisions
  - BMP committee.
  - Risk identification and assessment.
  - Reporting of BMP incidents.
  - Materials compatibility.
  - Good housekeeping.
  - Preventive maintenance.
  - Inspections and records.
  - Security.
  - Employee training.

BMP plans used to supplement effluent limitations or to describe how the discharger plans to meet effluent limitations can be submitted to the regulatory agency or be kept on-site and made available to the permitting authority upon request. A general schedule for BMP plan development can be included in the permit (e.g., complete and submit the plan within six months of permit issuance and begin implementing the plan within nine months of permit issuance).

Exhibit 9-1 presents example permit text for a requirement to develop and implement a BMP plan and should be adapted as necessary to reflect conditions at the individual facility.

Exhibit 9-1 Example BMP plan requirement

The following is example text for requiring development and implementation of a BMP plan through an NPDES permit. The text should be crafted and changed as necessary to meet the individual facility's needs and the permitting authority's goals. The bracketed text should be updated to be specific to the permit.

1. Implementation.

[IF A BMP PLAN DOES NOT EXIST:]

The permittee, must develop and implement a best management practices (BMP) plan that achieves the objectives and the specific requirements listed below. A copy of the plan must be submitted to the U.S. Environmental Protection Agency (EPA) **[AND/OR STATE AGENCY]** within six months of the effective date of this permit. The plan must be implemented as soon as possible but no later than nine months from the effective date of the permit. The permittee must update and amend the plan as needed.

[IF A BMP PLAN ALREADY EXISTS:]

The permittee must during the term of this permit operate the facility in accordance with the BMP plan **[CITE EXISTING PLAN]** and in accordance with subsequent amendments to the plan. The permittee must amend the plan to incorporate practices to achieve the objectives and specific requirements listed below, and a copy of the amended plan must be submitted to the U.S. Environmental Protection Agency (EPA) **[AND/OR STATE AGENCY]** within three months of the effective date of this permit. The amended plan must be implemented as soon as possible but not later than six months from the effective date of the permit.

2. Purpose

Through implementation of the BMP plan the permittee must prevent or minimize the generation and the potential for the release of pollutants from the facility to the waters of the United States through normal operations and ancillary activities.

3. Objectives

The permittee must develop and amend the BMP plan consistent with the following objectives for the control of pollutants.

a. The number and quantity of pollutants and the toxicity of effluent generated, discharged, or potentially discharged at the facility must be minimized by the permittee to the extent feasible by managing each influent waste stream in the most appropriate manner.
b. Under the BMP plan, and any Standard Operating Procedures (SOPs) included in the plan, the permittee must ensure proper operation and maintenance of the treatment facility as required by § 122.41(e).
c. The permittee must establish specific objectives for the control of pollutants by conducting the following evaluations.
    1. Each facility component or system must be examined for its waste minimization opportunities and its potential for causing a release of significant amounts of pollutants to waters of the United States because of equipment failure, improper operation, and natural phenomena such as rain or snowfall, etc. The examination must include all normal operations and ancillary activities including material storage areas, plant site runoff, in-plant transfer, process and material handling areas, loading or unloading operations, spillage or leaks, sludge and waste disposal, or drainage from raw material storage. **[NOTE THAT ONLY THE APPLICABLE AREAS SHOULD BE INCLUDED IN THE PREVIOUS LIST.]**
    2. Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances that may result in significant amounts of pollutants reaching surface waters, the program should include a prediction of the direction, rate of flow and total quantity of pollutants that could be discharged from the facility as a result of each condition or circumstance.

4. Requirements

The BMP Plan must be consistent with the objectives in the Objectives section above and the general guidance contained in the publication entitled *Guidance Manual for Developing Best Management Practices (BMPs)*, EPA 833-B-93-004, <www.epa.gov/npdes/pubs/owm0274.pdf> or any subsequent revisions to the guidance document. The BMP plan must

a. Be documented in narrative form, must include any necessary plot plans, drawings or maps, and must be developed in accordance with good engineering practices. The BMP plan must be organized and written with the following structure:
    1. Name and location of the facility.
    2. Statement of BMP policy.
    3. Structure, functions, and procedures of the BMP Committee.
    4. Specific management practices and standard operating procedures to achieve the above objectives, including the following:

Exhibit 9-1 Example BMP plan requirement (continued)

a. Modification of equipment, facilities, technology, processes, and procedures.
b. Reformulation or redesign of products.
c. Substitution of materials.
d. Improvement in management, inventory control, materials handling or general operational phases of the facility.

5. Risk identification and assessment.
6. Reporting of BMP incidents.
7. Materials compatibility.
8. Good housekeeping.
9. Preventative maintenance.
10. Inspections and records.
11. Security.
12. Employee training.

b. Include the following provisions concerning BMP plan review:
   1. Review by plant engineering staff and the plant manager.
   2. Review and endorsement by the permittee's BMP Committee.
   3. A statement that the above reviews have been completed and that the BMP plan fulfills the requirements set forth in this permit. The statement must include the dated signatures of each BMP Committee member as certification of the reviews.

c. Establish specific BMPs to meet the objectives identified in the Objectives section above, addressing each component or system capable of generating or causing a release of significant amounts of pollutants, and identifying specific preventive or remedial measures to be implemented.

d. Establish specific BMPs or other measures that ensure that the following specific requirements are met:
   1. Ensure proper management of solid and hazardous waste in accordance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA). Management practices required under RCRA regulations must be referenced in the BMP plan.
   2. Reflect requirements for Spill Prevention, Control, and Countermeasure (SPCC) plans under Clean Water Act (CWA) section 311 and 40 CFR Part 112 and may incorporate any part of such plans into the BMP plan by reference.
   3. Reflect requirements for stormwater control under CWA section 402(p) and the regulations at 40 CFR 122.26 and 122.44, and otherwise eliminate to the extent practicable, contamination of stormwater runoff.

   etc.

[NOTE: SECTION d. ABOVE COULD BE TAILORED TO EACH FACILITY BY THE PERMIT WRITER AND MAY INCLUDE PROCESSES OR AREAS OF THE FACILITY WITH HOUSEKEEPING PROBLEMS, NONCOMPLIANCE, SPILLS/LEAKS, OR OTHER PROBLEMS THAT COULD BE REMEDIED THROUGH A BMP. IF THERE IS A KNOWN SOLUTION TO THE PROBLEM (E.G., MORE FREQUENT INSPECTIONS, PREVENTIVE MAINTENANCE, ETC.), THIS REMEDY COULD ALSO BE INCLUDED AS A PART OF THE BMP PLAN REQUIREMENTS. TO GATHER IDEAS FOR SUCH REQUIREMENTS, THE PERMIT WRITER MAY WANT TO CONTACT THE PERMITTEE, COMPLIANCE PERSONNEL, FACILITY INSPECTORS, OPERATIONS OFFICE PERSONNEL, AND STATE AGENCY COUNTERPARTS. THE PERMIT WRITER MIGHT ALSO WANT TO CHECK REQUIREMENTS IN OTHER PERMITS AND BMP PLANS FOR SIMILAR FACILITIES.]

5. Documentation

The permittee must maintain a copy of the BMP plan at the facility and must make the plan available to EPA **[AND/OR STATE AGENCY]** upon request. All offices of the permittee, which are required to maintain a copy of the NPDES permit, must also maintain a copy of the BMP plan.

6. BMP Plan Modification

The permittee must amend the BMP plan whenever there is a change in the facility, or in the operation of the facility, that materially increases the generation of pollutants or their release or potential release to the receiving waters. The permittee must also amend the plan, as appropriate, when plant operations covered by the BMP plan change. Any such changes to the BMP plan must be consistent with the objectives and specific requirements listed above. All changes in the BMP plan must be reported to EPA **[AND/OR STATE AGENCY]** in writing.

7. Modification for Ineffectiveness

If at any time the BMP plan proves to be ineffective in achieving the general objective of preventing and minimizing the generation of pollutants and their release and potential release to the receiving waters and/or the specific requirements above, the permit and/or the BMP plan must be subject to modification to incorporate revised BMP requirements.

9.1.2.3 Pollution Prevention in BMPs

BMPs are, by their nature, pollution prevention practices. Traditionally, BMPs have focused on good housekeeping measures and good management techniques that attempt to avoid contact between pollutants and water as a result of leaks, spills, and improper waste disposal. However, on the basis of the authority granted under the regulations, BMPs may include a range of pollution prevention options, including production modifications, operational changes, materials substitution, and materials and water conservation.

When developing BMPs, permit writers should be familiar with the fundamental principles of pollution prevention:

- Pollution should be prevented or reduced at the source, whenever feasible (*Reduce*).
- Pollution that cannot be prevented should be reused or recycled in an environmentally safe manner, whenever feasible (*Reuse-Recycle*).
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner, whenever feasible (*Treat*).
- Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner (*Dispose of*).

When writing an NPDES permit, a permit writer who has familiarity with a certain type of processes might identify pollution prevention practices that are not used at a facility and that would help that facility achieve its pollution prevention goals. Where the pollution prevention practices are necessary to carry out the purposes and intent of the CWA, the permit writer may develop BMPs to implement those practices.

9.1.3 Compliance Schedules

The NPDES regulations at § 122.47 allow permit writers to establish schedules of compliance to give permittees additional time to achieve compliance with the CWA and applicable regulations. Schedules developed under this provision must require compliance by the permittee *as soon as possible*, but may not extend the date for final compliance beyond compliance dates established by the CWA. Thus, compliance schedules in permits are not appropriate for every type of permit requirement. Specifically, a permit writer may not establish a compliance schedule in a permit for TBELs because the statutory deadlines for meeting technology standards (i.e., secondary treatment standards and effluent guidelines) have passed. This restriction applies to both existing and new dischargers. Permit writers should note, however, that § 122.29(d)(4) allows a new source or new discharger up to 90 days to *start-up* its pollution control equipment and achieve compliance with its permit conditions (i.e., provides for up to a 90-day period to achieve compliance).

Examples of requirements for which a compliance schedule in an NPDES permit might be appropriate include:

- Pretreatment program development.
- Sludge use and disposal program development and implementation.
- BMP plan development and implementation.
- Effluent limitations derived from new or revised water quality standards.

An EPA Administrator's decision specifically addresses compliance schedules for effluent limitations derived from new or revised water quality standards. In the decision *In the Matter of Star-Kist Caribe, Inc*., documented in the memorandum *Order Denying Modification Request With Respect to the Administrator's 1990 Decision in Star-Kist Caribe, Inc. (NPDES Appeal No. 88-5)*[10] <www.epa.gov/npdes/pubs/owm0121.pdf>, the EPA Administrator interpreted CWA section 301(b)(1)(C) to mean that 1) after July 1, 1977, permits may not contain compliance schedules for effluent limitations based on water quality standards adopted before July 1, 1977, and 2) compliance schedules are allowed for effluent limitations based on standards adopted after that date *only* if the state has clearly indicated in its water quality standards or implementing regulations that it intends to allow them.

In May 2007, the Director of EPA's Office of Wastewater Management issued a memorandum to EPA Region 9 that clarified the requirements of § 122.47 as they relate to WQBELs [see *Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits*[11] <www.epa.gov/npdes/pubs/memo_complianceschedules_may07.pdf>. Permit writers should consider the principles outlined in this memo when assessing whether a compliance schedule for achieving a WQBEL is consistent with the CWA and its implementing regulations and when documenting the basis for a compliance schedule in a permit. Considerations outlined in the memo include the following:

- Demonstrate that the permittee cannot immediately comply with the new effluent limitation on the effective date of the permit.
- Include an enforceable *final* effluent limitation and a date for achievement in the permit.
- Justify and document the *appropriateness* of the compliance schedule; factors relevant to a determination that a compliance schedule is appropriate include how much time the discharger had to meet the WQBEL under prior permit(s), whether there is any need for modifications to treatment facilities, operations, or other measures and, if so, how long it would take to implement such modifications.
- Justify and demonstrate that compliance with the final WQBEL is required *as soon as possible*; factors relevant to a determination that a compliance is required as soon as possible include the steps needed to modify or install treatment facilities, operations, or other measures and the time those steps would take.
- Include an enforceable sequence of events leading to compliance with interim milestones for schedules longer than one year.
- Recognize that a schedule solely to provide time to develop a total maximum daily load (TMDL) or to conduct a use attainability analysis (UAA) is not appropriate.

Many of the principles outlined in the memo could be more generally applied to compliance schedules for requirements other than WQBELs.

9.2 Special Conditions for Municipal Facilities

This section explains several common special conditions that are applicable only to municipal facilities. These conditions reflect requirements for publicly owned treatment works (POTWs) to implement and enforce local pretreatment programs for their industrial users; biosolids (sewage sludge) disposal requirements; CSO requirements; SSO requirements; and municipal separate storm sewer system (MS4) requirements.

9.2.1 The National Pretreatment Program

CWA section 402(b)(8) requires that certain POTWs receiving pollutants from significant industrial sources (subject to CWA section 307(b) standards) establish a pretreatment program to ensure compliance with these standards. The implementing regulations at § 403.8(a) state that:

> Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (mgd) and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards will be required to establish a POTW pretreatment program unless the NPDES state exercises its option to assume local responsibilities as provided in § 403.10(e).

As specified in § 403.8(a), the Regional Administrator or Director of an authorized state may require a POTW with a design flow of 5 mgd or less to develop a POTW pretreatment program. Program development could be determined to be necessary to prevent interference with or pass through of the POTW based on the nature, or volume, of the industrial influent, a history of treatment process upsets and violations of POTW effluent limitation(s), and contamination of municipal sludge.

Since 1978, approximately 1,500 POTWs have been required to develop and implement pretreatment programs through special conditions of NPDES permits. The pretreatment program was developed to control industrial discharges to POTWs and to meet the following objectives:

- To prevent pass through of pollutants.
- To prevent interference with POTW processes, including interference with the use or disposal of municipal sludge.
- To improve opportunities to recycle and reclaim municipal and industrial wastewater and sludges.

The pretreatment program also helps ensure POTW personnel health and safety.

As authorized by the pretreatment regulations at §§ 403.8(c), 403.8(d) and 403.8(e) and the NPDES regulations at § 122.44(j)(2), the requirements to develop and implement a POTW pretreatment program are included as enforceable conditions in the POTW's NPDES permit. NPDES permits drive the development and implementation of pretreatment programs by requiring the following:

- Adequate legal authority.
- Maintenance of an industrial user inventory.
- Development and implementation of local limits.
- Control mechanisms issued to significant industrial users (SIUs).
- Compliance monitoring activities.
- Swift and effective enforcement.
- Data management and recordkeeping.
- Reporting to the approval authority (EPA or state).
- Public participation.

Through the NPDES permit, the POTW is required to develop and implement a pretreatment program. The POTW is required to submit an approvable program that meets the requirements in § 403.9(b). A more detailed description of these required program elements is in § 403.8(f). The POTW must have the legal authority enabling it to do the following:

- Deny or condition new or increased contributions of pollutants, or changes in nature of pollutants, to the POTW by industrial users.
- Require compliance with applicable pretreatment standards and requirements by industrial users.
- Control through a permit, order, or similar means the contribution to the POTW by each industrial user to ensure compliance with applicable pretreatment standards and requirements. These control mechanisms must have certain conditions as laid out in § 403.8(f)(1)(iii) and be enforceable.
- Require the development of compliance schedules where necessary by each industrial user for the installation of technology required to meet applicable pretreatment standards and requirements, and submission of all notices and self-monitoring reports to assess and ensure compliance.
- Carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance with applicable pretreatment standards and requirements independent of information submitted by the industrial user (including the authority to enter the premises of the industrial user).
- Obtain remedies for noncompliance (e.g., injunctive relief, penalties).
- Comply with confidentiality requirements.

Further, at a minimum, the POTW must have procedures to do the following:

- Identify and locate all possible industrial users that might be subject to the POTW pretreatment program.
- Identify the character and volume of pollutants contributed to the POTW by the industrial users.
- Notify industrial users of applicable pretreatment standards and applicable requirements under CWA sections 204(b) and 405 and RCRA Subtitles C and D.
- Receive and analyze self-monitoring reports.
- Conduct sampling, inspections and other surveillance activities to determine compliance with applicable pretreatment standards and requirements independent of information supplied by the industrial user.
- Investigate instances of noncompliance.
- Comply with public participation requirements, including annual public notice of industrial users determined to be in significant noncompliance during the previous 12-month period.

Also, as part of the POTW pretreatment program, POTWs must have adequate resources and funding to implement the program, evaluate the need for and, as necessary, develop local limits and develop an enforcement response plan.

The NPDES permit should include the conditions specified in § 403.9, including that the POTW be required to submit the program documentation, detailing the authority and procedures to be implemented, along with other information about the program. The permit will allow the POTW up to one year, from the time when written notification from the approval authority determined the need for a pretreatment program, to develop and submit a program for approval as stated in § 403.8(b). Once the permitting authority reviews and approves the program, the requirement to implement the approved program is then incorporated into the permit.

The permit writer generally incorporates the requirement to develop a pretreatment program at the time of permit reissuance. The requirement, however, may also be incorporated through a modification of the permit if there is *cause*, as defined in detail in § 403.8(e), to make such a modification. The permit writer must follow procedures outlined by § 122.62 related to modifications when including the requirement to develop a pretreatment program in an NPDES permit

During the life of the permit, it might be necessary for the POTW to modify its approved pretreatment program (changes to local limits, changes to the ordinance, and such). The changes can be brought about by the POTW's desire to change the way the program operates, or they can be the result of changes that are necessary to address deficiencies in the program found during inspections or audits done by the permitting authority. Whatever the reason for the modification, the permitting authority must review and approve any modification to the approved program that is considered substantial, as required by § 403.18. All substantial program modifications to the POTW's approved pretreatment program require minor modifications to the NPDES permit and are subject to the procedural requirements in §§ 122.63(g) and 403.18. In addition, incorporating the requirement for a previously approved pretreatment program for the purpose of making the implementation of the program an enforceable part of the permit is also considered a minor modification to the NPDES permit.

The majority of POTWs that need pretreatment program requirements in their permits currently have them in place. In addition, an NPDES state or an EPA region will often designate a pretreatment coordinator to serve as the pretreatment expert to review the annual report from the POTW and recommend any action to be taken. The state or EPA regional pretreatment coordinator is a key resource on pretreatment issues, particularly at the time of NPDES permit reissuance. EPA regions and approved states have developed standard pretreatment development or implementation conditions (with minor modifications made to tailor the conditions to the specific discharger) that are placed in all applicable NPDES permits in that region or state. The permit writer can usually obtain examples of these NPDES pretreatment conditions from the EPA or state pretreatment coordinators. The permit writer might need to update or modify pretreatment implementation language or initiate corrective action related to the pretreatment program.

EPA has developed the Pretreatment Program Website <www.epa.gov/npdes/pretreatment> and prepared a number of guidance manuals for POTWs on how to implement their local pretreatment programs that are accessible through this website. In addition, EPA prepared the *Introduction to the National Pretreatment Program*[12] <www.epa.gov/npdes/pubs/final99.pdf> as a reference for anyone interested in understanding the basics of pretreatment program requirements and to provide a roadmap to additional and more detailed guidance materials for those trying to implement specific elements of the pretreatment program.

Pretreatment program information and monitoring data obtained through the POTW's pretreatment program are useful to the permit writer in identifying possible modifications to the pretreatment program's local limits or procedures, or the need for water quality-based controls. The permit writer should obtain such data with the aid of the pretreatment coordinator. Permits must include conditions requiring a POTW to provide a written technical evaluation of the need to revise local limits under § 403.5(c)(1) following permit issuance or reissuance [§ 122.44(j)(2)(ii)]. In addition, POTWs with a design flow greater than or equal to one mgd and with an approved pretreatment program or required to develop a pretreatment program must sample and analyze their effluent for priority (toxic) pollutants listed in Part 122, Appendix J, Table 2 as part of the permit application process [see § 122.21(j)(4)(iv)]. Those data and information also are useful for determining the need for WQBELs.

9.2.2 Biosolids (Sewage Sludge)

CWA section 405(d) requires that EPA regulate the use and disposal of sewage sludge to protect public health and the environment from any reasonably anticipated adverse effects of these practices. In the CWA, Congress directed EPA to develop technical standards for municipal sludge use and disposal options and enacted strict deadlines for compliance with these standards. Within one year of promulgation of the standards, compliance was required unless construction of new pollution control facilities was necessary, in which case compliance was required within two years.

EPA promulgated Part 503, Standards for the Use or Disposal of Sewage Sludge in 58 *Federal Register* (FR) 9248, February 19, 1993, with amendments in 59 FR 9095, February 19, 1994 and 60 FR 54764, October 25, 1995. These regulations address four sludge use and disposal practices: land application, surface disposal, incineration, and disposal in a municipal solid waste landfill. The standards for each end use and disposal method consist of general requirements, numeric effluent limitations, operational standards, and management practices, as well as monitoring, recordkeeping, and reporting requirements. Unlike technology standards, which are based on the ability of treatment technologies to reduce the level of pollutants, EPA's sewage sludge standards are based on health and environmental risks. Part 503 imposes requirements on four groups:

- Persons who prepare sewage sludge or material derived from sewage sludge.
- Land appliers of sewage sludge.
- Owners/operators of sewage sludge surface disposal sites.
- Owners/operators of sewage sludge incinerators.

Details of that rule are described in *A Plain English Guide to the EPA Part 503 Biosolids Rule*[13] <www.epa.gov/owm/mtb/biosolids/503pe/>.

The risk assessment for the Part 503 rule that governs the land application of biosolids took nearly 10 years to complete and had extensive rigorous review and comment. The risk assessment evaluated and established limitations for a number of pollutants. These limitations are in chapter 4 of *A Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule*[14] <www.epa.gov/owm/mtb/biosolids/503rule/>.

The regulation is largely self-implementing, and anyone who engages in activities covered by the regulation must comply with the appropriate requirements on or before the compliance deadlines. A person who violates Part 503 requirements is subject to administrative, civil, and criminal enforcement actions.

CWA section 405(f) requires the inclusion of sewage sludge use or disposal requirements in any NPDES permit issued to a Treatment Works Treating Domestic Sewage (TWTDS) and authorizes the issuance of sewage sludge-only permits to non-discharging TWTDS. In response, EPA promulgated revisions to the NPDES permit regulations at Parts 122 and 124 in 54 FR 18716, May 2, 1989, to address inclusion of sewage sludge use and disposal standards in NPDES permits and NPDES permit issuance to treatment works that do not have an effluent discharge to waters of the United States, but are involved in sewage sludge use or disposal as preparers, appliers, or owners/operators. TWTDS includes all sewage sludge generators and facilities, such as blenders, that change the quality of sewage sludge.

EPA recognizes that implementation of Part 503 requirements is a source of confusion for permit writers and permittees who might already have NPDES permits with special conditions addressing sewage sludge requirements. EPA has provided several guidance documents to help clarify NPDES permitting expectations, and explain the requirements of Part 503:

- *Part 503 Implementation Guidance*[15] <www.epa.gov/npdes/pubs/owm0237.pdf>.
- *Land Application of Sewage Sludge—A Guide for Land Appliers on the Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge Management in 40 CFR Part 503*[16] <www.epa.gov/npdes/pubs/sludge.pdf>.
- *Surface Disposal of Sewage Sludge—A Guide for Owners/Operators of Surface Disposal Facilities on the Monitoring, Recordkeeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge in 40 CFR Part 503*[17] <No Link–see the endnote for ordering instructions>.
- *Preparing Sewage Sludge for Land Application or Surface Disposal—A Guide for Preparers of Sewage Sludge on the Monitoring, Record Keeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge in 40 CFR Part 503*[18] <No Link–see the endnote for ordering instructions>.
- *Domestic Septage Regulatory Guidance, A Guide to the EPA 503 Rule*[19] <www.epa.gov/npdes/pubs/owm0026.pdf>.
- *Control of Pathogens and Vector Attraction in Sewage Sludge*[20] <www.epa.gov/nrmrl/pubs/625r92013/625R92013.pdf>.

The permit writer should refer to the *Part 503 Implementation Guidance* and EPA Region and state guidelines or policies for instructions on how to implement the applicable Part 503 standards into the permit. The permit writer will need to determine the type of sewage sludge use or disposal practice(s) used by the discharger and apply the appropriate Part 503 standards. In general, conditions will need to be established to address the following:

- Pollutant concentrations or loading rates.
- Operational standards (such as pathogen and vector attraction reduction requirements for land application and surface disposal and total hydrocarbons (THC) concentrations for incinerators).
- Management practices (e.g., siting restrictions, design requirements, operating practices).
- Monitoring requirements (e.g., pollutants to be monitored, sampling locations, frequency, and sample collection and analytical methods).

- Recordkeeping requirements.
- Reporting requirements (e.g., contents of reports and frequency or due dates for submission of reports).
- General requirements (e.g., specific notification requirements before land application, submission of closure and post closure plan for surface disposal sites).

In addition to any specific applicable Part 503 standards, three boilerplate conditions must be written in the NPDES permit where applicable. These consist of the following:

- Text requiring the POTW/TWTDS to comply with all existing requirements for sewage sludge use and disposal, including the Part 503 standards [see § 122.44(b)(2)].
- A reopener clause, which authorizes reopening a permit to include technical standards if the technical standards are more stringent or more comprehensive than the conditions in the permit [see § 122.44(c)].
- A notification provision requiring the permittee to give notice to the permitting authority when a significant change in the sewage sludge use or disposal practice occurs (or is planned) [see standard conditions in § 122.41(l)(1)(iii)].

If permit conditions based on existing regulations are insufficient to protect public health and the environment from adverse effects that could occur from toxic pollutants in sewage sludge, permit conditions should be developed on a case-by-case basis using best professional judgment (BPJ) to fulfill the statutory requirement. The *Part 503 Implementation Guidance* contains information to assist permit writers in developing effluent limitations and management practice requirements on a case-by-case basis to protect public health and the environment from adverse effects that could occur from toxic pollutants in sewage sludge. For more information on biosolids, see section 2.3.1.3 of this manual and the Biosolids Website <www.epa.gov/owm/mtb/biosolids/index.htm>

9.2.3 Combined Sewer Overflows (CSOs)

Combined sewer systems were designed and built in the 19th and early 20th centuries to collect sanitary and industrial wastewater and stormwater runoff. During dry weather, combined sewers carry sanitary wastes and industrial wastewater to a treatment plant. In periods of heavy rainfall, however, stormwater is combined with untreated wastewater, which can overflow and discharge directly to a waterbody without being treated. These overflows are called combined sewer overflows (CSOs).

EPA published a CSO Control Policy in 59 FR 18688, April 19, 1994. That policy represents a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a comprehensive and coordinated planning effort to achieve cost-effective CSO controls that ultimately meet appropriate health and environmental objectives.

The CSO Control Policy includes expectations for NPDES permitting authorities. In general, EPA envisioned a phased permit approach, including initial requirements to implement Nine Minimum CSO Controls (NMC) and develop a Long-Term CSO Control Plan (LTCP), followed by requirements to implement the controls in the approved LTCP. The Wet Weather Water Quality Act of 2000 amended the CWA to add section 402(q), which required that CSO permits be issued in conformance with the CSO Control Policy.

CSOs are point source discharges subject to both the technology-based requirements of the CWA and applicable state water quality standards. Under the CWA, CSOs must comply with Best Available Technology Economically Achievable (BAT) for nonconventional and toxic pollutants and Best Conventional Technology (BCT) for conventional pollutants. However, there are no promulgated BAT or BCT limitations in effluent guidelines for CSOs. As a result, permit writers must use BPJ in developing technology-based permit requirements for controlling CSOs. Permit conditions also must achieve compliance with applicable water quality standards.

The 1994 CSO Control Policy contains the recommended approach for developing and issuing NPDES permits to control CSOs. In addition, EPA has developed the following CSO guidance documents to help permit writers and permittees implement the CSO Control Policy:

- *Combined Sewer Overflows–Guidance for Long-Term Control Plan*[21] <www.epa.gov/npdes/pubs/owm0272.pdf>.
- *Combined Sewer Overflows–Guidance for Nine Minimum Controls*[22] <www.epa.gov/npdes/pubs/owm0030.pdf>.
- *Combined Sewer Overflows–Guidance for Screening and Ranking*[23] <www.epa.gov/npdes/cso>.
- *Combined Sewer Overflows–Guidance for Monitoring and Modeling*[24] <www.epa.gov/npdes/pubs/sewer.pdf>.
- *Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development*[25] <www.epa.gov/npdes/pubs/csofc.pdf>.
- *Combined Sewer Overflows–Guidance for Funding Options*[26] <www.epa.gov/npdes/pubs/owm0249.pdf>.
- *Combined Sewer Overflows–Guidance for Permit Writers*[27] <www.epa.gov/npdes/cso>.
- *Combined Sewer Overflows–Guidance: Coordinating Combined Sewer Overflow Long-Term Planning with Water Quality Standards Reviews*[28] <www.epa.gov/npdes/pubs/wqs_guide_final.pdf>.

Combined Sewer Overflows–Guidance for Permit Writers[24] contains guidance and example permit language that permit writers can use. Controlling CSOs typically requires substantial long-term planning, construction, financing and continuous reassessment; therefore, the implementation of CSO controls will probably occur over several permit cycles. The guidance explains a phased permitting approach to CSOs. Exhibit 9-2 depicts this phased permitting approach and the types of permit conditions that should be developed for each phase.

Exhibit 9-2 Categories of CSO permitting conditions

NPDES permit	Phase I	Phase II	Post phase II
A. Technology-based	• NMC, at a minimum	• NMC, at a minimum	• NMC, at a minimum
B. Water Quality-based	• Narrative	• Narrative + performance-based standards	• Narrative + performance-based standards + numeric WQBELs (as appropriate)
C. Monitoring	• Characterization, monitoring, and modeling of CSS	• Monitoring to evaluate water quality impacts • Monitoring to determine effectiveness of CSO controls	• Post-construction compliance monitoring
D. Reporting	• Documentation of NMC implementation • Interim LTCP deliverables	• Implementation of CSO controls (both NMC and long-term controls)	• Report results of post-construction compliance monitoring
E. Special conditions	• Prohibition of dry weather overflows (DWO) • Development of LTCP	• Prohibition of DWO • Implementation of LTCP • Reopener clause for water quality standards violations • Sensitive area reassessment	• Prohibition of DWO • Reopener clause for water quality standards violations

Depending on the permittee's situation, a permit may contain both Phase I and Phase II elements. Phase I permits require demonstration of implementation of the NMC, shown in Exhibit 9-3.

Exhibit 9-3 Nine minimum CSO controls

1. Proper operation and regular maintenance programs for the sewer system and the CSOs
2. Maximum use of the collection system for storage
3. Review and modification of pretreatment requirements to ensure that CSO impacts are minimized
4. Maximization of flow to the POTW for treatment
5. Prohibition of CSOs during dry weather
6. Control of solid and floatable materials in CSOs
7. Establishment of pollution prevention programs
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

In the Phase I permit issued/modified to reflect the CSO Control Policy, the NPDES authority should at least require permittees to

- Immediately implement BAT/BCT, which at a minimum includes the NMC, as determined on a BPJ basis by the permitting authority.
- Develop and submit a report documenting the implementation of the NMC within 2 years of permit issuance/modification.

- Comply with applicable water quality standards, no later than the date allowed under the state's water quality standards expressed in the form of a narrative limitation.
- Develop and submit, consistent with the CSO Control Policy and based on a schedule in an appropriate enforceable mechanism, an LTCP, as soon as practicable, but generally within 2 years after the effective date of the permit issuance/modification. Permitting authorities may establish a longer timetable for completion of the long-term CSO control plan on a case-by-case basis to account for site-specific factors that could influence the complexity of the planning process. Exhibit 9-4 shows the minimum elements of the LTCP.

Exhibit 9-4 Elements of the long-term CSO control plan

1. Characterization, monitoring, and modeling of the combined sewer system
2. Public participation
3. Consideration of sensitive areas
4. Evaluation of alternatives
5. Cost/performance considerations
6. Operational plan
7. Maximizing treatment at the existing POTW treatment plant
8. Implementation schedule
9. Post-construction compliance monitoring program

Phase II permits require the implementation of an LTCP. The Phase II permit should contain the following:

- Requirements to implement the technology-based controls including the NMC determined on a BPJ basis.
- Narrative requirements that ensure that the selected CSO controls are implemented, operated and maintained as described in the LTCP.
- Water quality-based effluent limits under §§ 122.44(d)(1) and 122.44(k), requiring, at a minimum, compliance with, no later than the date allowed under the state's water quality standards, the numeric performance standards for the selected CSO controls, based on average design conditions specifying at least one of the following:
  - A maximum number of overflow events per year for specified design conditions consistent with II.C.4.a.i of the CSO Control Policy.
  - A minimum percentage capture of combined sewage by volume for treatment under specified design conditions consistent with II.C.4.a.ii of the CSO Control Policy.
  - A minimum removal of the mass of pollutants discharged for specified design conditions consistent with II.C.4.a.iii of CSO Control Policy.
  - Performance standards and requirements that are consistent with II.C.4.b of the CSO Control Policy.
- A requirement to implement, with an established schedule, the approved post-construction water quality assessment program including requirements to monitor and collect sufficient information to demonstrate compliance with water quality standards and protection of designated uses as well as to determine the effectiveness of CSO controls.

- A requirement to reassess overflows to sensitive areas in those cases where elimination or relocation of the overflow is not physically possible and economically achievable.
- Conditions establishing requirements for maximizing the treatment of wet-weather flows at the POTW, as appropriate, consistent with section II.C.7. of the CSO Policy.
- A reopener clause authorizing the NPDES authority to reopen and modify the permit upon determination that the CSO controls fail to meet water quality standards or protect designated uses.

Reviewing the permittee's LTCP and consultations with other staff involved in the CSO control process and the permittee are important steps in the process of determining the appropriate Phase II permit conditions. Water quality-based controls in Phase II generally are expressed as narrative requirements and performance standards for the combined sewer system. Finally, post Phase II permit conditions would address continued implementation of the NMC, long-term CSO controls, and post-construction compliance monitoring. There may also be numeric WQBELs when there are sufficient data to support their development.

LTCP implementation schedules were expected to include project milestones and a financing plan for design and construction of necessary controls as soon as practicable. The CSO Control Policy expected permitting authorities to undertake the following:

- Review and revise, as appropriate, state CSO permitting strategies developed in response to the National CSO Control Strategy.
- Develop and issue permits requiring CSO communities to immediately implement the NMC and document their implementation and develop and implement an LTCP.
- Promote coordination among the CSO community, the water quality standards authority, and the general public through LTCP development and implementation.
- Evaluate water pollution control needs on a watershed basis and coordinate CSO control with the control of other point and nonpoint sources of pollution.
- Recognize that it might be difficult for some small communities to meet all the formal elements of LTCP development, and that compliance with the NMC and a reduced scope LTCP might be sufficient.
- Consider sensitive areas, use impairment, and a CSO community's financial capability in the review and approval of implementation schedules.

Communities must develop and implement LTCPs to meet water quality standards, including the designated uses and criteria to protect those uses for waterbodies that receive CSO discharges. The CSO Control Policy recognized that substantial coordination and agreement among the permitting authority, the water quality standards authority, the public, and the CSO community would be required to accomplish this objective. The CSO Control Policy also recognized that the development of the LTCP should be coordinated with the review and appropriate revision of water quality standards and their implementation procedures.

In developing permit requirements to meet technology-based requirements and applicable state water quality standards, the permit writer, in conjunction with staff involved in water quality standards and the

permittee, should identify the appropriate site-specific considerations that will determine the CSO conditions to be established in the permit. EPA believes that the following information will be particularly relevant in developing the appropriate conditions:

- CSO Discharge
  - Flow, frequency, and duration of the CSO discharge.
  - Available effluent characterization data on the CSO discharge.
  - Available information and data on the impacts of the CSO discharge(s) (e.g., CWA section 305(b) reports, ambient survey data, fish kills, CWA section 303(d) lists of impaired waters).
  - Compliance history of the CSO owner, including performance and reliability of any existing CSO controls.
  - Current NPDES permit and NPDES permit application.
  - Facility planning information from the permittee that addresses CSOs.
- Technologies
  - Performance data (either from the manufacturer or from other applications) for various CSO technologies that may be employed, including equipment efficiency and reliability.
  - Cost information associated with the installation, operation and maintenance of CSO technologies.
  - Reference materials on various types of CSO.

For more information on CSOs, see section 2.3.1.4 of this manual and the Combined Sewer Overflows Website <www.epa.gov/npdes/cso>.

9.2.4 Sanitary Sewer Overflows (SSOs)

EPA's *Report to Congress on the Impacts and Control of CSOs and SSOs*[29] <www.epa.gov/npdes/csossoreport2004> shows that NPDES permit requirements establishing clear reporting, recordkeeping and third party notification of overflows from municipal sewage collection systems, as well as clear requirements to properly operate and maintain the collection system, are critical to effective program implementation. NPDES authorities should be improving NPDES permit requirements for SSOs and sanitary sewer collection systems, which could lead to improved performance of municipal sanitary sewer collection systems and improved public notice for SSO events.

The NPDES regulations provide standard conditions that are to be in NPDES permits for POTWs as discussed in Chapter 10 of this manual. Standard conditions in a permit for a POTW apply to portions of the collection system for which the permittee has ownership or has operational control. When reissued, permits for POTW discharges should clarify how key standard permit conditions apply to SSOs and sanitary sewer collection systems. On August 20, 2007, EPA circulated a draft fact sheet, NPDES Permit Requirements for Municipal Sanitary Sewer Collection Systems and SSOs <www.epa.gov/npdes/pubs/sso_fact_sheet_model_permit_cond.pdf>, which explains the ways NPDES permitting authorities should be improving implementation of NPDES permit requirements to address SSOs and sanitary sewer collection systems.

The draft fact sheet indicates that clarifications should address the particular application of standard permit conditions to SSOs and municipal sanitary sewer collection systems as discussed below.

- **Immediate reporting.** Permits should clarify that the permittee is required to notify the NPDES authority of an overflow that could endanger health or the environment from portions of the collection system over which the permittee has ownership or operational control as soon as practicable but within 24 hours of the time the permittee becomes aware of the overflow. [See § 122.41(l)(6)].
- **Written reports**. Permits should clarify that the permittee is required to provide the NPDES authority a written report within 5 days of the time it became aware of any overflow that is subject to the immediate reporting provision. [See § 122.41(l)(6)(i).] In addition, permits should clarify that any overflow that is not immediately reported as indicated above, should be reported in the discharge monitoring report. [See § 122.41(l)(7)].
- **Third party notice.** Permits should establish a process for requiring the permittee or the NPDES authority to notify specified third parties of overflows that could endanger health because of a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that could endanger health because of a likelihood of human exposure. Permits should clarify that the permittee is required to develop, in consultation with appropriate authorities at the local, county, or state level (or any combination), a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, and other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported, to whom they should be reported, the specific information that would be reported, a description of lines of communication, and the identities of responsible officials. [See § 122.41(l)(6)].
- **Recordkeeping**. Permits should clarify that the permittee is required to keep records of overflows. Clarified permit language for recordkeeping should require the permittee to retain the reports submitted to the NPDES authority and other appropriate reports that could include work orders associated with investigation of system problems related to an overflow, that describes the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow. [See § 122.41(j)].
- **Capacity, management, operation and maintenance programs.** Permits should clarify requirements for proper operation and maintenance of the collection system. [See §§ 122.41(d) and 122.41(e)]. This may include requiring the development and implementation of capacity, management, operation and maintenance (CMOM) programs. EPA's Region 4 has developed materials and guidance that can help a municipality with its CMOM program on the Management, Operation and Maintenance (MOM) Programs Project Website <www.epa.gov/region4/water/wpeb/momproject/>. The CMOM program may use a process for self-assessment and information management techniques for ongoing program improvement and may develop and implement emergency response procedures to overflows. In addition, the CMOM permit condition may specify appropriate documentation requirements, including the following:
  - CMOM program summary. Permittees may be required to develop a written summary of their CMOM programs, which would be available to the NPDES authority and public on request. The program summary would give an overview of the management program and summarize major implementation activities.

- Program audit report. Permittees may be required to conduct comprehensive audits of their programs during the permit cycle, and submit a copy of the audit report to the NPDES authority with the application for permit renewal. EPA's Sanitary Sewer Overflow Toolbox Website <www.epa.gov/npdes/sso/ssotoolbox> provides information on CMOM.
- System evaluation and capacity assurance plan. Capacity assurance refers to a process to identify, characterize and address hydraulic deficiencies in a sanitary sewer collection system. The permit may require the permittee to implement a program to assess the current capacity of the collection system and treatment facilities that they own or over which they have operational control to ensure that discharges from unauthorized locations do not occur. Where peak flow conditions contribute to an SSO discharge or to noncompliance at a treatment plant, the permittee may be required to prepare and implement a system evaluation and capacity assurance plan. In some instances, the permittee may already be under an enforceable obligation and schedule, in which case this permit provision would be redundant and, thus, unnecessary.

Section 2.3.1.5 of this manual and EPA's Sanitary Sewer Overflows Website <www.epa.gov/npdes/sso> provide more information on SSOs.

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CHAPTER 10. Standard Conditions of NPDES Permits

This chapter describes standard conditions, sometimes called *boilerplate* conditions, that must be incorporated in National Pollutant Discharge Elimination System (NPDES) permits. Standard conditions, specified in Title 40 of the *Code of Federal Regulations* (CFR) 122.41 and 122.42, play an important supporting role to effluent limitations, monitoring and reporting requirements, and special conditions because they delineate various legal, administrative, and procedural requirements of the permit. Standard conditions cover various topics, including definitions, testing procedures, records retention, notification requirements, penalties for noncompliance, and other permittee responsibilities. The conditions provided in § 122.41 apply to all types and categories of NPDES permits and must be included in all permits (see § 123.25 for applicability to state NPDES permits). The conditions provided in § 122.42 apply only to certain categories of NPDES facilities. Any permit issued to a facility in one of the categories listed in § 122.42 must contain the additional conditions, as applicable.

The use of standard conditions helps ensure uniformity and consistency of all NPDES permits issued by authorized states or the U.S. Environmental Protection Agency (EPA) Regional Offices. Permit writers need to be aware of the contents of the standard conditions because it might be necessary to explain portions of the conditions to a discharger. The permit writer should keep abreast of any changes in EPA's standard conditions set out in §§ 122.41 and 122.42. According to § 122.41, standard conditions may be incorporated into a permit either expressly (verbatim from the regulations) or by reference to the regulations. It generally is preferable for permit writers to attach the standard conditions expressly because permittees might not have easy access to the regulations. Some states have developed an attachment for NPDES permits that includes the federal standard conditions.

10.1 Types of Standard Conditions

A brief summary of the § 122.41 standard conditions that must be included in all types of NPDES permits follows:

- **Duty to Comply** § 122.41(a): The permittee must comply with all conditions of the permit. Noncompliance is a violation of the Clean Water Act (CWA) and is grounds for enforcement action, changes to or termination of the permit, or denial of a permit renewal application.
- **Duty to Reapply** § 122.41(b): A permittee wishing to continue permitted activities after the permit expiration date must reapply for and obtain a new permit.
- **Need to Halt or Reduce Activity not a Defense** § 122.41(c): The permittee may not use as a defense in an enforcement action the reasoning that halting or reducing the permitted activity is the only way to maintain compliance.
- **Duty to Mitigate** § 122.41(d): The permittee is required to take all reasonable steps to prevent any discharge or sludge use or disposal in violation of the permit that has a reasonable likelihood of adversely affecting human health or the environment.
- **Proper Operation and Maintenance** § 122.41(e): The permittee must properly operate and maintain all equipment and treatment systems used for compliance with the terms of the permit.

The permittee must provide appropriate laboratory controls and quality assurance procedures. Operation of backup systems is required only when needed to ensure compliance.

- **Permit Actions** § 122.41(f): The permit may be modified, revoked and reissued, or terminated for cause. A request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance does not suspend the permittee's obligation to comply with all permit conditions.
- **Property Rights** § 122.41(g): The permit does not convey any property rights of any sort, or any exclusive privilege.
- **Duty to Provide Information** § 122.41(h): The permittee must furnish, within a reasonable time, any information needed to determine compliance with the permit or to determine whether there is cause to modify, revoke and reissue, or terminate the permit. The permittee also must furnish, on request, copies of records that must be kept as required by the permit.
- **Inspection and Entry** § 122.41(i): The permittee must, upon presentation of valid credentials by the Director or his or her representative, allow entry into the premises where the regulated activity or records are present. The Director must have access to and be able to make copies of any required records; inspect facilities, practices, operations, and equipment; and sample or monitor at reasonable times.
- **Monitoring and Records** § 122.41(j): Samples must be representative of the monitored activity. The permittee must retain records for 3 years (5 years for sewage sludge activities) subject to extension by the Director. Monitoring records must identify the sampling dates and personnel, the sample location and time, and the analytical techniques used and corresponding results. Wastewater and sludge measurements must be conducted in accordance with Parts 136 or 503 or other specified procedures. Falsification of results is a violation under the CWA.
- **Signatory Requirement** § 122.41(k): The permittee must sign and certify applications, reports, or information submitted to the Director in accordance with the requirements in § 122.22. Knowingly making false statements, representations, or certifications is punishable by fines or imprisonment.
- **Planned Changes** § 122.41(l)(1): Notice must be given to the Director as soon as possible of planned physical alterations or additions to the facility (or both) that could meet the criteria for determining whether the facility is a new source under § 122.29(b); result in changes in the nature or quantity of pollutants discharged; or significantly change sludge use or disposal practices.
- **Anticipated Noncompliance** § 122.41(l)(2): The permittee must give advance notice of any planned changes that could result in noncompliance.
- **Permit Transfers** § 122.41(l)(3): The permit is not transferable except after written notice to the Director. The Director may require modification or revocation and reissuance, as necessary.
- **Monitoring Reports** § 122.41(l)(4): Monitoring results must be reported at the frequency specified in the permit and be reported on a discharge monitoring report (DMR) or forms provided or specified by the Director for reporting results of monitoring sludge use or disposal practices. Monitoring for any pollutant that occurs more frequently than is required by the permit and uses approved test procedures or test procedures specified in the permit must also be reported. Calculations requiring averaging must use an arithmetic mean unless otherwise specified in the permit.

- **Compliance Schedules** § 122.41(l)(5): Reports of compliance or noncompliance or any progress report must be submitted no later than 14 days following the interim or final compliance date specified in a compliance schedule.
- **Twenty-Four Hour Reporting** § 122.41(l)(6): The permittee must orally report any noncompliance that might endanger human health or the environment within 24 hours after becoming aware of the circumstances. Within 5 days of becoming aware of the circumstances, the permittee must provide a written submission including a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the anticipated time the noncompliance is expected to continue (if not already corrected); and steps taken to reduce, eliminate, or prevent reoccurrence unless the Director waives the requirement. In addition, 24-hour reporting is required for an unanticipated bypass exceeding effluent limits; an upset exceeding effluent limits; and a violation of a maximum daily effluent limitation for pollutants listed in the permit for 24-hour reporting.
- **Other Noncompliance** § 122.41(l)(7): The permittee must report all instances of noncompliance not reported under other specific reporting requirements at the time monitoring reports are submitted.
- **Other Information** § 122.41(l)(8): If the permittee becomes aware that it failed to submit any relevant facts in its application, or submitted incorrect information in its application or other reports, it must promptly submit such facts or information.
- **Bypass** § 122.41(m): The intentional diversion of wastestreams from any portion of a treatment facility. Bypass is prohibited unless the bypass does not cause the effluent to exceed limits and is for essential maintenance to assure efficient operation (no notice or 24-hour reporting is required in such a case). All other bypasses are prohibited, and the Director of the NPDES program may take enforcement action against a permittee for a bypass, unless the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage, there was no feasible alternative, and the proper notification was submitted.
- **Upset** § 122.41(n): An upset (i.e., an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limits because of factors beyond the permittee's control) can be used as an affirmative defense in actions brought against the permittee for noncompliance. An upset does not include noncompliance to the extent caused by operational error, improperly designed or inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation. The permittee (who has the burden of proof to demonstrate that an upset has occurred) must have operational logs or other evidence that shows
  - When the upset occurred and its causes.
  - The facility was being operated properly.
  - Proper notification was made.
  - Remedial measures were taken.

10.2 Other Standard Conditions

In addition to standard conditions specified in § 122.41 that are applicable to all permittees, § 122.42 includes additional conditions applicable to certain categories of NPDES permits. Below are summaries of these additional standard conditions applicable to various types of NPDES permits.

Non-Municipal (Industrial) Permits: Additional standard conditions applicable to non-municipal permits are found in § 122.42(a) and specify that the permittee must notify the Director as soon as it knows or has reason to believe that the discharge has or will exceed certain notification levels specified in §§ 122.42(a)(1) and (2). In addition, § 122.44(f) allows the Director to establish alternate notification levels upon petition by the permittee or by his or her own initiative.

Publicly Owned Treatment Work (POTW) Permits: Additional standard conditions applicable to POTWs are found in § 122.42(b). The standard conditions specify that the permittee must provide adequate notice to the Director of the new introduction of certain pollutants into the POTW from an indirect discharger and of substantial changes in the volume or character of pollutants introduced into the POTW. That notice must include information on the quality and quantity of effluent introduced to the POTW and information on the impact to the quality and quantity of the POTW's effluent.

Municipal Separate Storm Sewer Systems: Additional standard conditions applicable to large, medium or EPA-designated municipal separate storm sewer systems are in § 122.42(c). Those standard conditions require that the permittee submit an annual report addressing the status, and changes to, the stormwater management program, water quality data and other information specified in §§ 122.42(c)(1)-(6).

Individual Stormwater Permits: Initial permits for discharges composed entirely of stormwater and permitted under § 122.26(e)(7) must require compliance no later than 3 years after permit issuance.

Concentrated Animal Feeding Operations (CAFO) Permits: The regulations at § 122.42(e) specify conditions that must be included in all permits for CAFOs.

CHAPTER 11. NPDES Permit Administration

Previous discussions in this manual focused on the process of developing National Pollutant Discharge Elimination System (NPDES) permit conditions and effluent limitations. This chapter describes the administrative process associated with the issuance of an NPDES permit including a discussion of the other federal laws that might affect the development or issuance of NPDES permits.

11.1 Other Federal Laws Applicable to NPDES Permits

This section addresses other federal laws, besides the Clean Water Act (CWA), that permit writers should consider when drafting an NPDES permit. The requirements imposed under these statutes only apply to federal actions (i.e., U.S. Environmental Protection Agency [EPA] issuance of permits). Permits issued by states authorized to administer the NPDES program are not subject to the requirements of these statutes. However, many states may have enacted state legislation that is modeled on federal law and, therefore, it is prudent to review state law in these areas before preparing an NPDES permit.

The following sections briefly discuss the other federal laws and contain links to other websites for more information. Because these laws are implemented by other federal agencies, many of the links provided below are to websites outside EPA, and EPA is not responsible for the information provided on those websites. The NPDES regulations at Title 40 of the *Code of Federal Regulations* (CFR) 122.49 also include a discussion of how some of the laws relate to the federal NPDES program. Exhibit 11-1 presents the other federal laws that are applicable to NPDES permits and includes the legislative citations from the *United States Code* (U.S.C.) and the implementing regulations in the CFR.

Exhibit 11-1 Other federal laws applicable to NPDES permits

Federal law	Year	Federal agency	Legislative citations	Implementing regulations
Endangered Species Act (ESA)	1973	FWS, NMFS	16 U.S.C. 1531 et seq.	50 CFR Part 402
National Environmental Policy Act (NEPA)	1969	CEQ	42 U.S.C. 4321 et seq.	40 CFR Part 6
National Historic Preservation Act (NHPA)	1992	ACHP	16 U.S.C. 470 et seq.	36 CFR Part 800
Coastal Zone Management Act (CZMA)	1972	NOAA	16 U.S.C. 1451 et seq.	15 CFR Part 930
Wild and Scenic Rivers Act	1968	Various	16 U.S.C. 1271 et seq.	36 CFR Part 297
Fish and Wildlife Coordination Act (FWCA)	1934	FWS	16 U.S.C. 661 et seq.	--
Essential Fish Habitat Provisions (EFH)	1996	NOAA	16 U.S.C. 1855(b)(2)	50 CFR Part 600

11.1.1 Endangered Species Act

This section discusses procedures intended to protect endangered species that apply only to permits issued by EPA. The 1973 Endangered Species Act (ESA) <www.fws.gov/endangered/esa-library/pdf/ESAall.pdf>, 16 U.S.C. 1531 *et seq.*, was enacted to protect and conserve endangered and threatened species and critical habitat. The Fish and Wildlife Service (FWS) <www.fws.gov/endangered/> of the Department of the Interior and the National Marine Fisheries Service (NMFS) <www.nmfs.noaa.gov/pr/> of the National

Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce (collectively *the Services*) share primary responsibility for administration of the ESA.

ESA section 7 requires that federal agencies consult with the Services to ensure that any action authorized, funded, or carried out by the agencies that could affect a listed species or critical habitat and to ensure that their actions are not likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species. The ESA section 7 regulations are in 50 CFR Part 402. FWS/NMFS published the ESA Section 7 Consultation Handbook <www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF> to address the major consultation processes pursuant to ESA section 7.

Consultation may be either informal or formal. An informal consultation determines if an action is or is not likely to adversely affect the species. A formal consultation is required if the findings from the informal consultation show that there is a likelihood for adverse impacts and evaluates whether the proposed action is likely to jeopardize the continued existence of the species. It is EPA's responsibility to ensure that consultation occurs; however, a nonfederal representative (i.e., the discharger) may be designated for the informal consultation.

On February 22, 2001, EPA entered into a National Memorandum of Agreement (*National MOA*) <www.epa.gov/fedrgstr/EPA-SPECIES/2001/February/Day-22/e2170.pdf> with the Services that outlines the process for consulting on federally issued NPDES permits. In addition, because consultation is not required for state-issued permits, the National MOA includes a process for coordinating with the Services on state-issued permits. EPA permit writers should review the ESA consultation regulations and the ESA section 7 Consultation Handbook, and coordinate with the Region's ESA coordinator (if such a position has been established in a Region) and the Service office(s) nearest to the site.

11.1.2 National Environmental Policy Act

This section discusses environmental review procedures that apply only when EPA issues permits to *new sources* (dischargers subject to New Source Performance Standards). The 1969 National Environmental Policy Act (NEPA) <www.epa.gov/compliance/basics/nepa.html>, 42 U.S.C. 4321 *et seq*., requires that agencies perform environmental impact reviews and prepare an *Environmental Impact Statement* (EIS) for major federal actions significantly affecting the quality of the human environment [see section 102(2)(C)]. The President's Council on Environmental Quality (CEQ) <www.whitehouse.gov/ceq/> coordinates federal environmental efforts to comply with NEPA.

Within EPA, the Office of Federal Activities under the Office of Enforcement and Compliance Assurance (OECA) is responsible for EPA's implementation of NEPA <www.epa.gov/compliance/nepa/>. EPA's NEPA regulations are at 40 CFR Part 6. With respect to NPDES permits, CWA section 511 establishes that only EPA-issued permits to new sources are subject to NEPA's environmental review procedures before permit issuance. States may have their own state law versions of NEPA. Federal permit writers should coordinate efforts with the Office of Federal Activities and document all NEPA activities in the permit file and fact sheet.

11.1.3 National Historic Preservation Act Amendments

Section 106 of the 1992 National Historic Preservation Act (NHPA) <www.achp.gov/nhpa.html>, 16 U.S.C. 470 *et seq.*, as amended, and implementing regulations 36 CFR Part 800 require the Regional Administrator, before issuing a license (permit), to identify the area of potential effect of a permitted discharge and, if historic or cultural resources within that area would be adversely affected by the discharge, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places.

The Act's requirements are to be implemented in cooperation with State Historic Preservation Officers <www.achp.gov/shpo.html>, and upon notice to, and when appropriate, in consultation with the Advisory Council on Historic Preservation <www.achp.gov/>, which provides national oversight for the NHPA. A decision by the D.C. Circuit in 2003 concluded that NHPA consultation is not required for state-issued permits (*National Mining Ass'n v. Fowler*, 324 F.3d 752 (D.C. Cir. 2003) <caselaw.findlaw.com/us-dc-circuit/1169695.html>).

Federal permit writers should evaluate potential effects of NHPA and submit written documentation of the evaluation to the State Historic Preservation Office and to the permit file.

11.1.4 Coastal Zone Management Act

The 1972 Coastal Zone Management Act (CZMA) <www.coastalmanagement.noaa.gov/czm/czm_act.html>, 16 U.S.C. 1451 *et seq.*, was enacted to manage the nation's coastal zone and is implemented through a state-federal partnership. Section 307 of the CZMA (16 U.S.C. 1456 and 15 CFR Part 930) prohibits the issuance of federal NPDES permits for activities affecting land or water use in coastal zones unless the permit applicant certifies that the proposed activity complies with the state Coastal Zone Management Program and the relevant state either concurs with the applicant's certification or the state's concurrence is conclusively presumed as a result of the state's failure to concur or non-concur. *Coastal States*, according to the CZMA, include those states and territories adjacent to the Atlantic, Pacific, or Arctic oceans; the Gulf of Mexico; or one or more of the Great Lakes. Any of those states that have completed the development of its management program is required, as a condition of receipt of federal grant money under the CZMA, to adopt coastal management plans, which designate boundaries, identify areas of particular concern, and establish inventories of permitted uses and enforcement policies. Beach access, emergency planning, and erosion control also must be addressed in such plans.

The Office of Ocean and Coastal Resource Management <www.coastalmanagement.noaa.gov/>, which is part of NOAA within the Department of Commerce, oversees the CZMA. The CZMA implementing regulations are at 15 CFR Part 930. EPA and other federal agencies must coordinate their activities on coastal lands with state CZMA plans. Federal permit writers should document all activities relating to CZMA in the permit file.

11.1.5 Wild and Scenic Rivers Act

The 1968 Wild and Scenic Rivers Act (WSRA) <www.rivers.gov/publications/wsr-act.pdf>, 16 U.S.C. 1271 *et seq.*, established a National Wild and Scenic Rivers System (System) and prescribed the process by which additional rivers may be added to this System. Rivers may be added by act of Congress [WSRA section 2(a)(i)] or by the Secretary of the Interior at the initiative of a state governor [WSRA section 2(a)(ii)]. Under WSRA section 7(a), EPA is prohibited from assisting, by license or otherwise, in the construction

of any water resources project that would have a direct and adverse effect on the values for which a national wild and scenic river was established. The WSRA regulations are codified at 36 CFR Part 297.

Federal permit writers should verify whether the receiving water is part of the System and document all activities related to the Act in the permit file and fact sheet. For detailed explanation of WSRA section 7, refer to Wild and Scenic Rivers Act: Section 7 <www.rivers.gov/publications/section-7.pdf>, a technical report of the Interagency Wild and Scenic Rivers Coordinating Council. Permit writers may also refer to Water Quantity and Quality as Related to the Management of Wild and Scenic Rivers <www.rivers.gov/publications/water.pdf>, a technical report of the Interagency Wild and Scenic Rivers Coordinating Council.

11.1.6 Fish and Wildlife Coordination Act

The 1934 Fish and Wildlife Coordination Act (FWCA) <www.fws.gov/habitatconservation/fwca.html>, 16 U.S.C. 661 *et seq.*, requires mitigation for the loss of wildlife habitat due to the construction of federal water resources projects. The FWCA requires designers of federal dams, reservoirs, and irrigation works to include the costs and benefits to fish and wildlife when determining the benefit/cost ratio of a project and requires that EPA and other federal agencies consult with state and federal wildlife and fisheries agencies to minimize the impacts of the activity on fish and wildlife. The FWCA specifically calls for ongoing studies by the U.S. Department of the Interior on the effects of domestic sewage and industrial wastes on fish and wildlife (16 U.S.C. 665).

No implementing regulations directly related to the FWCA and NPDES permits exist. However, the FWCA describes actions taken or compelled by the affected federal agencies. The Water Resources Development under the Fish and Wildlife Coordination Act manual <www.fws.gov/habitatconservation/fwca.pdf> provides the FWS guidance on implementing the FWCA. Federal permit writers should note any FWCA consultation activities in the permit file.

11.1.7 Essential Fish Habitat Provisions

The 1996 Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA) promote the protection of essential fish habitat in any federal action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that might adversely affect such habitat identified under the MSA [16 U.S.C. 1855(b)(2)]. The MSA requires that federal agencies, such as EPA, consult with the NMFS for any EPA-issued permits that might adversely affect essential fish habitat identified under the MSA. The regulations applicable to federal agencies' coordination and consultation under the MSA are codified at 50 CFR 600.905 through 600.930, and other EFH information can be found on the NMFS EFH Website <www.habitat.noaa.gov/protection/efh/index.html>. Federal permit writers should note any EFH determinations and consultation activities in the permit file.

11.2 Documentation for Development of the Draft Permit

EPA regulations at 40 CFR 124.2 define a draft permit as a document that indicates the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a permit. After the permit is issued, the fact sheet and supporting documentation (administrative record) are the primary support for defending the permit in the administrative appeals process. Documenting the permit requires

the permit writer to be organized and logical throughout the permit development process. Some of the content of the fact sheet and administrative record is specified by federal and state regulation, and the remainder is dictated by good project management. Permit writers should recognize the importance of

- Developing a thorough permit in a logical fashion.
- Meeting legal requirements for preparation of an administrative record, fact sheet, and statement of basis.
- Substantiating permit decisions and providing a sound basis for the derivation of permit terms, conditions, and limitations if challenges are made.
- Establishing a permanent record of the basis of the permit for use in future permit actions.

Exhibit 11-2 presents reasons for good documentation in the permit file and fact sheet.

Exhibit 11-2 Reasons for good documentation

- Streamlines the permit reissuance/ compliance monitoring process
- Establishes a permanent record of the basis for the permit
- Explains the legal and technical basis of the permit
- Provides a sound basis for future modifications and permits
- Requires the permit writer to be organized and logical throughout permit development process

Exhibits 11-3 and 11-4 provide flow diagrams of the NPDES permit administrative process. In general, the administrative process includes the following:

- Documenting all permit decisions.
- Coordinating EPA and state review of the draft (or proposed) permit.
- Providing public notice, conducting hearings (if appropriate), and responding to public comments.
- Defending the permit and modifying it (if necessary) after issuance.

Note that Exhibit 11-3 provides the general framework for the administrative process where EPA is the NPDES permitting authority and Exhibit 11-4 provides a typical framework for the administrative process where a state is the permitting authority. State requirements need not be identical to federal regulatory requirements, provided they are at least as stringent. Some authorized states have slightly different processes for developing and issuing NPDES permits. The same holds true for the appeal process. This manual presents EPA's procedure; state procedures for NPDES permit hearings and appeals vary according to state law.

Exhibit 11-3 Administrative process for EPA-issued NPDES permits

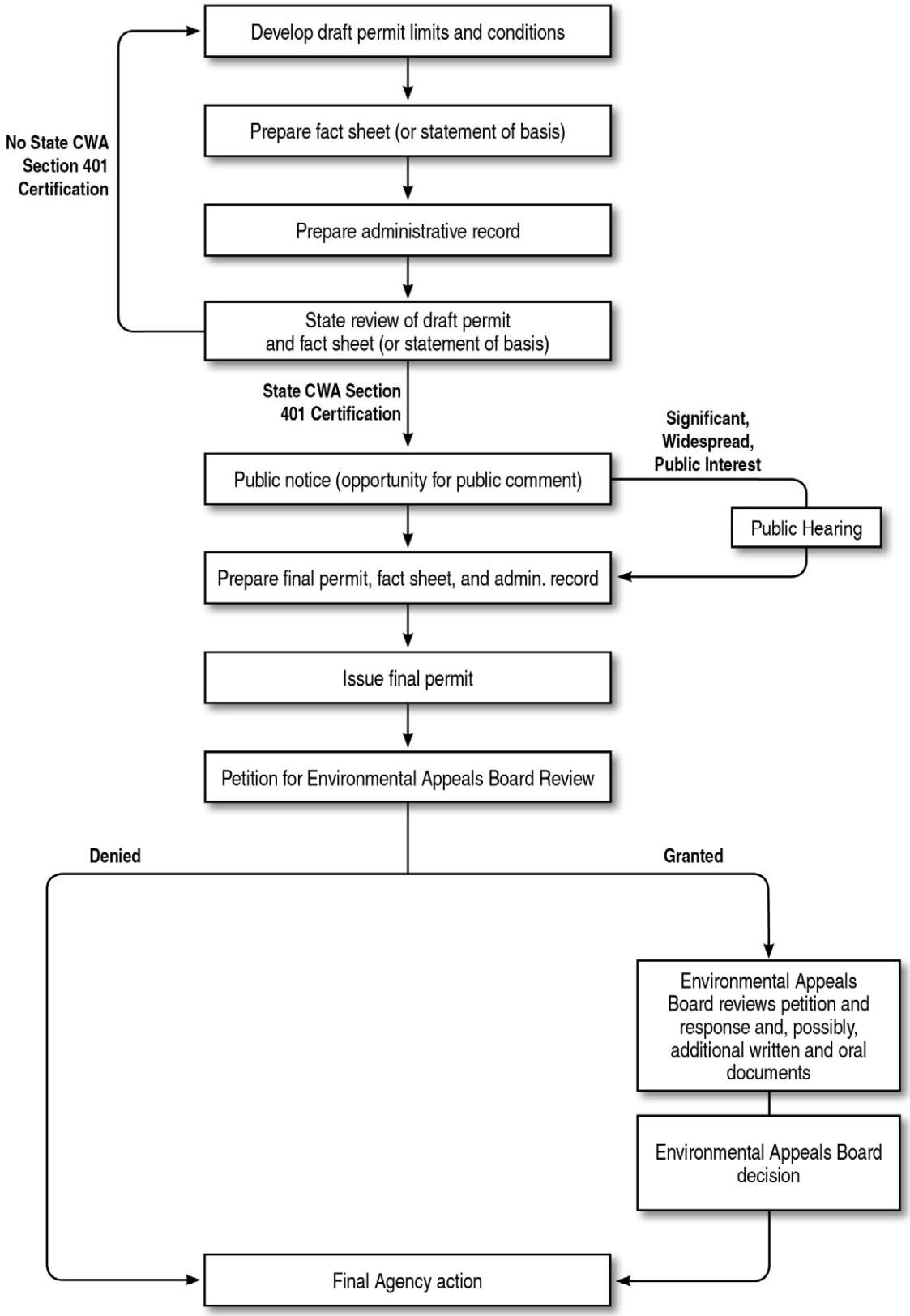
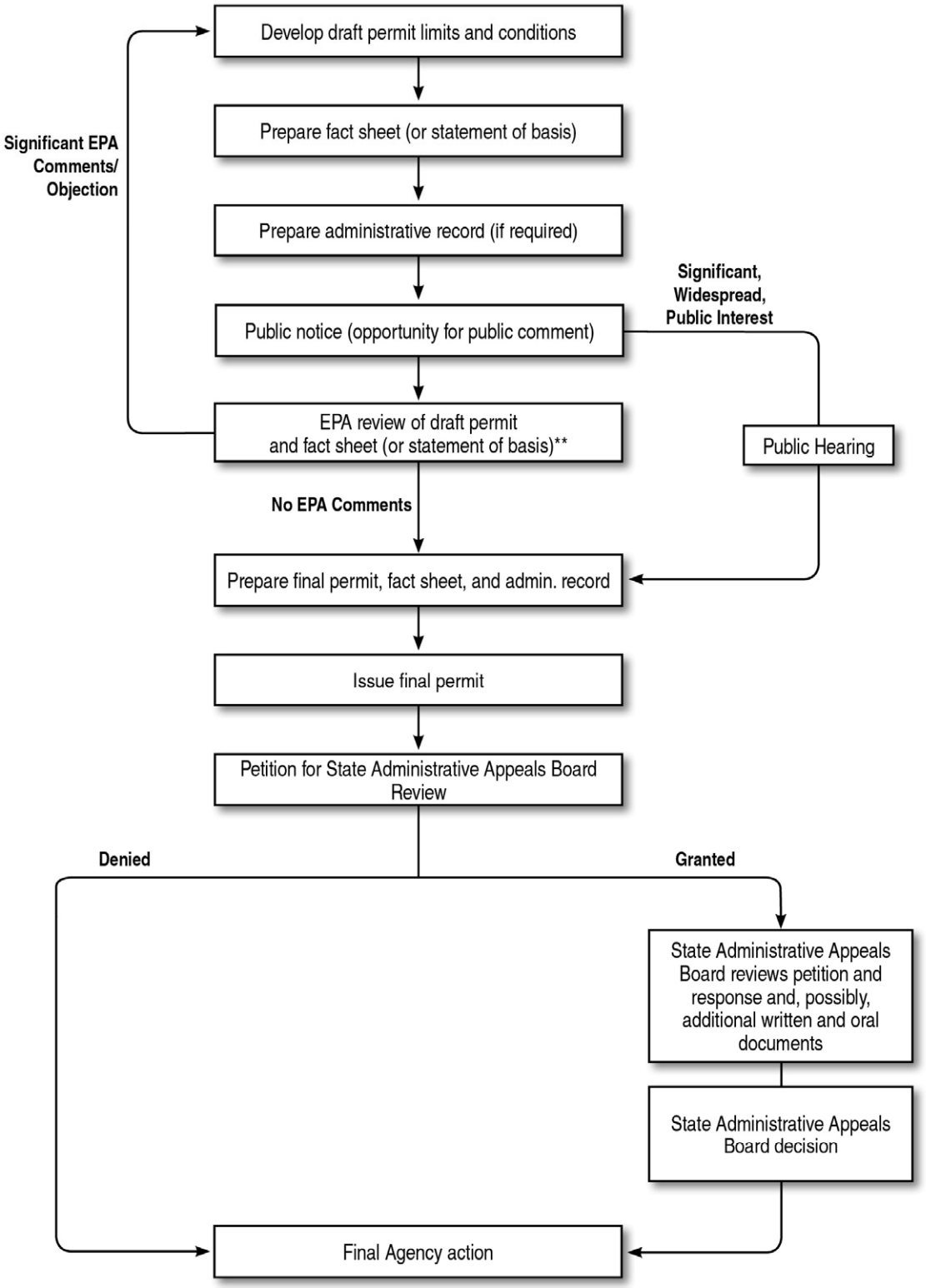


Exhibit 11-4 Typical administrative process for state-issued NPDES permits*



* State statutes and regulations govern the specific steps of the state administrative process, which may differ from the process outlined in this exhibit.
** Under State/EPA MOA, EPA may review draft or proposed permit.

11.2.1 Administrative Record

The administrative record should be considered the foundation that supports the NPDES permit. If EPA issues the permit, the contents of the administrative record are prescribed by regulation, with § 124.9 identifying the required content of the administrative record for a draft permit and § 124.18 describing the requirements for final permits. Regardless of whether a state or EPA issues the permit, all supporting materials must be made available to the public at any time and may be examined during the public comment period and any subsequent public hearing. The importance of maintaining the permit records in a neat, orderly, complete, and retrievable form cannot be over emphasized. The record allows personnel from the permitting agency to reconstruct the justification for a given permit and defend the permit during any legal proceedings regarding the permit.

The administrative record for a draft permit consists, at a minimum, of the specific documents shown in Exhibit 11-5. Materials that are readily available in the permit issuing office or published material that is generally available do not need to be physically included with the record as long as they are specifically referred to in the fact sheet or statement of basis. If EPA issues a draft permit for a new source, the administrative record should include any EISs or *Environmental Assessments* (EAs) performed in accordance with § 122.29(c).

Exhibit 11-5 Elements of the administrative records for a draft permit

- Permit application and supporting data
- Draft permit
- Statement of basis or fact sheet
- All items cited in the statement of basis or fact sheet, including calculations used to derive the permit limitations
- Meeting reports
- Correspondence with the applicant and regulatory personnel
- All other items in the supporting file
- For new sources, any EA, draft/final EIS, or other such background information, such as a Finding of No Significant Impact (only applies if EPA issues the permit)

The administrative record should include all meeting reports and correspondence with the applicant and other regulatory agency personnel, trip reports, and records of telephone conversations. All correspondence, notes, and calculations should be dated and indicate the name of the writer and all other persons involved. Because correspondence is subject to public scrutiny, references or comments that do not serve an objective purpose should be avoided. Finally, the presentation of calculations and documentation of decisions should be organized in such a way that they can be reconstructed and the logic supporting the calculation or decisions can easily be found.

11.2.2 Fact Sheets and Statements of Basis

A fact sheet is a document that briefly sets forth the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. When the permit is in the draft stage, the fact sheet and supporting documentation serve to explain the rationale and assumptions used in deriving the limitations to the discharger, the public, and other interested parties.

The NPDES regulations at § 124.8(a) stipulate that every EPA and state-issued permit must be accompanied by a fact sheet if the permit

- Involves a major facility or activity.
- Incorporates a variance or requires an explanation under § 124.56(b) (toxic pollutants, internal waste stream, and indicator pollutants and for privately owned waste treatment facilities).
- Is an NPDES general permit.
- Is subject to widespread public interest.
- Is a Class I sludge management facility.
- Includes a sewage sludge land application plan.

A well-documented rationale for all permit decisions reduces the work necessary to reissue a permit by eliminating conjecture concerning the development of those permit conditions that are being carried forward to the next permit. That is also true if a modification is initiated during the life of the permit. The required contents of a fact sheet, as specified in §§ 124.8 and 124.56, are listed in Exhibit 11-6.

Exhibit 11-6 Required elements of a fact sheet

Required element	Regulatory citation (40 CFR)
General facility information • Description of the facility or activity • Sketches or a detailed description of the discharge location • Type and quantity of waste/pollutants discharged	 § 124.8 § 124.56 § 124.8
Summary rationale of permit conditions • Summary of the basis for the draft permit conditions • References to the applicable statutory or regulatory provisions • References to the administrative record	§ 124.8
Detailed rationale of permit conditions • Explanation and calculation of effluent limitations and conditions • Specific explanations of – Toxic pollutant limitations – Limitations on internal wastestreams – Limitations on indicator pollutants – Case-by-case requirements – Decisions to regulate non-publicly owned treatment works (POTWs) under a separate permit • For EPA-issued permits, the requirements of any state certification • For permits with a sewage sludge land application plan, a description of how all required elements of the land application plan are addressed in the permit • Reasons why any requested variances do not appear justified, if applicable	 § 124.56 § 124.8
Administrative Requirements • A description of the procedures for reaching a final decision on the draft permit, including – Public comment period beginning and ending dates – Procedures for requesting a hearing – Other procedures for public participation • Name and telephone number of the person to contact for additional information	 § 124.8

The fact sheet should include detailed discussions of the development of permit limitations for each pollutant, including the following:

- Calculations and assumptions related to production and flow.
- Type of limitations (i.e., limitations based on secondary treatment standards, effluent limitations guidelines and standards (effluent guidelines), case-by-case determinations, or water quality standards).
- Whether the effluent guidelines used were Best Practicable Control Technology Currently Available (BPT), Best Available Technology Economically Achievable (BAT), Best Conventional Pollutant Control Technology (BCT), or New Source Performance Standards (NSPS).
- The water quality standards or criteria used.
- Whether any parameters were used as indicators for other pollutants.
- Citations to appropriate wasteload allocation or total maximum daily load studies, guidance documents, other references.

Often, decisions to include certain requirements lead to a decision to exclude other requirements. It is just as important to keep a thorough record of items that were not included in the draft permit as it is to keep a record of included items. Such records might include the following:

- Why were secondary treatment standards, case-by-case determinations, or effluent guidelines used as the basis for final effluent limitations rather than water quality standards (i.e., demonstrate that the limitations checked to see that water quality standards would be attained)?
- Why was biomonitoring not included?
- Why were pollutants that were reported as present in the permit application not specifically limited in the permit?
- Why is a previously limited pollutant no longer limited in the draft permit?

Finally, the fact sheet should address the logistics of the permit issuance process, including the beginning and ending dates of the public comment period, procedures for requesting a hearing, and other means of public involvement in the final decision.

A statement of basis, as described in § 124.7, is required for EPA-issued permits that are not required to have a fact sheet. A statement of basis describes the derivation of the effluent limitations and the reasons for special conditions. However, a prudent permit writer will develop the detailed rationale required in a fact sheet for any permit that includes complex calculations or special conditions (e.g., case-by-case effluent limitations based on best professional judgment [BPJ]) even if a fact sheet is not required by regulation.

11.3 Items to Address before Issuing a Final Permit

This section describes the public participation activities that must be conducted in the permit issuance process. These include providing public notices, collecting and responding to public comments, and holding public hearings as necessary.

11.3.1 Public Notice

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft NPDES permit or other significant actions with respect to an NPDES permit or permit application. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to NPDES permits. The exact scope, required contents, and methods for effecting public notices are found in § 124.10. The NPDES permit-related actions for which public notice is required are shown in Exhibit 11-7.

Exhibit 11-7 Actions for which public notice is required

- Tentative denial of an NPDES permit application (not necessarily applicable to state programs)
- Preparation of a draft NPDES permit, including a proposal to terminate a permit
- Scheduling of a public hearing
- An appeal has been granted by the Environmental Appeals Board
- Major permit modifications (after permit issuance)
- New Source determinations (EPA only)

The permit writer should be particularly concerned with the first three items in Exhibit 11-7. It is important to note that no public notice is required when a request for a permit modification, revocation, reissuance, or termination is denied.

Public notice of NPDES permit-related activities should be provided using the following methods:

- For major permits, publication of a notice in daily or weekly newspaper within the area affected by the facility or activity.
- For general permits issued by EPA, publication in the FR.
- For all permits, direct mailing to various interested parties. This mailing list should include the following:
  - The applicant.
  - Any interested parties on the mailing list.
  - Any other agency that has issued or is required to issue a Resource Conservation and Recovery Act (RCRA), Underground Injection Control (UIC), Prevention of Significant Deterioration (PSD) (or other permit under the Clean Air Act), NPDES, CWA section 404, sludge management, or ocean dumping permit under the Marine Research Protection and Sanctuaries Act for the same facility or activity.
  - Federal and state agencies with jurisdiction over fish, shellfish, and wildlife resources and over coastal zone management plans, the Advisory Council on Historic Preservation, State Historic Preservation Officers, including any affected states and tribes.
  - State agencies conducting area-wide and continuing planning under CWA sections 208(b)(2), 208(b)(4) or 303(e) and the FWS, NMFS, and the U.S. Army Corps of Engineers.
  - Users identified in the permit application of a privately owned treatment work.
  - Persons on any mailing lists developed by including those who request inclusion in writing and persons solicited for *area lists* from participants in past permit proceedings in the area.
  - Any local government having jurisdiction over the locality of the facility.

A public notice must contain the information shown in Exhibit 11-8.

Exhibit 11-8 Contents of the public notice

- Name and address of the office processing the permit action
- Name and address of the permittee or applicant and, if different, of the facility or activity regulated by the permit
- A brief description of the business conducted at the facility or activity described in the permit
- Name, address, and telephone number of a contact from whom interested persons can obtain additional information
- A brief description of the comment procedures required, the time and place of any hearing to be held including procedures to request a hearing
- For EPA-issued permits, the location and availability of the administrative record and the times at which the record will be open for public inspection and a statement that all data submitted by the applicant is available as part of the administrative record
- A description of the location of each existing or proposed discharge point and the name of the receiving water and the sludge use and disposal practice(s) and the location of each sludge treatment works treating domestic sewage and use or disposal sites known at the time of permit application
- Requirements applicable to a thermal variance under CWA section 316(a)
- Requirements applicable to cooling water intake structures under CWA section 316(b)
- Any additional information considered necessary

The regulatory agency preparing the permit must provide public notice of the draft permit (including a notice of intent to deny a permit application), and it must provide at least 30 days for public comment. The draft permit is usually submitted for public notice after it has undergone internal review by the regulatory agency that is issuing the permit. State-issued permits typically undergo public notice after EPA has reviewed and commented on the draft permit. In the special case of those EPA-issued permits that require an EIS, public notice is not given until after a draft EIS is issued.

11.3.2 Public Comments

Public notice of a draft permit might elicit comments from concerned individuals or agencies. Frequently, such comments are simply requests for additional information. However, some comments are of a substantive nature and suggest modifications to the draft permit or indicate that the draft permit is inappropriate for various reasons. In such cases, commenters must submit all reasonable arguments and factual material in support of their positions and comments by the close of the public comment period, and the permitting authority must consider those comments in making final decisions. If the approach is technically correct and clearly stated in the fact sheet, it will be difficult for commenters to find fault with the permit. Commenters can always suggest alternatives, however. In addition, an interested party may also request a public hearing.

To the extent possible, it is desirable to respond to all public comments as quickly as possible. In some cases, it might be possible to diffuse a potentially controversial situation by providing further explanation of permit terms and conditions. Additionally, permit writers should also consider notifying commenters that their comments have been received and are being considered.

The permitting agency must respond to all significant comments, in accordance with § 124.17, at the time a final permit decision is reached (in the case of EPA-issued permits) or at the same time a final permit is

actually issued (in the case of state-issued permits). The response should incorporate the following elements:

- Changes in any of the provisions of the draft permit and the reasons for the changes.
- Description and response to all significant comments on the draft permit or the permit application raised during the public comment period or during any hearing.

If any information is submitted during the public comment period raises substantial new questions about the draft permit, one of the following actions can occur:

- A new draft permit with a revised fact sheet or statement of basis is prepared.
- A revised statement of basis, a fact sheet, or revised fact sheet is prepared, and the comment period is reopened.
- The comment period is reopened but is limited to new findings only.

If any of those actions is taken, a new public notice, as described earlier, must be given.

For EPA-issued permits, any documents cited in the response to comments must be included in the administrative record. If new points are raised or new material is supplied during the public comment period, EPA may document its response to these new materials by adding new materials to the administrative record.

11.3.3 Public Hearings

Any interested party may request a public hearing. The request should be in writing and should state the nature of the issues proposed to be raised during the hearing. However, a request for a hearing does not automatically necessitate that a hearing be held. A public hearing should be held when there is a significant amount of interest expressed during the public comment period or when it is necessary to clarify the issues involved in the permit decision.

Thus, the decision of whether to hold a public hearing is actually a judgment call. Such decisions are usually made by someone other than the permit writer. However, the permit writer will be responsible for ensuring that all the factual information in support of the draft permit is well documented.

Public notice of a public hearing must be given at least 30 days before the public meeting. Public notice of the hearing may be given at the same time as public notice of the draft permit, and the two notices may be combined. The public notice of the hearing should contain the following information:

- Brief description of the nature and purpose of the hearing, including the applicable rules and procedures.
- Reference to the dates of any other public notices relating to the permit.
- Date, time, and place of the hearing.

Scheduling a hearing automatically extends the comment period until at least the close of the hearing [§ 124.12(c)] and the public comment period may be extended by request during the hearing. Anyone may submit written or oral comments concerning the draft permit at the hearing. A presiding officer is responsible for scheduling the hearing and maintaining orderly conduct, including setting reasonable time

limitations for oral statements. Note that a transcript or recording of the hearing must be available to interested persons.

11.3.4 Environmental Justice Considerations

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across U.S. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

In NPDES permits, the public participation process provides opportunities to address EJ concerns by providing appropriate avenues for public participation, seeking out and facilitating involvement of those potentially affected, and including public notices in more than one language where appropriate.

11.3.5 EPA and State/Tribal Roles in Reviewing Draft Permits

The CWA and the NPDES regulations include review roles for EPA and for states, tribes, and territories (states) depending on whether EPA or a state is issuing an NPDES permit.

11.3.5.1 State-issued Permits

Each authorized state administering an NPDES program must transmit to the EPA Region copies of permit applications received and copies of draft or proposed permits [§ 123.43(a)]. The state and the EPA Region execute a Memorandum of Agreement (MOA) under § 123.24 that addresses administration and enforcement of the state's regulatory program. The MOA may specify that EPA will review draft permits rather than proposed permits [§ 123.44(j)] and specify the classes or categories of permit applications and draft or proposed permits that the state will send to the EPA Region for review, comment, and, where applicable, objection. In addition, the MOA specifies classes or categories of permits for which EPA will waive its right to review the draft or proposed permit. EPA cannot waive its right to review classes or categories of permits for the following:

- Discharges into the territorial seas.
- Discharges that could affect waters of a state other than the one in which the discharge originates.
- Discharges proposed to be regulated by general permits.
- Discharges from a POTW with a daily average discharge exceeding 1 million gallons per day.
- Discharges of uncontaminated cooling water with a daily average discharge exceeding 500 million gallons per day.
- Discharges from any major discharger or from any NPDES primary industry category.
- Discharges from other sources with a daily average discharge exceeding 500,000 gallons per day (however, EPA may waive review for non-process wastewater).

The MOA provides a period up to 90 days from receipt of a permit during which the EPA Region can make general comments on, objections to, or recommendations with respect to the permit. If the EPA

Region objects to a permit, within 90 days of receiving the permit it must transmit to the state a statement of the reasons for the objection and the actions that the state must take to eliminate the objection [§ 123.44(a)-(b)]. Specific causes for objection are outlined in the regulations at § 123.44(c). Any interested party can request a public hearing on an objection by the EPA Region. After such a hearing, the Region can affirm the objection, modify the terms of the objection, or withdraw the objection and notify the state of that decision. If the EPA Region does not withdraw the objection, the state then has 30 days to resubmit a permit revised to meet the objection. If the state does not do so, exclusive authority to issue the permit passes to the EPA Region. If no public hearing on the objection is held, the time frame for the state to resubmit a revised permit is 90 days from receipt of the objection.

11.3.5.2 EPA-issued Permits

Permits issued by EPA require an opportunity for state review and certification under CWA section 401. The state in which a discharge originates or will originate is provided the opportunity to review an application or a draft permit and certify that the discharge will comply with the applicable water quality standards. This process also has the benefits of ensuring that state initiatives or policies are addressed in EPA-issued NPDES permits and promoting consistency between state-issued and EPA-issued permits where not all permits within the state are issued by the same agency.

Regulations at §§ 124.53 (State Certification) and 124.54 (Special provisions for state certification and concurrence on applications for CWA section 301(h) variances) describe procedures an EPA permit writer should follow to obtain state certification. Under CWA section 401(a)(1), EPA may not issue a permit until a certification is granted or waived. If EPA is preparing the draft permit, state certification can be accomplished by allowing states to review and certify the application before draft permit preparation. Under § 124.53, if EPA has not received a state certification by the time the draft permit is prepared, EPA must send the state a copy of the draft permit along with a notice requesting state certification.

If the state does not respond within a specified reasonable time, which cannot exceed 60 days, it is deemed to have waived its right to certify. If the state chooses to certify the draft permit, it may include any conditions more stringent than those in the draft permit necessary to ensure compliance with the applicable provisions of the CWA or state law, and must cite the CWA or state law references that support the changes. In addition, the state is required to include a statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of state law, including water quality standards. Failure to provide this statement for any condition waives the right to certify or object to any less stringent condition that might be established during the EPA permit issuance process. When a permit applicant requests a CWA section 301(h) variance (§ 124.54), the state certification process is very similar to the process described above. For more on CWA section 301(h) variances, see section 5.1.3.5 of this manual.

11.3.6 Schedule for Final Permit Issuance

The final permit may be issued after the close of the public notice period and after state certification has been received (for permits issued by EPA). The public notice period consists of the following:

- A 30-day period that gives notice of intent to issue or deny the permit.
- A 30-day period advertising a public hearing (if applicable).
- Any extensions or reopening of the comment period.

Final EPA permit decisions are effective immediately upon issuance unless comment were received on the draft permit, in which case, the effective date of the permit is 30 days after issuance (or a later date if specified in the permit). In addition, permit decisions will not be immediately effective if review is requested on the permit under § 124.19. As discussed earlier, any comments that are received must be answered at the time of final permit issuance (in the case of NPDES states or tribes) or after a final decision is reached (in the case of EPA). The administrative record for the final permit consists of the items in Exhibit 11-9.

Exhibit 11-9 Elements of the administrative records for a final permit

- All elements for the draft permit administrative record (see Exhibit 11-5)
- All comments received during the comment period
- The tape or transcript of any public hearing
- Any materials submitted at a hearing
- Responses to comments
- For NPDES new source permits, the draft or final EIS
- The final permit

11.4 Administrative Actions after Final Permit Issuance

Once the final permit has been issued, the issuing authority should enter the permit limitations and any special conditions into the Integrated Compliance Information System for the NPDES program (ICIS-NPDES) (for more on ICIS-NPDES, see the introduction to this manual and section 11.5.1.1 below). Entering permit information into ICIS-NPDES will ensure that the facility's performance will be tracked and the permitting agency will be alerted to the need for corrective action if violations of permit limitations, terms, or conditions occur.

After final permit issuance, interested parties have opportunities to change the permit through permit appeals, major/minor permit modifications, termination and revocation, or transfer. Those administrative procedures are described below.

11.4.1 Permit Appeals

Throughout the process of developing a permit and during the public notice period, the permit writer should carefully consider all legitimate concerns of the applicant/permittee and any other interested party. Nevertheless, there will inevitably be situations in which a permit is issued in spite of the objections of the permittee or a third party. In such instances, the permittee or interested party can choose to legally contest or appeal the NPDES permit, as provided in § 124.19. Permit appeals are the process by which any person that filed comments on the draft permit may contest the final limitations and conditions in a permit.

Appeals of EPA-issued permits consist of petitioning the Environmental Appeals Board (EAB) for review. Such review must be requested within 30 days of issuance of the final permit, and challenges must be limited to issues raised during the draft permit's public comment or hearing processes, although persons not participating in these processes may seek review of changes in the permit from draft to final permit. During the appeals process, only those conditions of an existing permit that are being contested

are stayed. Within a reasonable time following the filing of the petition for review, the EAB must grant or deny the petition. Only individual permits may be appealed to the EAB; general permits may be challenged in court or an individual permit may be sought and appealed.

Many states have similar administrative appeal procedures designed to resolve challenges to the conditions of a permit. For the sake of convenience, such procedures, which could be known by different names (e.g., evidentiary hearing, administrative appeal), are hereafter *permit appeals*. Permit writers will, from time to time, be involved in permit appeals and will need to address the types of issues discussed below.

Aside from preparing the administrative record and notices, the permit writer might not be involved in the procedural matters relating to permit appeals. All requests for permit appeals are coordinated through the office of the EPA Regional Counsel or the appropriate state legal counsel. The permit writer's first involvement with the appeals process will likely come as a result of designation of the appeals staff, and his or her role will be limited to that of a technical advisor to legal counsel and, where a state uses an evidentiary hearing procedure, possibly a witness.

11.4.1.1 Deposition and Testimony

In a state hearing procedure, a permit writer might be required to give a deposition during which the appellant attorney conducts the questioning that would otherwise occur in the hearing. The deposition is transcribed and presented as evidence. The appellant attorney may ask some of the same questions at the hearing.

To prepare for a deposition and testimony, the permit writer should first consult with his or her general counsel to become familiar with laws, regulations, and policies that could affect the permit. The permit writer should also be thoroughly familiar with the technical basis for the permit conditions. For example, if final effluent limitations are based on water quality standards, the permit writer should thoroughly study the applicable water quality standards, water quality models, and procedures used to develop the effluent limitations and be prepared to defend all assumptions and decisions made in the effluent limitation calculations. For case-by-case limitations based on BPJ, the permit writer should carefully review all applicable data and procedures used to calculate the effluent limitations and should be sure that the information on which case-by-case limitations are based is unimpeachable, the limitations were derived from the data in a logical manner in accordance with established procedures, and the limitations are technically sound and meet applicable standards for economic reasonableness.

A permit appeal before the EAB relies on the information presented in the petitions and briefs, and possibly includes oral argument, but typically does not use depositions and direct testimony.

11.4.1.2 The Permit Writer's Role in the Appeals Process

As technical advisor to legal counsel, the permit writer's most important function is to develop support for contested permit conditions. A permit writer should not attempt to support technically indefensible conditions. Contested permit conditions that are not technically defensible and are not based on any legal requirement should be brought to counsel's attention, with advice that EPA or the state withdraw those conditions.

The second most important advisory function of the permit writer is assisting counsel in identifying weaknesses in the appellant's arguments. That process could include developing questions for cross-examination of opposing witnesses in a state permit appeal that involves a hearing. Questions should be restricted to the subject material covered by the witness' direct testimony and should be designed to elicit an affirmative or negative response, rather than an essay-type response.

Finally, the permit writer should remember that when a person petitions for EAB review or requests a hearing for a state-issued permit, the permit writer should refrain from any discussion about the case without first consulting with legal counsel.

In the role of technical advisor or witness, the permit writer should do the following:

- Cultivate credibility.
- Never imply or admit weakness in his or her area of expertise.
- Never attempt to testify about subjects outside his or her area of expertise.
- Always maintain good communication with counsel.

The EAB generally will attempt to resolve permit appeals in the initial stage of granting review. If that is not possible, the EAB conducts formal review of the contested conditions and publishes a written opinion (an Environmental Administrative Decision). The result of an EAB or state permit appeal might be relief from certain permit conditions, validation or strengthening of contested permit conditions, or a combination of these two outcomes. Under certain circumstances, decisions of the EAB can be appealed in federal court. Authorized state's permit appeal procedures typically provide for further appeal of administrative decisions regarding contested permit conditions in state court when all administrative steps have been fulfilled.

11.4.2 Modification or Revocation and Reissuance of Permits

In most cases, a permit will not need to be modified (or revoked and reissued) during the term of the permit if the facility can fully comply with permit conditions. However, under certain circumstances, it might be necessary to modify the permit before its expiration date. A permit modification could be triggered in several ways. For example, a representative of the regulatory agency might inspect the facility and identify a need for the modification (i.e., the improper classification of an industry), or information submitted by the permittee might suggest the need for a change. Of course, any interested person may make a request for a permit modification.

Modifications differ from revocations and reissuance. In a permit modification, only the conditions subject to change are reconsidered while all other permit conditions remain in effect. Conversely, the entire permit could be reconsidered when it is revoked and reissued.

Except where the permittee requests or agrees, permit modifications are limited to specific *causes* identified in §§ 122.62(a) and 122.62(b) and summarized in Exhibit 11-10. Most NPDES permit modifications require EPA or the state to conduct the public notice and participation activities of Part 124, similar to the issuance or reissuance of the permit; however, only those specific conditions being modified are open to review and comment. The permitting authority may revoke and reissue a permit during its term for the causes identified in § 122.62(b) (i.e., the final two bulleted items in Exhibit 11-10).

Exhibit 11-10 Causes for permit modification

- **Alterations**: When there are material and substantial alterations or changes to the permitted facility or activity occur that justify new conditions that are different from the existing permit.
- **New information**: When information is received that was not available at the time of permit issuance.
- **New regulations**: Under limited circumstances, when standards or regulations on which the permit was based have been changed by the modification, withdrawal or promulgation of amended standards or regulations or by judicial decision.
- **Compliance schedules**: To modify the compliance schedule when good cause exists, such as an act of God, strike, or flood.
- **Variance requests**: When requests for variances or fundamentally different factors are filed within the specified time but not granted until after permit issuance.
- **Toxics**: To insert CWA section 307(a) toxic effluent standard or prohibition.
- **Reopener**: Conditions in the permit that require it to be reopened under certain circumstances.
- **Net limits**: Upon request of a permittee who qualifies for effluent limitations on a net basis under § 122.45(g) or when a permittee is no longer eligible for net limitations, as provided in § 122.45(g)(1)(ii).
- **Pretreatment**: As necessary under § 403.8 (e) to put a compliance schedule in place for the development of a pretreatment program or to change the schedule for program development.
- **Failure to notify**: Upon failure of an approved state to notify another state whose waters may be affected by a discharge from the approved state.
- **Non-limited pollutants**: When the level of any pollutant that is not limited in the permit exceeds the level that can be achieved by the technology-based treatment requirements appropriate to the permit.
- **Notification levels**: To establish notification levels for toxic pollutants as provided in §122.44(f).
- **Compliance schedules for innovative or alternative facilities**: To modify the compliance schedule in light of the additional time that might be required to construct such a facility.
- **Small municipal separate storm sewer system (MS4) minimum control measures**: For a small MS4 to include required minimum control measures when the permit does not include such measure(s) based on the determination that another entity was responsible for implementation and the other entity fails to fulfill its responsibility to implement such measure(s).
- **Technical mistakes**: To correct technical mistakes or mistaken interpretations of law made in developing the permit conditions.
- **Failed BPJ compliance**: When BPJ technology is installed and properly operated and maintained but the permittee is unable to meet its limitations, the limitations may be reduced to reflect actual removal; however, they may not be less than the limitations in the effluent guidelines. If BPJ operation and maintenance costs are extremely disproportionate to the costs considered in a subsequent effluent guideline, the permittee may be allowed to backslide to the limitations in the effluent guideline.
- **Land application plans**: When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.
- **Cause exists for termination**: Cause exists under § 122.64, and the Director determines that modification is appropriate.
- **Notification of proposed transfer**: Director may modify the permit upon receipt of ownership transfer notification.

There are certain minor modifications that, upon consent of the permittee, may be processed by the permitting authority without following the procedures for public notice in Part 124. Minor modifications are generally non-substantive changes (e.g., typographical errors) and are exempt from the administrative procedures; that is, a draft permit and public review are not required. The specific permit changes that can be processed as minor modifications, described in § 122.63, are to

- Correct typographical errors.
- Incorporate more frequent monitoring or reporting.
- Revise an interim compliance date in the schedule of compliance, provided the new date is not more than 120 days after the date specified in the permit and does not interfere with attainment of the final compliance date requirement.
- Allow for a change of ownership, provided no other change is necessary (see section 11.4.4 below).
- Change the construction schedule for a new source discharger.
- Delete a point source outfall when that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.
- Incorporate an approved local pretreatment program.

11.4.3 Permit Termination

Situations could arise during the life of the permit that are causes for termination of the permit. Such circumstances, described in § 122.64(a), include the following:

- Noncompliance by the permittee with any condition of the permit.
- Misrepresentation or omission of relevant facts by the permittee.
- Determination that the permitted activity endangers human health or the environment, and can be regulated to acceptable levels only by permit modification or termination.
- A change in any condition that requires either a temporary or permanent reduction or elimination of a discharge (e.g., plant closure).

Terminations are used to retract a permittee's privileges to discharge during the permit term. A notice of intent to terminate a permit is a type of draft permit that follows the same procedures as any draft permit prepared under § 124.6. Administrative procedures, such as public notice, must be followed in permit termination proceedings. If a facility with a terminated permit wishes to obtain permit coverage, it would have to submit an application and apply for a new permit.

The regulations at § 122.64(b) do provide one exception to the more formal permit termination process described above. Where the entire discharge is permanently terminated by elimination of the flow or by connection to a POTW (but not by land application or disposal into a well) the permit can be terminated by notice to the permittee, and the Part 124 administrative process is not required. However, if the permittee objects to such an expedited termination, the Permitting Authority must then proceed in accordance with the administrative procedures described above.

11.4.4 Permit Transfer

Regulatory agencies occasionally receive notification of a change in ownership of a facility covered by an NPDES permit. Such changes require that a permit be transferred by one of two provisions:

- **Transfer by modification or revocation**: The transfer may be made during the process of a major or minor permit modification. It may also be addressed by revoking and subsequently reissuing the permit.
- **Automatic transfer**: A permit may automatically be transferred to a new permittee if three conditions are met:
  - The current permittee notifies the Director 30 days in advance of the transfer date.
  - The notice includes a written agreement between the old and new owner that contains the specific date for transfer of permit responsibility, coverage, and liability between them.
  - The Director of the regulatory agency does not notify the old permittee and the proposed new permittee that the subject permit will be modified or revoked and reissued.

11.5 Permit Compliance and Enforcement

EPA's OECA is responsible for nationally managing EPA's compliance and enforcement programs for all media including the CWA and NPDES. EPA uses a mix of tools including compliance assistance, incentives, and monitoring and enforcement. EPA and state environmental agencies authorized to administer the NPDES program seek to achieve and maintain a high level of compliance with environmental laws and regulations. Enforcement provides a powerful incentive for NPDES permittees to comply, and the way in which an NPDES permit is written directly affects its enforceability. Each permit must be written clearly and unambiguously so that compliance can be tracked effectively and the permit can be enforced if violations occur.

The permit writer could become actively involved with the compliance monitoring and enforcement of the terms and conditions of the NPDES permits that he or she has written. The extent of the permit writer's involvement will usually depend on the organizational structure of the regulatory agency. Larger, centrally organized agencies typically have separate personnel responsible for enforcing the terms of NPDES permits. In other organizations, the individual who writes the permit will also be responsible for such enforcement activities as discharge monitoring report (DMR) tracking, facility inspections, and enforcement recommendations. If a civil judicial enforcement action occurs, the permit writer might be called on to testify regarding the specific requirements of the permit or its basis.

Regardless of a regulatory agency's organizational structure, the permit writer should have an appreciation for the various aspects of a meaningful NPDES compliance enforcement program. The following sections address compliance monitoring reviews and inspections and data in the national ICIS-NPDES (formerly the Permit Compliance System or PCS) database, which provides the basis for evaluating compliance. This section concludes with a brief description of the enforcement actions available to facilitate permit compliance. For more information about CWA enforcement, see OECA's Clean Water Act Enforcement Website <www.epa.gov/compliance/civil/cwa/index.html>.

11.5.1 Compliance Monitoring

Compliance monitoring is a broad term that includes all activities that federal or state regulatory agencies take to ascertain a permittee's compliance with the conditions specified in an NPDES permit. Compliance monitoring data collected as part of the NPDES program are used to evaluate compliance and support enforcement actions. The process includes receiving, reviewing, and entering data into the ICIS-NPDES database, conducting on-site inspections, identifying violators, and determining an appropriate response.

A primary function of the compliance monitoring program is to verify compliance with permit conditions, including effluent limitations and compliance schedules. Compliance verification is achieved through

- **Compliance review**: A review of all written reports and other material relating to the status of a permittee's compliance.
- **Compliance inspections**: Field-related regulatory activities (i.e., facility inspections, effluent sampling) to determine compliance.

11.5.1.1 Compliance Review

Compliance and enforcement personnel use two primary sources of information to carry out compliance reviews:

- Permit/compliance files.
- The ICIS-NPDES database.

Permit/compliance files include the permit, application, fact sheet, compliance schedule reports, compliance inspection reports, DMRs, enforcement actions, and correspondence (e.g., summaries of telephone calls, copies of warning letters). Compliance personnel periodically review that information and use it to determine if enforcement is necessary and, if so, what level of enforcement is appropriate.

The ICIS-NPDES database <https://icis.epa.gov/icis> is the national database for tracking compliance with NPDES requirements and is discussed further in this manual's introduction. Information in ICIS-NPDES includes facility and discharge characteristics, self-monitoring data, compliance schedules, permit conditions, inspections, and enforcement actions. Permittees are required to submit effluent monitoring data, and compliance and status information, via Compliance Schedule Reports and DMRs. EPA Regions and NPDES states enter such information into ICIS-NPDES and evaluate permittees on compliance with NPDES permit requirements. Inspection and enforcement information is collected and entered by Regions or authorized states or both. Quarterly, EPA reviews the ICIS-NPDES system data and generates a *quarterly noncompliance report* (QNCR) for all major facilities following the requirements of § 123.45.

ICIS-NPDES supports compliance and enforcement actions and assists EPA staff in evaluation and oversight of the NPDES program. The database also promotes national consistency and uniformity in permit and compliance evaluations. NPDES permits must be written so that compliance can be tracked using ICIS-NPDES. Situations might arise in which permit limitations and monitoring conditions are not initially compatible with ICIS-NPDES entry and tracking. In such cases, the permit writer should alert the state or EPA Regional staff responsible for entering ICIS-NPDES codes and work with them to resolve any coding issues. To assist ICIS-NPDES coders in accurately interpreting and entering the permit into ICIS-NPDES and to assist enforcement personnel in reviewing permittee's self-monitoring data and

reports in a timely manner, permit writers should follow the compliance inspection procedures discussed in the next section.

11.5.1.2 Compliance Inspections

Compliance inspections refer to all field-related regulatory activities conducted to determine permit compliance. Such field activities can include compliance evaluation inspections (non-sampling), sampling inspections, other specialized inspections, and remote sensing. Certain inspections, such as diagnostic inspections and performance audit inspections, aid the regulatory agency in evaluating the facility's problems in addition to providing information to support enforcement action. Biomonitoring inspections are specifically targeted at facilities with effluent suspected or identified as causing toxicity problems that threaten the ecological balance of the receiving waters.

Compliance inspections are undertaken to fulfill one or more of the following purposes:

- Establish a regulatory presence to deter noncompliance.
- Ensure that permit requirements are being met or determine if permit conditions are adequate.
- Check the completeness and accuracy of a permittee's performance and compliance records.
- Assess the adequacy of the permittee's self-monitoring and reporting program including on-site laboratory functions.
- Determine the progress or completion of corrective action.
- Obtain independent compliance data on a facility's discharge.
- Evaluate the permittee's operation and maintenance activities.
- Observe the status of construction required by the permit.

11.5.2 Quarterly Noncompliance Reports

EPA Regional offices and NPDES states are required by the regulations at § 123.45 to report quarterly on major facilities that are not in compliance with the terms and conditions of their permit or enforcement order (i.e., that meet the criteria for *reportable noncompliance* [RNC] for effluent limitation, schedules, and reporting violations).

The regulations in § 123.45 establish requirements for listing facility violations and resulting regulatory enforcement action on QNCRs. The regulation establishes reporting requirements for violations that meet specific, quantifiable reporting criteria, as well as for violations that are more difficult to quantify but are of sufficient concern to be considered reportable. The regulation also specifies the format that the reports must follow and the schedule for their submission.

Only major facilities that meet RNC criteria must be reported on the QNCR. RNC consists of several general types of violations as established in § 123.45:

- Effluent limitations
  - Monthly average effluent limitations (see below for more).
  - Other effluent limitations with water quality or health impacts.

- Schedule: Violations of compliance schedule milestones by 90 days or more.
- Reporting: Reports late by 30 days or more.

A violation of any monthly average limitation should be evaluated for magnitude by comparing the measured amount in the DMR to the product of the monthly average limitation times the Technical Review Criteria (TRC) for that pollutant or parameter. The TRC is 1.4 for Group I (conventional) pollutants and 1.2 for Group II (generally toxic) pollutants. Appendix A to Part 123 contains a list of pollutants in each Group. RNC includes violations of a given Group I or Group II pollutant or parameter that equals or exceeds the product of the TRC times the monthly average limitation for any 2 or more months during a 6-month reporting period. RNC also includes violations of a Group I or Group II parameter by any amount (not necessarily TRC times the limitation or greater) for 4 months during the 6-month reporting period.

A subset of instances of RNC that appear on the QNCR could be noted as *significant noncompliance* (SNC). This distinction is used solely for management accountability purposes as a means of tracking trends in compliance and evaluating the relative timeliness of enforcement response toward priority violations.

The definition of SNC is not regulatory and can change as the NPDES program evolves to encompass new enforcement priorities. For example, in September 1995, EPA revised the definition of SNC to include violations of non-monthly average permit limitations by major facilities. Many permits for NPDES major facilities lacked required monthly average limitations and, thus, were not evaluated for SNC violations and follow-up formal enforcement action. The new definition became effective as of October 1, 1996. EPA's SNC policy is described in the memorandum Revision of NPDES Significant Noncompliance (SNC) Criteria to Address Violations of Non-Monthly Average Limits[1] <www.epa.gov/compliance/resources/policies/civil/cwa/revisedsncmemo.pdf>.

Generally, the designation of SNC indicates a violation is of sufficient magnitude or duration or both to be considered among EPA's priorities for regulatory review or response. The categories of SNC are

- Effluent limitations: The effluent limitation SNC criteria are the same as for QNCR discussed above.
- Schedule: The schedule SNC criteria are the same as for QNCR discussed above.
- Reporting: The reporting SNC criteria are the same as for QNCR discussed above.
- Order requirements: Violation of requirements in administrative or judicial orders.

The instance of SNC is considered resolved when the SNC criteria are no longer met during the review period, or when the permittee formerly in SNC exhibits compliance for all 3 months of the most recent 3-month reporting period. A permittee with SNC violations under a compliance schedule that is meeting its deadlines for corrective actions is in *resolved pending* status.

Any major permittee that is listed on the QNCR for two consecutive 3-month reporting periods for the same instance of SNC (e.g., same outfall point, same parameter, same category of violation) is expected to return to compliance or to be addressed with an appropriate enforcement action before the reporting deadline for the second QNCR. If the facility is in SNC after the second QNCR, and no enforcement

action has been taken, the facility is placed on the Watch List. The Watch List is a management tool that identifies and tracks facilities with serious violations and no apparent formal enforcement response.

11.5.3 Enforcement

EPA's NPDES compliance and enforcement principles and recommendations are described in the NPDES Enforcement Management System (EMS)[2] <www.epa.gov/compliance/resources/policies/civil/cwa/emscwa-jensen-rpt.pdf>. By choosing an appropriate enforcement response to CWA violations, EPA tries to achieve several goals:

- Correction of the violation as soon as possible.
- Deterrence of future violations by the same permittee or other permittees.
- Equal treatment of the regulated community through use of a uniform approach to selecting enforcement responses (i.e., similar violations are treated similarly).
- Assessment of an appropriate penalty.
- Protection of human health and the environment.

Once a facility has been identified as having potential CWA violations, EPA or the NPDES state reviews the facility's compliance history. The review includes an assessment of the magnitude, frequency, and duration of violations. The permitting authority identifies significant violations and makes a determination of the appropriate enforcement response. CWA section 309 authorizes the Agency to bring civil or criminal action against facilities that discharge pollutants without a permit or discharge in violation of NPDES permit conditions and judicial penalties up to $32,500 per day per violation.

EPA Regions and authorized states have specific procedures for reviewing self-monitoring and inspection data and for deciding what type of enforcement action is warranted. EPA recommends an escalating response to continuing noncompliance. The range of enforcement responses includes the following:

- Informal action (e.g., *notice of violation* [NOV]).
- Formal action.
- Administrative compliance order.
- Administrative order with or without an administrative penalty order (up to $157,500).
- Civil judicial action that imposes injunctive relief seeking compliance or penalty or both.
- Criminal prosecution.

Considerations when making determinations on the level of the enforcement response include the following:

- The duration of the violation.
- The severity of the violation.
- The degree of economic benefit obtained through the violation.
- Compliance history and previous enforcement actions taken against the violator.
- The degree of culpability.
- The deterrent effect of the response on similarly situated permittees.

Equally important considerations may include fairness and equity, national consistency, and the integrity of the NPDES program.

Citizens can participate in the enforcement process in a number of ways. Under the Freedom of Information Act, citizens have the right to request certain facility-specific compliance information from EPA's ICIS-NPDES database. In addition, under NPDES regulations, interested citizens can intervene in any federal civil judicial action to enjoin any threatened or continuing violation of program requirements or permit conditions, and to recover civil penalties in court. Citizens also have the opportunity to review and comment on any proposed consent decree to resolve a state or federal civil judicial enforcement action.

CWA section 505 allows any citizen to begin a civil judicial enforcement action on his or her own behalf. In certain circumstances, citizens may not begin suit if EPA or the state is diligently prosecuting a civil or criminal judicial action or an administrative action to obtain a penalty under CWA section 309(g) or a comparable provision of state law. Citizens must also give EPA, the state, and the alleged violator 60 days' notice of the alleged violation before beginning a citizen suit.

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[1] Herman, S.A. 1995. *Revision of NPDES Significant Noncompliance (SNC) Criteria to Address Violations of Non-Monthly Average Limits.* U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance. Memorandum, September 21, 1995. <www.epa.gov/compliance/resources/policies/civil/cwa/revisedsncmemo.pdf>.

[2] U.S. Environmental Protection Agency. 1989. *The Enforcement Management System: National Pollutant Discharge Elimination System (Clean Water Act)*. EC-G-1998-11b. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/compliance/resources/policies/civil/cwa/emscwa-jensen-rpt.pdf>.

Appendix A. Acronyms, Abbreviations and Glossary

This appendix contains two tables for permit writers to more easily navigate through the acronyms and the terms that are mentioned throughout this manual. The first table, *Acronyms and Abbreviations*, provides the full text of the acronyms and abbreviations used throughout and indicates whether they are defined in the *Glossary* (the second table), which provides definitions of terms used in the Clean Water Act and NPDES permit program. It provides a reference to the source of the definitions, where available.

A.1 Acronyms and Abbreviations

Exhibit A-1 presents the abbreviations used in the *NPDES Permit Writers' Manual*.

Exhibit A-1 Acronyms and abbreviations

Acronym or abbreviation	Full phrase	Glossary
1Q10	1-day, 10-year Low Flow	
7Q10	7-day, 10-year Low Flow	
4AAP	4-Aminoantipyrine (used for detecting phenolic compounds colorimetrically)	
ACHP	Advisory Council on Historic Preservation	
ACR	Acute-to-Chronic Ratio	
AFO	Animal Feeding Operation	x
AML	Average Monthly Limitation	x
ASR	Alternative State Requirement	
AWL	Average Weekly Limitation	x
BA	Biological Assessment	
BAT	Best Available Technology Economically Achievable	x
BCT	Best Conventional Pollutant Control Technology	x
BE	Biological Evaluation	
BMP	Best Management Practice	x
BOD	Biochemical Oxygen Demand	x
BOD_5	5-day Biochemical Oxygen Demand	
BPJ	Best Professional Judgment	x
BPT	Best Practicable Control Technology Currently Available	x
CAAP	Concentrated Aquatic Animal Production	
CAFO	Concentrated Animal Feeding Operation	x
CBOD	Carbonaceous Biochemical Oxygen Demand	x
$CBOD_5$	5-day Carbonaceous Biochemical Oxygen Demand	
CEQ	Council on Environmental Quality	
CERCLA	Comprehensive Environmental Response, Compensation and Liabilities Act	
CFR	*Code of Federal Regulations*	x
cfs	Cubic Feet per Second	
CGP	Construction General Permit	
CMOM	Capacity, Management, Operation and Maintenance	

Exhibit A-1 Acronyms and abbreviations (continued)

Acronym or abbreviation	Full phrase	Glossary
COD	Chemical Oxygen Demand	x
CSO	Combined Sewer Overflow	x
CSS	Combined Sewer System	x
CV	Coefficient of Variation	
CWA	Clean Water Act	x
CWIS	Cooling Water Intake Structure	
CZMA	Coastal Zone Management Act	
DMR	Discharge Monitoring Report	x
DWO	Dry Weather Overflow	
EA	Environmental Assessment	
EAB	Environmental Appeals Board	
EC	Effect Concentration	
EFH	Essential Fish Habitat	
EIS	Environmental Impact Statement	
ELG	Effluent Limitations Guidelines or Effluent Guidelines	x
EMS	Enforcement Management System	
eNOI	Electronic Notice of Intent	
EPA	U.S. Environmental Protection Agency	
ESA	Endangered Species Act	
FDF	Fundamentally Different Factors	x
FR	*Federal Register*	
FWCA	Fish and Wildlife Coordination Act	
FWPCA	Federal Water Pollution Control Act	
FWS	U.S. Fish and Wildlife Service	
GC/MS	Gas Chromatography/Mass Spectroscopy	
gpd	Gallons per Day	
HEM	Hexane Extractable Material	
IC	Inhibition Concentration	
ICIS	Integrated Compliance Information System	
I/I	Infiltration/Inflow	
LA	Load Allocation	
lbs/day	Pounds per Day	
LC_{50}	Lethal Concentration to 50% of test organisms	
LOEC	Lowest Observed Effect Concentration	
LTA	Long-Term Average	
LTCP	Long-Term Control Plan	
MDL	Method Detection Limit	x
MDL	Maximum Daily Effluent Limitation	x
MEP	Maximum Extent Practicable	
µg/L	Micrograms per Liter	
mg/L	Milligrams per Liter	
mgd	Million Gallons per Day	x
ML	Minimum Level	x

Exhibit A-1 Acronyms and abbreviations (continued)

Acronym or abbreviation	Full phrase	Glossary
MOA	Memorandum of Agreement	
MS4	Municipal Separate Storm Sewer System	x
MSA	Magnuson-Stevens Act	
MSGP	Multi-Sector General Permit	
N/A	Not Applicable	
NAICS	North American Industrial Classification System	x
NEMI	National Environmental Methods Index	
NEPA	National Environmental Policy Act	
NHPA	National Historic Preservation Act	
NMC	Nine Minimum CSO Controls	
NMFS	National Marine Fisheries Service	
NMP	Nutrient Management Plan	
NOAA	National Oceanic and Atmospheric Administration	
NOEC	No Observable Effect Concentration	
NOI	Notice of Intent	
NOV	Notice of Violation	
NPDES	National Pollutant Discharge Elimination System	x
NRDC	Natural Resources Defense Council	
NSCEP	National Service Center for Environmental Publications	
NSPS	New Source Performance Standards	
NTIS	National Technical Information Service	
O&G	Oil and Grease	
OCPSF	Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category	
OECA	EPA Office of Enforcement and Compliance Assurance	
ONRW	Outstanding National Resources Waters	
OTIS	Online Tracking Information System	
OW	Office of Water	
OWRC	Office of Water Resource Center	
PCS	Permit Compliance System	
POTW	Publicly Owned Treatment Works	x
PSD	Prevention of Significant Deterioration	
PSES	Pretreatment Standards for Existing Sources	
PSNS	Pretreatment Standards for New Sources	
QNCR	Quarterly Noncompliance Report	
RAPP	Refuse Act Permit Program	
RCRA	Resource Conservation and Recovery Act	
RNC	Reportable Noncompliance	
SIC	Standard Industrial Classification	x
SIU	Significant Industrial User	x
SNC	Significant Noncompliance	
SOP	Standard Operating Procedure	
SPCC	Spill Prevention Control and Countermeasure	x
SS	Suspended Solids	x

Exhibit A-1 Acronyms and abbreviations (continued)

Acronym or abbreviation	Full phrase	Glossary
SSO	Sanitary Sewer Overflow	x
STORET	EPA Storage and Retrieval Database	x
SWPPP	Stormwater Pollution Prevention Plan	
TBEL	Technology-Based Effluent Limit(s)	x
TCDF	Tetrachlorodibenzofuran	
TEC	Transportation Equipment Cleaning Point Source Category	
THC	Total Hydrocarbons	
TIE	Toxicity Identification Evaluation	
TMDL	Total Maximum Daily Load	x
TOC	Total Organic Carbon	x
TRC	Technical Review Criteria	
TRE	Toxicity Reduction Evaluation	x
TRI	Toxic Release Inventory	
TSD	Technical Support Document [for Water Quality-based Toxics Control]	
TSS	Total Suspended Solids	x
TTO	Total Toxic Organics	
TU	Toxic Units	
TUa	Toxic Units – Acute	
TUc	Toxic Units – Chronic	
TWTDS	Treatment Works Treating Domestic Sewage	x
UAA	Use Attainability Analysis	
UIC	Underground Injection Control	
U.S.C.	*United States Code*	
WET	Whole Effluent Toxicity	x
VGP	Vessel General Permit	
WLA	Waste Load Allocation	x
WPD	EPA Water Permits Division	
WQA	Water Quality Act of 1987	
WQBEL	Water Quality-Based Effluent Limit(s)	x
WQS	Water Quality Standard(s)	x
WSRA	Wild and Scenic Rivers Act	

A.2 Glossary

Exhibit A-2 includes definitions of terms used in the *NPDES Permit Writers' Manual*. For terms that have a definition in the federal regulations, that definition is included with an appropriate citation. The citations also indicate where this guidance manual has paraphrased or modified the regulatory definitions for consistency with the format of the glossary. For terms that do not have a regulatory definition, but that are defined in another published EPA document, the citation to the relevant EPA document is provided.

Note that the definitions provided in the Glossary do not constitute EPA's official use of terms and phrases for regulatory purposes, and nothing in this document should be construed to alter or supplant any

other federal document. Official terminology is in the laws and related regulations as published in such sources as the Congressional Record, *Federal Register*, and elsewhere.

Exhibit A-2 Glossary

Term	Definition	Citation
401(a) Certification	A requirement of CWA section 401(a) that all federally issued permits be certified by the state in which the discharge occurs. The state certifies that the proposed permit will comply with state water quality standards and other state requirements.	1996 U.S. EPA NPDES Permit Writers' Manual (1996 PWM) <www.epa.gov/npdes/pubs/owm0243.pdf>
Acute Effect	The effect of a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect generally observed in 96 hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute effect is not always measured in terms of lethality.	1996 PWM
Animal Feeding Operation (AFO)	Lot or facility (other than an aquatic animal production facility) where the following conditions are met: • Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period. • Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.	§ 122.23(b)(1)
Anti-backsliding	In general, a statutory provision that prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains effluent limitations, permit conditions, or standards that are less stringent than those established in the previous permit. For more information on anti-backsliding, see Chapter 7 of this manual.	CWA section 402(o)
Antidegradation	A policy developed and adopted as part of a state's water quality standards that ensures protection of existing uses and maintains the existing level of water quality where that water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. This policy also includes special protection of water designated as Outstanding National Resource Waters.	Adapted from 1996 PWM
Authorized Program or Authorized State	A state, territorial, tribal, or interstate NPDES program that has been approved or authorized by EPA under Part 123.	1996 PWM
Average Monthly Discharge Limitation	The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during that month divided by the number of daily discharges measured during that month.	§ 122.2
Average Weekly Discharge Limitation	The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.	§ 122.2
Best Available Technology Economically Achievable (BAT)	Technology standard established by the CWA as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. BAT limitations in effluent guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.	Adapted from 1996 PWM

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Best Conventional Pollutant Control Technology (BCT)	Technology-based standard for the discharge from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, oil and grease. The BCT is established in light of a two-part cost reasonableness test, which compares the cost for an industry to reduce its pollutant discharge with the cost to a POTW for similar levels of reduction of a pollutant loading. The second test examines the cost-effectiveness of additional industrial treatment beyond BPT. EPA must find limits which are reasonable under both tests before establishing them as BCT.	1996 PWM
Best Management Practice (BMP)	Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of *waters of the United States*. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.	§ 122.2
Best Practicable Control Technology Currently Available (BPT)	The first level of technology standards established by the CWA to control pollutants discharged to waters of the U.S. BPT limitations in effluent guidelines are generally based on the average of the best existing performance by plants within an industrial category or subcategory.	Adapted from 1996 PWM
Best Professional Judgment (BPJ)	The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.	1996 PWM
Bioassay	A test used to evaluate the relative potency of a chemical or a mixture of chemicals by comparing its effect on a living organism with the effect of a standard preparation on the same type of organism.	1996 PWM
Biochemical Oxygen Demand (BOD)	A measurement of the amount of oxygen used by the decomposition of organic material, over a specified time (usually 5 days) in a wastewater sample; it is used as a measurement of the readily decomposable organic content of a wastewater.	1996 PWM
Biosolids	See *Sewage Sludge*.	--
Bypass	The intentional diversion of waste streams from any portion of a treatment facility. This definition applies to both direct and indirect discharges.	§ 122.41(m)(1)(i) and § 403.17
Carbonaceous Biochemical Oxygen Demand (CBOD)	The biochemical oxygen demand of carbonaceous sources. This differs from BOD in that BOD measures both nitrogenous and carbonaceous sources, whereas CBOD excludes nitrogenous sources (e.g., nitrifying bacteria) from determination through the addition of a nitrification inhibitor.	--
Categorical Industrial User (CIU)	An industrial user subject to national categorical pretreatment standards.	1996 PWM
Categorical Pretreatment Standards	National pretreatment standards , expressed as Pretreatment Standards for Existing Sources (PSES) or Pretreatment Standards for New Sources (PSNS), specifying quantities or concentrations of pollutants or pollutant properties that may be discharged to a POTW by existing or new industrial users in specific industrial subcategories established as separate regulations under the appropriate subpart of 40 CFR chapter I, subchapter N.	Adapted from § 403.6

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Chemical Oxygen Demand (COD)	A measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater. COD is expressed as the amount of oxygen consumed in mg/L. Results do not necessarily correlate to the biochemical oxygen demand (BOD) because the chemical oxidant can react with substances that bacteria do not stabilize.	Adapted from 1996 PWM
Chronic Effect	The effect of a stimulus that lingers or continues for a relatively long period, often one-tenth of the life span or more. The measurement of a chronic effect can be reduced growth, reduced reproduction, and such, in addition to lethality.	1996 PWM
Clean Water Act (CWA)	The Clean Water Act is a statute passed by the U.S. Congress to control water pollution. It was formerly referred to as the Federal Water Pollution Control Act of 1972 or Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), 33 U.S.C. 1251 *et seq.*, as amended by: Public Law 96-483; Public Law 97-117; Public Laws 95-217, 97-117, 97-440, and 100-04.	1996 PWM
Code of Federal Regulations (CFR)	A codification of the final rules published daily in the *Federal Register*. Title 40 of the CFR contains regulations for the protection of the environment.	1996 PWM
Combined Sewer Overflow (CSO)	A discharge of untreated wastewater from a combined sewer system at a point before the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowmelt). During periods of wet weather, these systems become overloaded, bypass treatment works, and discharge directly to receiving waters at designed overflow points.	1996 PWM
Combined Sewer System (CSS)	A wastewater collection system that conveys sanitary wastewaters (domestic, commercial and industrial wastewaters) and stormwater through a single pipe to a publicly owned treatment works for treatment before discharge to surface waters.	1996 PWM
Compliance Schedule (or Schedule of Compliance)	A schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the CWA and regulations.	§ 122.2
Composite Sample	Sample composed of two or more discrete aliquots (samples). The aggregate sample will reflect the average water quality of the compositing or sample period.	--
Conventional Pollutants	Pollutants typical of municipal sewage, and for which publicly owned treatment works typically are designed to remove; defined by Federal Regulation (§ 401.16) as BOD, TSS, fecal coliform bacteria, oil and grease, and pH.	1996 PWM
Daily Discharge	The *discharge of a pollutant* measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.	§ 122.2

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Designated Uses	Those uses specified in water quality standards for each waterbody or segment whether they are being attained (§ 131.3). Examples of designated uses include cold and warm water fisheries, public water supply, and irrigation.	Adapted from EPA. Terms of Environment: Glossary, Abbreviations, Acronyms. <www.epa.gov/OCEPAterms/dterms.html>
Development Document	A report prepared during development of an effluent guideline by EPA that provides the data and methodology used to develop effluent guidelines and categorical pretreatment standards for an industrial category.	Adapted from 1996 PWM
Director	The Regional Administrator or the State Director, as the context requires, or an authorized representative. When there is no *approved state program*, and there is an EPA-administered program, *Director* means the Regional Administrator. When there is an approved state program, Director normally means the State Director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved state program. (For example, when EPA has issued an NPDES permit before the approval of a state program, EPA may retain jurisdiction over that permit after program approval, see § 123.1.) In such cases, Director means the Regional Administrator and not the State Director.	§ 122.2
Discharge Monitoring Report (DMR)	The EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by *approved states* as well as by EPA. EPA will supply DMRs to any approved state upon request. The EPA national forms may be modified to substitute the state agency name, address, logo, and other similar information, as appropriate, in place of EPA's.	§ 122.2
Draft Permit	A document prepared under § 124.6 indicating the Director's tentative decision to issue, deny, modify, revoke and reissue, terminate, or reissue a *permit.* A notice of intent to terminate a permit, and a notice of intent to deny a permit, as discussed in § 124.5, are types of *draft permits*. A denial of a request for modification, revocation and reissuance, or termination, as discussed in § 124.5, is not a draft permit. A *proposed permit* is not a draft permit.	§ 122.2
Effluent Limitation	Any restriction imposed by the Director on quantities, discharge rates, and concentrations of *pollutants* which are *discharged* from *point sources* into waters of the United States, the waters of the *contiguous zone*, or the ocean.	§ 122.2
Effluent Limitations Guidelines (Effluent Guidelines or ELG)	A regulation published by the Administrator under CWA section 304(b) to adopt or revise *effluent limitations*.	§ 122.2
Existing Uses	Those uses actually attained in the waterbody on or after November 28, 1975, whether they are included in the water quality standards.	§ 131.3

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Fact Sheet	A document that must be prepared for all draft individual permits for NPDES major dischargers, NPDES general permits, NPDES permits that contain variances, NPDES permits that contain sewage sludge land application plans and several other classes of dischargers. The document summarizes the principal facts and the significant factual, legal, methodological and policy questions considered in preparing the draft permit and explains how the public may comment (§§ 124.8 and 124.56). Where a fact sheet is not required, a statement of basis must be prepared (§ 124.7).	1996 PWM
Fundamentally Different Factors (FDF)	Those components of a petitioner's facility that are determined to be so unlike those components considered by EPA during the effluent guidelines and pretreatment standards rulemaking that the facility is worthy of a variance from the effluent guidelines or categorical pretreatment standards that would otherwise apply.	Adapted from 1996 PWM
General Permit	An NPDES permit issued under § 122.28 that authorizes a category of discharges under the CWA within a geographical area. A general permit is not specifically tailored for an individual discharger.	1996 PWM
Grab Sample	A sample taken from a wastestream on a one-time basis without consideration of the flow rate of the wastestream and without consideration of time.	Adapted from 1996 PWM
Hazardous Substance	Any substance—as designated under Part 116 pursuant to CWA section 311—that presents an imminent and substantial danger to the public health or welfare, including fish, shellfish, wildlife, shorelines, and beaches, upon discharge to navigable waters of the United States.	Adapted from § 122.2 and CWA section 311(b)(2)(A)
Indirect Discharger	A nondomestic discharger introducing *pollutants* to a publicly owned treatment works.	40 CFR 122.2
Instantaneous Maximum Limit	The maximum allowable concentration or other measure of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.	1996 PWM
Instantaneous Minimum Limit	The minimum allowable concentration or other measure of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.	--
Load Allocation	The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.	§ 130.2
Local Limits	Where specific prohibitions or limits on pollutants or pollutant parameters are developed by a POTW in accordance with § 403.4(c), such limits must be deemed Pretreatment Standards for the purposes of CWA section 307(d).	Adapted from § 403.4(d)

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Major Facility	Any NPDES facility or activity classified as such by the Regional Administrator, or in the case of approved state programs, the Regional Administrator in conjunction with the State Director (§ 122.2). Major municipal dischargers include all facilities with design flows of greater than one million gallons per day and facilities with EPA/state approved industrial pretreatment programs. Major industrial facilities are determined based on specific ratings criteria developed by EPA or are classified as such by EPA in conjunction with the state.	1996 PWM
Method Detection Limit (MDL)	The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.	§ 136 - Appendix B
Maximum Daily Effluent Limitation (MDL)	The highest allowable daily discharge of a pollutant. (Chapter 6)	--
Million Gallons per Day (or mgd)	A unit of flow commonly used for wastewater discharges. One million gallon per day is equivalent to 1.547 cubic feet per second.	1996 PWM
Minimum Level (ML)	The level at which the entire analytical system must give a recognizable signal and acceptable calibration point. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.	§ 136 - Appendix A
Mixing Zone	An area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.	Technical Support Document for Water Quality-based Toxics Control <www.epa.gov/npdes/pubs/owm0264.pdf>
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): a. Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under CWA section 208 that discharges to waters of the United States. b. Designed or used for collecting or conveying stormwater. c. [That] is not a combined sewer. d. [That] is not part of a Publicly Owned Treatment Works (POTW) as defined at § 122.2.	§ 122.26(b)(8)
Municipal Sludge	See *Sewage Sludge*.	--

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
National Pollutant Discharge Elimination System (NPDES)	The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA sections 307, 318, 402, and 405. The term includes *approved program*. NPDES permits regulate discharges of pollutants from point sources to waters of the United States. Such discharges are illegal unless authorized by an NPDES permit.	Adapted from § 122.2
National Pretreatment Standard or Pretreatment Standard	Any regulation promulgated by EPA in accordance with CWA sections 307(b) and 307(c) that applies to a specific category of industrial users and provides limitations on the introduction of pollutants into publicly owned treatment works. The term includes the prohibited discharge standards under § 403.5.	Adapted from § 403.3(l)
New Discharger	Any building, structure, facility, or installation: a. From which there is or may be a discharge of pollutants. b. That did not begin the discharge of pollutants at that site before August 13, 1979. c. That is not a new source. d. That has never received a finally effective NPDES permit for discharges at that site. This definition includes an *indirect discharger* that begins discharging into waters of the United States after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a *site* for which it does not have a permit; and any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a site under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is in an area determined by the Regional Administrator in the issuance of a final permit to be an area or biological concern. In determining whether an area is an area of biological concern, the Regional Administrator must consider the factors specified in §§ 125.122(a)(1) - 125.122(a)(10). An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a *new discharger* only for the duration of its discharge in an area of biological concern.	Adapted from § 122.2

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
New Source	Any building, structure, facility, or installation from which there is or could be a discharge of pollutants, the construction of which commenced: a. After promulgation of standards of performance under CWA section 306, which are applicable to such source; or b. After proposal of standards of performance in accordance with CWA section 306, which are applicable to such source but only if the standards are promulgated in accordance with CWA section 306 within 120 days of their proposal. Additional Criteria: Except as otherwise provided in an applicable new source performance standard, a source is a *new source* if it meets the definition in § 122.2; and i. It is constructed at a site at which no other source is located; or ii. It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or iii. Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.	Adapted from § 122.2 and § 122.29(b)(1)
New Source Performance Standards (NSPS)	Technology standards for facilities that qualify as new sources under § 122.2 and § 122.29. Standards consider that the new source facility has an opportunity to design operations to more effectively control pollutant discharges.	1996 PWM
Nonconventional Pollutants	All pollutants that are not included in the list of conventional or toxic pollutants in Part 401. Includes pollutants such as chemical oxygen demand (COD), total organic carbon (TOC), nitrogen, and phosphorus.	1996 PWM
Nonpoint Source	Diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by stormwater. Atmospheric deposition and hydromodification are also sources of nonpoint source pollution.	--
North American Industrial Classification System (NAICS)	The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.	Retrieved from <www.census.gov/epcd/www/naics.html>
Nutrients	Chemical elements and compounds found in the environment that plants and animals need to grow and survive. Nutrients include compounds of nitrogen (nitrate, nitrite, ammonia, organic nitrogen) and phosphorus (orthophosphate and others), both natural and man-made.	--
Permitting Authority	The agency authorized to issue and enforce specific requirements of the NPDES permit program. The permitting authority may be EPA, or a state, territorial, or tribal agency that has been authorized under CWA section 402(b) to administer the NPDES program within its jurisdiction.	--

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
pH	A measure of the hydrogen ion concentration of water or wastewater; expressed as the negative log of the hydrogen ion concentration in mg/L. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic.	1996 PWM
Point Source	Any discernible, confined, and discrete conveyance, including any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. The term does not include return flows from irrigated agriculture or agricultural stormwater runoff.	Adapted from § 122.2
Pollutant	Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended [42 U.S.C. 2011 *et seq.*)], heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean a. Sewage from vessels. b. Water, gas, or other material that is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by authority of the state in which the well is located, and if the state determines that the injection or disposal will not result in the degradation of ground or surface water resources.	§ 122.2
Pollutant, Conservative	Pollutants that do not readily degrade in the environment and that are mitigated primarily by dilution after entering receiving waters (e.g., metals, total suspended solids).	Adapted from 1996 PWM
Pollutant, Non-Conservative	Pollutants that are mitigated by natural biodegradation or other environmental decay or removal processes in the receiving water after mixing and dilution have occurred (e.g., biochemical oxygen demand, pH, volatile organic compounds).	Adapted from 1996 PWM
Pretreatment	The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW.	§ 403.3(s)
Primary Industry Category	Any industry category listed in the NRDC settlement agreement (*Natural Resources Defense Council et al. v. Train,* 8 E.R.C. 2120 [D.D.C. 1976], modified 12 E.R.C. 1833 [D.D.C. 1979]); also listed in Appendix A of Part 122.	§ 122.2
Primary Treatment	The practice of removing some portion of the suspended solids and organic matter in wastewater through sedimentation. Common usage of this term also includes preliminary treatment to remove wastewater constituents that may cause maintenance or operational problems in the system (i.e., grit removal, screening for rags and debris, oil and grease removal, etc.).	1996 PWM
Priority Pollutants	Those pollutants considered to be of principal importance for control under the CWA based on the NRDC Consent Decree (*NRDC et al. v. Train,* 8 E.R.C. 2120 [D.D.C. 1976], modified 12 E.R.C. 1833 [D.D.C. 1979]); a list of the pollutants is provided as Appendix A to 40 CFR Part 423.	1996 PWM

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Process Wastewater	Any water [that], during manufacturing or processing, comes into direct contact with, or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.	§ 122.2
Production-Based Standard	A discharge standard expressed in terms of pollutant mass allowed per unit of product manufactured or some other measure of production.	1996 PWM
Proposed Permit	A state NPDES *permit* prepared after the close of the public comment period (and when applicable, any public hearing and administrative appeals) [that] is sent to EPA for review before final issuance by the state. A *proposed permit* is not a *draft permit*.	§ 122.2
Publicly Owned Treatment Works (POTW)	A treatment works as defined by CWA section 212, which is owned by a state or municipality [as defined by CWA section 502(4)]. This definition includes any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW. The term also means the municipality as defined in CWA section 502(4), which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.	§ 403.3(q)
Sanitary Sewer	A pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the POTW.	1996 PWM
Sanitary Sewer Overflows (SSO)	Untreated or partially treated sewage overflows from a sanitary sewer collection system.	1996 PWM
Secondary Industry Category	Any industry category, which is not a *primary industry category*.	§ 122.2
Secondary Treatment	Technology-based requirements for direct discharging POTWs. Standard is based on the expected performance of a combination of physical and biological processes typical for the treatment of pollutants in municipal sewage. Standards are expressed as a minimum level of effluent quality in terms of: BOD_5, total suspended solids (TSS), and pH (except as provided by treatment equivalent to secondary treatment and other special considerations).	Adapted from 1996 PWM
Section 304(a) Criteria	Developed by EPA under authority of CWA section 304(a) based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. This information is issued periodically to the states as guidance for use in developing criteria.	§ 131.3(c)
Self-Monitoring	Sampling and analyses performed by a facility to determine compliance with effluent limitations or other regulatory requirements.	1996 PWM

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Sewage Sludge	Any solid, semi-solid, or liquid residue removed during the treatment of municipal waste water or domestic sewage. Sewage sludge includes solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, type III marine sanitation device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.	Adapted from § 122.2 and Part 503
Significant Industrial User (SIU)	An indirect discharger that is the focus of control efforts under the National Pretreatment Program. SIUs include [with exceptions provided under § 403.3(v)]: i. All Industrial Users subject to Categorical Pretreatment Standards under § 403.6 and Chapter 1, Subchapter N. ii. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's operation or for violating any Pretreatment Standard or requirement [in accordance with § 403.8(f)(6)].	Adapted from § 403.3(v)
Spill Prevention Control and Countermeasure Plan (SPCC)	A plan prepared by a facility to minimize the likelihood of a spill and to expedite control and cleanup activities if a spill occurs. Such plans are required for certain facilities under the Oil Pollution Prevention Regulations at 40 CFR Part 112.	Adapted from 1996 PWM
Standard Industrial Classification (SIC) Code	A code number system used to identify various types of industries. A particular industry may have more than one SIC code if it conducts several types of commercial or manufacturing activities onsite. An online version of the 1987 SIC Manual <www.osha.gov/pls/imis/sic_manual.html> is available courtesy of the Occupational Safety & Health Administration (OSHA).	Adapted from 1996 PWM
Statement of Basis	A document prepared for every draft NPDES permit for which a fact sheet is not required. A statement of basis briefly describes how permit conditions were derived and the reasons the conditions are necessary for the permit.	1996 PWM
STORET	EPA's computerized STOrage and RETrieval water quality data base that includes physical, chemical, and biological data measured in waterbodies throughout the United States.	1996 PWM
Storm Water (or Stormwater)	Stormwater runoff, snow melt runoff, and surface runoff and drainage.	§ 122.26(b)(13)
Technology-Based Effluent Limitation (TBEL)	An effluent limit for a pollutant that is based on the capability of a treatment method to reduce the pollutant to a certain concentration or mass loading level. TBELs for POTWs are derived from the secondary treatment regulations in Part 133 or state treatment standards. TBELs for non-POTWs are derived from effluent guidelines, state treatment standards, or by the permit writer on a case-by-case basis using best professional judgment.	Adapted from 1996 PWM

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Tiered Permit Limits	Permit limits that apply to the discharge only when a certain threshold (e.g., production level), specific circumstance (e.g., batch discharge), or time frame (e.g., after 6 months, during the months of May through October) triggers their use.	Adapted from 1996 PWM
Total Maximum Daily Load (TMDL)	The sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If best management practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.	40 CFR § 130.2(i)
Total Suspended Solids (TSS)	A measure of the filterable solids present in a sample, as determined by the method specified in Part 136.	1996 PWM
Toxic Pollutant	Any pollutant listed as toxic under CWA section 307(a)(1) or, in the case of *sludge use or disposal practices*, any pollutant identified in regulations implementing CWA section 405(d).	§ 122.2
Toxicity Reduction Evaluation (TRE)	A site-specific study conducted in a step-wise process designed to identify the causative agent(s) of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.	1996 PWM
Toxicity Test	A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.	1996 PWM
Trading (or Water Quality Trading)	An innovative approach to achieve water quality goals more efficiently. Trading is based on the fact that sources in a watershed can face very different costs to control the same pollutant. Trading programs allow facilities facing higher pollution control costs to meet their regulatory obligations by purchasing environmentally equivalent (or superior) pollution reductions from another source at lower cost, thus achieving the same water quality improvement at lower overall cost.	Water Quality Trading Fact Sheet: <www.epa.gov/owow/watershed/trading/handbook/factsheet.html>
Treatability Manual	Five-set library of EPA guidance manuals that contain information related to the treatability of many pollutants. The manual may be used in developing effluent limitations for facilities and pollutants, which, at the time of permit issuance, are not subject to industry-specific effluent guidelines. The five volumes that comprise this series consist of Vol. I – Treatability Data (EPA-600/8-80-042a); Vol. II – Industrial Descriptions (EPA-600/8-80-042b); Vol. III – Technologies (EPA-600/8-80-042c); Vol. IV – Cost Estimating (EPA-600/8-80-042d); and Vol. V – Summary (EPA-600/8-80-042e).	1996 PWM
Treatment Works Treating Domestic Sewage (TWTDS)	A POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices. For purposes of this definition, *domestic sewage* includes waste and waste water from humans or household operations that are discharged to or otherwise enter a treatment works.	Adapted from § 122.2

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Upset	An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.	§ 122.41(n)
Use Attainability Analysis	A structured scientific assessment of the factors affecting the attainment of the use that [can] include physical, chemical, biological, and economic factors as described in § 131.10(g).	§ 131.3
Variance	Any mechanism or provision under CWA sections 301 or 316 or under 40 CFR Part 125, or in the applicable *effluent limitations guidelines*, which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of the CWA. This includes provisions, [that] allow the establishment of alternative limitations based on fundamentally different factors or on CWA sections 301(c), 301(g), 301(h), 301(i), or 316(a).	§ 122.2
Wasteload Allocation (WLA)	The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.	Adapted from § 130.2(h)
Water Quality Criteria	Elements of state water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.	§ 131.3(b)
Water Quality Limited Segment	Any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by CWA sections 301(b) and 306.	§ 131.3
Water Quality Standards (WQS)	Provisions of state or federal law that consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based on such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water, and serve the purposes of the CWA.	Adapted from §131.3
Water Quality-Based Effluent Limitation (WQBEL)	An effluent limitation determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (e.g., aquatic life, human health, wildlife, translation of narrative criteria) for a specific point source to a specific receiving water.	Adapted from 1996 PWM

Exhibit A-2 Glossary (continued)

Term	Definition	Citation
Waters of the United States	Means a. All waters [that] are currently used, were used in the past, or [could] be susceptible to use in interstate or foreign commerce, including all waters [that] are subject to the ebb and flow of the tide. b. All interstate waters, including interstate *wetlands*. c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, *wetlands*, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters 1. [That] are or could be used by interstate or foreign travelers for recreational or other purposes. 2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce or 3. [That] are used or could be used for industrial purposes by industries in interstate commerce. d. All impoundments of waters otherwise defined as waters of the United States under this definition. e. Tributaries of waters identified in paragraphs (a) through (d) of this definition. f. The territorial sea and g. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. [see additional notes in § 122.2]	§ 122.2
Whole Effluent Toxicity (WET)	The aggregate toxic effect of an effluent measured directly by a toxicity test.	§ 122.2

Appendix B. Index to the CWA and NPDES Regulations

This appendix provides two tables to help permit writers navigate Clean Water Act (CWA) legislation and National Pollutant Discharge Elimination System (NPDES) regulations. The first table provides key sections of the CWA and the second table provides an index to NPDES regulations.

B.1 Index to Sections of the CWA

Title 33 of the *United States Code* (U.S.C.) includes the statutes and amendments to the CWA. Exhibit B-1 matches key sections of the CWA to the appropriate reference in the U.S.C. This latest version, dated December 20, 2004, was provided by the New England Interstate Water Pollution Control Commission.

Exhibit B-1 Index to sections of the CWA

33 U.S.C. section	Section title	CWA section
Subchapter I Research and Related Programs		
1251	Congressional declaration of goals and policy	**101**
1252	Comprehensive programs for water pollution control	**102**
1253	Interstate cooperation and uniform laws	**103**
1254	Research, investigations, training and information	**104**
1255	Grants for research and development	**105**
1256	Grants for pollution control programs	**106**
1257	Mine water pollution demonstrations	**107**
1258	Pollution control in the Great Lakes	**108**
1259	Training grants and contracts	**109**
1260	Applications for training grants and contracts; allocations	**110**
1261	Scholarships	**111**
1262	Definitions and authorization	**112**
1263	Alaska village demonstration project	**113**
1265	In-place toxic pollutants	**115**
1266	Hudson River reclamation demonstration project	**116**
1267	Chesapeake Bay	**117**
1268	Great Lakes	**118**
1269	Long Island Sound	**119**
1270	Lake Champlain management conference	**120**
1273	Lake Pontchartrain Basin	**121**
1274	Wet weather watershed pilot projects	**121**
Subchapter II Grants for Construction of Treatment Works		
1281	Congressional declaration of purpose	**201**
1282	Federal share	**202**
1283	Plans, specifications, estimates, and payments	**203**
1284	Limitations and conditions	**204**
1285	Allotment of grant funds	**205**
1286	Reimbursement and advanced construction	**206**
1287	Authorization of appropriations	**207**
1288	Area wide waste treatment management	**208**
1289	Basin planning	**209**

Exhibit B-1 Index to sections of the CWA (continued)

33 U.S.C. section	Section title	CWA section
1290	Annual survey	**210**
1291	Sewage collection system	**211**
1292	Definitions	**212**
1293	Loan guarantees	**213**
1294	Wastewater recycling and reuse information and education	**214**
1295	Requirements for American materials	**215**
1296	Determination of priority	**216**
1297	Guidelines for cost-effective analysis	**217**
1298	Cost effectiveness	**218**
1299	State certification of projects	**219**
1300	Pilot program for alternative water source projects	**220**
1301	Sewer overflow control grants	**221**
	Subchapter III Standards and Enforcement	
1311	Effluent Limitations	**301**
1312	Water quality-related effluent limitations	**302**
1313	Water quality standards and implementation plans	**303**
1314	Information and guidelines	**304**
1315	Water quality inventory	**305**
1316	National standards of performance	**306**
1317	Toxic and pretreatment effluent standards	**307**
1318	Records and reports, inspections	**308**
1319	Enforcement	**309**
1320	International pollution abatement	**310**
1321	Oil and hazardous substance liability	**311**
1322	Marine sanitation devices	**312**
1323	Federal facility pollution control	**313**
1324	Clean lakes	**314**
1325	National study commission	**315**
1326	Thermal discharges	**316**
1328	Aquaculture	**318**
1329	Nonpoint source management program	**319**
1330	National estuary study	**320**
	Subchapter IV Permits and Licenses	
1341	Certification	**401**
1342	National pollutant discharge elimination system	**402**
1343	Ocean discharge criteria	**403**
1344	Permits for dredge and fill materials	**404**
1345	Disposal or use of sewage sludge	**405**
1346	Coastal recreation water quality monitoring and notification	**406**
	Subchapter V General Provisions	
1361	Administration	**501**
1362	Definitions	**502**
1363	Water pollution control advisory board	**503**
1364	Emergency powers	**504**
1365	Citizen suits	**505**
1366	Appearance	**506**
1367	Employee protection	**507**
1368	Federal procurement	**508**
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1371	Authority under other laws and regulations	**511**
1251 Note	Separability	**512**
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1373	Public health agency coordination	**514**
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Subchapter VI State Water Pollution Control Revolving Funds		
1381	Grants to States for establishment of revolving funds	**601**
1382	Capitalization grant agreements	**602**
1383	Water pollution control revolving loan funds	**603**
1384	Allotment of funds	**604**
1385	Corrective actions	**605**
1386	Audits, reports, fiscal controls, intended use plan	**606**
1387	Authorization of appropriations	**607**

B.2 Index to NPDES Regulations

The index to NPDES regulations table presented in Exhibit B-2 was created by Sylvia Kawabata of EPA Region 10 on February 1, 1986, and is maintained by Doug Corb of EPA Region 1.

Exhibit B-2 Index to NPDES regulations

Subject	40 CFR section number
Selected CWA sections	
CWA section 301(c) – Modification of Timetable	§ 122.21(m)(2) Part 125, Subpart E (reserved)
CWA section 301(g) – Modifications for Certain Nonconventional Pollutants	§ 122.21(m)(2) Part 125, Subpart F (reserved) *Technical Guidance Manual for the Regulations Promulgated Pursuant to section 301(g) of the Clean Water Act of 1977 and 40 CFR Part 125 (Subpart F); August 22, 1984.* <www.epa.gov/npdes/pubs/owm0008.pdf>
CWA section 301(h) – Secondary Treatment Waiver	§ 122.21(n)(1) Part 125, Subpart G
CWA section 301(n) – Timetable for Achievement of Objectives	See Fundamentally Different Factors
CWA section 316(a) – Thermal Discharges	§ 122.21(m)(6) Part 125, Subpart H § 124.57 § 124.62(a)(2) § 124.66
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Administrative Procedures Act Permit Continuance	§ 122.6
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Alternate Test Procedures • Application • Approval	 • § 136.4 • § 136.5
Ambient Monitoring (for Indicator Parameters)	§ 122.44(d)(1)(vi)(C)(3)
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Antidegradation Policy	§ 131.12
Applicability to State NPDES Programs	See General Conditions for All Permits (State Programs)
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Aquaculture	§ 122.25 Part 125, Subpart B
Aquatic Animal Production Facilities • Application • Definition Criteria for Determination • General Permit	§ 122.24 • § 122.21(i)(2) • § 122.24 Part 122, Appendix C • § 122.28
Average Monthly (Definition) • Requirements for use in Non-POTWs • Requirements for use in POTWs	§ 122.2 • § 122.45(d)(1) • § 122.45(d)(2)
Average Weekly (Definition) • Requirements for use in POTWs	§ 122.2 • § 122.45(d)(2)
Biochemical Oxygen Demand (BOD_5)	§ 133.101(d)
Backsliding • From Water Quality and Technology Based Limits • From Water Quality	§ 122.44(l) § 122.62(a)(15) § 122.62(a)(17) • CWA section 402(o) • CWA section 303(d)(4)
Best Management Practices • Definition • In Effluent Limitation Guidelines • Case-by-Case Authority	 • § 122.2 § 122.44(k) § 130.2(m) • CWA section 304(e) • CWA section 402(a)(1)
Best Professional Judgment (BPJ) • Case-by-Case Authority • Appropriate Factors	 • §125.3(a)(1) • §§125.3(c) and 125.3(d)
BMP	See Best Management Practices
Boilerplate Permit Conditions	§§ 122.41 - 122.42
BPJ	See Best Professional Judgment
Bypasses	§ 122.41(m)
CAFO	See Concentrated Animal Feeding Operations
Calculating NPDES Permit Conditions	§ 122.45
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	§ 133.101(e)
Case-by-Case Limitations	See also BPJ § 122.44(a) § 125.3
Case-by-Case Permits	See also BPJ § 124.52

Exhibit B-2 Index to NPDES regulations (continued)

Subject	40 CFR section number
Clean Water Act (CWA)	(Public Law 92-500), 33 U.S.C. 1251 *et seq.*, as amended by Public Laws 96-483; 97-117; 95-217, 97-117, 97-440, and 100-04
Coast Guard (Discharges from Transportation Over Water)	§ 122.44(p)
Coastal Zone Management Act	§ 122.49(d)
Combined Sewer Overflow Policy	59 FR 18688, April 19, 1994 <www.epa.gov/npdes/pubs/owm0111.pdf>
Comments Received During Public Notice Period	§ 124.13
Compliance Schedules (in permits) • Allowance by State Water Quality Standards	§ 122.41(l)(5) § 122.47 §§ 122.62(a)(4), (a)(9), (a)(13) • Star-kist Caribe, Inc., NPDES Appeal No. 88-5 <www.epa.gov/npdes/pubs/owm0121.pdf> (EAB, May 25, 1992)
Computation of Time	§ 124.20
Concentrated Animal Feeding Operations	§ 122.23
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Conditions Applicable to Specified Categories	§ 122.42
Confidentiality of Information	§ 122.7 Part 2
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Continuation of Expired Permits	§ 122.6
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Conventional Pollutants	§ 401.16
Cooling Water Intake Structures [CWA section 316(b)]	Part 125, Subparts I, J and N § 122.21(r) § 401.14
DMR	See Discharge Monitoring Report
Daily Average	See Average Monthly
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Definitions	§ 122.2 § 124.2 § 401.11
Denial of Permit • Public Notice of Denial	§ 124.6(b) • § 124.10(a)(1)(i)
Design Flow (POTWs)	§ 122.45(b)(1)
Dilution, Not A Substitute For Treatment	§ 122.45(f)(1)(iii) § 125.3(f)
Discharge Monitoring Report (DMR)	§ 122.41(l)(4)
Discharge of a Pollutant (Definition)	§ 122.2
Disposal into Wells, into POTWs, or by Land Application	§ 122.50 § 122.45(i)
Draft Permit	§ 124.6
Dredged Materials (Discharge to Waters of the United States)	CWA section 404
Duration of Permits • Computation of time	§ 122.46 • § 124.20
Duty to Comply	§ 122.41(a)
Duty to Mitigate	§ 122.41(d)
Duty to Provide Information	§ 122.41(h)
Duty to Reapply	§ 122.41(b)
Effect of a Permit	§ 122.5

Exhibit B-2 Index to NPDES regulations (continued)

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Endangered Species Act	§ 122.49(c)
Enforcement Authority	§ 123.27
Environmental Impact Statement (EIS) • EIS Public Notice of a New Source • Final EIS • New Source • NEPA	 • § 124.10(b)(1) • § 124.61 • § 122.29(c) • Part 6
Equivalent To Secondary Treatment (for POTWs)	§ 133.105
Establishing Limitations, Standards	§ 122.44
Establishing Permit Conditions	§ 122.43
Evidentiary Hearing Procedures (Eliminated)	§§ 124.21 (b) - (c)
Exclusions	§ 122.3
Existing Source (Definition)	§ 122.29(a)(3)
Expiration Dates	See Duration of Permits
Extension of Public Notice Comment Period	§ 124.12(c)
FDF	See Fundamentally Different Factors
Fact Sheets	§ 124.8 § 124.56
Feedlots	See Concentrated Animal Feeding Operations
Filter Backwash	§ 125.3(g)
Fish and Wildlife Coordination Act	§ 122.49(e)
Fish Farms	See Aquatic Animal Production Facilities
Flow Augmentation	§ 125.3(f)
Flow Limits (POTW - Design Flow)	§ 122.45(b)
Flow Monitoring Requirement	§ 122.44(i)(1)(ii)
Fundamentally Different Factors (FDF)	§ 122.21(m)(1) § 122.44(d)(8) Part 125, Subpart D
Frequency of Sampling (Not less than once per year)	§ 122.44(i)(2)
General Conditions Applicable to All Permits	§ 122.41
General Conditions for All Permits (State Programs)	§ 123.25
General Permits • Public Notice • Individual Permit Required	§ 122.28 • § 124.10(c)(2)(i) • § 122.28(b)(3)
Great Lakes Water Quality Guidance	Part 132
Indian Tribe (Definition)	§ 124.2
Innovative Technology	See CWA section 301(k) – Innovative Technology
Inspection and Entry	§ 122.41(i)
Internal Waste Streams	§ 122.45(h)
Interim Dates for Schedules of Compliance	§ 122.47(a)(3)
Introduction of New Pollutants (POTW)	§ 122.42(b)
Issuance and Effective Date	§ 124.15 § 124.60
Mass Limitations	§ 122.45(f) § 122.44(i)(1)(i)
Maximum Daily (Definition) • Requirements for Non-POTWs	§ 122.2 • § 122.45(d)(1)
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Exhibit B-2 Index to NPDES regulations (continued)

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Monitoring and Records • Monitoring Reports • Requirements • Recordkeeping	§ 122.41(j) • § 122.41(l)(4) • § 122.44(h) • § 122.21(p)
Municipal Separate Storm Sewer Systems (MS4) • When Permit Required • Definitions	 • §§ 122.26(a)(3), (4), and (5) • § 122.26(b)
• Large and Medium MS4s Application Requirements • Small MS4 Requirements	• § 122.26(d) • §§ 122.30 and 122.32 - 122.37
• Tribes	• § 122.31
NPDES (Definition)	§ 122.2
National Environmental Policy Act (NEPA)	§ 122.49(g)
National Historic Preservation Act	§ 122.49(b)
Navigable Waters (Definition)	§ 110.1
Navigation	§ 122.44(q)
Need to Halt or Reduce Activity, Not a Defense	§ 122.41(c)
Net/Gross - Intake Credits	§ 122.45(g)
New Discharger (Definition)	§ 122.2
New Source • Definition • Application Requirements • Program Requirements • Determination • Mitigation Measures • Prohibited discharges • Public Notice	 • § 122.2 • § 122.21(k) • § 122.29 • § 122.29(b) • § 122.44(d)(9) • § 122.4(i) • § 124.10(a)(1)(vi)
Non-Attainment Waters	§ 130.10(d)
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Noncompliance • Anticipated • Other	 • § 122.41(l)(2) • § 122.41(l)(7)
Notification Levels • General • For Existing Manufacturing, Commercial, Mining, and Silvicultural Dischargers	 • § 122.62(a)(12) • § 122.42(a) • § 122.44(f)
Ocean Discharge Criteria	Part 125, Subpart M
Offshore Oil and Gas Facilities • Requirements Applicable to Cooling Water Intake Structures for New Offshore Oil and Gas Extraction Facilities under CWA section 316(b) • General Permit Requirements & Application	 • Part 125, Subpart N • § 122.28(c)
Effluent Guidelines and Standards	Part 435, Subpart A
Stormwater Exemption	§ 122.26(a)(2)
Oil Pollution Prevention	Part 112

Exhibit B-2 Index to NPDES regulations (continued)

Subject	40 CFR section number
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Operation and Maintenance	§ 122.41(e)
pH Limits with Continuous Monitoring	§ 401.17
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POTWs, Applications for New and Existing	§ 122.21(j)
Pretreatment	§ 122.44(j) Part 403
Primary Industry Categories	Part 122, Appendix A
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Priority Pollutants	Part 423, Appendix A
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Production-based Limitations	§ 122.45(b)
Prohibitions	§ 122.4
Proper Operation and Maintenance	§ 122.41(e)
Property Rights	§ 122.41(g)
Public Hearing • Public Notice for Public Hearings	§ 124.12 • § 124.10(b)(2) § 124.10(d)(2)
Public Notice • Specific Procedures Applicable to NPDES Permits	§ 124.10 • § 124.57
Reapplication	§ 122.21(d)
Recordkeeping and Reporting	§ 122.21(p) § 122.41(j)(2) § 122.48
Reopener Clause • Treatment Works Treating Domestic Sewage • Other	 • § 122.44(c) • § 122.62(a)(7)
Reopening of Public Comment Period	§ 124.14
Response to Comments	§ 124.17
Reasonable Potential (RP) - Need For A Limit • Chemical Specific • Whole Effluent Toxicity (WET)	§ 122.44(d)(1) • § 122.44(d)(1)(vi) • § 122.44(d)(1)(v)
Retention of Records	§ 122.41(j)(2)
Revocation and Reissuance	§ 122.62
Sample Type (Composite/Grab)	§ 122.21(g)(7)(i)
Sample Holding Times, Containers, and Preservation	§ 136.3
Sample, Representative	§ 122.41(j)
Schedule of Compliance (Definition)	See also Compliance Schedule § 124.2
Secondary Treatment Regulation (POTW) • Definitions • Secondary Treatment • Special Considerations • Treatment Equivalent to Secondary Treatment	Part 133 • § 133.101 • § 133.102 • § 133.103 • § 133.105
Signatory Requirements	§ 122.22
Silviculture	§ 122.27

Exhibit B-2 Index to NPDES regulations (continued)

Subject	40 CFR section number
Sludge (Definition) • Sludge Standards • Land Application • Surface Disposal • Pathogens and Vector Attraction Reduction • Incineration	§ 122.44(o) • Part 503 • Part 503, Subpart B • Part 503, Subpart C • Part 503, Subpart D • Part 503, Subpart E
Sludge, Municipal Co-Disposal Landfills	Part 258
Sludge-Only Facilities (Handlers)	§ 122.1(b)(3)
Small Business Exemption	§ 122.21(g)(8)
Solid Waste Facilities, Classification of	Part 257
Spill Prevention, Control, and Countermeasures (SPCC)	§ 112.3
Standard Conditions	§§ 122.41 and 122.42
State Certification • Applications for CWA section 301(h) Variances • Effect of State Certification	§ 124.53 • § 124.54 • § 124.55
State Program Requirements	Part 123
Statutory Deadlines • For POTWs • For Non-POTWs	 • § 125.3(a)(1) • § 125.3(a)(2)
Statutory Variances and Extensions	§ 125.3(b)
Stays of Contested Permit Conditions	§ 124.16
Stormwater • Discharge Associated with Industrial Activity	§ 122.26 • § 122.26(b)(14)
Test Methods, EPA Approved	Part 136
Ten-Year Protection Period	See also New Sources and Dischargers § 122.29
Termination of a Permit	§ 122.64
Thermal Discharge Variance	See CWA section 316(a) – Thermal Discharges
Total Maximum Daily Load (TMDL) • Definition • Which Waterbodies Need TMDLs	 • § 130.2 • § 130.7
Toxics – Application and Testing	§ 122.21(g)(7) § 122.21(g)(9) § 122.21(g)(11)
Toxic Pollutants (Definition) • Technology-based Controls	§ 122.2 • § 122.44(e)
Toxic Pollutant List	§ 401.15
Toxicity Based Permit Limits	§ 125.3(c)(4)
Transfer of Permit	§ 122.61
Treatment Works Treating Domestic Sewage Sludge (TWTDS) (Definition)	§ 122.2
Twenty-four Hour Reporting	§ 122.41(l)(6)
Upset	§ 122.41(n)
Variances for • Non-POTWs • POTWs • Appeals of variances • Decisions on variances • Expedited variance procedures and time extensions • Procedures for variances when EPA is the permitting authority	 • § 122.21(m) • § 122.21(n) • § 124.64 • § 124.62 • § 122.21(o) • § 124.63

Exhibit B-2 Index to NPDES regulations (continued)

Subject	40 CFR section number
Vessel (Definition)	§ 112.2
Waste Stabilization Ponds (POTW)	§ 133.103(c)
Water Quality Report – CWA section 305(b)	§ 130.8
Water Quality Standards (WQS) • Scope • Purpose • Definitions • State Authority • EPA Authority • Submission, Minimum Requirements • Dispute Resolution • Establishment of Standards • Criteria • Antidegradation Policy • General Policies on Establishing WQS • State Review and Revision of WQS • EPA Review and Approval of WQS • EPA Promulgation of WQS • Federally Promulgated Standards (State-By-State List)	Part 131 • § 131.1 • § 131.2 • § 131.3 • § 131.4 • § 131.5 • § 131.6 • § 131.7 • § 131.10 • § 131.11 • § 131.12 • § 131.13 • § 131.20 • § 131.21 • § 131.22 • Part 131, Subpart D
Waters of the United States (Definition)	§ 122.2
Wetlands	See Waters of the U.S. § 122.2
Whole Effluent Toxicity (WET) Limits	§ 122.44(d)(1)(iv) § 125.3(c)(4)
WET Testing With Permit Application (POTWs)	§ 122.21(j)
Wild and Scenic Rivers Act	§ 122.49(a)
Withdrawal Of State Program	§§ 123.63 - 123.64

Appendix C. Priority Pollutants

Exhibit C-1 presents the list of 126 priority (toxic) pollutants from 40 CFR Part 423 Appendix A, which are further discussed in sections 1.2 and 6.1.1.2 of this manual. Note that the list goes up to 129 because numbers 017, 049, and 050 were deleted.

Exhibit C-1 Priority pollutants from 40 CFR Part 423, Appendix A

#	Pollutant name	#	Pollutant name
001	Acenaphthene	067	Butyl benzyl phthalate
002	Acrolein	068	Di-N-Butyl Phthalate
003	Acrylonitrile	069	Di-n-octyl phthalate
004	Benzene	070	Diethyl Phthalate
005	Benzidine	071	Dimethyl phthalate
006	Carbon tetrachloride (tetrachloromethane)	072	1,2-benzanthracene (benzo(a) anthracene
007	Chlorobenzene	073	Benzo(a)pyrene (3,4-benzo-pyrene)
008	1,2,4-trichlorobenzene	074	3,4-Benzofluoranthene (benzo(b) fluoranthene)
009	Hexachlorobenzene	075	11,12-benzofluoranthene (benzo(b) fluoranthene)
010	1,2-dichloroethane	076	Chrysene
011	1,1,1-trichloreothane	077	Acenaphthylene
012	Hexachloroethane	078	Anthracene
013	1,1-dichloroethane	079	1,12-benzoperylene (benzo(ghi) perylene)
014	1,1,2-trichloroethane	080	Fluorene
015	1,1,2,2-tetrachloroethane	081	Phenanthrene
016	Chloroethane	082	1,2,5,6-dibenzanthracene (dibenzo(,h) anthracene)
018	Bis(2-chloroethyl) ether	083	Indeno (,1,2,3-cd) pyrene (2,3-o-pheynylene pyrene)
019	2-chloroethyl vinyl ether (mixed)	084	Pyrene
020	2-chloronaphthalene	085	Tetrachloroethylene
021	2,4, 6-trichlorophenol	086	Toluene
022	Parachlorometa cresol	087	Trichloroethylene
023	Chloroform (trichloromethane)	088	Vinyl chloride (chloroethylene)
024	2-chlorophenol	089	Aldrin
025	1,2-dichlorobenzene	090	Dieldrin
026	1,3-dichlorobenzene	091	Chlordane (technical mixture and metabolites)
027	1,4-dichlorobenzene	092	4,4-DDT
028	3,3-dichlorobenzidine	093	4,4-DDE (p,p-DDX)
029	1,1-dichloroethylene	094	4,4-DDD (p,p-TDE)
030	1,2-trans-dichloroethylene	095	Alpha-endosulfan
031	2,4-dichlorophenol	096	Beta-endosulfan
032	1,2-dichloropropane	097	Endosulfan sulfate
033	1,2-dichloropropylene (1,3-dichloropropene)	098	Endrin
034	2,4-dimethylphenol	099	Endrin aldehyde
035	2,4-dinitrotoluene	100	Heptachlor
036	2,6-dinitrotoluene	101	Heptachlor epoxide (BHC-hexachlorocyclohexane)
037	1,2-diphenylhydrazine	102	Alpha-BHC
038	Ethylbenzene	103	Beta-BHC
039	Fluoranthene	104	Gamma-BHC (lindane)
040	4-chlorophenyl phenyl ether	105	Delta-BHC (PCB-polychlorinated biphenyls)

Exhibit C-1 Priority pollutants from 40 CFR Part 423, Appendix A (continued)

#	Pollutant name	#	Pollutant name
041	4-bromophenyl phenyl ether	106	PCB-1242 (Arochlor 1242)
042	Bis(2-chloroisopropyl) ether	107	PCB-1254 (Arochlor 1254)
043	Bis(2-chloroethoxy) methane	108	PCB-1221 (Arochlor 1221)
044	Methylene chloride (dichloromethane)	109	PCB-1232 (Arochlor 1232)
045	Methyl chloride (dichloromethane)	110	PCB-1248 (Arochlor 1248)
046	Methyl bromide (bromomethane)	111	PCB-1260 (Arochlor 1260)
047	Bromoform (tribromomethane)	112	PCB-1016 (Arochlor 1016)
048	Dichlorobromomethane	113	Toxaphene
051	Chlorodibromomethane	114	Antimony
052	Hexachlorobutadiene	115	Arsenic
053	Hexachloromyclopentadiene	116	Asbestos
054	Isophorone	117	Beryllium
055	Naphthalene	118	Cadmium
056	Nitrobenzene	119	Chromium
057	2-nitrophenol	120	Copper
058	4-nitrophenol	121	Cyanide, Total
059	2,4-dinitrophenol	122	Lead
060	4,6-dinitro-o-cresol	123	Mercury
061	N-nitrosodimethylamine	124	Nickel
062	N-nitrosodiphenylamine	125	Selenium
063	N-nitrosodi-n-propylamin	126	Silver
064	Pentachlorophenol	127	Thallium
065	Phenol	128	Zinc
066	Bis(2-ethylhexyl) phthalate	129	2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)

Appendix D. New Source Dates by Effluent Guideline Category

This appendix provides the applicable new source dates used in making new source determinations by effluent guideline category as provided in Appendix B of the U.S. Environmental Protection Agency (EPA) memorandum *New Source Dates for Direct and Indirect Dischargers*[1] <www.epa.gov/npdes/pubs/newsource_dates.pdf> sent by the directors of EPA's Water Permits Division and the Engineering and Analysis Division to the Regional Water Division Directors on September 28, 2006. Section 5.2.2.4 of this manual discusses the determination of whether existing or new source standards apply.

EPA has promulgated regulations under the Clean Water Act (CWA) that establish effluent limitations guidelines for existing sources, standards of performance for new sources and pretreatment standards for new and existing sources. EPA has codified these regulations at Title 40 of the *Code of Federal Regulations* (CFR) Subchapter N. As discussed in section 5.2.1 of this manual, EPA has published effluent guidelines for 56 major industrial categories (over 450 subcategories) since the passage of the 1972 CWA. Those regulations limit the discharge of pollutants to surface waters by point source dischargers (*direct dischargers*). The regulations also limit the introduction of pollutants into publicly owned treatment works (POTWs) by industrial users (*indirect dischargers*). The CWA and EPA regulations define when a source is a *new source*. A discharger is defined as a new source in CWA sections 306(a)(2) and 307(c) and §§ 122.2 (for direct dischargers) and 403.3(m) (for indirect dischargers). In general, a facility is a new source if it begins construction after either the date of promulgation of new source performance standards applicable to the direct dischargers or the date of publication of a proposed new source performance standard applicable to an indirect discharger.

Exhibit D-1 lists new source dates for direct or indirect dischargers based on regulatory definitions. In some cases, effluent guidelines in 40 CFR Chapter I, Subchapter N, specify New Source Dates, and these dates are reported in the table below. If dates are not specified in the rule language, EPA based the date on the regulatory definitions of new source, which are cited above. EPA's General Pretreatment Regulations provide that an indirect source is a new source if construction of the source began after the publication of proposed pretreatment standards for new sources if the proposed standard is later finalized [§ 403.3(m)]. For direct dischargers, § 122.2 states that the New Source date is the proposal date if the standard is finalized within 120 days after its proposal; otherwise, the New Source date is the *promulgation date*. EPA's regulations establish the time and date of EPA's actions for purposes of determining when the action is subject to judicial review. The regulations, in the case of the CWA, define the date of an EPA promulgation action as two weeks after the rule appears in the *Federal Register* (see § 23.2). Before February 1985, the date on which the final rule was published was considered the promulgation date.

This document is not a regulation itself, nor does it substitute for any requirements under the CWA or EPA's regulations. Thus, it does not impose legally binding requirements on EPA, states or the regulated community. While EPA has made every effort to ensure the accuracy of this table, dischargers' obligations are determined, in the case of direct dischargers, by the terms of their NPDES permit and the CWA and EPA's regulations, and, in the case of indirect dischargers, by permits or equivalent control

mechanisms issued to POTW industrial users and the CWA and EPA regulations. Nothing in this document changes any statutory or regulatory requirement. If the discussion in this memorandum conflicts with any permit or regulation, this document would not be controlling.

Exhibit D-1 New source dates by effluent category

40 CFR Part	Category	New source date for direct dischargers		New source date for indirect dischargers	
467	Aluminum Forming	Subparts A-F:	10/24/83	Subparts A-F:	11/22/82
427	Asbestos Manufacturing	Subparts A-K:	10/30/73[2]	Not Applicable	
461	Battery Manufacturing	Subparts A-G:	03/09/84	Subparts A-G	11/10/82
407	Canned and Preserved Fruits and Vegetables Processing	Subparts A-H:	03/21/74	Not Applicable	
408	Canned and Preserved Seafood Processing	Subparts A-J, N: Subparts O-AG:	06/26/74 12/01/75	Not Applicable	
458	Carbon Black Manufacturing	Subparts A-D:	01/09/78	Subparts A-D:	05/18/76
411	Cement Manufacturing	Subparts A-C:	02/20/74	Not Applicable	
437	Centralized Waste Treatment (CWT)	Subparts A-D:	01/05/01	Subparts A-D:	01/13/99
434	Coal Mining	Subparts B-E, H: Subpart G:	05/04/84[3] 02/22/02[4]	Not Applicable	
465	Coil Coating	Subparts A-C: Subpart D:	12/01/82 11/17/83	Subparts A-C: Subpart D:	01/12/81 02/10/83
412	Concentrated Animal Feeding Operations (CAFO)	Subparts A-B: Subparts C-D:	02/14/74 04/14/03[5]	Subpart B:	09/07/73
451	Concentrated Aquatic Animal Production	Subparts A-B:	09/07/04	Not Applicable	
468	Copper Forming	Subpart A:	08/15/83	Subpart A:	11/12/82
405	Dairy Products Processing	Subparts A-L:	05/28/74	Not Applicable	
469	Electrical and Electronic Components	Subparts A-B: Subparts C-D:	04/08/83 12/14/83	Subparts A-B: Subparts C-D:	08/24/82 03/09/83
413	Electroplating	Not Applicable[6]		See Metal Finishing[7]	
457	Explosives Manufacturing	Not Applicable		Not Applicable	
424	Ferroalloy Manufacturing	Subparts A-C:	02/22/74	Not Applicable	
418	Fertilizer Manufacturing	Subparts A-D: Subpart E: Subparts F-G:	04/08/74 01/16/76 10/07/74[8]	Subparts A-D[9]: Subpart E: Subparts F-G:	12/07/73 01/16/76 10/07/74
426	Glass Manufacturing	Subpart A: Subparts B-D: Subparts E-G: Subparts H, J-M:	01/22/74 02/14/74 02/14/74 01/16/75	Subparts H, K-M:	08/21/74
406	Grain Mills	Subparts A-J:	12/04/73[10]	Subpart A:	12/04/73
454	Gum and Wood Chemicals	Not Applicable		Not Applicable	
460	Hospitals	Not Applicable		Not Applicable	
447	Ink Formulating	Subpart A:	07/28/75	Subpart A:	02/26/75

Exhibit D-1 New source dates by effluent category (continued)

40 CFR Part	Category	New source date for direct dischargers		New source date for indirect dischargers	
415	Inorganic Chemicals	Subparts B-F, H, K-N, P, Q, T, V, W, AJ [$CuSO_4$ manufacturing], AH, AP, AU [$NiSO_4$ manufacturing], BB: Subparts AJ [except $CuSO_4$ manufacturing], AU [except $NiSO_4$ manufacturing], BL - BO:	06/29/82 08/22/84	Subparts B-F, H, K-N, P, Q, V, AH, AJ [$CuSO_4$ manufacturing], AP, AU [$NiSO_4$ manufacturing], BB: Subparts T, AA, AC, AE, AI, AJ [except $CuSO_4$ manufacturing], AL, AN, AQ, AR, AU [except $NiSO_4$ manufacturing], AX, BC, BH, BK-BO:	07/24/80 10/25/83
420	Iron and Steel Manufacturing	Subparts A-B: Subpart C: Subpart D, Semi-Wet: Subpart D, Other: Subparts E-L: Subpart M:	11/18/02[11] 05/27/82 10/31/02 05/27/82 05/27/82 10/31/02	Subparts A-B: Subpart C: Subpart D, Semi-Wet: Subpart D, Other: Subparts E-F, H-J,L: Subpart M:	11/18/02[12] 01/07/81 12/27/00 01/07/81 01/07/81 12/27/00
445	Landfills	Subparts A-B:	02/02/00	Not Applicable	
425	Leather Tanning and Finishing	Subparts A, B, D-I: Subpart C:	11/23/82 04/04/88	Subpart A, B, D-I: Subpart C:	07/02/79 01/21/87
432	Meat and Poultry Products	Subparts A-D, Small Facilities: Subparts A-D, Other: Subparts E-I, Small Facilities: Subparts E-I, Other: Subpart J-L:	02/28/74[13] 09/22/04 01/03/75[14] 09/22/04 09/22/04	Not Applicable	
433	Metal Finishing	Subpart A:	07/15/83	Subpart A:	08/31/82
464	Metal Molding and Casting	Subparts A-D:	11/13/85	Subparts A-D:	11/15/82
438	Metal Products and Machinery	Subpart A:	06/12/03[15]	Not Applicable	
436	Mineral Mining and Processing	Not Applicable		Not Applicable	
471	Nonferrous Metals Forming and Metal Powders	Subparts A-J:	09/06/85	Subparts A-J:	03/05/84
421	Nonferrous Metal Manufacturing	Subparts B-I (except molybdenum acid plants), K-M: Subparts N-AE, molybdenum acid plants in subpart I: Subpart J:	03/08/84 10/04/85 02/04/88	Subparts B-I (except molybdenum acid plants), K-M: Subparts N-AE, molybdenum acid plants in subpart I: Subpart J:	02/17/83 06/27/84 01/22/87
435	Oil and Gas Extraction[16]	Subparts C (Onshore), D (Coastal), and E (Agriculture & Wildlife): Subparts A and D (Synthetic-Based Drilling Fluids):	03/04/93 02/05/01	Subpart D:	02/17/95
440	Ore Mining and Dressing	Subparts A-F, J, M:	12/03/82	Not Applicable	

Exhibit D-1 New source dates by effluent category (continued)

40 CFR Part	Category	New source date for direct dischargers		New source date for indirect dischargers	
414	Organic Chemicals, Plastics, and Synthetic Fibers	Subparts B-H:	11/19/87	Subparts B-H:	03/21/83
446	Paint Formulating	Subpart A:	07/28/75	Subpart A:	02/26/75
443	Paving and Roofing Materials (Tars and Asphalt)	Subparts A-D:	07/28/75	Subparts A-D:	01/10/75
455	Pesticide Chemicals	Subparts A-B: Subparts C, E:	10/12/93 11/20/96	Subparts A-B: Subparts C, E:	04/10/92 04/14/94
419	Petroleum Refining	Subparts A-E:	10/18/82	Subparts A-E:	12/21/79
439	Pharmaceutical Manufacturing	Subparts A-D:	11/20/98[17]	Subparts A-D:	05/02/95
422	Phosphate Manufacturing	Subparts D-F:	06/23/76	Not Applicable	
459	Photographic	Not Applicable		Not Applicable	
463	Plastics Molding and Forming	Subparts A-C:	12/17/84	Not Applicable	
466	Porcelain Enameling	Subparts A-D:	11/24/82	Subparts A-D:	01/27/81
430	Pulp, Paper, and Paperboard	Subparts B, E: Subparts A, C, D, F, G, I-L:	06/15/98[18] 11/18/82	Subparts B, E: Subparts A, C, D, F, G, I-L:	12/17/93 01/06/81
428	Rubber Manufacturing	Subparts A-D: Subparts E-J:	02/21/74 01/10/75	Subparts E-K:	08/23/74
417	Soap and Detergents Manufacturing	Subparts A-S:	4/12/74	Subpart Q: Subparts O, P, R:	12/26/73 02/20/75
423	Steam Electric Power Generation		11/19/82[19]		10/14/80
409	Sugar Processing	Subpart A: Subparts B, C:	1/31/74 12/07/73[20]	Not Applicable	

[1] Boornazian, Linda and Mary Smith. 2006. *New Source Dates for Direct and Indirect Dischargers*. U.S. Environmental Protection Agency, Office of Water Memorandum. September 28, 2006. <www.epa.gov/npdes/pubs/newsource_dates.pdf>.

[2] The rule was finalized within 120 days of its October 30, 1973, proposal (38 FR 22606).

[3] The New Source date is specified in 40 CFR 434.11(j)(1).

[4] The New Source date is specified in 40 CFR 434.11(j)(1).

[5] New Source date derived from the 10-year protection period [see 40 CFR 412.35(d) and 412.43(d)].

[6] Direct dischargers formerly regulated under Part 413 are now regulated under Part 433 (metal finishing).

[7] Pretreatment categorical standards in Part 413 currently apply only to job shop electroplaters and independent printed circuit board manufacturers that were in existence before the New Source date for Part 433 (metal finishing). Job shop electroplaters and independent printed circuit board manufacturers that are "New Sources" must comply with PSNS in Part 433. Except for these "existing" job shop electroplaters and independent printed circuit board manufacturers, all other operations formerly subject to Part 413 are now subject to Part 433.

[8] The rule was finalized within 120 days of its October 7, 1974, proposal.

[9] Section 41 8.46 (the PSNS under Subpart D) was suspended until further notice, at 40 FR 26275, June 23, 1975, effective July 20, 1975.

[10] The rule was finalized within 120 days of its December 4, 1973, proposal (38 FR 33438).

Endnotes for this chapter continued on the next page.

[11] Date specified in 40 CFR 420.14(a)(2), 420.16(a)(2), 420.24(b), and 420.26(a)(2).

[12] See previous footnote.

[13] The 2004 Amendment did not revise NSPSs for small meat products facilities in Subparts A-I, so the 2004 New Source date does not affect these facilities.

[14] See previous footnote.

[15] Date specified in 40 CFR 438.15.

[16] See promulgated standards at 40 CFR 58 FR 12505 and 66 FR 6850 for complete information on the applicability of New Source standards.

[17] New Source date derived from the 10-year protection period [see 40 CFR 439.15(c), 439.35(c), and 439.45(b)].

[18] Date specified in 40 CFR 430.25(b) and 430.55(b). Refer to these sections for additional information regarding the applicability of NSPSs.

[19] NSPS promulgated were not removed via the 1982 regulation; therefore wastewaters generated by Part 423-applicable sources that were New Sources under the 1974 regulations are subject to the 1974 NSPS. The New Source date for the 1974 regulations was 10/8/1974.

[20] The rule was finalized within 120 days of its December 7, 1973, proposal (38 FR 33846).

Notice of Intent Form

California Regional Water Quality Control Board
Los Angeles Region

Linda S. Adams
Acting Secretary for Environmental Protection

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Edmund G. Brown Jr.
Governor

NOTICE OF INTENT

TO COMPLY WITH GENERAL WASTE DISCHARGE REQUIREMENTS
AND
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT

SECTION I. DISCHARGE STATUS

Check only one item.

A. New Discharge ☐ B. Material Change ☐ C. Existing Discharge ☐ CI # _____

SECTION II. OWNER/OPERATOR & FACILITY INFORMATION

A. OWNER				
Name/Agency		Contact Person		
Mailing Address		Title of Contact Person		
City	County	State	ZIP	Phone

B. OPERATOR (*If different from owner)*				
Name/Agency		Contact Person		
Mailing Address		Title of Contact Person		
City	County	State	ZIP	Phone

C. FACILITY				
Facility Name			Owner Type (check one) 1. ☐City 2.☐ County 3.☐ State 4. ☐Fed 5. ☐Private	
Facility Address		Contact email address		
City	County	State	ZIP	Phone

D. STANDARD INDUSTRIAL CLASSIFICATION CODE (SIC) (4 digit code in order of priority)			
1.)	(specify)	2.)	(specify)
3.)	(specify)	4.)	(specify)

Nature of Business (provide a brief description)

SECTION III. APPLICABLE GENERAL PERMIT FOR DISCHARGE

Check only one item.

- ☐ Volatile Organic Compounds Contaminated Groundwater (Order No. R4-2007-0022), Include Supplemental Analysis
- ☐ Wastewaters from Investigation and/or Cleanup of Petroleum Fuel Pollution (Order No. R4-2007-0021), Include Supplemental Analysis
- ☐ Discharges of Groundwater from Potable Water Supply Wells (Order No. R4-2003-0108), Include Attachment A – Screening Levels
- ☐ Discharges of Groundwater from Construction and Project Dewatering (Order No. R4-2008-0032), Include Supplemental Analysis
- ☐ Discharge of Nonprocess Wastewater (Order No. R4-2009-0047), Include Supplemental Analysis
- ☐ Hydrostatic Test Water (Order No. 2009-0068), Include Attachment A – Screening Levels

SECTION IV. EXISTING REQUIREMENTS/PERMITS (Skip if not applicable)

List any active Orders or Permits adopted by this Regional Board for the facility.

A. Order No.

---------- ---------- ----------

B. NPDES Permit(s)

---------- ---------- ----------

SECTION V. OUTFALL AND RECEIVING WATER INFORMATION

List Discharge Point (Outfall) and receiving waterbody (river; stream; channel; lake; ocean; etc.)

Outfall Number (list)	Latitude			Longitude			Receiving Water (Name)
	Deg	Min	Sec	Deg	Min	Sec	

Attach additional sheet if necessary

SECTION VI. PROJECT DESCRIPTION AND TREATMENT PROCESS DESCRIPTION (if applicable)

Describe your project and describe the type of discharge requiring NPDES permit. If additives are added to your process, briefly describe their composition if the information is available. If treatment is necessary prior to discharge, attached a schematic flow diagram and provide description of all treatment processes. In addition, include the proposed maximum daily discharge volume in gallons per day (gpd), the approximate start-up date for the project and discharge, and the projected discharge duration. (attach additional sheets, if necessary)

Proposed Maximum Discharge Flow (gallons per day (gpd))	
Proposed discharge startup date	
Estimated discharge duration	

SECTION VII. DISCHARGE QUALITY INFORMATION

This NOI requires that you obtain and analyze representative influent wastewater sample for the pollutants listed on Attachment A.

Have you included a completed **Supplemental Pollutants Analysis/Measurements Form**? …….. ☐ Yes ☐ No

OR:

Have you included a completed Attachment A – **Screening for Potential Pollutants of Concern in Potable Water**?
(Applies only to potable water related discharges.) …….. ☐ Yes ☐ No

If **No**, explain.

(Note: Include the chain of custody Form and the analytical data from the laboratory with the screening forms)

SECTION VIII. OTHER REQUIRED INFORMATION

Provide a 7.5' USGS Quadrangle Map (Scale 1:24,000) showing the project location and identifying surface water to which you propose to discharge to.

Fees: Have you included appropriate filing fee with this submittal? (Applicable to new enrollees only)
Make checks payable to the Water Resources Control Board

SECTION IX. CERTIFICATION AND SIGNATURE (see appendix on who is authorized to sign)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I assure that the provisions of the permit will be complied with."

_____ _____
Printed Name of Person Signing Date

_____
Signature

_____
Title

SECTION X. FORM SUBMITTAL

Send this completed Notice of Intent to:
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Assistance with this form may be obtained by contacting the Regional Board at:
Phone (213) 576-6600
Fax (213) 576-6660

Notice of Intent Instructions

INSTRUCTIONS
FOR COMPLETING THE NOTICE OF INTENT FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMITS FOR DISCHARGE OF WASTEWATERS TO SURFACE WATERS

These instructions are intended to help you, the discharger, complete the Notice of Intent (NOI) form for general permits. Please type or print clearly when completing the NOI form and the vicinity map(s).

One NOI should be submitted by each owner/operator to cover all proposed discharges within the boundaries of this Regional Board.

Section I. Discharge Status

Please check appropriate box indicating whether this application is for new discharge, material change, or existing discharge. If it is an existing discharge, indicate four digit CI #.

Section II. Facility/Discharge Information

Section II.A. Owner

Name/Agency – The name (first and last)of the owner/operator of the facility. If the owner/operator is a company, corporation, etc., please put the name of the company, corporation, etc., in this space.
Contact Person – Please list the name (first and last) of the contact person for the owner/operator (agency, corporation, private business, etc.) listed above.
Mailing Address – The street number and street name where mail and correspondence should be sent (P.O. Box is acceptable).
City, County, State, Zip Code – The city, county, state, Zip code that apply to the mailing address given.
Title of Contact Person – The official company title of the contact person.
Phone – The daytime telephone number of the contact person.

Section II.B. Operator (if different from owner)

Name/Agency – The name (first and last)of the owner/operator of the facility. If the owner/operator is a company, corporation, etc., please put the name of the company, corporation, etc., in this space.
Contact Person – Please list the name (first and last) of the contact person for the owner/operator (agency, corporation, private business, etc.) listed above.
Mailing Address – The street number and street name where mail and correspondence should be sent (P.O. Box is acceptable).
City, County, State, Zip Code – The city, county, state, Zip code that apply to the mailing address given.
Title of Contact Person – The official company title of the contact person.
Phone – The daytime telephone number of the contact person

Section II.C. Facility

Name – The name (first and last) of the person responsible for this facility.
Address – The street number and street name where the facility or actual discharge is located. Check the most appropriate ownership, City, County, State, Federal or Private.
E-mail Address – Please list the e-mail address of the contact person for the owner/operator (agency, corporation, private business, etc.) listed above.
City, County, State, Zip Code – The city, county, state, Zip code that apply to the facility address.

Phone – The daytime telephone number of the person responsible for this facility.

Section II.D. Standard Industrial Classification (SIC) (4 digit code in order of priority)

List, in descending order of significance, the 4—digit standard industrial classification (SIC) codes which best describe your facility in terms of the principal products or services you produce or provide. Also, specify each classification in words. These classification may differ from the SIC codes describing the operations generating discharge, air emissions, or hazardous wastes.

SIC code numbers are descriptions which may be found in the "Standard Industrial Classification Manual" prepared by the Executive Office of the President, Office of Management and Budget, which is available from the Government Printing Office, Washington, D. C.. Use current edition of the manual. If you have any question concerning the appropriate SIC code for your facility the NPDES Permitting Units of the Regional Water Quality Control Board.

Section III. Type of Discharge

Check the appropriate box indicating the type of discharge for this facility. Check only one box.

Section IV. Existing Requirements/Permits

If this facility has no existing permits or orders, skip this section. If the facility has any existing permits or orders, list it in the appropriate space provided.

Section V. Outfall and Receiving Water Information

If the facility discharges into a storm drain, indicate the immediate receiving waterbody (listed in the Basin Plan) where the discharge drains into.

Section VI. Description of Project/Discharge

Provide summary description of the project. Also describe the general characteristic of the discharge. If required, indicate the treatment process that would be needed to bring the discharge into compliance. Provide estimate of maximum discharge flow rate, proposed discharge startup date, and estimated discharge duration.

Section VII. Discharge Quality

This NOI requires that you obtain and analyze for the pollutants listed on the *Supplemental Pollutants Analysis/Measurements* or*, Attachment A – Screening Levels for Potential Pollutants of Concern in Potable Water (applies to potable water related discharges only)*. Check the YES box if analytical result is attached. If not, provide reasons why it was not included. Note that processing of your NOI application may be delayed until this required information is provided.

Section VIII. Other Required Information

Attach to this application a topographic map (7.5' USGS Quadrangle Map, Scale 1:24,000) of the area. The map must show the outline of the facility.

Section IX. Certification and Signature

Printed Name of Person Signing – Please type or print legibly. This section should be filled out by the responsible person as defined by 40 CFR 122.22.
Signature and Date – Signature of name printed above and the date signed.
Title – The professional title of the person signing the NOI.

Required signatories per 40 CFR 122.22

1. For a corporation
   By responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (I) A president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy-or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental laws and regulations; the manager can assure that the necessary systems are established or action taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

2. For a partnership or sole proprietorship
   By a general partner or the proprietor, respectively; or

3. For a municipality, State, Federal or public agency
   By either a principal executive officer or ranking elected official. For the purposes of this section, a principal executive officer of a Federal agency includes: (I) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operation of a principal geographic unit of the agency.

Los Angeles Regional Water Quality Control Board (LARWQCB)

CWA Section 401 Water Quality Certification

Section 401 Water Quality Certification Application Form

California Regional Water Quality Control Board
Los Angeles Region

320 W. 4th Street, Suite 200, Los Angeles, California 90013
(213) 576-6600 • FAX (213) 576-6640
http://www.waterboards.ca.gov/losangeles

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

SECTION 401 WATER QUALITY CERTIFICATION APPLICATION FORM

Applications for Water Quality Certification shall be filed in accordance with Sections 3830 through 3869 of Title 23 of the California Code of Regulations. An initial deposit of **$944** must accompany all applications. Please include a check made out to the State Water Resources Control Board. The schedule of fees can be found at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/401_water_quality_certification/. **Failure to submit this fee deposit will make this application incomplete. Submit your completed application form to the address above, Attn: 401 Certification Staff.** Attach additional sheets as necessary.

1. APPLICANT/AGENT INFORMATION

a) Applicant:	b) Agent/Consultant*:
Main Contact:	Main Contact:
Address:	Address:
Email:	Email:
Phone No.	Phone No.
Fax No.	Fax No.

*Complete only if applicable

2. PROJECT DESCRIPTION

a) Project Title:

b) Purpose/Goal:

c) Project Activities: (Attach additional sheets as necessary)

Please provide a detailed explanation of all project activities. Include information such as: avoidance and minimization measures for project impacts; alternatives analysis; project activity impacts to waterbodies and/or water quality; and implementation of Low Impact Development (LID) strategies.

Please note that the Regional Board will not allow stormwater treatment facilities to be placed within waters of the United States

d) Proposed Schedule (Start-up, duration, and completion dates):

3. FEDERAL LICENSES/PERMITS

a) Federal Agency(ies)/File Number(s): U.S. Army Corps of Engineers Representative_____

U.S. Army Corps of Engineers_____ Other_____

File No.(s)_____

b) Permit Type(s) (please provide permit number(s):

Nationwide Permit No.(s)_____ Regional General Permit No.(s) _____
Individual Permit____ Other_____

c) Does the project require any Federal Application(s), Notification(s) or Correspondence?

Yes _____ (attach copy(ies)) No _____ (Attach detailed explanation)

4. OTHER LICENSES/PERMITS/AGREEMENTS

a) Please list all other required regulatory approvals (submit final or draft copy if available):

Agency	Agency Representative	License/Permit/Agreement	Approval Date

b) Does the project require a Federal Energy Regulatory Commission (FERC) license or amendment to a FERC license?

No_____ Yes_____ (Attach application copy)

5. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Indicate CEQA Document (submit final or draft copy*) and Lead Agency:

Categorical Exemption__ Negative Declaration___ Environmental Impact Report___

Has the document been certified/approved, or has a Notice of Exemption been filed?_____

If yes, date of approval/filing_____ If no, expected approval/filing date:_____

Lead Agency_____

*Note, ample time must be provided to the certifying agency to properly review a final copy of valid CEQA documentation before certification can occur.

6. PROJECT SITE DESCRIPTION (INCLUDES AREAS OUTSIDE OF U.S. WATERS)

a) Project Location (Attach map of suitable quality and detail):

City or Area_____ County_____

b) Longitude/Latitude

[Information regarding submittal of longitude and latitude coordinates can be found at : http://www.swrcb.ca.gov/~rwqcb4/html/meetings/401wqc.html]

[A minimum of eight (8) coordinates – All project areas or zones must be delineated with enough waypoints to accurately depict polygons or polylines with at least two (2) points per line segment.]

(Decimal-Degrees)_____ (Decimal-Degrees)_____
(Decimal-Degrees)_____ (Decimal-Degrees)_____
(Decimal-Degrees)_____ (Decimal-Degrees)_____
(Decimal-Degrees)_____ (Decimal-Degrees)_____

Township/Range

c) Total Project Size:

_____ Acres* ___ linear feet (if appropriate)

d) Area Type/Description (check as appropriate):

Urban_____ Residential_____ Recreation_____
Agriculture_____ Open Space_____ Wildlife Corridor_____
Migratory Pathway_____ Spawning Habitat_____
Threatened/Endangered Species Habitat_____ Other_____

*This information is required.

7. IMPACTED WATER BODIES

a) Name(s) of Receiving Water Body(ies)*:

b) Indicate in ACRES and LINEAR FEET (where appropriate) the proposed **waters of the United States** to be impacted by <u>any discharge other than dredging</u>, and identify the impacts(s) as permanent and/or temporary for each water body type listed below:

Jurisdictional Wetland:	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET
Streambed (vegetated):	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET
Streambed (unvegetated):	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET
Lake/Reservoir:	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET
Ocean/Estuary/Bay:	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET
Isolated waters:	_____ permanent,	_____ temporary ACRES
	_____ permanent,	_____ temporary LINEAR FEET

Please explain exactly how waters will be impacted by proposed project activities.
*(*Attach additional sheets as necessary*)*

c) Indicate in CUBIC YARDS the volume of <u>Dredged</u> material to be discharged in waters of the United States:

d) Indicate type(s) of material proposed to be discharged in waters of the United States:

*All receiving water bodies must be identified in the *Water Quality Control Plan, Los Angeles Region* (Basin Plan). Any unnamed/unidentified waters must be extended to an identifiable tributary.

8. COMPENSATORY MITIGATION

a) Indicate in ACRES and LINEAR FEET (where appropriate) the total quantity of **waters of the United States** proposed to be Created, Restored and/or Enhanced for purposes of providing Compensatory Mitigation:

Water Body Type	Created	Restored	Enhanced
Jurisdictional Wetland			
Streambed (vegetated)			
Streambed (unvegetated)			
Lake/Reservoir			
Ocean/Estuary/Bay			

Please describe mitigation activities proposed (Attach additional sheets as necessary).

b) If contributing to a Mitigation or Conservation Bank, indicate the agency, dollar amount, acreage, and water body type (omit if not applicable):

Conservation Agency_____

$_____ for_____ acres of _____ (water body type)

How many acres of this qualify as waters of the United States?

c) Other Mitigation (omit if not applicable):

How many acres of this qualify as waters of the United States?

e) Location of Compensatory Mitigation Site(s) (Attach map of suitable quality and detail):

City or Area_____ County_____

Longitude/Latitude (Decimal-Degrees)_____
[A minimum of eight (8) coordinates]

9. OTHER ACTIONS/BEST MANAGEMENT PRACTICES (BMPs)

Briefly describe other actions/BMPs to be implemented to Avoid and/or Minimize impacts to waters of the United States, including SUSMPs/Low Impact Development (LID), habitat preservation, erosion control measures, project scheduling, flow diversions, etc.

10. PAST/FUTURE PROPOSALS BY THE APPLICANT

Briefly list/describe any projects carried out in the last 5 years or planned for implementation in the next 5 years that are in any way related to the proposed activity or may impact the same receiving body of water. Include estimated adverse impacts.

_____ _____

Applicant's Signature Date
(Agent may not sign for Applicant)

Should you have any questions regarding the water quality certification process, please contact Ms. Valerie Carrillo (213) 576-6759 or Mr. Dana Cole (213) 576-5733.

Wetland, Riparian, and Eelgrass Project Data Form

WETLAND, RIPARIAN, AND EELGRASS, PROJECT DATA FORM and HABITAT MAPS

for Projects in the Southern California Region

Two brackets [ ] represent a checkbox; check a checkbox like this: [x]. For text responses, add text after the colon, on the next line if necessary. Separate multiple items (such as sponsors) with semicolons. Provide all dates as mm/dd/yy.

Note: Two maps should be submitted with this form; see instructions below.

1. Completed by [ ] Applicant/Applicant's agent [ ] Other (Specify) Name/ Information of Person to Be Contacted for Questions on this Form Name_____ Phone number/email:_____	**2. Date of submission**:	Tracker No. (auto generated)

3. Corps File No: District: Permit type (drop down menu) **Date of Permit:**	**4. Water Board Record No:** Region: Permit type (drop down menu) **Certification Letter Site No:** **OR** **Board Order No. (WDR only):**	**5.CCC Record No:** Region: **Date of CCC Action:**	**6. CA DF&G Record No:** Region: permit type (drop down menu) **Date of CA DF&G Action:**
7. USFWS File No. **Region:** **Action (e.g. take permit)** **Date of Action**	**8. NMFS File No.** **Office:** **Action (e.g. take permit, EFH consultation)** **Date of Action**	**9. SCC Project No.** **Region:** **Status/Action** **Date of Action.**	**10. State Clearinghouse Number**
11.Other Agency: **Action:** **Date of Action:**			

12. Is portion of project funded by sources other than permitee? Yes { } No { }

If so, what are the funding sources (check)

[ ] SCC
[ ] Water Board
[ ] WCB
[ ] NOAA
[ ] State Conservancy: [drop down list]
[ ] State Parks
[ ] DFG……..
[ ] CalTRANS……..
[ ] USFWS……
[ ] Resources……..
[ ] USACOE……
[ ] NRCS……
[ ] Other: ……..

GENERAL PROJECT INFORMATION

13. Project name (include any alternative names):	**14. Project county(ies)**:

15. Brief project description

16. Project types (see definitions to right)

Check one type: [ ] Compensatory mitigation [ ] Non-mitigation

AND

Check all you think apply:

[ ] Creation [ ] Restoration [ ] Preservation [ ] Enhancement

[ ] Other (please describe):

Definitions for Wetland and Riparian Project Types

Mitigation: Compensation for impacts to existing wetland/riparian habitat.

Creation: Establishment of wetland/riparian where previously none existed.

Restoration: Establishment of wetland/riparian where some did previously exist.

Enhancement: Improvement of functions of existing wetland/riparian habitat; habitat size and type does not change.

Preservation: Protection of existing wetland/riparian habitat *without changing it*

PERMITTEE/GRANTEE INFORMATION

17. Permitee name and/or organization:

18. Mailing Address:	**19. Email:**	**20. Phone:**

CONTACT FOR INQUIRIES

21. Contact Name:	**22. Organization Name:**	
23. Mailing Address:	**24. Email:**	**25. Phone:**

26. Other Sponsoring Organizations (List All Known)**:**

MITIGATION /RESTORATION SITE INFORMATION

27. Restoration/mitigation site name (if different than Project name):

28. Restoration/mitigation site county(ies):

29. Mitigation site is (check any that apply): [ ] on site [ ] off site and/or [ ] mitigation bank

30. Restoration/mitigation site location **Latitude:** **Longitude:** **Datum**:

Decimal degrees of approximate center of **restoration/mitigation area**; NAD83 datum if possible

31. Project Dates

Estimated Construction Start Date:	Estimated Construction End Date:
Estimated Monitoring Start Date:	Estimated Monitoring End Date:
Actual Construction Start Date:	Actual Construction End Date:
Actual Monitoring Start Date:	Actual Monitoring End Date:

32. Is a wetland assessment (such as CRAM) planned for the project area after completion?

Pre-construction? [ ] No [ ] Yes if yes [ ] CRAM [ ] other

After completion of project? [ ] No [ ] Yes if yes [ ] CRAM [ ] other

33. Is a wetland delineation planned for the project area [ ] Yes [ ] No

34. Water Sources (Check all that apply)

[ ] Tidal [ ] Natural Runoff [ ] Stream or River Overflow [ ] Groundwater [ ] Agricultural Runoff

[ ] Treated Wastewater [ ] Urban Runoff [ ] Raw Water Pipeline

PROJECT PERFORMANCE CRITERIA

35. Performance Criteria

Paste into this area the criteria by which the performance and success of the project will be judged. Table formats are preferred; criteria can be extracted from final mitigation plan or permit. Attach separate file if necessary; can include time-based criteria, such as percent plant cover by year; or duration and extent of soil saturation. For eelgrass monitoring projects please provide completed copies of the Southern California Eelgrass Mitigation Policy Monitoring and Compliance Reporting Summary.

36. Vegetation Planting List Paste from mitigation plan or permit, if available, into this area a list of any plant species that will be planted as part of this project. If no planting will occur, list species by habitat type expected to develop. Note that target vegetation should be native species. Attach a separate file if necessary.

37. List reference sites or reference datasets (e.g. contaminant guidelines) to be used, if any

38. Other Project Conditions in Permit (Add as necessary) Paste into this area any additional permit requirements by which the performance and success of the project will be judged. Table formats are preferred;. Attach separate file if necessary.

DEVELOPMENT PROJECT OR IMPACTED SITE INFORMATION
(if applicable)

39. Development Project /Impacted Site Name (if any; include alternate names):	**40. County(ies):**

41: Impacted Site Location **Latitude:** **Longitude:**
Provide decimal degrees of approximate center of impacted area (NAD83 datum)

42. Project Type (check all that apply)
Construction ("new fill") [ ]—Building
Transportation
Repair [ ]
Maintenance [ ]
Replacement [ ]
Other [ ] (not that this includes non-regulatory restoration

43: Type of work causing impacts Check all that apply

Project (Impact Type) [ ]
Utility line (transmission line, pipeline for potable water, sewage, electrical, oil, gas) [ ]
Water control structure (basins, Diversions) [ ]
Transportation—linear (Culverts) [ ]
Development fill (Municipal facilities, Housing, Education, Power plants, Parks,)Marinas [ ]
Flood control (Bank stabilization, Shoreline stabilization) [ ]
Regulatory restoration (SEP, Delayed mitigation, Enforcement) [ ]
Non-regulatory restoration [ ]
Mitigation/Conservation Bank [ ]
Agriculture/Silviculture [ ]
Fishery (Aquaculture) [ ]
Beach nourishment [ ]
Mining [ ]
Outfalls/intakes [ ]
Dredging (Navigation) [ ]
Docks/piers [ ]

44. Is a wetland condition assessment (such as CRAM) to be conducted on the impacted site(s)?

Prior to the impact? [ ] No [ ] Yes if yes [ ] CRAM [ ] other
After completion of project? [ ] No [ ] Yes if yes [ ] CRAM [ ] other

45. Is a wetland delineation to be conducted on the site prior to impacts? [ ] Yes [ ] No

REPORTING

46. Reporting requirements
Monitoring reports are required every: [ ] year [ ] 2 years [ ] other
Other reports required:

PROJECT HABITAT MAPS

47. Please include two maps of your mitigation/restoration project: a) map of present habitats and b) map of proposed habitat changes (gain/improvement/loss),

For mitigation projects, the impacted site for which the mitigation project is compensating should be included (either on the same or separate maps as necessary), with planned habitat losses mapped. Provide map in one of the following formats (listed in order of preference): For impact sites, both current habitat, temporary and permanent impacts should be designated. Eelgrass habitat mapping shall conform to the requirements of the most current version of the Southern California Eelgrass Mitigation Policy.

[ ] GIS shapefile. The shapefile must depict the boundaries of all habitats, using habitat list provided on this form. Each shape should be attributed with the habitat name. Features and boundaries should be accurate to within 10 meters. If possible, provide map in NAD83/WGS84 datum, UTM Zone 10 projection; identify datum/projection used.

[ ] **Google KML files** saved from Google Maps: My Maps or Google Earth Pro. Maps must show the boundaries of all project habitats, using the habitat list provided on this form.

[ ] Other electronic format (CAD or illustration format) that provides a context for location (inclusion of landmarks, known structures, geographic coordinates, or USGS DRG or DOQQ). Map must show the boundaries of all habitats, using the habitat list provided on this form.

[ ] Map marked on paper USGS 7.5 minute topographic map(s) or DOQQ printout(s). Map must show the boundaries of all habitats, using the habitat list provided on this form.

Note: Submittal of additional project maps (e.g. a planting map) is not required, but can help document the project and is encouraged.

HABITAT CHANGES

48. Area or length gained, improved and lost by habitat and project activity Consider all areas in both the mitigation/restoration site and the development project/impact site**;** see project type definitions above; see habitat definitions below; fill out table below to the nearest 0.1 acre; for rivers and stream habitat, describe the size in **both** acres **and** linear feet.

	Impacted Site						**Planned or Required Habitat Changes**												**"As Built" Habitat Changes**											
	Total Habitat On Site		Permanent (lost/ converted) Impacts		Temporary ((lost/ converted) Impacts		Total		Creation-On Site		Creation-Off Site		Restoration		Habitat Enhancement		Preservation		Total		Creation-On Site		Creation-Off Site		Restoration		Habitat Enhancement		Preservation	
Habitat and subhabitat type	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf	Acre	Lf
Estuaries																														
Emergent Marsh																														
Mudflat																														
Subtidal Open water																														
ubmerged Aquatic Vegetation Beds																														
Lakes																														
Emergent marsh and unvegetated flats																														
Open water																														
Depressional wetlands (except vernal pools, swales)																														
Emergent marsh and unvegetated flats																														
Open water																														
Streams and Rivers																														
Channel bed																														
Riparian habitat																														
ernal pools & swales (always seasonal)*																														
Total perimeter of pool(s) at maximum volume																														
eeps and springs																														
Perimeter of seep/spring																														
layas*																														
Emergent marsh and unvegetated flats																														
Open water																														
ther Non-Riverine Riparian Habitat																														
Unknown wetland habitat																														
Totals (wetland/riparian)																														
Adjacent upland/buffer																														

* This habitat type can contain seasonal (ephemeral) wetlands ** *Preserved* habitats have no physical changes planned

49. Habitat types were determined by [ ] aerial photos [ ] field survey [ ] other (specify)

HABITAT DEFINITIONS

Estuarine wetlands exist along the margins of tidal sloughs, bays, and estuaries. They are subject to daily or twice-daily tidal fluctuations in water height. These fluctuations might be fully natural or muted due to tide gates, culverts, weirs, etc. The water is a mixture of marine or ocean water and freshwater. Water salinity can range from fresh to hyper-saline (i.e., more saline than the ocean). Typical freshwater sources include rivers, streams, groundwater, point discharges (e.g., effluent from sewage treatment facilities), and storm drains.

Depressional wetlands exist in topographic lows that may or may not have outgoing surface drainage. Precipitation and overland flow is their main source of water. They differ from springs and seeps that depend mainly on groundwater. They differ from lakes by not having a perennial body of water at least 6 ft deep and at least 20 acres in area during the dry season. Depressional wetlands can have prominent areas of shallow open water and can be densely vegetated. They differ from playas by not being strongly alkaline or saline.

Vernal pools and swales are a special kind of ephemeral (seasonal) depressional wetlands having bedrock or an impervious soil horizon close to the surface and supporting a unique "vernal pool flora." These depressions fill with rainwater and runoff from small catchment areas during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season. Estimated vernal pool areas should only include the pools themselves at maximum water volume, not the surrounding uplands.

Seeps and springs wetlands form due to seasonal or perennial emergence of groundwater into the root zone or onto the ground surface. They can form on hillsides (e.g., hill slope seeps) or nearly level terrain (e.g., wet meadows). They differ from riparian wetlands by lacking well-defined channels that extend throughout the wetland. Seeps and springs are almost entirely dependent on groundwater.

Playas are nearly level, shallow, ephemeral (seasonal) or perennial, sodic (i.e., strongly alkaline) or saline water bodies with very fine-grain sediments of clays and silts. Unlike vernal pools, playas have little or no vascular vegetation within the water body itself, and they support sparse peripheral vegetation. Unlike lakes, playas are less than 6 ft deep during the dry season, although they can be hundreds of acres in size.

Lakes differ from playas in being at least 6 feet deep during the dry season. Lakes are at least 20 acres in size and can be fringed with **lake marsh**.

Streams and rivers—channel is the portion of the stream habitat covered by water at bank-full stage.

Streams and rivers—riparian habitat is transitional between rivers or streams and adjacent terrestrial areas. It borders the banks of all perennial and seasonal rivers and streams, and includes the floodplain.

Other Non-riverine Riparian habitat is transitional between a variety of habitats (e.g. estuaries, playas, lakes, depressions, etc.) and adjacent terrestrial areas. It borders the banks and includes the floodplain.

Buffer areas are terrestrial areas that adjoin wetlands, aquatic habitats, and riparian habitats. They help protect these habitats from the adverse influences of other nearby lands.

50. General Project Comments

PROJECT MONITORING CHECKLIST (optional)

Check all that apply

Parameter	Sample Frequency						
	Annual	Seasonal	Quarterly	Monthly	Continuous	Total Time Span	Other (describe frequency)
51. CRAM (California Rapid Assessment Method) or other method.							
52. Hydrology							
Tide Levels (select datum) [ ] NAVD 88 [ ] Local MHW [ ] Local MLW [ ] arbitrary							
Frequency & duration of inundation							
Sedimentation Rates							
Flow							
Tidal Prism							
Hydraulic Geometry							
Thalweg Profile							
Channel Length							
Channel Density							
Shoreline or Bank Stability							
Other							
53. Vegetation							
Percent Cover							
Plant Height							
Plant vigor							
Standing crop							
Productivity							
Native Species Richness							
Non-native Species Richness							
Survival of Vegetation							
Other							
54. Water Chemistry							
pH							
Conductivity							
Total Suspended Solids							
Turbidity							
Dissolved Oxygen							
Temperature							
Salinity							
Biological Oxygen Demand							
Metals (select) [ ] Hg [ ] MeHg [ ] Pb [ ] Cu [ ] Se [ ] Zn [ ] other (list)							
Organic Contaminants (select) [ ] PCB [ ] OC [ ] PAH [ ] other (list)							
Chlorophyl A							
Ammonia							
TOC							
Other							
55. Sediment Chemistry							
Grain Size							
Nitrogen							
Phosphorus							
Metals (select) [ ] Hg [ ] MeHg [ ] Pb [ ] Cu [ ] Se [ ] Zn [ ] other (list)							
Organic Contaminants (select) [ ] PCB [ ] OC [ ] PAH [ ] other (list)							
Bulk Density							
TOC							
Other							

56. Wildlife							
Mammals (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
Amphibians/Reptiles (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
Birds (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
Fish (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
Benthic Invertebrates (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
Aquatic Invertebrates (select) [ ] Species Richness [ ] Population Size [ ] Survival [ ] Evidence Of Use							
57. Other Monitoring (identify parameters, frequency and time span of data collection)							

California Coastal Commission (CCC)

Coastal Development Permit / Local Coastal Program / Harbor Access Permits

CDP Instructions and Application Form

CALIFORNIA COASTAL COMMISSION
SAN DIEGO COAST DISTRICT OFFICE
7575 METROPOLITAN DRIVE, SUITE 103
SAN DIEGO, CA 92108-4421
VOICE AND TDD (619) 767-2370
FAX (619) 767-2384

PERMIT APPLICATION INSTRUCTIONS

A completed application includes the APPLICATION FOR COASTAL DEVELOPMENT PERMIT, the appendices to the application, and Required Attachments.

- Please answer all questions. If a question is not applicable to your project, indicate "N.A."
- Refer to pages 7–8 of the APPLICATION for a list of Required Attachments.
- Incomplete applications will not be accepted for filing.
- All exhibits must be legible.

The following checklist is provided for the convenience of applicants in gathering necessary application materials; it is not a complete statement of filing requirements.

	Page	Item
☐ Proof of applicant's interest in the property.	7	1
☐ Assessor's parcel map(s) showing the proposed development site and **all** adjacent properties within 100 feet of the property boundary.	7	2
☐ Stamped envelopes *(no postage meter please)* addressed to neighboring property owners and occupants and other interested parties ***and*** a list of the same.	7, 8	4, 5
☐ Vicinity map.	8	6
☐ Two sets of each : project plan(s), site plan(s), and applicable other plans. (Please note the size which plans are required to be submitted.).....	8	7, 11
☐ Copy of any environmental documents (DRAFT AND FINAL EIRs, EISs, NEGATIVE DECLARATION) if prepared for the project and any comments and responses.	8	9
☐ Verification of all other permits, permissions or approvals applied for or granted by public agencies.	8	10
☐ Copy of geology or soils report (if necessary).	8	11
☐ Local approval of the project.	Appendix B	
☐ Has the Notice of Pending Permit been posted in a conspicuous place?	Appendix D	
☐ Filing fee.	Appendix E	

☐ Have you and the agent (if appropriate) signed the application at the appropriate lines on pages 9, 10, and 13?

APPLICATION FOR COASTAL DEVELOPMENT PERMIT

SECTION I. APPLICANT

1. Name, mailing address, and telephone number of all applicants.

_____

_____

_____

(Area code/daytime phone number)

Note: All applicants for the development must complete Appendix A, the declaration of campaign contributions.

2. Name, mailing address and telephone number of applicant's representatives, if any. Please include all representatives who will communicate on behalf of the applicant or the applicant's business partners, for compensation, with the Commission or the staff. (It is the applicant's responsibility to update this list, as appropriate, including after the application is accepted for filing. Failure to provide this information prior to communication with the Commission or staff may result in denial of the permit or criminal penalties.)

_____

_____

_____

(Area code/daytime phone number)

SECTION II. PROPOSED DEVELOPMENT

Please answer all questions. Where questions do not apply to your project (for instance, project height for a land division), indicate Not Applicable or N.A.

1. Project Location. Include street address, city, and/or county. If there is no street address, include other description such as nearest cross streets.

_____

number *street*

_____

city *county*

Assessor's Parcel Number(s) (obtainable from tax bill or County Assessor):

_____

_____

_____

_____

_____

FOR OFFICE USE ONLY	RECEIVED _____
	FILED _____
_____	FEE _____
APPLICATION NUMBER	DATE PAID _____

2. Describe the proposed development in detail. Include secondary improvements such as grading, septic tanks, water wells, roads, driveways, outbuildings, fences, etc. (Attach additional sheets as necessary.)

a. If multi-family residential, state:

Number of units			Number of bedrooms per unit (both existing and proposed)	Type of ownership proposed
Existing units	Proposed new units	Net number of units on completion of project		☐ rental ☐ condominium ☐ stock cooperative ☐ time share ☐ other_____

b. If land division or lot line adjustment, indicate:

Number of lots			*Size of lots to be created (indicate **net** or **gross** acreage)*	
Existing Lots	Proposed new lots	Net number of lots on completion of project	Existing	Proposed

3. Estimated cost of development (not including cost of land) $ _____

4. Project height: Maximum height of structure (ft.) _____
   - above existing (natural) grade ..... _____
   - above finished grade ..... _____
   - as measured from centerline of frontage road ..... _____

5. Total number of floors in structure, including subterranean floors, lofts, and mezzanines..... _____

6. Gross floor area excluding parking (sq.ft.) ..... _____

   Gross floor area including covered parking and accessory buildings (sq.ft.) ..... _____

7. Lot area (within property lines) (sq.ft. or acre) ..... _____

Lot coverage	*Existing (sq.ft. or acre)*	*New proposed (sq.ft. or acre)*	*Total (sq.ft. or acre)*
Building			
Paved area			
Landscaped area			
Unimproved area			
Grand Total (should equal lot area as shown in #7 above)			

8. Is any grading proposed? ..... ☐ Yes ☐ No

If yes, complete the following.			
a) Amount of cut	cu. yds.	d) Maximum height of cut slope	ft.
b) Amount of fill	cu. yds.	e) Maximum height of fill slope	ft.
c) Amount of **import** or **export** (circle which)	cu. yds.	f) Location of borrow or disposal site	

Grading, drainage, and erosion control plans must be included with this application, if applicable. In certain areas, an engineering geology report must also be included. See page 7, items # 7 and 11.

Please list any geologic or other technical reports of which you are aware that apply to this property:

_____

_____

9. Parking:

Number of parking spaces (indicate whether standard or compact)		
Existing Spaces	Proposed new spaces	Net number of spaces on completion of project

Is any existing parking being removed?..... ☐ Yes ☐ No

If yes, how many spaces? _____ size _____

Is tandem parking existing and/or proposed?..... ☐ Yes ☐ No

If yes, how many tandem sets? _____ size _____

10. Are utility extensions for the following needed to serve the project? (Please check yes or no)

a) water	*b) gas*	*c) sewer*	*d) electric*	*e) telephone*
☐ Yes	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ No	☐ No	☐ No	☐ No	☐ No

Will electric or telephone extensions be above-ground? ..... ☐ Yes ☐ No

11. Does project include removal of trees or other vegetation? ..... ☐ Yes ☐ No

If yes, indicate number, type and size of trees _____

_____

or type and area of other vegetation _____

_____

SECTION III. ADDITIONAL INFORMATION

The relationship of the development to the applicable items below must be explained fully. Attach additional sheets if necessary.

1. Present use of property.

a. Are there existing structures on the property? ..... ☐ Yes ☐ No

If yes, describe
_____ _____ _____

b. Will any existing structures be demolished? ..... ☐ Yes ☐ No

Will any existing structures be removed? ..... ☐ Yes ☐ No

If yes to either question, describe the type of development to be demolished or removed, including the relocation site, if applicable.

2. Is the proposed development to be governed by any Development Agreement? ..... ☐ Yes ☐ No

3. Has any application for development on this site including any subdivision been submitted previously to the California Coastal Zone Conservation Commission or the Coastal Commission? ..... ☐ Yes ☐ No

   If yes, state previous application number(s) _____

4. a. Is the development between the first public road and the sea (including lagoons, bays, and other bodies of water connected to the sea) ..... ☐ Yes ☐ No

   b. If yes, is public access to the shoreline and along the coast currently available on the site or near the site? ..... ☐ Yes ☐ No

If yes, indicate the location and nature of the access, including the distance from the project site, if applicable.

   c. Will the project have an effect on public access to and along the shoreline, either directly or indirectly (e.g., removing parking used for access to the beach)? ..... ☐ Yes ☐ No

If yes, describe the effect

5. Does the development involve diking, filling, draining, dredging or placing structures in open coastal waters, wetlands, estuaries, or lakes? (Please check yes or no)

a) diking	*b) filling*	*c) dredging*	*d) placement of structures*
☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ No	☐ No	☐ No	☐ No

Amount of material to be dredged or filled (indicate which) _____ cu. yds

Location of dredged material disposal site _____

Has a U.S. Army Corps of Engineers' permit been applied for? ..... ☐ Yes ☐ No

6. Will the development extend onto or adjoin any beach, tidelands, submerged lands or public trust lands? ..... ☐ Yes ☐ No

For projects on State-owned lands, additional information may be required as set forth in Section IV, paragraph 10.

7. Will the development protect existing lower-cost visitor and recreational facilities? ..... ☐ Yes ☐ No

Will the development provide public or private recreational opportunities? .. ☐ Yes ☐ No

If yes, explain.
_____
_____
_____

8. Will the proposed development convert land currently or previously used for agriculture to another use? ..... ☐ Yes ☐ No

If yes, how many acres will be converted? _____

9. Is the proposed development in or near:

a. Sensitive habitat areas (Biological survey may be required) ..... ☐ Yes ☐ No

b. Areas of state or federally listed rare, threatened, or endangered species ..... ☐ Yes ☐ No

c. 100-year floodplain (Hydrologic mapping may be required) ..... ☐ Yes ☐ No

d. Park or recreation area ..... ☐ Yes ☐ No

10. Is the proposed development visible from:

a. State Highway 1 or other scenic route ..... ☐ Yes ☐ No

b. Park, beach, or recreation area ..... ☐ Yes ☐ No

c. Harbor area ..... ☐ Yes ☐ No

11. Does the site contain any: (If yes to any of the following, please explain on an attached sheet.)

a. Historic resources ..... ☐ Yes ☐ No

b. Archaeological resources ..... ☐ Yes ☐ No

c. Paleontological resources ..... ☐ Yes ☐ No

12. Where a stream or spring is to be diverted, provide the following information:

Estimated streamflow or spring yield (gpm) _____

If well is to be used, existing yield (gpm) _____

If water source is on adjacent property, attach Division of Water Rights approval and property owner's approval.

SECTION IV. REQUIRED ATTACHMENTS

The following items must be submitted with this form as part of the application.

1. **Proof of the applicant's legal interest in the property.** A copy of any of the following will be acceptable: current tax bill, recorded deed, lease, easement, or current policy of title insurance. Preliminary title reports will not be accepted for this purpose. Documentation reflecting intent to purchase such as a signed Offer to Purchase along with a receipt of deposit or signed final escrow document is also acceptable, but in such a case, issuance of the permit may be contingent on submission of evidence satisfactory to the Executive Director that the sale has been completed.

   The identity of all persons or entities which have an ownership interest in the property superior to that of the applicant must be provided.

2. **Assessor's parcel map(s)** showing the page number, the applicant's property, and all other properties within 100 feet (excluding roads) of the property lines of the project site. (Available from the County Assessor.)

3. Copies of required **local approvals** for the proposed project, including zoning variances, use permits, etc., as noted on Local Agency Review Form, Appendix B. Appendix B must be completed and signed by the local government in whose jurisdiction the project site is located.

4. **Stamped envelopes addressed to each property owner and occupant of property situated within 100 feet of the property lines of the project site (excluding roads), along with a list containing the names, addresses and assessor's parcel numbers of same.** The envelopes must be plain (i.e., no return address), and regular business size (9 1/2" x 4 1/8"). Include first class postage on each one. **Metered postage is not acceptable**. Use Appendix C, attached, for the listing of names and addresses. (Alternate notice provisions may be employed at the discretion of the District Director under extraordinary circumstances.)

5. Stamped, addressed envelopes (no metered postage, please) and a list of names and addresses of all other parties known to the applicant to be interested in the proposed development (such as persons expressing interest at a local government hearing, etc.).

6. A vicinity or location map (copy of Thomas Bros. or other road map or USGS quad map) with the project site clearly marked.

7. Copy(s) of plans drawn to scale, including (as applicable):
   - site plans
   - floor plans
   - building elevations
   - grading, drainage, and erosion control plans
   - landscape plans
   - septic system plans

   Trees to be removed must be marked on the site plan. In addition, a reduced site plan, 8 1/2" x 11" in size, must be submitted. Reduced copies of complete project plans will be required for large projects. NOTE: See Instruction page for number of sets of plans required.

8. Where septic systems are proposed, evidence of County approval or Regional Water Quality Control Board approval. Where water wells are proposed, evidence of County review and approval.

9. A copy of any Draft or Final Negative Declaration, Environmental Impact Report (EIR) or Environmental Impact Statement (EIS) prepared for the project. If available, comments of all reviewing agencies and responses to comments must be included.

10. Verification of all other permits, permissions or approvals applied for or granted by public agencies such as:
    - Department of Fish and Game
    - State Lands Commission
    - Army Corps of Engineers
    - U.S. Coast Guard

    For projects such as seawalls located on or near state tidelands or public trust lands, the Coastal Commission must have a written determination from the State Lands Commission whether the project would encroach onto such lands and, if so, whether the State Lands Commission has approved such encroachment.

11. For development on a bluff face, bluff top, or in any area of high geologic risk, a comprehensive, site-specific geology and soils report (including maps) prepared in accordance with the Coastal Commission's Interpretive Guidelines. Copies of the guidelines are available from the District Office.

SECTION V. NOTICE TO APPLICANTS

Under certain circumstances, additional material may be required prior to issuance of a coastal development permit. For example, where offers of access or open space dedication are required,

preliminary title reports, land surveys, legal descriptions, subordination agreements, and other outside agreements will be required prior to issuance of the permit.

In addition, the Commission may adopt or amend regulations affecting the issuance of coastal development permits. If you would like notice of such proposals during the pendency of this application, if such proposals are reasonably related to this application, indicate that desire..... ☐ Yes ☐ No

SECTION VI. COMMUNICATION WITH COMMISSIONERS

Decisions of the Coastal Commission must be made on the basis of information in the public record available to all commissioners and the public. Permit applicants and interested parties and their representatives may contact individual commissioners to discuss permit matters outside the public hearing (an "ex parte" communication). However, the commissioner must provide a complete description of the communication either in writing prior to the hearing or at the public hearing, to assure that such communication does not jeopardize the fairness of the hearing or potentially result in invalidation of the Commission's decision by a court. Any written material sent to a commissioner should also be sent to the commission's office in San Francisco and the appropriate district office for inclusion in the public record and distribution to other commissioners.

SECTION VII. CERTIFICATION

1. I hereby certify that I, or my authorized representative, have completed and posted or will post the Notice of Pending Permit stock card in a conspicuous place on the property within three days of submitting the application to the Commission office.

2. I hereby certify that I have read this completed application and that, to the best of my knowledge, the information in this application and all attached appendices and exhibits is complete and correct. I understand that the failure to provide any requested information or any misstatements submitted in support of the application shall be grounds for either refusing to accept this application, for denying the permit, for suspending or revoking a permit issued on the basis of such misrepresentations, or for seeking of such further relief as may seem proper to the Commission.

3. I hereby authorize representatives of the California Coastal Commission to conduct site inspections on my property. Unless arranged otherwise, these site inspections shall take place between the hours of 8:00 A.M. and 5:00 P.M.

_____

Signature of Authorized Agent(s) or if no agent, signature of Applicant

NOTE: IF SIGNED ABOVE BY AGENT, APPLICANT MUST SIGN BELOW.

SECTION VIII. AUTHORIZATION OF AGENT

I hereby authorize _____ to act as my representative

and to bind me in all matters concerning this application.

_____

Signature of Applicant(s)
(Only the applicant(s) may sign here to authorize an agent)

APPLICATION FOR COASTAL DEVELOPMENT PERMIT

APPENDIX A

DECLARATION OF CAMPAIGN CONTRIBUTIONS

Government Code Section 84308 prohibits any Commissioner from voting on a project if he or she has received campaign contributions in excess of $250 within the past year from project proponents or opponents, their agents, employees or family, or any person with a financial interest in the project.

In the event of such contributions, a Commissioner must disqualify himself or herself from voting on the project.

Each applicant must declare below whether any such contributions have been made to any of the listed Commissioners or Alternates (see last page).

CHECK ONE

☐ The applicants, their agents, employees, family and/or any person with a financial interest in the project have not contributed over $250 to any Commissioner(s) or Alternate(s) within the past year.

☐ The applicants, their agents, employees, family, and/or any person with a financial interest in the project have contributed over $250 to the Commissioner(s) or Alternate(s) listed below within the past year.

Commissioner or Alternate _____

Commissioner or Alternate _____

Commissioner or Alternate _____

_____ _____

Signature of Applicant or Authorized Agent *Date*

Please type or print your name _____

APPENDIX B

LOCAL AGENCY REVIEW FORM

SECTION A (TO BE COMPLETED BY APPLICANT)

Applicant _____

Project Description _____

_____

Location _____

_____

Assessor's Parcel Number _____

SECTION B (TO BE COMPLETED BY LOCAL PLANNING OR BUILDING INSPECTION DEPARTMENT)

Zoning Designation _____ _____ du/ac

General or Community Plan Designation _____ _____ du/ac

Local Discretionary Approvals

☐ Proposed development meets all zoning requirements and needs no local permits other than building permits.

☐ Proposed development needs local discretionary approvals noted below.

Needed	*Received*	
☐	☐	Design/Architectural review
☐	☐	Variance for _____
☐	☐	Rezone from _____
☐	☐	Tentative Subdivision/Parcel Map No. _____
☐	☐	Grading/Land Development Permit No. _____
☐	☐	Planned Residential/Commercial Development Approval
☐	☐	Site Plan Review
☐	☐	Condominium Conversion Permit
☐	☐	Conditional, Special, or Major Use Permit No. _____
☐	☐	Other _____

CEQA Status

☐ Categorically Exempt *Class* _____ *Item* _____

☐ Negative Declaration Granted (Date) _____

☐ Environmental Impact Report Required, Final Report Certified (Date) _____

☐ Other _____

Prepared for the City/County of _____ by _____

Date _____ Title _____

Application No. _____

APPENDIX C

LIST OF PROPERTY OWNERS AND OCCUPANTS WITHIN 100 FEET AND THEIR ADDRESSES
(MAKE ADDITIONAL COPIES OF THIS SHEET AS NECESSARY)

APPENDIX D
(Permit Application)

DECLARATION OF POSTING

Prior to or at the time the application is submitted for filing, the applicant must post, at a conspicuous place, easily read by the public and as close as possible to the site of the proposed development, notice that an application for the proposed development has been submitted to the Commission. Such notice shall contain a general description of the nature of the proposed development. The Commission furnishes the applicant with a standardized form to be used for such posting. If the applicant fails to post the completed notice form and sign the Declaration of Posting, the Executive Director of the Commission shall refuse to file the application. 14 Cal. Code Regs. Section 13054(d).

Please sign and date this Declaration of Posting form when the site is posted; it serves as proof of posting. It should be returned to our office with the application.

Pursuant to the requirements of California Administrative Code Section 13054(b), I hereby certify that on, _____ (date of posting) I or my authorized representative posted the Notice of Pending Permit for application to obtain a coastal development permit for the development of

_____

_____

_____
(description of development)

Located at _____

_____
(address of development or assessor's parcel number)

The public notice was posted at _____

_____
(a conspicuous place, easily seen by the public and as close as possible to the site of the proposed development)

_____
(signature)

_____
(date)

NOTE: Your application cannot be processed until this ***Declaration of Posting*** *is signed and returned to this office.*

FOR OFFICE USE ONLY

PERMIT NUMBER ..... _____

RECEIVED ..... _____

DECLARATION COMPLETE ..... _____

APPENDIX E

FILING FEE SCHEDULE

(EFFECTIVE MARCH 17, 2008)

FEES WILL BE ADJUSTED EACH YEAR ON JULY 1, ACCORDING TO THE CALIFORNIA CONSUMER PRICE INDEX

- Pursuant to Government Code section 6103, public entities are exempt from the fees set forth in this schedule.

- Permits shall not be issued without full payment for all applicable fees. If overpayment of a fee occurs, a refund will be issued. Fees are assessed at the time of application, based on the project as proposed initially. If the size or scope of a proposed development is amended during the application review process, the fee may be changed. If a permit application is withdrawn, a refund will be due only if no significant staff review time has been expended (e.g., the staff report has not yet been prepared). Denial of a permit application by the Commission is not grounds for a refund.

- If different types of development are included on one site under one application, the fee is based on the sum of each fee that would apply if each development were applied for separately, not to exceed $100,000 for residential development and $250,000 for all other types of development.

- Fees for after-the-fact (ATF) permit applications shall be five times the regular permit application fee unless the Executive Director reduces the fee to no less than two times the regular permit application fee. The Executive Director may reduce the fee if it is determined that either: (1) the ATF application can be processed by staff without significant additional review time (as compared to the time required for the processing of a regular permit,) or (2) the owner did not undertake the development for which the owner is seeking the ATF permit.

- In addition to the above fees, the Commission may require the applicant to reimburse it for any additional reasonable expenses incurred in its consideration of the permit application, including the costs of providing public notice.

- The Executive Director shall waive the application fee where requested by resolution of the Commission. Fees for green buildings or affordable housing projects may be reduced, pursuant to Section 13055(h) of the Commission's regulations.

SEE SECTION 13055 OF THE COMMISSION'S REGULATIONS
(CALIFORNIA CODE OF REGULATIONS, TITLE 14)
FOR FULL TEXT OF THE REQUIREMENTS

I. RESIDENTIAL DEVELOPMENT[1]

De minimis waiver	☐	$ 500
Administrative permit	☐	$ 2,500[2]

A. Detached residential development

Regular calendar for up to 4 detached, single-family dwelling(s)[3,4]

1,500 square feet or less	☐	$ 3,000/ea
1,501 to 5,000 square feet	☐	$ 4,500/ea
5,001 to 10,000 square feet	☐	$ 6,000/ea
10,001 or more square feet	☐	$ 7,500/ea

Regular calendar for more than 4 detached, single-family dwellings[3,4]

1,500 square feet or less	☐	$ 15,000 or $1,000/ea[5] whichever is greater
1,501 to 5,000 square feet	☐	$ 22,500 or $1,500/ea[5] whichever is greater
5,001 to 10,000 square feet	☐	$ 30,000 or $2,000/ea[5] whichever is greater
10,001 or more square feet	☐	$ 37,500 or $2,500/ea whichever is greater

B. Attached residential development

2–4 units	☐	$ 7,500
More than 4 units	☐	$ 10,000 or $750/ea[6] whichever is greater

C. Additions or improvements

If **not** a waiver or an amendment to a previous coastal development permit, the fee is assessed according to the schedule in A. above (i.e., based on the calendar and/or size of the addition, plus the grading fee, if applicable).

If handled as an amendment to a previous coastal development permit, see Amendments (in Section III.F).

---

[1] Additional fee for grading applies. (See Section III.A of this fee schedule.)
[2] Additional fee will apply if the project is removed from the Administrative Calendar and rescheduled on the Regular Calendar.
[3] "Square footage" includes gross internal floor space of main house and attached garage(s), plus any detached structures (e.g., guest houses, detached bedrooms, in-law units, garages, barns, art studios, tool sheds, and other outbuildings).
[4] For developments that include residences of different sizes, the fee shall be based upon the average square footage of all the residences.
[5] Not to exceed $100,000.
[6] Not to exceed $50,000.

II. OFFICE, COMMERCIAL, CONVENTION, INDUSTRIAL (INCLUDING ENERGY FACILITIES), AND OTHER DEVELOPMENT NOT OTHERWISE IDENTIFIED IN THIS SECTION[7,8,9]

A. Based on Gross Square Footage

1,000 square feet (gross) or less	☐	$ 5,000
1,001 to 10,000 square feet (gross)	☐	$ 10,000
10,001 to 25,000 square feet (gross)	☐	$ 15,000
25,001 to 50,000 square feet (gross)	☐	$ 20,000
50,001 to 100,000 square feet (gross)	☐	$ 30,000
100,001 or more square feet (gross)	☐	$ 50,000

B. Based on Development Cost[10]

Development cost up to and including $100,000	☐	$ 3,000
$100,001 to $500,000	☐	$ 6,000
$500,001 to $2,000,000	☐	$ 10,000
$2,000,001 to $5,000,000	☐	$ 20,000
$5,000,001 to $10,000,000	☐	$ 25,000
$10,000,001 to $25,000,000	☐	$ 30,000
$25,000,001 to $50,000,000	☐	$ 50,000
$50,000,001 to $100,000,000	☐	$ 100,000
$100,000,001 or more	☐	$ 250,000

III. OTHER FEES

A. Grading[11]

50 cubic yards or less	☐	$ 0
51 to 100 cubic yards	☐	$ 500
101 to 1,000 cubic yards	☐	$ 1,000
1,001 to 10,000 cubic yards	☐	$ 2,000
10,001 to 100,000 cubic yards	☐	$ 3,000
100,001 to 200,000 cubic yards	☐	$ 5,000
200,001 or more cubic yards	☐	$ 10,000

[7] The fee shall be based on either the gross square footage or the development cost, whichever is greater.
[8] Additional fee for grading applies. (See section III.A of this schedule).
[9] Pursuant to section 13055(a)(5) of the Commission's regulations, this category includes all development not otherwise identified in this section, such as seawalls, docks and water wells.
[10] Development cost includes all expenditures, including the cost for planning, engineering, architectural, and other services, made or to be made for designing the project plus the estimated cost of construction of all aspects of the project both inside and outside the Commission's jurisdiction.
[11] The fee for grading is based on the cubic yards of cut, plus the cubic yards of fill.

B. Lot line adjustment[12] ..... ☐ $ 3,000

C. Subdivision[13]

Up to 4 new lots ..... ☐ $ 3,000/ea

More than 4 new lots..... ☐ $ 12,000 plus $1,000 for each lot above 4

D. Administrative permit..... ☐ $ 2,500[14]

E. Emergency permit ..... ☐ $ 1,000[15]

F. Amendment

Immaterial amendment ..... ☐ $ 1,000

Material amendment ..... [50% of fee applicable to underlying permit if it were submitted today] ☐ $ _____ (calculate fee)

G. Temporary event which requires a permit pursuant to Public Resources Code section 30610(i)

If scheduled on administrative calendar…… ☐ $ 1,000

If not scheduled on administrative calendar…… ☐ $ 2,500

H. Extension[16] and Reconsideration

Single-family residence..... ☐ $ 500

All other development ..... ☐ $ 1,000

I. Request for continuance

1st request..... ☐ No charge

Each subsequent request (where Commission approves the continuance) ..... ☐ $ 1,000

J. De minimis or other waivers..... ☐ $ 500

K. Federal Consistency Certification[17] [The fee is assessed according to sections I, II, and III, above]..... ☐ $ ____

L. Appeal of a denial of a permit by a local government[18] [The fee is assessed according to sections I, II, and III, above] ..... ☐ $ ____

[12] A lot line adjustment is between adjoining parcels where the land taken from one parcel is added to an adjoining parcel, and where a greater number of parcels than originally existed is not thereby created.

[13] The fee is charged for each parcel created in addition to the parcels that originally existed.

[14] Additional fee will apply if the project is removed from the Administrative Calendar and rescheduled on the Regular Calendar.

[15] The emergency application fee is credited toward the follow-up permit application fee.

[16] If permit extension is objected to by the Commission and the application is set for a new hearing, then a new application fee is required, based on type of development and/or applicable calendar.

[17] Fees for federal consistency items will be assessed now that the Commission has received approval from NOAA to amend the California Coastal Management Program.

[18] Pursuant to Public Resources Code section 30602 or 30603(a)(5).

M.	Written Permit Exemption.....	☐	$ 250
N.	Written Boundary Determination	☐	$ 250
O.	Coastal Zone Boundary Adjustment.....	☐	$ 5,000

TOTAL SUBMITTED	$

TO BE COMPLETED BY STAFF

SUBMITTED FEE VERIFIED BY:	*DATE:*

IS SUBMITTED AMOUNT CORRECT?

☐ Yes. Applicant has correctly characterized the development, and payment is appropriate.

☐ Applicant did not fill out form, thus staff has marked the form to compute the fee, and applicant has paid fee.

☐ No. Why?

_____

_____

REFUND OR ADDITIONAL FEE REQUIRED? (STATE REASON)

☐ Refund amount (_____)

☐ Additional fee amount (_____)

REMINDER: RECORD FEE PAYMENT IN PERMIT LOG

FINAL FEE VERIFIED BY: (TO BE COMPLETED AFTER COMMISSION ACTION)	*DATE:*

NOTICE OF

PENDING PERMIT

A PERMIT APPLICATION FOR DEVELOPMENT ON THIS SITE IS PENDING BEFORE THE CALIFORNIA COASTAL COMMISSION.

PROPOSED DEVELOPMENT: _____

_____

_____

_____

LOCATION: _____

_____

APPLICANT: _____

APPLICATION NUMBER:_____

DATE NOTICE POSTED: _____

FOR FURTHER INFORMATION, PLEASE PHONE OR WRITE THE OFFICE LISTED BELOW BETWEEN 8 A.M. AND 5 P.M., WEEKDAYS.

CALIFORNIA COASTAL COMMISSION
SAN DIEGO COAST DISTRICT OFFICE
7575 METROPOLITAN DRIVE, STE 103
SAN DIEGO, CA 92108-4402
(619) 767-2370

PRINT ON YELLOW STOCK CARD

Seawater Desalination and the Coastal Development Act (March 2004)

Seawater Desalination And the California Coastal Act

California Coastal Commission March 2004

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EXECUTIVE SUMMARY

In view of evolving issues relating to adequacy of water supplies to meet the state's projected population growth, desalination will obviously be an important part of California's water future. The question is not whether, but rather how, where, when, by whom, and under what conditions will desalination projects be designed, built, and operated.

There is growing interest and concern about seawater desalination along the California coast. The interest is due in large part to recent technological developments that reduce the costs and energy requirements of producing desalinated water. Additionally, many water agencies and purveyors are interested in reducing their dependence on imported water supplies and view desalination as providing a reliable and local source of water. The concerns about desalination are due primarily to its potential to cause adverse effects and growth that are beyond the capacity of California's coastal resources.

There are currently about two dozen seawater desalination facilities being proposed along the California coast, including some that would be the largest in the U.S. The state does not have a great deal of recent experience or expertise in evaluating the environmental impacts or the public resource issues associated with desalination, and this report is meant to identify many of the elements that will likely be a part of these upcoming evaluations.

The California Coastal Commission will be involved in nearly all coastal desalination proposals, either through planning, permitting, permit appeals, or other forms of review. This report from Commission staff is meant to help with those reviews in several ways:

- It provides general information for the Commission, applicants, and the interested public about the issues related to desalination along the California coast, and desalination's possible effects on coastal resources and coastal uses;
- It describes the status of seawater desalination in California and the proposed facilities now being planned;
- It identifies and discusses Coastal Act policies most likely to apply to proposed desalination facilities; and,
- It identifies much of the information likely to be required during coastal development permit review for proposed facilities.

Additionally, the report is based on several key points:

- ***It is meant to be informational only:*** The report does not create new regulations or guidelines for reviewing proposed desalination facilities. Rather, it describes desalination issues as they relate to existing Coastal Act policies, and discusses how these policies are likely to apply to a proposal.

- ***It is based on the need to provide case-by-case review:*** Because each proposed desalination facility will have unique design and siting characteristics, each is likely to be subject to a different set of Coastal Act policies and will likely conform to those policies in different ways. This report, therefore, makes no overarching recommendations in support or opposition to desalination. Some desalination proposals may be environmentally benign or may even provide environmental benefits, while others may cause significant adverse impacts. Determining whether a proposed project will conform to the Coastal Act will therefore be done on a case-by-case basis.

- ***It is written in a precautionary tone:*** Many of the concerns and issues involved in large-scale coastal desalination have not yet been tested in California, and much of the information about desalination, when it is available, has not yet been compiled in a comprehensive and useful way. As a result, much of this report is written in a precautionary tone. Some of the facilities being proposed raise significant public policy and environmental issues, and the consequences of some of those issues, such as the cumulative impacts of desalination on the marine ecosystem or the implications of consumptive use of ocean water under international trade agreements, are still emerging. It is therefore likely that upcoming reviews of proposed facilities will require comprehensive, detailed, and specific analysis to ensure the facilities meet applicable policies and allow the state to maintain and protect its coastal resources.

The report is also being issued as part of a larger statewide interest in determining the implications of desalination to California. In 2004, the Department of Water Resources convened a task force, pursuant to AB 2717, to identify the opportunities and constraints for desalination to provide part of the state's water supply, and to evaluate whether the state should play a role in supporting desalination. This report incorporates the work of the task force, as appropriate. It also incorporates many of the comments received during a ninety-day public review period in the fall of 2004 on a draft version of this report so as to more fully reflect concerns and issues related to desalination and Coastal Act policies.

INITIAL FINDINGS

Some of the key findings in this report include:

- ***Each proposed desalination facility will require case-by-case review:*** As stated above, because each facility has unique design, siting, and operating characteristics, different Coastal Act policies are likely to apply differently to each one. This will require case-by-case review to determine Coastal Act conformity, adverse impacts, and the measures necessary to avoid and mitigate for those impacts.

- ***Coastal Act policies do not suggest overall support of, or opposition to, desalination:*** The Coastal Act allows many types of development to occur within the coastal zone, as long as they conform to Coastal Act policies. Properly designed and operated desalination is one of these types of development.

- ***There may be differences in applying Coastal Act policies to public or private desalination facilities:*** The Coastal Act is based in part on many of the coastal resources of California being public resources, and the consumptive use of seawater by private entities will require thorough evaluation and adequate assurances that public uses and values will be protected. There are also numerous concerns about how various international trade agreements may affect implementation of not only the Coastal Act, but many other state and local environmental or public interest regulations.

- ***The most significant potential direct adverse environmental impact of seawater desalination is likely to be on marine organisms:*** This impact is due primarily to the effects of the seawater intake and discharge on nearby marine life; however, these effects can be avoided or minimized through proper facility design, siting, and operation.

- ***The most significant potential indirect adverse impacts are likely to be those associated with growth-inducement:*** Review of coastal desalination facilities will likely need to assess whether the water supply provided by then new facilities comes with assurances that the resulting growth will not exceed the capacity of coastal resources.

- ***Desalination facilities proposing to co-locate with coastal power plants will raise unique issues and will need to be reviewed differently than facilities proposing to locate independently:*** The largest proposed desalination facilities would be located at coastal power plants that use ocean water for cooling. While this co-location may offer some advantages, review of such facilities will need to consider the combined and incremental effects caused by operating desalination facilities at coastal power plants using up to hundreds of millions of gallons per day of seawater.

SUMMARY OF PUBLIC COMMENTS

Commission staff received numerous comments during public review of the draft version of this report. The primary types of comments are summarized below:

Regarding the benefits of desalination: Commenters suggested the report describe more of the benefits associated with desalination, such as reducing dependence on imported water supplies, providing better quality drinking water, reducing pressure on other surface water sources, etc.

In response, the report now includes descriptions or acknowledgement of several additional benefits that may result from desalination. It has kept its overall cautionary tone, however, in recognition of the high degree of uncertainty about the effects of desalination on a variety of coastal resources.

Regarding growth-inducement: Comments ranged from recognizing this as the most critical aspect associated with desalination's effects on the coast to statements that the Coastal Act does not allow the Coastal Commission to review growth-inducing aspects of development.

In response, the report retains and clarifies its discussion on growth-inducement as a part of Coastal Act review, and also recognizes that some aspects of this issue are often addressed through other local, regional, or state processes.

Regarding desalination effects on water quality and marine biology: Comments ranged from recognizing these as potentially significant impacts to recommending the Coastal Commission defer evaluation of these issues to other agencies.

In response, the report retains and clarifies discussion of these issues and emphasizes the Coastal Commission's role in maintaining, restoring, and enhancing coastal water quality and habitats.

Regarding co-locating desalination facilities with power plants: Commenters suggested the report emphasize the benefits of co-locating with existing power plants using once-through cooling. Other commenters expressed concerns that co-location could allow continuation and expansion of environmentally harmful effects associated with once-through cooling system.

In response, the report includes a separate section on this issue and describes both the advantages and concerns that may be brought about by co-location.

Regarding public, private, and international trade issues: Comments ranged from those recognizing these issues as critical in the Commission's deliberations about desalination and other issues that could affect coastal resources to those strongly suggesting these issues had no place in this report.

In response, and with additional research, the report retains its discussion of these issues, although with more recognition of the questions still needing to be answered than the answers themselves.

Regarding "coastal-dependency": Several commenters suggested for various reasons – its dependence on seawater, its similarity to other uses so designated, etc. – that desalination should be considered "coastal-dependent" for purposes of Coastal Act review.

In response, the report re-iterates the likelihood that portions of many desalination facilities may be considered "coastal-dependent" and that other portions might not be. It also provides a more detailed description of related policies and examples of other similar situations in which distinctions were made between "coastal-dependent" and non-"coastal-dependent" portions of proposed developments.

CHAPTER 1: INTRODUCTION AND BACKGROUND

Chapter Sections:

1.1 PURPOSE OF REPORT

For years, desalination has been considered as a possible source of fresh water for areas of coastal California. Along many parts of the coast, the amount of available water has been one of the primary limits on the rate of growth. However, despite the abundance of water in the Pacific Ocean, desalination's relatively high costs and energy requirements have resulted in coastal areas getting most of their water supply from other sources such as groundwater and imported water or from water conservation measures.

Recent changes in desalination technology have reduced its costs to levels closer to those of some of these other sources. Additionally, many are looking at desalination as a way to provide a more reliable supply of water during the state's recurring droughts and to reduce the dependence of coastal communities on water imported from inland areas. Additional interest has been generated by recently implemented state laws that require proposed developments to provide more certainty of adequate water supplies during environmental or permit review. As a result, desalination is currently being considered as a more feasible source of water in many areas of the California coast than it had been previously.

Seawater desalination also raises concerns about how it will affect marine life, water quality, public access, and other coastal resources. Numerous studies and reports identify the adverse effects of pollution, overfishing, and other unsustainable practices on water quality and marine life along the California coast, and poorly designed desalination facilities, particularly at the scale of some proposed in California, could not only cause significant adverse impacts on their own, but could add substantially to the cumulative detrimental effects already occurring.

Desalination facilities proposed along California's coast will require review by the California Coastal Commission to determine whether the proposal conforms to the policies of the California Coastal Act. This report, by Coastal Commission staff, addresses many of the issues that are likely to be considered during such a review, and is meant to serve a number of purposes:

- It provides information to the Coastal Commission, applicants, and the interested public about many of the issues related to desalination along the California coast, especially as they relate to the Coastal Act.

- It describes much of the information and evaluation that will likely be needed as part of the Coastal Commission's review of proposed facilities to determine whether the proposals conform to Coastal Act policies.
- It summarizes the status of desalination along the coast and lists the known anticipated facilities now being planned.

- It updates the Coastal Commission's 1993 report, Seawater Desalination in California, to reflect changes in desalination technology, improved understanding of coastal resources, and additional policy considerations of the Coastal Act. When the 1993 report was published, the state was just coming out of a period of several years of low water supplies, and there were about a dozen relatively small desalination facilities along the California coast, producing relatively expensive water primarily for drought relief, emergency supply, or for use in areas isolated from other water sources. Since that time, with increasing pressures on other available sources of water and decreasing economic costs of desalination, facilities being proposed would increase seawater desalination eighty-fold along the coast.

- It reflects some of the recent work done by two working groups looking at desalination in California. One group, a state desalination task force convened by the California Department of Water Resources, was formed pursuant to AB 2717 and was asked to identify the opportunities and constraints for desalination in the state and determine what role, if any, the state should play in furthering desalination technology. This group developed a number of findings and recommendations, many of which are incorporated into this report. Another group, convened by the Monterey Bay National Marine Sanctuary as part of the Sanctuary's Management Plan Update, developed recommendations regarding desalination for the Sanctuary's update of its Management Plan. While this latter group's efforts focused on desalination within the Sanctuary boundary, much of its work is applicable to the entire California coast.

- Finally, pursuant to Coastal Act Section 30006.5, the report is meant to provide "sound and timely scientific recommendations to the Coastal Commission" to use during deliberations on significant issues related to coastal resources.

CAVEATS

Several important caveats should be noted regarding this report:

- Because the report evaluates desalination in general rather than reviews a specific proposal, it is not meant to represent the definitive set of issues and concerns that would be addressed during review of any particular proposal. Each review will likely raise unique Coastal Act conformity issues based on the location, design, and operation of each proposed facility. The report, however, does describe a fairly complete range of the more significant issues that may be involved in reviewing any given proposed facility.

- The report is focused primarily on how proposed seawater desalination facilities are likely to be evaluated for conformity to Coastal Act policies. It is not meant to identify all the other issues that may come up during review under other regulations, such as local zoning

ordinances, health department requirements, or others, although many may be the same or similar to those discussed herein.

- While the report mentions some of the broader issues involved in planning for state or regional water supplies, such as discussing the role of imported water, conservation, or elements that may be included in a comprehensive water portfolio, it is not meant to replace the more detailed planning needed at the state, regional, or local level to fully evaluate the mix of sources and uses for a community's water supply.

- Finally, given the state's limited experience with large-scale seawater desalination and the many uncertainties about how such facilities may affect coastal resources, the report is written in a cautionary tone. There is relatively little information available on many aspects of desalination – such as its effects on particular marine species or habitats, whether monitoring requirements at existing facilities adequately characterize the effects the facilities are having, and the potential cumulative impacts of water withdrawals and discharges from multiple desalination facilities or other types of facilities in a waterbody – and so, absent a large body of research or scientific certainty, the report attempts to make it clear that review of a proposed project may require significant information to provide the level of certainty needed to determine whether a facility will conform to the Coastal Act.

1.2 PRIMARY FINDINGS AND RECOMMENDATIONS

The report makes a number of findings and recommendations related to project review, protection of coastal resources, and the applicability of various Coastal Act policies, including the following:

GENERAL FINDINGS AND RECOMMENDATIONS

The report neither supports nor opposes desalination. Desalination has been identified as an important part of the state's future water supply. The California Department of Water Resources as well as a number of local or regional water agencies have identified desalination as providing a portion of the water they expect to provide to the state over the next several decades. If properly sited, designed, and operated, some desalination facilities could be operated in an environmentally benign manner and conform to Coastal Act requirements, and may even result in some environmental benefits, while other proposed facilities would likely cause significant adverse effects and not conform to applicable regulations.

Desalination facilities will require case-by-case review. Because each proposed facility would have a different design and location, each will also raise different issues of concern and likely be subject to a different mix of Coastal Act policies. Therefore, the information provided in this report recognizes that each desalination proposal will require case-by-case review. This approach will allow each proposal to be reviewed based on the specific characteristics of the proposed facility and the particular coastal resources of concern at specific sites, and will allow necessary mitigation measures to be tailored to each. Although each facility will undergo case-by-case review and a location-specific evaluation, this report is meant to provide sufficient general information about the types of review and the level of detail likely to be required to complete Coastal Commission review.

PLANNING

A desalination facility's most significant effect could be its potential for inducing growth. The existing pressures on California's coastal resources are substantial, even with the protections provided by such measures as the Coastal Act and other laws. If desalination removes the limits imposed on growth along the coast due to the current limited supply of water, the degradation of coastal resources could increase beyond sustainable levels. Adequate, comprehensive review of these issues will be a critical part of reviewing proposed facilities to ensure the California coast remains a place of environmental value and public enjoyment.

Desalination proposals should be reviewed in the context of an overall water management plan. A proposed desalination facility should not be reviewed in isolation – it should be part of a comprehensive water management approach that identifies other water sources, incorporates conservation methods, and assesses alternative methods of providing a community's water supply. A comprehensive plan should identify and implement all opportunities for water conservation and reclamation that would reduce impacts on coastal resources. As part of this approach, Local Coastal Programs (LCPs) should incorporate and encourage use of conservation and reclamation measures to reduce the need for new water projects. LCPs should also specify the quantity of water supplies that will be needed for the planned levels of development.

There may be significant differences in determining whether public or private desalination facilities conform to Coastal Act policies. The Coastal Act is based largely on coastal resources being public resources. Private consumptive use of these resources will likely result in a different type of review than public use. Water is often the limiting factor for potential development projects and growth within a community. Because the form of ownership and operation of a desalination facility may contribute to whether its water allocations are consistent with the development priorities mandated in the Coastal Act or incorporated in a certified LCP, the Commission should evaluate whether special or additional conditions may be necessary or appropriate based on a proposed facility's form of ownership.

The cumulative impacts of a proposed desalination projects should be thoroughly evaluated during environmental review. Coastal Commission staff should work with the applicant, other agencies, and the interested public to consider the potential cumulative impacts of desalination projects. Among the important issues to address are the impacts of building a number of small facilities versus a few larger ones, the cumulative impacts on growth from the additional water supplied by new facilities, and the environmental effects of additional power production needed to operate the facilities.

REVIEW PROCEDURES

There should be early coordination between project proponents and involved agencies. The Coastal Commission staff should become involved in a desalination project proposal as early as possible in the applicable planning processes, including but not limited to those

mandated under CEQA and/or NEPA, and those carried out by local or regional water supply agencies.

FACILITY DESIGN AND OPERATIONS

The most significant direct adverse environmental impacts of seawater desalination facilities are likely to be their effects on marine organisms. Seawater desalination facilities that draw water directly from the open ocean or estuaries entrain and kill many small marine organisms, such as plankton, larvae, and fish eggs. In some cases, this impact could be significant, especially with a large or poorly sited intake. However, there are several alternative designs and mitigation measures that could completely avoid or substantially reduce this impact. Subsurface intakes, such as beach wells or infiltration galleries, where feasible, have the significant advantage of eliminating impingement and entrainment impacts. Applicants are encouraged to use subsurface intakes whenever feasible, and where they will not cause significant adverse impacts to either beach topography or potable groundwater supplies. Projects proposing to use open water intakes should expect to provide information about their effects on marine organisms as part of their permit applications.

Facilities should be designed to avoid or minimize the use of hazardous chemicals. Applicants are encouraged to select technologies and processes that minimize or eliminate the need for hazardous chemicals. This will reduce the disposal requirements for such substances, lessen the impacts of potential spills or releases from the facility, and reduce discharges of hazardous constituents into the ocean. Applicants should also select the least environmentally damaging options for feedwater treatment and cleaning of plant components.

Facilities should incorporate any of several ways to avoid or minimize adverse impacts associated with desalination discharges. Applicants should provide information about the potential impacts to marine resources from the proposed discharges. This information may be obtained from survey results, pre-operational monitoring, monitoring results from other desalination plants, or other sources. The information will then be reviewed by the Coastal Commission staff in consultation with the RWQCB with jurisdiction in the area where the facility is proposing to locate. Applicants should also evaluate options for combining brine discharges with discharges from a power plant or a sewage treatment plant. Combining the desalination discharge with other discharges may be preferable to direct discharges of brine and may result in fewer overall impacts, but this will require case-by-case review. When the brine will be combined with other discharges, the applicant should clearly identify which party or parties will be responsible for monitoring the discharges and for providing corrective measures for any adverse impacts that occur.

1.3 REPORT ORGANIZATION

Chapter 1 of this report provides a brief introduction, a description of existing and proposed desalination facilities along the California coast, and some of the current local, state, and federal initiatives on desalination. **Chapter 2** provides a summary of the Coastal Act – including its background, some of its policies and definitions, and its review process – and discusses how some of these issues are likely to be incorporated into the review of proposed desalination facilities. **Chapter 3** follows with a description of the main methods used in desalination and a discussion of desalination costs and energy requirements. **Chapter 4** discusses the primary public resource issues related to reviewing proposals for conformity to the Coastal Act, including the Public Trust Doctrine, issues of public or private ownership, international trade, and several specific Coastal Act policies. **Chapter 5** discusses some environmental effects that desalination may have on various coastal resources, in particular those associated with marine biology and water quality. **Chapter 6** provides a brief description of some other regulatory issues and the local, state, or federal agencies likely to be involved in desalination review. **Appendix A** includes a glossary of desalination-related terms. For ease of reading, many sections of the report start with **Main Points** that are then discussed in greater detail within that section of the report. In addition, many sections end with **What's Likely Needed During Review?**, describing information about a proposed project that may be needed during Coastal Act review.

1.4 EXISTING AND PROPOSED DESALINATION FACILITIES ALONG THE CALIFORNIA COAST

There are currently about a dozen existing desalination facilities along the California coast (see Table 1) and at about two dozen facilities being considered (see Table 2). Comparing the two tables gives a sense of the current high level of interest in desalination along the coast and the scale of the changes being considered. Existing coastal desalination facilities are relatively small, and in total, can produce up to a maximum of about 3300 acre-feet per year. The total output of all the currently proposed coastal facilities, including some that would be the largest in the country, would be about 260,000 acre-feet per year, which represents roughly a 80-fold increase in production.

TABLE 1: EXISTING DESALINATION FACILITIES ALONG THE CALIFORNIA COAST

Operator/Location/Purpose/ Public or Private:	**Purpose/ Public or Private:**	**Maximum Capacity:**	**Status:**
Chevron/ Gaviota	- Industrial processing - Private	410,000 gpd/ 460 AF/yr.	Active
City of Morro Bay	- Municipal/domestic - Public	830,000 gpd/ 929 AF/yr.	Intermittent use
City of Santa Barbara	- Municipal/domestic - Public	N/A	Inactive
Duke Energy/ Morro Bay Power Plant	- Industrial processing - Private	430,000 gpd/ 482 AF/yr.	Not known
Duke Energy/ Moss Landing Power Plant	- Industrial processing - Private	480,000 gpd/ 537 AF/yr.	Active
Marina Coast Water District	- Municipal/domestic - Public	300,000 gpd/ 335 AF/yr.	Active
Monterey Bay Aquarium	- Aquarium visitor use - Non-profit	40,000 gpd/ 45 AF/yr.	Active
PG&E/ Diablo Canyon	- Industrial processing - Private	576,000 gpd/ 645 AF/yr.	Not known
Santa Catalina Island	- Municipal/domestic - Private	132,000 gpd/ 148 AF/yr.	Not known
U.S. Navy/ Nicholas Island	- Municipal/domestic - Government	24,000 gpd/ 27 AF/yr.	Not known
Various offshore oil & gas platforms	- Platform uses - Private	2,000–30,000 gpd/ 2–33 AF/yr.	Active
Total Production:	***~ 3 million gallons per day /3300 acre-feet per year***		

Note: gpd = gallons per day, and AF/yr. = acre-feet per year. There are approximately 326,000 gallons in an acre-foot, which represents the amount of water it takes to cover an acre of land one foot deep. Typically, a household will use one to two acre-feet per year.

TABLE 2: PROPOSED DESALINATION FACILITIES ALONG THE CALIFORNIA COAST

Operator/ Location:	**Purpose, and public or private:**	**Maximum Capacity:**	**Status:**
Cambria Community Services District	- Municipal/ domestic - Public	500,000 gpd/ 560 AF/yr.	Planning
Ocean View Plaza/ Monterey	- New development - Private	5,000 gpd/ 6 AF/yr.	Planning
Carmel Area Wastewater District	- Municipal/ domestic - Public	Not known	Not known
City of San Buenaventura	- Municipal/ domestic - Public	Not known	Not known
City of Sand City	- Municipal/ domestic - Public	27,000 gpd/ 30 AF/yr.	Planning
City of Santa Cruz	- Municipal/ domestic - Public	2.5 million gpd/ 2800 AF/yr.	Planning
East-West Ranch/ Cambria	- New development - Private	Not known	Withdrawn
Marina Coast Water District/ Fort Ord	- Municipal/ domestic - Public	2.68 million gpd/ 3000 AF/yr.	Planning
Long Beach	- Research - Public	300,000 gpd/ 335 AF/yr.	Design phase
Long Beach	- Municipal/ domestic - Public	10 million gpd/ 11,000 AF/yr.	Planning
Los Angeles Dept. of Water and Power	- Municipal/ domestic - Public	10 million gpd/ 11,000 AF/yr.	Planning
Monterey Bay Shores	- New development - Private	20,000 gpd/ 22 AF/yr.	Not known
Monterey Peninsula Water Mgmt. District / Sand City	- Municipal/domestic - Public	7.5 million gpd/ 8,400 AF/yr.	Planning
Cal-Am/Moss Landing Power Plant	- Municipal/domestic	9 million gpd/ 10,000 AF/yr.	Planning
Municipal Water District of Orange County / Dana Point	- Municipal/domestic - Public	27 million gpd/ 30,000 AF/yr.	Planning
Poseidon Resources / Huntington Beach	- Various - Private	50 million gpd/ 55,000 AF/yr.	Draft EIR completed
San Diego County Water Authority / San Onofre Nuclear Generating Station	- Municipal/domestic - Public	TBD	Planning
San Diego County Water Authority / South County	- Municipal/domestic - Public	50 million gpd/ 55,000 AF/yr.	Planning
San Diego County Water Authority & Poseidon Resources /Carlsbad	- Municipal/domestic - Public/private	50 million gpd/ 55,000 AF/yr.	Planning
U.S. Navy / San Diego	- Municipal/domestic - Government	700,000 gpd/ 780 AF/yr.	Not known
West Basin Municipal Water District	- Municipal/domestic - Public	20 million gpd/ 22,000 AF/yr.	Planning
Total Proposed Production:	***~ 240 million gallons per day / 260,000 AF/yr.***		

1.5 OTHER STATE, FEDERAL, AND LOCAL DESALINATION INITIATIVES

There are a number of efforts currently underway in California to study, promote, or anticipate the need for additional water supplies using desalination or other methods. Some of the main ones are listed below.

STATE

California Department of Water Resources (DWR): DWR is one of the lead agencies in the state for developing and allocating water resources. Its current work includes the following:

- ***Update of the California Water Plan for 2003:*** The draft Plan identifies the need for the state to have a balanced and integrated water portfolio and includes seawater desalination as one of over twenty sources for the state's water supply (along with surface flows, reclaimed water, groundwater, etc.). The Plan considers it moderately likely that seawater desalination could provide up to 200,000 acre-feet per year of the state's water demand by 2030.

- ***Desalination Task Force (per Assembly Bill 2717):*** This task force was charged with identifying the opportunities and constraints for desalination in providing some of the state's water supply, and to examine whether the state should play a role in furthering the use of desalination. In October 2003, the Task Force completed its work and published its findings and recommendations (see http://www.owue.water.ca.gov/recycle/desal/desal.cfm). Selected findings and recommendations have been incorporated into relevant sections of this report. As a follow-up to the work of the Task Force, DWR will continue to coordinate much of the desalination research and information available at the state level.

California Energy Commission:

- ***Review of entrainment studies:*** The CEC is compiling information about existing studies that have been used to evaluate the effects of coastal power plants on marine organisms. The compilation is meant in part to identify the adequacy and applicability of these studies to current environmental conditions near the plants, and to identify where updated studies are needed. Many of the report's findings will likely be applicable to desalination facilities proposing to co-locate at coastal power plants.

- ***Energy demand:*** Energy Commission staff is compiling data to help determine how the energy demand of proposed desalination facilities will affect the state's power grid.

FEDERAL

Bureau of Reclamation: The Bureau has several research initiatives underway. It is working with Sandia National Laboratories on a Desalination and Water Purification Technology Roadmap, primarily to identify and prioritize areas where technological efficiencies in desalination might be most effective. It is also coordinating several of the desalination research initiatives under "Water 2025", a federal program meant to manage water resources in the Western U.S. The Bureau is also working with the City of Long Beach Water Department to

develop a nanofiltration desalination technology which is anticipated to be much more energy-efficient than other types of reverse-osmosis membrane technology. The two agencies are developing a pilot project to test various techniques and types of equipment. The project would be located at the Haynes Generating Station in Long Beach.

Monterey Bay National Marine Sanctuary: The Sanctuary is updating its Management Plan and will consider including recommendations about desalination facilities that may be proposed within Sanctuary boundaries. The recommendations were developed by a desalination workgroup representing a number of interests and stakeholders in the Monterey Bay area, were evaluated by both the Sanctuary Advisory Group and the public during review of the Draft Management Plan during the summer and fall of 2003, and will be considered for adoption as part of the final Management Plan sometime in 2004. The workgroup's recommendations include the following:

- Develop a regional planning program for desalination.
- Develop facility siting guidelines, including identifying preferred conditions and habitats, areas that should be avoided, etc.
- Define standards for entrainment and impingement caused by desalination facilities and limits for brine discharges to Sanctuary waters.
- Determine which water quality models are suitable for determining discharge plumes for desalination outfalls.
- Identify the minimum required information for permit applications.
- Develop a regional monitoring program to determine cumulative impacts of multiple desalination facilities.
- Develop an education and outreach program for desalination issues.
- Track and evaluate emerging desalination activity and technology and outside the Sanctuary.

Several of these recommendations have been incorporated into applicable sections of this report.

LOCAL AND REGIONAL

A number of local or regional water districts are also considering desalination programs to provide a portion of their water supplies. Although desalination is still more expensive than existing supplies, there is a growing interest by water supply agencies to diversify their water sources and to decrease their reliance on imported water. Major efforts include:

- **Metropolitan Water District (MWD) of Southern California:** MWD is considering proposals to build and operate coastal desalination facilities within its Southern California service area. To further this goal, MWD has offered to subsidize desalination production at the rate of $250 per acre-foot for up to 25 years. At this time, five of the proposals shown in Table 2 are being considered:
  - Long Beach Water Department
  - Los Angeles Department of Water and Power
  - Municipal Water District of Orange County
  - San Diego County Water Authority/Poseidon Resources
  - West Basin Municipal Water District

The purposes of this program include reducing Southern California's dependence on imported water supplies, enhancing the portfolio of supplies available to the area, and providing an incentive to develop desalination as an additional water source in Southern California.

- **Long Beach Water Department (LBWD):** The Department recently started construction of a desalination test facility that will evaluate several desalination techniques, including one patented by the Department that may provide greater efficiencies and lower energy use.

- **San Diego County Water Authority (SDCWA):** The SDCWA recently circulated a Draft EIR for its Regional Water Facilities Master Plan that identified development of large-scale desalination facilities (up to 100,000 acre-feet per year) as its preferred alternative to provide for regional growth through 2030.

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CHAPTER 2: ELEMENTS OF COASTAL ACT REVIEW

Chapter Sections:

Most, if not all, seawater desalination facilities will require review for conformity to the Coastal Act due to their proposed use of seawater and their location on or near the coast. This chapter provides an overview of the Coastal Act and some of the key aspects of the Act that will likely apply to proposed desalination facilities during these reviews. It summarizes some of the Act's history and goals, its jurisdictional boundaries, and some key terms used in Coastal Act review, including "feasibility", "alternatives analysis", "mitigation", and "coastal-dependency". More information about each of these issues is available at the Coastal Commission's web site, at: www.coastal.ca.gov.

2.1 ABOUT THE CALIFORNIA COASTAL ACT

In 1976, the state Legislature enacted the California Coastal Act to provide long-term protection of the state's coastline. The Act grew out of a 1972 citizens' initiative (Proposition 20) passed to ensure protection of the California coast. The Act includes a number of policies related to:

- Protection and expansion of public access to the shoreline;
- Protection, enhancement, and restoration of important habitats and biological communities;
- Protection of areas of the coast used for priority purposes, such as coastal recreation, coastal agriculture, and others;
- Preventing sprawl;
- Providing public education about the coast and coastal issues; and,
- Establishing local controls for coastal development.

The Coastal Act is implemented through a combination of state and local jurisdictions within the state's Coastal Zone.

COASTAL ZONE

The Coastal Act applies within the state's Coastal Zone, which encompasses an area along the state's entire 1100-mile coastline, starting three miles offshore and extending inland at distances ranging from several blocks to about five miles from the ocean[1]. Additionally, the Coastal Commission has jurisdiction in matters requiring federal permits or approvals in the federal waters beyond the three-mile boundary of state waters.

[1] ***Note:*** The Coastal Commission's jurisdiction does not extend into San Francisco Bay. Areas in and around the Bay inside the Golden Gate are under the jurisdiction of the San Francisco Bay Conservation and Development Commission.

COASTAL COMMISSION

The Coastal Commission consists of twelve voting members, with four each appointed by the Governor, the head of the Senate Rules Committee, and the Speaker of the Assembly, and four non-voting members (the Secretaries of the Resources Agency and the Business and Transportation and Housing Agency, the Chair of the State Lands Commission, and the Director of the Trade and Commerce Agency). As explained below, the Commission has permit authority in those parts of the Coastal Zone without a certified Local Coastal Program, and has the ability to review and determine appeals of some local decisions.

LOCAL COASTAL PROGRAMS

Local Coastal Programs (LCPs), when adopted by local governments and certified by the Commission establish development controls for areas of local jurisdictions within the coastal zone. The Coastal Commission retains its permit jurisdiction, however, in coastal waters and tidelands and for certain types of facilities, including major public works projects. The Commission also hears appeals of local decisions in areas of an LCP designated as within the Commission's appeal jurisdiction.

PERMITS AND APPROVALS

The Coastal Act requires that many development activities and uses within the Coastal Zone obtain a permit. The types of development requiring a permit are defined in Coastal Act Section 30106:

> *"Development" means, on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision pursuant to the Subdivision Map Act (commencing with Section 66410 of the Government Code), and any other division of land, including lot splits, except where the land division is brought about in connection with the purchase of such land by a public agency for public recreational use; change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511).*
>
> *As used in this section, "structure" includes, but is not limited to, any building, road, pipe, flume, conduit, siphon, aqueduct, telephone line, and electrical power transmission and distribution line.*

COASTAL DEVELOPMENT PERMIT PROCESS

Reviewing a proposed project for conformity to Coastal Act requirements may encompass a wide range of issues, depending on the type of proposal, its location, and its potential to affect coastal resources. A permit review commonly addresses issues such as public access, environmental effects, priority coastal uses, visual resources, and others.

2.2 KEY COASTAL ACT TERMS

This section of the report describes several key terms used in the Coastal Act that will likely apply during review of a proposed desalination facility. How these terms are applied could determine whether a proposal is approved and how it might be sited, designed, or operated. This section first discusses three general terms – "feasibility", "alternatives" and "mitigation" – and how they may be used in Coastal Act review. The report next describes two terms specific to the Coastal Act – "coastal-dependency" and "coastal-related", and how they may affect the review of proposed desalination facilities.

2.2.1 "FEASIBILITY", "ALTERNATIVES", AND "MITIGATION"

Main Point:

- ***Many Coastal Act policies applicable to desalination facilities require incorporating feasible alternatives and mitigation measures into project design and operation.***

The three terms above are important in determining the extent of review under the Coastal Act. A key element in many decisions for proposed projects requiring Coastal Act permits is how well the design and siting incorporate considerations of feasibility, alternatives, and mitigation into the proposal.

FEASIBILITY

"Feasible" is defined in both the Coastal Act (at Section 30108) and in CEQA as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors". The Coastal Act includes two main uses of "feasibility" – first, as it relates to project alternatives, and next, as it relates to mitigation measures. Primary examples include:

> ***From Section 30230 (Marine Resources):*** *"Marine resources shall be maintained, enhanced, and where feasible, restored".*
>
> ***From Section 30231 (Biological Productivity and Water Quality):*** *"The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored..."*

> ***From Section 30233(a) (Diking, Filling, or Dredging):*** *"The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects..."*
>
> ***From Section 30251 (Scenic and Visual Resources):*** *"Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas."*
>
> ***From Section 30260 (Coastal-dependent Industrial Facilities):*** *"...where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted... if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible."*
>
> ***From Section 30235 (Shoreline Construction):*** *"Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible".*

It is also included as part of one of the Act's goals, in Section 30001.5: to "protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources".

Coastal Act review may consider at least four distinct feasibility factors, each of which can be addressed separately, but which also must be brought together when determining whether a proposed alternative or mitigation measure is feasible. The four aspects are:

- ***Environmental factors:*** refers to selecting mitigation measures that can successfully respond to the environmental impact being addressed, that have a strong likelihood of success, and that do not cause other undesirable environmental impacts.

- ***Technological factors:*** refers to the engineering and operational ability to implement an alternative or mitigation measure. For desalination, an example may be to consider treating water using ultraviolet light rather than chemicals. The end result may be the same – water treated to a desirable level – but the method using ultraviolet light would result in fewer environmental impacts. This aspect of feasibility may also be applied when considering combined benefits – for example, a facility near the ocean may be required to put up screens or panels to reduce its visual impacts, and those panels may also result in lower maintenance costs at the facility due to reduced exposure to salt spray or wind.

- ***Social factors:*** refers primarily to the public's acceptance or non-acceptance of certain measures. An example of social feasibility related to desalination is the potential to desalinate treated wastewater instead of seawater. While this alternative is feasible in many ways – it can be done technologically, it is less expensive than desalting seawater, and it may result in fewer environmental impacts due to discharging the waste in the ocean – it is also viewed by many members of the public as less desirable. Part of the consideration in reviewing social feasibility may be to determine what effort it would take to have some measures could gain public acceptance.

- ***Economic factors:*** generally includes determining the environmental impacts of a proposal along with the economic costs of mitigating those impacts through alternatives, avoidance, minimization, or other means. The review may also compare the mitigation costs with the overall project costs to determine whether mitigation costs represent a reasonable proportion of the project costs. Two aspects of desalination – its relatively high capital and operating costs, and its potential to cause significant adverse environmental impacts – could make extensive mitigation measures both necessary and feasible. For example, a project with significant environmental impacts and capital costs of $200 million would spend only five percent of that amount to produce $10 million worth of mitigation measures. In some cases, economic feasibility may also include determining the opportunity costs gained or lost by using a coastal site for one activity rather than another. This is generally an element of the Coastal Act policies related to priority uses, but may also be included in feasibility in some instances. Economic factors may also come into play in combination with the others – for example, in determining that it is both technically and economically feasible to use a less hazardous membrane cleaning method at a facility. [See also Chapter 3.2 for more detailed discussion of how costs may be incorporated into Coastal Act review.]

ALTERNATIVES AND MITIGATION

Coastal Act review generally evaluates a proposed project to determine whether there are alternative versions of the project that may be less environmentally harmful. Not only are alternatives and mitigation measures required to be feasible, but for some Coastal Act policies, all feasible alternatives and mitigation measures must be implemented[2]. Review of a desalination proposal, therefore, will likely require an alternatives analysis to identify whether there are other feasible alternatives that better conform to Coastal Act requirements, and an assessment of mitigation measures available to avoid or reduce its impacts.

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[2] Mitigation measures are generally considered in sequence based on their effectiveness in avoiding or alleviating an impact. The "mitigation sequence", as defined in CEQA Section 15370, consists of:
(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.
For purposes of this report, the term "minimize" is defined as "to reduce to the smallest possible level."

Some examples of possible alternatives and mitigation measures to be considered include:

- ***Conservation:*** This could include incentive-based or voluntary measures, ranging from urging landowners to use drought-resistant native plants to regulatory requirements, such as requiring new developments to use only low-flow water fixtures. Many conservation measures provide a dual advantage, in that not only are they effective in reducing water demand but often cheaper than providing additional water. A November 2003 report by the Pacific Institute states that California could increase its urban water supplies by 85% by using available and cost-effective measures, such as installing low-flow fixtures, timers, and other devices[3]. Many California communities have already implemented these measures, and are part of a comprehensive local or regional strategy to reduce water demand. The state Desalination Task Force recognized this when it included as one of its recommendations:

  Include desalination, where economically and environmentally appropriate, as an element of a balanced water supply portfolio, which also includes conservation and water recycling to the maximum extent practicable.

- ***Using reclaimed or recycled water:*** This will likely depend on the availability of nearby sources, the infrastructure needs to make these sources available to end users, the degree of certainty that those sources will be available when needed, and other similar factors.

- ***Reallocating existing supplies:*** This could include a number of approaches, such as retiring existing water rights or assigning those rights to be used for various conservation purposes (e.g., fish flows, instream values, etc.).

- ***Market-based measures:*** This could include measures such as trading water rights, using a rate structure that charges different amounts for different sources of water or for water use during different times of day.

Additional alternatives and mitigation measures are discussed in other sections of this report as they apply to particular topics.

WHAT'S LIKELY NEEDED DURING REVIEW?

Evaluation of alternatives and mitigation measures considered and how those were determined to be feasible or infeasible: As part of a desalination permit application, an applicant should be prepared to describe and evaluate the existing conservation measures being implemented in a proposed service area, whether there are comprehensive conservation plans or water use reduction plans in place, the effectiveness of such measures to reduce overall water consumption, and additional feasible measures that could reduce impacts associated with a constructing or operating a desalination facility. In many areas, this will likely require tying the proposed desalination facility to adopted local or regional water management plans, growth projections, local coastal programs, and other planning documents.

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[3] Gleick, Dr. Peter, Waste Not, Want Not: The Potential for Urban Water Conservation in California, November 2003.

The application will also likely need to describe what considerations were used to determine whether particular designs, locations, and mitigation measures were determined to be feasible or infeasible. The most documentation should probably be provided for those aspects of a proposed project that would have the greatest effect on avoiding or reducing adverse impacts.

2.2.2 "COASTAL-DEPENDENT" AND "COASTAL-RELATED"

Main Points:

- ***The Coastal Act allows many types of development in the coastal zone, and recognizes that some uses are "coastal-dependent" in that they require a site on or immediately adjacent to the ocean. The Act also defines "coastal-related" uses as being those that depend on "coastal-dependent" uses.***
- ***Desalination, in and of itself, is not "coastal-dependent".***
- ***While desalination processing facilities are not likely to be considered "coastal-dependent", their associated pipelines may be. If the pipelines for a desalination facility using seawater are considered "coastal-dependent", the associated processing facility would be considered "coastal-related".***

The Coastal Act includes policies that acknowledge the limited amount of coastal land in California, the need for certain activities to be located on the coast, and the public's interest in having land available for those activities and uses. One of the primary determinations to be made during review of many projects proposed to be sited in or next to the ocean is whether they are "coastal-dependent" or "coastal-related". Section 30101 of the Coastal Act defines a "coastal-dependent development or use" as "any development or use which requires a site on, or adjacent to, the sea to be able to function at all," and Section 30001.2 further describes "coastal-dependent" developments as including "ports and commercial fishing facilities, offshore petroleum and gas development, and liquefied natural gas facilities"[4]. Section 30101.3 of the Act defines a "coastal-related development" as "any use that is dependent on a coastal-dependent development or use".

The issue of "coastal-dependency" is not a concern within the entire width of the coastal zone, only for those developments proposing to locate on or immediately adjacent to the ocean. The issue of "coastal-dependency" is generally not an issue for projects proposed to be located at some distance inland from the ocean but still within the Coastal Zone – for example, on the landward side of a coastal highway or on a parcel not bordering coastal waters.

[4] This section further distinguishes between "coastal-dependent" facilities and other facilities such as electrical generating facilities and refineries, which it recognizes may be necessary to locate in the Coastal Zone, although not necessarily on or adjacent to the ocean.

IS DESALINATION "COASTAL-DEPENDENT"?

While a facility dependent on seawater may, at first glance, appear to fit this definition, desalination, in and of itself, is not necessarily a coastal-dependent development or use. Many desalination facilities are located at inland locations where the source water is brackish water, groundwater, reclaimed water, or similar sources other than seawater. Similarly, providing a water supply is not necessarily a coastal-dependent use, as most potable water is provided from sources other than seawater. Even for facilities using seawater, the actual processing of that water does not depend on being in or adjacent to the ocean.

While a desalination facility itself might not be coastal-dependent, the pipelines for getting seawater to and from the facility may be. The desalination processing facility may only need to be located close enough to the water to feasibly pump the source water inland from the shoreline. For many proposals, this may require no more than being located across the street from the ocean rather than right on the ocean.

In some cases, the pipelines, too, might be found to not be "coastal-dependent" – if, for example, the facility can get its source water from wells located near, but not directly on the shoreline rather than from open intakes in the ocean.

> ***Example of a development considered partially "coastal-dependent" and partially "coastal-related":*** In a decision on the Las Flores Canyon oil and gas processing facility in Santa Barbara County, the Commission found that the pipelines providing oil and gas from offshore oil platforms were considered "coastal-dependent", but that the facility used to process the oil and gas was not "coastal-dependent". However, because the processing facility was dependent on the use of those "coastal-dependent" pipelines, it was considered "coastal-related". This allowed project elements needing to be sited on or adjacent to the water to be sited there and resulted in other parts of the development being located some distance away from the shore.
>
> The Commission has made similar determinations in several instances that aquaculture dependent on seawater is not necessarily "coastal-dependent", since it, too, can be located at some distance inland from the shoreline, although the water supply lines may be considered "coastal-dependent."

WHY IS "COASTAL-DEPENDENCY"IMPORTANT?

Whether all or part of a proposal is "coastal-dependent" is important in several ways:

- Priority uses: Recognizing the limited amount of coastal land in the state, the Coastal Act includes several policies that prioritize coastal-dependent development for coastal areas. Section 30255, for example, states that coastal-dependent development has priority over other development on or near the shoreline and that it should be within reasonable proximity of the coastal-dependent uses it supports. [These priority uses are discussed further in Chapter 4.3.2.]

- Placing fill: To place fill in coastal waters, a proposed development must fall within one of the eight categories listed under Coastal Act section 30233(a)[5]. Just one of these eight categories (Category 1 – port, energy, and coastal-dependent industrial facilities) is likely to apply to desalination, but only for the parts of the facility that have been determined to be coastal-dependent (e.g., the intake and outfall pipelines). Further, the fill allowed under this policy is subject to two additional measures – there must be no feasible less environmentally damaging alternative, and feasible mitigation measures must minimize adverse environmental effects.

  Unless designed and operated to avoid impacts, seawater intakes and outfalls are likely to cause adverse effects to coastal resources, primarily due to "entraining" marine organisms (see Chapter 5.1.1 of this report) and due to the highly saline discharge back to the ocean (see Chapter 5.1.2.). Therefore, the review for proposed pipelines considered "coastal-dependent" will need to determine whether there are feasible alternatives, including other locations, water sources, or methods such as beach wells, infiltration galleries or other types of subsurface intakes or outfalls, as well as existing intakes and outfalls, that are less environmentally damaging.

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[5] Section 30233(a): The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:
(l) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.
(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities, shall not exceed 25 percent of the degraded wetland.
(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.
(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.
(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.
(7) Restoration purposes.
(8) Nature study, aquaculture, or similar resource dependent activities.

Note: Category 5 of this policy, which includes "incidental public services" has generally been intepreted by the Commission to include only temporary impacts, such as construction- or maintenance-related activities. The Commission has generally not interpreted this section to allow ongoing impacts that might be associated with an open intake, such as entrainment or impingement of marine species.

- Proposals that don't fully meet applicable Coastal Act policies: Section 30260 of the Act recognizes that some facilities that are "coastal-dependent" might not conform to all applicable policies of the Coastal Act:

  Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.

  This section, therefore, provides that coastal-dependent industrial facilities not consistent with other applicable policies of the Coastal Act may be permitted if the Commission finds that they meet a three-part test:

  - Are alternative locations infeasible or more environmentally damaging?;
  - Would doing otherwise adversely affect the public welfare?; and,
  - Are adverse environmental effects mitigated to the maximum extent feasible?

Similar to the tests described above in Section 30233(a) for proposals involving placing fill, the review of desalination facilities or pipelines considered "coastal-dependent" will need to evaluate whether there are other feasible or less environmentally damaging locations and determine what measures are needed to mitigate adverse environmental effects to the maximum extent feasible. Again, this review is likely to include an evaluation of whether the facility can be located and operated to avoid entraining and impinging marine organisms and whether the outfall can be designed to avoid or minimize harmful discharges to the ocean.

CHAPTER 3: TECHNICAL AND ECONOMIC ASPECTS OF DESALINATION

Chapter Sections:
3.1 Desalination Methods and Processes
3.2 Desalination Economics and Energy Use

Desalination refers to any of several methods that remove dissolved salts and other chemicals from water. Desalination is most well known as a way to treat seawater to provide drinking water, but it is also used to treat sources of water other than seawater, including brackish groundwater, recycled or reclaimed wastewater, agricultural runoff water, and others[6]. It can provide different levels of treatment to allow a source water to be used for drinking, industrial processes, agricultural uses, or other uses that may allow for a particular concentration of dissolved solids and other materials in the water.

The desalination process generally involves drawing in source water (e.g., brackish or salt water) and separating it into two streams – a stream of desalted water that contains a minimal concentration of dissolved salts and minerals (the product water), and a stream of liquid containing the residual dissolved solids, including salts and other minerals and compounds. Depending on which desalination method is used, every 100 gallons of seawater can produce 15 to 50 gallons of potable water and discharge 50 to 85 gallons of effluent containing higher concentrations of the removed solids[7].

3.1 DESALINATION METHODS AND PROCESSES

There are a number of desalination methods, including reverse osmosis, distillation, electrodialysis, and vacuum freezing. Reverse osmosis and distillation represent the predominant technologies currently being used around the world, and those are the two methods briefly described below. Most of the facilities being proposed along the California coast would use reverse osmosis methods, and this report focuses, for the most part, on that method.

DISTILLATION

This process requires the intake water to be heated to produce a vapor, which is then condensed to produce water with a low concentration of dissolved salt and other minerals. This method essentially mimics the hydrological cycle that occurs in nature. The most common methods of distillation include multistage flash (MSF), multiple effect distillation (MED), and vapor compression. Distillation plants generally require less pretreatment of feedwater than is

[6] "Brackish" water has a salt content of 5 to 20 parts per thousand (ppt), while seawater has salt content of over 20 ppt. The salt content of seawater along the California coast averages from about 32 to 34 ppt.

[7] In this report, the concentrated solution of salts and other constituents remaining after potable water is extracted from seawater is referred to as "desalination discharge". Other documents refer to it as "brine", "desalination concentrate", "seawater concentrate" "effluent", etc. For some facilities, the discharge may be only brine – which is defined as water with a high concentration of salts; in others, the discharge may contain concentrations of materials other than salt.

necessary in reverse osmosis, and they can generally use feedwater of lower quality. Distillation plants also do not need to shut down production for cleaning or replacement of equipment as often as reverse osmosis plants, and they do not generate waste from backwash of pretreatment filters. The most significant disadvantage of distillation is that it is extremely energy intensive, which typically limits its use to areas where energy costs are not as critical an issue. These facilities have most commonly been used in the Middle East. Scaling and corrosion of distillation plants are the major maintenance concerns, due to the exposure of the unprotected evaporator components to corrosive feedwater.

REVERSE OSMOSIS

This process involves pumping feedwater at high pressure through semi-permeable membranes to separate salt and other minerals from the water. The pores in the membrane are large enough to allow water molecules to pass through, yet are too small to allow the passage of salt and other minerals. Reverse osmosis facilities generally involves four separate processes: pretreatment, pressurization, membrane separation, and post-treatment stabilization. Both physical and chemical pretreatment can be used to remove suspended particles from the source water to keep the membrane surfaces clean and to treat the water to prevent growth of microbes on the membranes. The feedwater is then pressurized to about 800-1000 pounds per square inch (psi), a process that results in most of the energy demand for the reverse osmosis desalination method. The pressurized feedwater is then forced through the reverse osmosis membrane. Product water quality is sometimes improved by passing the water through a second set of membranes. Once the feed water is separated into two streams, the product water is treated to meet drinking water requirements, and then to the water distribution or storage system. Many reverse osmosis facilities are built using modular components that allow production to be expanded relatively easily. Many are built with multiple treatment "trains" that allows for some, but not all, production to be curtailed during cleaning or maintenance or during times of less demand. Some facilities include systems that separate most of the suspended solids and treatment chemicals from the waste stream so they can be sent separately to a wastewater treatment facility or dewatered and shipped to a landfill.

Reverse osmosis has several advantages over distillation, including:

- Less energy required;
- Its discharge has lower thermal impacts since the feedwater does not have to be heated;
- Fewer corrosion problems;
- Higher recovery rates – up to about 50% for seawater; and,
- Less surface area than distillation plants for the same amount of water production.

Reverse osmosis also has several disadvantages:

- It is generally more sensitive to poor water quality, resulting in the need to shut down facilities during severe storms or periods of high runoff when there are increased amounts of suspended particulates in the feedwater.
- It usually requires more frequent cleaning and maintenance, often using various chemicals and cleaning agents, and often requiring full or partial shutdowns during cleaning.

- The membranes are sensitive to fouling due to bacterial contamination or other causes, which may require more frequent replacement and result in higher costs.
- It requires more extensive pretreatment, often with the use of biocides, coagulants, and other compounds.
- The process and its use of cleaning agents generate wastes that may include toxic chemicals, metals, and other constituents that are either discharged to surface waters or are separated and sent to a wastewater treatment facility or landfill.

3.2 DESALINATION ECONOMICS AND ENERGY USE

Main Points:

- ***It is difficult to determine the full range of costs and benefits of any water supply, including desalination.***
- ***For water purveyors, one advantage to coastal desalination facilities is that, from an economic standpoint, seawater is considered free.***
- ***Energy costs are the most expensive part of the desalination process.***
- ***Desalination remains more expensive than other water sources, but its higher price is seen by some as a premium paid for a local and more reliable water supply.***
- ***Coastal Act review includes consideration of a proposed development's energy consumption and requires energy use to be minimized.***
- ***Coastal Act review includes consideration of costs associated with a project to assess feasible alternatives and mitigation measures.***

INTRODUCTION

It is difficult to determine the full economic cost of any source of water. Providing water supplies generally require both relatively direct and easily determined economic outlays – such as the capital cost to construct treatment plants and pipelines, the costs of operating and maintaining a water supply system, and the cost of electricity needed to pump water from one location to another – as well as indirect and non-monetary costs that are usually more difficult to determine – such as the environmental costs associated with lost streamflow or reduced watershed health caused by exporting water out of an area (e.g., fewer fish, smaller wetlands), societal costs (e.g., fewer recreational opportunities, decreased tourism), the costs of centralized infrastructure instead of dispersed systems, and others. These indirect costs may result in more significant economic, social, political, and environmental effects than the direct economic costs.

Adding to the difficulty of determining the overall costs of a water supply is that those costs are often countered by indirect or non-economic benefits – for instance, moving water from a stream to a distant reservoir may result in the loss of recreational opportunities in one location that are offset by increased recreational opportunities in another. Moving water from an area with a smaller population and lower economic demand into an area with a larger population and larger existing economic infrastructure may create more extensive economic benefits related to increased development. Another difficulty in determining costs is that these indirect economic considerations may or may not be evaluated as part of any particular water system depending on the level of public oversight, public interest and review, the perceived values of the affected resources, and other factors.

WHAT INFLUENCES DESALINATION COSTS?

Given the caveats above, some of the primary variables that determine costs for desalinated water are described below, along with some general comparisons between the costs of desalination and the costs of other water supplies. Many costs, such as those associated with storing or transporting water, are common to almost all water sources.

- **Energy use and costs:** Review under the Coastal Act includes consideration of a proposed development's energy consumption. Section 30253 of the Act requires, in part, that energy consumption of new development be minimized.

  Energy represents the single largest direct cost in producing desalinated water. Advances in desalination technology over the last ten years have significantly reduced the amount of energy needed to produce a given amount of water; however, energy continues to represent about one-third to one-half of the cost of desalination. As a result, desalination costs are relatively sensitive to the cost of energy – it is estimated that each one-cent difference in the price per kilowatt-hour of electricity causes about a fifty-dollar difference in the cost to produce an acre-foot of desalinated water. For example, water produced by desalination at a cost of $800 per acre-foot with electric rates at $0.05 per kilowatt-hour would cost $1050 per acre-foot if the electricity instead cost $0.10 per kilowatt-hour.

  Ocean water is generally more expensive to desalt than brackish water due to its higher concentration of dissolved solids. Brackish water, with salinity ranging from about 5 to 20 parts per thousand, generally requires less energy to desalt than ocean water, which has salinity levels greater than 20 parts per thousand.

  Along with the energy costs to produce the water, desalination also requires energy to transport water to its end users. This is a cost common to nearly all water sources, as water is a relatively heavy commodity and energy costs to lift water uphill or to pump it long distances can be the single largest expense for many water systems. Because seawater desalination facilities located along the coast will generally be located at the lowest elevation of a water service area, they could have significant "lifting" and distribution costs to get the water to the end users.

- **Water source:** There are two main cost components related to the source of water – the initial cost of the water, and the level of treatment needed to produce water of a desired quality. Regarding the initial costs, from the predominant economic standpoint, one of the primary benefits of seawater as a source of potable water is that it generally has a direct monetary price of zero. Seawater is seen as inexhaustible and noninterruptible, and therefore not subject to price variations due to scarcity or supply and demand. If a proposed desalination facility is co-located with a facility using an existing seawater supply, such as a power plant that uses ocean water for cooling, there may additional costs savings by not having to site, design, and construct new intake and outfall systems needed to use seawater as the source water. [Note: advantages and disadvantages of co-location are discussed in more detail in Chapter 5.1.3.] Sources of water other than seawater, such as agricultural water transfers, reclaimed, or recycled water, may have to be purchased from suppliers and may be subject to supply variability. However, these sources are often easier and less expensive to

treat to drinking water standards, because of their lower levels of dissolved solids. One of the primary issues related to many of these sources is the public perception that a particular source, such as treated wastewater, is unsuitable as drinking water, despite the ability of a properly operating desalination system to remove the harmful components in that water.

Regarding the costs associated with treatment, the general relationship is that the better the source water quality, the less expensive it is to treat. This is similar to brackish water requiring less energy to treat than seawater – the fewer contaminants, such as various chemicals or organisms (e.g., algal blooms), the less pre-treatment or treatment required, and thus lower costs. Some of these costs may be reflected in either the frequency of cleaning or maintenance required due to contaminants in the source water – for example, reverse osmosis membranes generally operate less effectively when there are high levels of dissolved solids, so such systems often need pre-treatment through sand filters or other types of filters before the water reaches the final reverse osmosis membranes. This situation can also increase the long-term maintenance requirements at a facility if the membranes need to be replaced more often due to water quality issues.

- **Desalination method:** Of the two primary desalination methods, distillation generally has higher energy costs than reverse osmosis because of the need to heat the source water. The cost differential between the two methods can be reduced somewhat if the source water is pre-heated or if it derives waste heat from another process, such as discharged cooling water from a coastal power plant, which may be 20° C. above ambient ocean water temperature.

- **Scale and capacity of facility:** Some desalination facilities are likely to benefit from economies of scale, although this is likely to depend on the particular characteristics, location, and capacity of a given facility.

- **Infrastructure:** A desalination facility must be able to either connect to an existing distribution system or construct new pipelines or a distribution system to get water to the end users. This cost will vary by location, size of the service area, and other factors. This may be a significant cost in much of coastal California, where most water delivery systems were engineered to move water from inland areas to the coast, not the other way around. When required as part of a proposed seawater desalination facility, some of the impacts associated with the distribution infrastructure may be part of Coastal Act review.

- **Maintenance and Cleaning:** Each desalination facility requires some level of anti-fouling treatment and regular maintenance and cleaning, which will vary based on the desalination method used, the type of materials used, and other factors. Recent developments in membrane technology have extended the expected lifespan of many membranes, filters, and associated materials; however, several of these improvements have not been thoroughly tested in a production environment. Additionally, like other water sources, once treated water is in the distribution system, it must be kept clean until it reaches the end users, so there are ongoing costs associated with maintenance and cleaning the water supply system.

- **Conformity with existing water supplies:** When various sources of water are mixed in a distribution system, they must be chemically compatible. For example, mixing water treated with chlorine and water treated with chloramines may cause problems in the system and to the end users.

- **Desired quality of end product:** Not all desalinated water is intended to be used as drinking water, and costs will vary depending on whether the water will be for purposes needing higher- or lower-quality water, such as manufacturing, irrigation, or agriculture. The standards that apply to the end product water will also affect costs – for example, a facility producing drinking water may be subject to stringent treatment requirements, more extensive sampling and monitoring of both its water quality and its production methods, and other conditions meant to protect public health.

- **Full-time or part-time operation:** Facilities that operate part time or to provide back-up supply are likely to have higher costs per acre-foot of produced water since the capital and maintenance costs must be paid even when the facility is not producing.

Other variables may include easily-determined costs and benefits such as sales revenue or financial incentives such as subsidies and grants, as well as less easily-determined considerations such as the value to a water purveyor or to end-users of having a reliable supply, increased control over future supplies, and the avoided costs of treatment, storage, and conveyance from other sources (from the 2000 Urban Water Management Plan, San Diego County Water Authority).

REDUCED COST DIFFERENCE BETWEEN DESALINATION AND OTHER SOURCES

A significant economic change during the last decade is the reduced difference in cost between desalinated water and other water sources. In its 1993 report, the Coastal Commission found that desalination cost between $1000 and $4000 per acre-foot (including operation and maintenance costs, along with capital costs amortized over an assumed plant life of 20 to 30 years). While there are currently no large-scale coastal desalination facilities operating in Southern California and therefore no actual costs to provide an accurate comparison, estimated costs from several facilities being proposed along the California coast represent a substantial decrease from 1993 cost estimates (see Table 3)[8].

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[8] Additionally, the San Diego County Water Authority recently studied some of the economic considerations that went into planning the 25 mgd desalination facility built in Tampa Bay, Florida. Water produced from that facility had been estimated to cost between $560-680 per acre-foot due in part to several economically advantageous aspects of the proposal:

- The source water in Tampa Bay has lower salinity than ocean water (about 26 ppt vs. 35 ppt);
- Power costs are just under $0.04 per kWh.
- The facility would use the existing intake and outfall from the adjacent power plant.
- Its relatively high capacity of 25 mgd allows for some economies of scale.

(from the SDCWA Urban Water Management Plan, 2000).

This facility opened in March 2003, but has been shut down or operating at lower production rates for most of the time since then, due to unanticipated processing problems, maintenance requirements, and financial difficulties. The eventual costs will likely be higher than the estimates cited above.

TABLE 3: PLANNED COSTS OF SEVERAL SOUTHERN CALIFORNIA DESALINATION PROPOSALS

Facility:	***Capacity (in million gallons per day):***	***Capital Cost (in millions):***	***Production Cost (per acre-foot, w/$0.05 kWh electricity):***
Los Angeles Department of Water and Power	12	$70	$1033
Long Beach Water District	9	$62-92	$711-1171
Orange County Municipal Water District	25	$114-140	$860-1007
San Diego County Water Authority	50	$272	$909
West Basin Municipal Water District	20	$130	$904

(from Shahid Chaudhry, California Energy Commission – Unit Cost of Desalination presentation to State Desalination Task Force, July 30, 2003.)

Note: These figures are based on energy costs of $0.05 per kWh. Under current requirements and market conditions, energy costs are in the range of $0.08 to $0.13 per kWh, so the production costs noted above should be adjusted upward by $150 to $350 per acre-foot.

During the same period, the costs of several other existing water sources have increased. For example, in 1991, the Metropolitan Water District (MWD) of Southern California paid approximately $27 per acre-foot for water delivered from the Colorado River and $195 per acre-foot for water from the California Water Project. The MWD now pays an average of $460 per acre-foot of delivered water. As a result of the cost increase for imported water and the cost decrease for desalination, the difference between the costs of the two sources has declined from up to 3000 percent in 1993 to roughly 50 to 100 percent today. Although desalination still costs more, there is apparently a willingness by some suppliers and users to pay a premium for water not subject to drought and less vulnerable to disruption.

Even with the trend towards reducing the cost difference between it and other sources, desalinated water is still likely to cost more for the foreseeable future. The higher costs, therefore, represent, at least in part, the costs associated with the perceived benefits of having a local and drought-proof supply.

HOW ARE ECONOMIC COSTS INCORPORATED INTO COASTAL ACT REVIEW?

Review under the Coastal Act requires evaluating the adverse environmental effects of proposed projects, and identifying the feasible alternatives that would be less environmentally damaging and the mitigation measures that would avoid or minimize those effects. "Feasibility" is defined in section 30108 of the Coastal Act as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors". Cost, therefore, is one element considered in determining which alternatives and mitigation measures are to be included as part of a proposed project for it to conform to the Coastal Act. Chapter 2.2.1 of this report discusses "feasibility" in greater detail.

WHAT'S LIKELY TO BE NEEDED DURING REVIEW?

Realistic assessment of project costs: At the very least, this should include costs of the various project components that may affect coastal resources and therefore may require an assessment of alternatives or mitigation measures, and should also include the assumptions used to establish these costs. It may be most efficient to include a comprehensive benefit/cost analysis as part of the initial environmental review of a proposed project so these issues can be addressed early in the process.

CHAPTER 4: COASTAL ACT PUBLIC RESOURCE POLICIES RELATED TO DESALINATION

Chapter Sections:

This chapter provides some background to the Coastal Act's underlying public resource principles and policies and the relationship of those Coastal Act elements to recent trends in privatization and international trade agreements. It starts with a discussion of coastal resources as part of the public "commons", and includes a brief description of the Public Trust Doctrine, one of the underlying legal constructs of the Coastal Act. The chapter next discusses the potential shift of seawater from a public and "commons" resource to a private and commodity resource. It also discusses possible differences in issues that might be evaluated in the context of coastal resource impacts and Coastal Act policies, depending on whether a proposed desalination facility is a public or a private commercial venture. Although Coastal Act policies must be applied equally to public and private commercial projects, different issues may be raised by virtue of the different nature of each type of entity. These sections are followed by a discussion of emerging issues relating to the possible implications of international trade agreements on the ability of state and local communities to effectively implement coastal resource protection policies in connection with the regulation of certain private commercial desalination projects. All of these sections address a common element of the Coastal Act – that many coastal resources in general, and ocean water, in particular, are public resources that must be protected for the benefit of current and future generations. This chapter then closes with discussions of specific Coastal Act public resource policies, including those related to growth inducement, priority uses, public access, and recreation.

4.1 COASTAL RESOURCES AS PUBLIC RESOURCES

Main Points:

- ***Ocean water and its associated uses and values are public resources.***
- ***Approved uses of ocean water must ensure protection of public rights, interests, and values for ongoing navigation, fishing, recreation, and ecosystem preservation pursuant to the Public Trust Doctrine and Coastal Act policies.***
- ***Coastal desalination represents a shift in the use of seawater from primarily non-consumptive uses to a consumptive use, which has implications for how seawater is perceived and valued.***

4.1.1 SEAWATER AS PART OF THE PUBLIC "COMMONS"

A fundamental Coastal Act principle is that many coastal resources are imbued with a public interest and value that must be vigorously protected for the benefit of current and future generations. Unlike many coastal resources that are privately owned, ocean water, and the uses and values it embodies, constitute a public trust resource held in common for public use and

enjoyment. This principle is codified in numerous federal and state laws and regulations, including the Coastal Act (see The Public Trust Doctrine, next page). Notwithstanding the public nature of coastal ocean waters, use of such waters and of living and non-living resources in and under them have historically been allowed for non-public purposes.

Ocean water serves a number of beneficial uses and vital environmental, social, and economic functions. It is part of the shared public "commons", it serves as habitat for a multitude of species, it is a source of food and livelihood for society, and it is used to support transportation, commerce, recreation, and other important societal uses. For the most part, these uses are non-consumptive and sustainable, in that using ocean water for one of these purposes does not necessarily impair its ability to be used for others.

SEAWATER AS A "COMMON" RESOURCE OR COMMODITY?

Using seawater as a source of potable water would represent a shift from it being subject to primarily non-consumptive uses to including a consumptive use. The scale of ocean water consumption due to proposed desalination would be extremely small compared to the overall size of the resource; however, there could be significant local or regional direct or cumulative impacts to the uses or values associated with ocean water. The economic dynamics and considerations involved in the consumptive use of a resource are significantly different from those of a non-consumptive use. One of these differences is that seawater is transformed from a public trust resource held in common for public use to that of a commodity[9] to be taken out of the larger resource to be sold and consumed. This "commodification", or conversion of a resource from being subject to mostly non-market social rules to market rules, is generally accompanied by significant shifts in how it is perceived and managed, and changes the basis of decision-making about the resource from being guided by non-market social rules to being directed primarily subject to market economic rules[10].

This shift is not unique – to some degree, many other public goods or resources have become commodities, including fresh water (through appropriative water rights, water marketing, interbasin transfers, etc.), clean air (through emissions trading), and public land (through grazing permits, timber harvests, mineral extraction, etc.). Each of these shifts has been accompanied by changes in how these resources are perceived and managed – for example, the public or private rights conveyed by their use, the interests, values and responsibilities involved in decision-making about them, and changes in both anticipated and unanticipated costs and benefits resulting from the manner in which they are used.

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[9] Commodity: "1. Something useful that can be turned to commercial or other advantage...; 2. An article of trade or commerce, especially an agricultural or mining product that can be processed and resold." From The American Heritage® Dictionary of the English Language, Fourth Edition.

[10] From Gleick, Peter, Gary Wolff, Elizabeth Chalecki, and Rachel Reyes. The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water. Pacific Institute for Studies in Development, Environment, and Security, February 2002.

THE PUBLIC TRUST DOCTRINE: The Public Trust Doctrine is a legal construct that predates by centuries the origins of the U.S. and the many other Western countries where it applies. The doctrine reflects English Common Law dating from the era of the Magna Carta in the 13th Century, which is, in turn, based on the Justinian Code of the Roman Empire.

Public trust resources are those that cannot be fully owned by a private entity and are held and managed by the state (the trustee) for the benefit of all. Some core principles of managing such a trust are: the trustee works solely on behalf of the beneficiaries (the public); the productive capacity of the trust is to be protected; and, the benefits and productivity are to be perpetual[1]. In practice, the Public Trust Doctrine requires that resources subject to the public trust (e.g., tidal and submerged lands) must be used in a manner that is consistent with public trust purposes and values even when private uses of such resources are permitted. The Doctrine's most common uses have been to ensure that navigable waters, tidelands, and submerged lands are protected for navigation, commerce, and fishing, although the flexibility inherent in the general Doctrine has resulted in somewhat different applications in different states. In California, it is codified in portions of the state Constitution[2]. California courts have determined the doctrine applies not only to the land underlying the water but also to the water itself[3], and applies not only to navigation[4], commerce and fisheries, but also to water quality "...boating, swimming, fishing, hunting, and all recreational purposes"[5], "preservation"[6], and other "ecological and aesthetic values"[7]. While private uses are allowed, they are generally limited to those that would not harm or interfere with public trust values, including the uses identified above.

In California, while the state legislature and the State Lands Commission, and, ultimately the courts are the primary guardians of land and water resources impressed with public trust values and interests, other public agencies and policies, such as the Coastal Commission and the Coastal Act, share public trust stewardship responsibilities and represent additional statutory codification of the Doctrine. The Commission's review of proposed coastal desalination facilities using seawater from the open ocean, bays, or estuaries must address the question whether the proposal is consistent with public trust principles as embodied in Coastal Act policies. As a basic underpinning of the Coastal Act, the Doctrine informs the Commission's interpretation and application of the Act's policies, and when applying those policies in its decisions, the Commission manifests and implements its public trust responsibilities to protect marine organisms, ecological functions and habitat, aesthetics, and other public trust interests and values.

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[1] Fairfax, Sally. "Trusts and the Public Trust Doctrine", from Tomales Bay Institute speech given November 14, 2000.

[2] California Constitution, Article 1, Section 25: "The people shall have the right to fish upon and from the public lands of the State and in the waters thereof, excepting upon lands set aside for fish hatcheries, and no land owned by the State shall ever be sold or transferred without reserving in the people the absolute right to fish thereupon; and no law shall ever be passed making it a crime for the people to enter upon the public lands within this State for the purpose of fishing in any water containing fish that have been planted therein by the State; provided, that the legislature may by statute, provide for the season when and the conditions under which the different species of fish may be taken."

[3] *National Audubon Society v. Superior Court*, (1983) 33 Cal.3d 419.

[4] *People v. Gold Run Ditch and Mining Co.* (1884) 66 Cal. 138.

[5] *People v. Mack*, 19 Cal. App. 3d 1040, 1045, 97 Cal. Rptr. 448 (1971).

[6] *Marks v. Whitney*, 6 Cal.3d 251, 259, 491 p.2d 374, 98 Cal. Rptr. 790 (1971) – "[O]ne of the most important public uses of the tidelands... is the preservation of these lands in their natural state..."

[7] *National Audubon Society v. Superior Ct.*, 33 Cal.3d 419, 435, 658 P.2d 709, 189 Cal. Rptr. 49 (1983) – "The principal values plaintiffs seek to protect, however, are recreational and ecological – the scenic views of the lake and its shore, the purity of the air, and the use of the lake for the nesting and feeding by birds. Under *Marks v. Whitney*, *supra*, 6 Cal. 3d 251 [491 P.2d 374, 98 Cal. Rptr. 790] (1971), it is clear that protection of these values is among the purposes of the public trust." Also *City of Berkeley v. Superior Court*, 26 Cal.3d 515, 521, 606 P.2d 362, 162 Cal. Rptr. 327 (1980) – "Although early cases expressed the scope of the public's rights in tidelands as encompassing navigation, commerce and fishing, the permissible range of public uses is far broader, including the right to ...preserve the tidelands in their natural state as ecological units for scientific study."

Additionally, these "commons" resources – fresh water, clean air, public land – were initially thought of as limitless, renewable, or sustainable, at least at their historic levels of use. With increasing pressures at local or regional scales, however, these resources have in many places shifted from being used at renewable levels to being degraded, used at unsustainable levels, or otherwise used in ways that reduce their availability to the public at large. Increased consumptive uses and the industrial processes associated with those uses can create localized adverse impacts, either directly – through facility siting, entrainment of marine organisms, or pollution discharges – or indirectly – due to poorly planned infrastructure systems, induced growth, or the numerous cascading environmental consequences that occur subsequent to many of the direct impacts. For example, trading emissions credits between air basins may result in an overall air quality improvement, but may cause one local population to suffer some loss of a common good (healthful air quality) due to improvements gained by another population. Similarly, a large-scale interbasin transfer of fresh water to a heavily-populated area may create shortages of a previously "common" good in the extraction area where economic considerations and pressure for development are not as great as in the areas to which the water is being transferred.

This increase in consumptive use may also increase the pressure to emphasize the market value i.e., the "commodification") of ocean water relative to its "commons" value. Currently, seawater is generally considered a limitless resource, just as the other resources of the commons were thought of in the past. And like the use of those other resources, consumptive uses of seawater and the industrial processes associated with those uses can result in significant direct or cumulative adverse environmental impacts at the local or regional level, resulting in effects such as species decline, reduction in bio-diversity, decline in water quality, degradation of scenic resources, development pressure, beach closures, or other adverse effects on coastal ecosystems. While ocean water desalination may not raise precisely the same concerns as interbasin transfers of surface or subsurface freshwater noted above, there are parallels – for example, a seaside community may be asked to absorb the adverse effects of a desalination facility, such as the impacts of the seawater intake and brine discharge on local beaches and marine life, while another community elsewhere on the coast or located some distance inland may reap the benefits of the produced water supply.

One significant difference between the proposed use of seawater for desalination and the other examples above is that the shift from a public trust or "common" resource to that of a privatized, marketable commodity has not yet happened in California. This provides an opportunity for a timely assessment and deliberative public discussion of the relative merits and demerits, and the potential comparative costs and benefits of allowing, or not allowing, a shift to a new form of appropriation of a common public resource (i.e., ocean water) imbued with public trust values.

4.1.2 COASTAL ACT CONSIDERATIONS OF PUBLIC OR PRIVATE OWNERSHIP OF WATER SERVICES

Main Points:

- ***Public not-for-profit and private commercial desalination facilities may raise different types of coastal resource impact concerns. Although the same Coastal Act policies generally apply to both public and private facilities, determining whether each type of facility conforms to those policies may require different types of information and may result in different decisions or conditions of approval to ensure coastal resources are adequately protected.***
- ***Private seawater desalination may result in an inherent conflict between the interest of a community in having a local and reliable supply of water while at the same time placing the decisions about how that water is used, priced, and managed outside of the community's control.***

The prevalent mechanism for water commodification is "privatization", or the transfer of some or all assets or operations from public to private entities. The legal and institutional nature of public and private entities delivering water services to communities of consumers exist on a continuum. There are purely "public" and purely "private" entities, with many variations in between[11]. The institutional arrangements between public and private entities can vary based on financing, production, operation, maintenance, management, marketing, pricing, public accountability, and distribution of water for various uses. Examples range from a situation where a public agency contracts with a private firm only to construct a new facility that is to be operated by the public entity, to the "design-build-own-operate" approach in which the private entity is contracted to take on all, or many, of a public agency's role in providing water services.

In California, water provision has most commonly been a service supplied by some type of public agency, municipal water district, or mutual water company, with a smaller number provided by investor-owned utilities[12]. The public agencies are generally subject to the types of standards and practices common to other public entities, such as transparency of decision-making by elected or appointed officials, requirements for public notice, public hearings and opportunity for public comment and oversight, and other similar measures. Public agencies subject to California Public Utility Commission (PUC) rate-setting regulations have consumer rates set at levels needed to cover costs of capitalizing facilities and operating the water service. The PUC also establishes rates for some private commercial for-profit operators which allow for

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[11] For example, Coastal Act Section 30114(a) defines "public works", in part as: "production, storage, transmission, and recovery facilities for water, sewerage, telephone, and other similar utilities owned or operated by any public agency or by any utility subject to the jurisdiction of the Public Utilities Commission, except for energy facilities."

[12] A public agency or municipal water district is meant to operate on behalf of the public that it serves. It is generally managed by a board that is either publicly-elected or appointed by elected officials. A mutual water company is generally a not-for-profit private company whose shareholders are the local property owners that use the water supply provided by the company. A private, or investor-owned company is organized as an investment venture to generate profit for its owners or shareholders, who may or may not be local users of the water supply.

The California Department of Water Resources reports that in 1994-96, of the 2850 water agencies in California, 195 (or about 7%) were private investor-owned facilities (Source: California Water Plan Update: Bulletin 160-98).

a reasonable profit on investment incorporating a variety of factors, including maintaining service quality, accountability, maintenance of the system, security, competition with other providers and users, and longevity of operations. There are also some private entities not subject to PUC rate-setting authority or associated regulatory oversight.

Two converging trends in this arena evident today are the allure of "privatization" and the perception of "water services" as a profit-making venture. As public entities face growing budgetary constraints, many local elected officials are attracted to the perceived benefits of "privatizing" all or some of their water service responsibilities. Concurrently, a number of domestic and multinational business entities have identified providing water or "water services" as an attractive profitable investment opportunity. Recent trends towards utility deregulation and interest by government entities to privatize public services are creating opportunities for private investors to take on some risks and responsibilities of providing water to the public in exchange for some level of compensation and profit. Additionally, some government and business sectors see water and water services as a marketable commodity rather than as a natural resource held in common for the public good or as a responsibility reserved for government implementation. Even assuming some financial benefit for public agencies, the combination of seawater desalination and the current interest in deregulation, privatization, and "running government like a business" creates a potential for commodification and privatization of ocean waters that, from the served community's perspective, may prove to be environmentally, socially, and economically ill-advised.

There have been a number of risks identified in privatizing the provision of water, which at the very least, may need to be addressed by governmental entities considering such a move:

- Will the privatization agreements protect public ownership of water and water rights?
- Will there be adequate public oversight and monitoring?
- What measures will be implemented to protect ecosystems or other water users, for both water quantity and water quality?
- What effect will privatization have on water-use efficiency and conservation?
- How will it affect under-represented or under-served communities, and what effect will it have on economic inequities?
- What measures are in place to rescind the agreements if privatization does not work or causes problems?[13]

A government entity considering a transfer of water-related assets from public to private control should, at the very least, incorporate answers to these questions into its considerations.

APPLYING COASTAL ACT POLICIES TO PUBLIC OR PRIVATE FACILITIES

Although public and private development proposals are generally held to the same Coastal Act standards when determining conformity with Coastal Act requirements, the law and its application in practice may result in some differences when reviewing one or the other type of proposal. Determining whether a proposal conforms to Coastal Act policies may require additional or different evaluations depending on the public or private nature of the entity

[13] From Gleick et. al, *ibid.*

proposing the new development. Recognizing that the same policies apply in either case, examples of possible differences include:

- Assessing the growth-inducing consequences of a desalination facility, including whether water service can be provided outside of existing community service areas.

- Identifying how and where a new water supply will be used to support other development, and whether that development, if in the coastal zone, is supportive of coastal priority uses – for example, a public facility is likely to factor into its water service decisions the need to provide for priority uses, whereas a private facility may make its service decisions based on the profitability of selling to one user over another.

- Determining incentives for project operators to implement effective water conservation measures that provide coastal resource protection benefits.

- Determining whether the project might compromise the fiscal viability of existing community services, or creates the potential to transfer responsibility for service to the public if a private water service venture either fails to obtain necessary financing (as was apparently the case with the recent Tampa Bay, Florida desalination project), or fails financially and ceases operations.

A key underlying difference between a public and private entity – the degree to which each is subject to public scrutiny and accountability – may result in a need for different types of assurances or permit conditions for each to ensure conformity to Coastal Act policies. Several areas where these differences are likely to show up – such as growth-inducement, "coastal-dependency", priority uses, and others – are discussed in later sections of this report.

In addition to these potential differences in determining whether a public or private development conforms to particular Coastal Act policies, there are broader implications that may affect how other aspects of the Coastal Act are implemented. Allowing ocean waters to become a commodity and marketed for profit would result in a substantial change in how seawater is used and valued by society. As a privatized commodity, water and water services would be developed, managed, and marketed as a for-profit product subject to market forces and practices significantly different from the values and decision-making involved when that same water is subject to the full range of public interest values. While the focus of regulatory and planning review pursuant to the Coastal Act must be on coastal resource impacts and conformity to the Act's policies, neither the Commission nor the public is likely to ignore the differences between a project driven by market forces serving the interests of investors and one driven by a public agency acting in what is required to be for the best interests of the community and coastal resources.

Private corporations are at the forefront of the drive to privatize public-serving water systems around the country and in the world. Unlike public agencies, which generally have an obligation to incorporate numerous social, environmental, health, and safety considerations into their decision-making, the primary purpose of private corporate commercial entities is to maximize profits for shareholders. It is the institutional nature of the corporation, and the responsibility of corporate directors and officers, to maximize return on investment, which is not necessarily in

the best interest of the local community or the environment. This invariably affects the way business is conducted and the way decisions are made, resulting in what can be significant impacts on consumers, the community, and the environment. Accordingly, if corporations are allowed to own, operate and profit from water services, pressure will inevitably be brought to bear on ways to increase profits through means such as expansion of service area, rate increases and higher consumption, which are not necessarily in the public interest.

Where profit is the primary motive underlying the ownership and provision of water services, it would not be unreasonable to conclude that water conservation, water reclamation, water quality, minimization of growth-inducing effects, and safeguarding community serving water systems against destructive hostile action may be compromised. Unlike public agencies not in pursuit of financial gains, privatized systems can reasonably be expected to provide only those environmental protections and other system safeguards that government regulations require or that marketing and tax write down incentives offer as economic benefits. For example, if conservation is seen as being in the public interest, a public agency might more strongly emphasize water conservation over water production, even if foregoing increased production would bring in less revenue. A private, for-profit facility, on the other hand, is more likely to emphasize the opportunity for increased profits that come with increased production. In addition, given the importance of community water systems, it is necessary and appropriate to expect the owner-operator to take all necessary and appropriate steps to ensure public safety by protecting the integrity of the system against hostile action (disruption or contamination of water supply). Public agencies have responsibilities to do so as a matter of their fundamental structure and duty notwithstanding the costs involved. Privately owned and operated for-profit systems are not driven by similar considerations, and may more readily chose to do no more than the minimum required to ensure basic protection of the system.

Several recent experiences in several areas of the U.S. and other parts of the world suggest that user rates, quality of customer service, infrastructure maintenance and upgrades, system reliability and water pressure may suffer if water services are privatized. Examples of private entities leaving the public to absorb the consequences, often at great public expense, are many[14]. The Coastal Commission has experience with failed privately owned projects (e.g., fiber-optic cable projects, coastal hotels, etc.) that adversely affected public resources but did not adequately provide some of the amenities necessary to mitigate for those effects. Other examples include public agencies having to take on the work and expense of cleaning up toxic contamination on sites abandoned by or transferred to the public by private commercial users. A local example is a recent public buy-back of the water system in Montara, California, which required passage of an $11 million bond by the local water users.

[14] Various reports and articles note difficulties with privitization in communities including Montara, California; Tampa Bay, Florida; Atlanta, Georgia; Stockton, California; New Orleans, Louisiana; Indianapolis, Indiana; Lawrence, Massachusetts.; the counties of Duval, Nassau and St. John's in Florida; Huber Heights, Ohio; Chattanooga, Tennessee; Washington Court House, Ohio; Peoria, Illinois; Pekin, Illinois; Angleton, Texas, and others.

The privatization and commodification of water services and water raises questions and concerns both directly and indirectly relevant to implementing Coastal Act policies. Many of these issues are part of a larger public policy debate, and raise questions about the implications of shifting control from public to private, such as the following:

- Should seawater, a public resource held in common for the benefit of current and future generations, be allowed to be expropriated by private business for profit?

- Is it in the public interest, and is it good public policy, for community-serving water systems to be bought by, or turned over to for-profit corporations?

- Does privatization of seawater desalination, with its decision-making by non-elected, non-appointed, and non-local interests, contradict the desire of communities to have a local and reliable water supply?

- Does the public or private nature of a community-serving water system result in a different level of security regarding protection of public health, protection from water supply disruption due to threats, or other related issues?

- What is the potential that international trade agreements could be used to override or impair state and local regulation of desalination facilities owned and operated by multi-national companies? This is a serious concern and is discussed in the next section of this report.

The profound changes in the world of water services discussed above are concurrent with technological advances that are making seawater desalination more feasible. Water providers along the California coast are proposing or considering numerous large-scale proposals to tap into the Pacific Ocean for potable water at economic costs approaching those of some other current sources, such as water imported from the Central Valley or the Colorado River. While many issues associated with the shifting legal landscape of providing water services in California lie within the purview of other government bodies, including various federal agencies, the California Public Utilities Commission, or the State Water Resources Control Board, the Coastal Commission still retains has important responsibilities in determining whether proposed desalination projects are consistent with the public policies related to coastal resource protection.

4.2 POTENTIAL EFFECTS OF INTERNATIONAL TRADE AGREEMENTS ON WATER SERVICES

Main Points:

- ***California expects that its laws and regulations apply as written and implemented; however, there are concerns that recent international agreements and legal decisions relating to free trade could be construed as limiting the ability of state and local governments to effectively regulate the activities of multinational corporations as they relate to environmental protection.***
- ***These concerns about how current and proposed international trade agreements will affect state and local agencies' abilities to regulate proposed desalination facilities are based in part on the stated purpose of many of these agreements, which is to remove as many barriers to trade as possible. In some cases, this may include environmental protection statutes, such as those contained in the Coastal Act.***
- ***Desalination projects proposed by multinational interests will undergo careful review and evaluation to ensure international trade agreements allow conformity to the Coastal Act.***

INTRODUCTION AND BACKGROUND

This section summarizes some of the complex underpinnings and possible consequences of the growing body of international trade agreements and international law that could ultimately change the governance of public resources (see Primary Multinational Agreements, next page). California expects that its laws and regulations will apply as written and implemented; however, arguments are being made that some existing and proposed agreements might limit the ability of state and local agencies to review and regulate projects for the purpose of environmental protection in cases that involve private entities with multinational ties. Agreements not yet adopted but currently being negotiated arguably could have even greater potential to affect state and local government regulation.

Provisions of the North American Free Trade Agreement (NAFTA), the General Agreement on Trade in Services (GATS), the General Agreement on Trade and Tariffs (GATT), and resulting changes in international law have created a new generation of complex, binding and enforceable trade agreements that raise potential conflicts with state and local regulatory authority, and may make nation-states liable for, among other things, lost corporate profits and investment expectations. There are differences between the various multinational agreements as to their extent into regulatory issues, their enforcement and monitoring provisions, whether signatory nations "opt in" or "opt out" of various provisions, and others. Within the various types of agreements, there are also different methods for implementing the agreements, each of which may affect local or state decision-making to a different degree. They range from the less restrictive "Most Favored Nation" status to provisions that limit the ability to apply domestic regulations to multinational entities. However, the common focus of these agreements is to remove as many barriers to trade as possible, which could include removing or weakening many domestic environmental, safety, and health standards. There are also similar bilateral agreements now in place or being negotiated that have a similar focus.

Primary Multilateral Agreements

Trade agreements provide a legal framework that defines the rules of international trade, a dispute resolution process for the interpretation of those rules, and the enforcement mechanisms necessary to ensure compliance of those rules.

GATT - The General Agreement on Tariffs and Trade, first negotiated in 1947, represents the primary foundation for modern multilateral trade agreements. Most recently renegotiated in 1994, GATT remains the primary agreement addressing the trade in goods. It also provides the basic framework for international trade and lays down many of the principles used in subsequent agreements. GATT is a voluntary organization, and it possesses few enforcement mechanisms.

WTO - The World Trade Organization agreement was negotiated in the Uruguay Round of trade talks and took effect in 1995. Currently, 142 countries are parties to the agreement. The WTO is the umbrella organization that covers about 60 agreements and separate commitments (called schedules). The WTO agreement is considered as a "single undertaking" agreement, meaning that by joining the WTO, a party (member nation) agrees to all of the covered agreements. The WTO, unlike its GATT predecessor, has real authority and disciplinary power.

NAFTA - The North American Free Trade Agreement was negotiated between Mexico, Canada and the United States and took effect in 1994. It seeks to eliminate all trade restrictions between the three countries and create a single trade region.

FTAA - The Free Trade Area of the Americas is now being negotiated and will encompass 34 of the 35 nations of North, Central and South America (excluding Cuba). The details are not yet known, but all indications are that it is being modeled after NAFTA.

GATS – The General Agreement on Trade in Services is part of the WTO and is under current negotiation (although the framework itself is not still under negotiation). A service is an intangible product of human labor. The GATS would create new trade rules that will affect the ways in which services are provided, including essential services such as public water supplies, public health care and public education. The stated goal of the GATS is the progressive liberalization of trade in services, which means removing as many barriers to trade as possible.

From the California State Senate Select Committee on International Trade Policy and State Legislation Factsheet: "Terms of International Trade".

APPLICABILITY OF TRADE AGREEMENTS TO SEAWATER DESALINATION

Water provision is not yet specifically listed as a "service" covered by the GATS, and has not yet been included by the U.S. as a specific service commitment; however, numerous water-dependent services have been included, and European Union proposals to include water as a "service" are currently being negotiated. If this occurs, it will mean that several of the more far-reaching provisions of GATS will apply to the provision of water services, including those provided through seawater desalination. Indeed, there is a strong push from several of the more powerful negotiating countries to include all services unless specifically exempted.

As noted in the previous section, the provision of water in urban areas has until recently been primarily a not-for-profit public service provided by public agencies, municipal water districts, or by mutual water companies controlled by shareholders who are the consumers living within the service area. Over the last decade, however, there has been a global push and trend to privatize water supplies and treat water as a for-profit commodity. Because of global consolidation within the water industry over this period, most private entities active in the industry today are subsidiaries or affiliates of multinational corporations. Three such entities (Vivendi, Suez Lyonnaise and RWE) now control more than 50% of the global water market[15].

These agreements are not limited to those trade activities that occur across national boundaries, but also includes entirely local transactions that involve a multinational corporation. The GATS defines "trade in services" broadly enough to apply to entirely local transactions if one of the entities is a multinational doing business in the territory of another member[16]. Under GATS, once a country has committed to apply GATS to a specific service sector, domestic laws relating to the provision of covered "services" must be based on "objective and transparent criteria", and not be "more burdensome than necessary"[17]. A report produced for the Council of Canadians states, "When transnational corporations become partners in a public-private partnership relationship, what would otherwise be entirely a matter of domestic regulation and contract becomes subject to international trade regulation"[18]. This means that a multinational corporation based in a NAFTA-member country or another country party to a similar agreement, (of which there are many) that is intending to operate a private desalination facility in California, even if only for local water distribution, could claim investor rights under NAFTA's Chapter 11. Moreover, the home country of the multinational could challenge the state's regulatory requirements under GATS, possibly subjecting the state's regulatory requirements to legal challenge at the international level. Challenges could be brought, for example, against Coastal Act policies relating to concentration of development, siting, habitat protection, agricultural preservation, or mitigation requirements for impacts related to entrainment, discharge, or runoff. Additionally, and importantly, if a multinational corporation invokes the WTO or NAFTA rules to challenge an action taken by the Commission or any other local or state agency, the party to the proceedings is not the agency whose action is being challenged, but the federal government.

The various trade agreements generally recognize the need for some level of health, safety, and environmental laws and regulations – for example, NAFTA, GATS, and GATT, all contain a provision supporting rules necessary to protect human, animal, or plant life or health. However, even with these provisions, thus far, and with one limited exception, all decisions on challenges to environmental laws under NAFTA and GATT have favored the multinational corporations.

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[15] *Thirst for Control*, Steven Shrybman, 2002, p. 23.

[16] General Agreement on Trade in Services, Article 1:2 (c), (d).

[17] Trade & Investment in Services, The Alliance for Sustainable Jobs and the Environment, 2002, p. 7.

[18] *Thirst for Control*, Steven Shrybman, 2002, p. 11.

Examples include:

- A NAFTA tribunal ruled that Mexico must pay Metalclad Corporation $16.7 million to compensate for the refusal by a Mexican municipality to allow Metalclad to run a hazardous waste dump after the federal government had assured the investor that it had all the necessary approvals, and the investor had sunk a lot of money into the project. With regards to the case, the Supreme Court of British Columbia opined that NAFTA's expropriation rule, (takings provisions for foreign investors) is "sufficiently broad to include a legitimate rezoning by a municipality or other zoning authority,"[19] which could pave the way for multinational corporations to make claims that go well beyond "takings" claims allowed under the U.S. Constitution's 5th Amendment.

- Aguas del Tunari, a subsidiary of the American-based Bechtel Corporation is currently suing the government of Bolivia for $25 million in lost profits from a failed privatization scheme in the city of Cochabamba. The dispute is being heard pursuant to a bilateral treaty between the Netherlands and Bolivia and a World Bank lending requirement. The tribunal hearing the dispute, the World Bank's International Center for the Settlement of Investment Disputes, has determined the case does not allow public participation or public access to the proceedings or to its associated documents.

- Several countries brought a challenge to the WTO against the U.S. requirement for shrimpers to use turtle-excluding devices on their nets. The tribunal upheld the right of the U.S. to impose requirements on shrimpers who catch shrimp for sale in the U.S., but also determined that the U.S. regulations were too strict. The federal government chose to resolve the issue by suspending the regulations relating to turtle-excluding devices and on-board monitors, and subsequently re-write them in what some say is substantially weakened form.

- In a case pending before the NAFTA tribunal, Methanex Corporation, maker of the gasoline additive MTBE, is seeking $970 million in damages due to California's phase-out of that additive, which Methanex characterizes as a barrier to free trade.

If the U.S. were to agree to include the provision of water as a service subject to GATS, Coastal Act policies as applied to private desalination facilities could potentially be interpreted as barriers to free trade if the Commission or local government imposed permit conditions that were found to be "overly burdensome" or "subjective" by a WTO tribunal, or because they exceed regulations imposed by other countries for similar activities[20]. Indeed, the Coastal Act is not the only regulatory program that could be at risk. Challenges could be lodged against government action under CEQA, the Clean Water Act, the Clean Air Act, and any other state, federal and

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[19] The United Mexican States vs. Metaclad Corporation, 2001 BCSC 664.

[20] "Standards imposed by, and practices employed in, other countries can create *de facto* standards that may be treated as demonstrating the existence of a "less burdensome alternative" for purposes of GATS Article VI:4(b) and VI:5(a). In addition, GATS envisions that reviewing bodies will look to "international standards of relevant international organizations" in determining whether a member is complying the "objective and transparent criteria" and "no more burdensome than necessary" standards. Art. VI:5(b)."

local environmental protection law that regulates land and water use, or the quality of water, air, or other resources where multinational entities are involved.

Because these emerging changes in international law are evolving and are subject to interpretation by private trade tribunals, they raise more questions than this report can definitively answer. It is likely that the full scope of the effects of NAFTA, GATS and other trade agreements on California's coastal management program will not be fully understood unless and until tested through the various dispute resolution processes, and perhaps not even then. To compound the situation, the impact and implications of these treaties are constantly shifting as a result of ongoing rounds of progressive trade agreement negotiations. If the U.S. were to agree to expressly include water as a service subject to GATS, it would create the potential for new and broader challenges along these lines. In the rush to address California's growing water needs, the consequences of international trade agreements constitute a profound, though not well understood, challenge to protecting public trust resources and implementing coastal resource protection policies pursuant to the Coastal Act at the state and local level.

Water Privatization in California: Of the approximately two dozen desalination projects currently proposed along the coast, at least six are proposed as privately-held facilities or public/private partnerships, including two (in Huntington Beach and Carlsbad) that would be the largest coastal desalination facilities in the U.S.

Other multinational private entities involved in supplying water to California include:

- ***US Filter***, a subsidiary of the French company Vivendi, purchased about 45,000 acres of farmland in the Imperial Valley with access to water rights totaling approximately 250,000 acre-feet per year, representing about 8% of the amount used by San Diego County.
- ***California-American Water Company*** (Cal-Am), which owns several water utilities in the state (in Sacramento, Sonoma, and Monterey Counties, and in the communities of Montara, Moss Beach, Felton, Thousand Oaks, Camarillo, Coronado, and Imperial Beach) is owned by American Water Works, which in turn is owned by Thames Water, the largest water company in England, which in turn was recently purchased by RWE, a firm based in Germany. Cal-Am is proposing a desalination facility at Moss Landing.
- ***Poseidon Resources***, proponent of the largest desalination facilities being proposed along the coast, has partnerships with a number of multinational companies, including Suez Lyonnaise and U.S. Filter.
- ***OMI-Thames***, a joint venture involving Thames Water, now operates the water utility for the City of Stockton through a 20-year, $600 million contract.

CONCLUSIONS AND POSSIBLE ACTIONS

The California Coastal Act is widely regarded among international coastal managers as the strongest and most effective of integrated coastal management programs. Given the risks to the program, to the state's coastal resources, and to most of the state's other significant environmental, health, and safety requirements meant to protect the public and the state's

resources, California should proceed cautiously in reviewing proposals to further privatize water and water services, particularly those involving seawater desalination. Such privatization coupled with uncertainty about the effects of international trade agreements may compromise the ability of state and local governments to effectively protect the environmental quality and integrity of life in natural and human communities along the coast.

Possible Commission actions to consider include the following:

- Increase awareness and understanding of the potential impacts of international trade rules on coastal management. In addition to a focus on desalination facilities, legal research on this topic should look into a broader range of coastal uses and on overall implementation of coastal resource protection policies by the Commission and local government. Collaboration with other state agencies and the state Attorney General's office is important.

- Before international trade agreements are invoked for "for-profit" water projects, undertake a thorough analysis of how the state will be able to implement Coastal Act and other policies through existing review and permit processes without provoking a trade challenge.

- In collaboration with the Coastal States Organization (CSO), undertake review of this issue area to identify concerns in common with other coastal states so that California can be part of a unified voice before Congress calling for safeguarding state's rights relative to the implementation of coastal management programs at the state and local level.

- The Commission, in collaboration with other appropriate state agencies, California's Attorney General, the Senate Select Committee on International Trade, and the Coastal States Organization, should monitor ongoing international trade negotiations by reviewing trade proposals listed in the federal register and provide comments to the U.S. trade representatives and the state's Congressional delegation about how proposed trade rules could affect implementation of California's coastal resource protection policies pursuant to the Coastal Act and federal consistency provisions of the federal Coastal Zone Management Act.

- Members of the California Legislature have repeatedly asked that state and local government regulatory authority to protect public health, safety and welfare be excluded from the operative provisions of international trade and investment agreements.[21] California should continue to voice its concerns about language that may compromise its regulatory authority. Specifically, California should request that U.S. trade negotiators support the position that water is not a "service" to be included as a sector-specific commitment under GATS.

In closing, it is clear that desalination projects proposed by private or multinational applicants must be carefully evaluated for possible implications relative to the effectiveness of coastal resource protection resulting from the possible operation of international trade treaties.

[21] Letter to USTR Rep Bob Zoellick from 29 members of Ca. Legislature, dated 3/28/03; SJR 40 (Kuehl), chaptered Aug 2002.

4.3 COASTAL ACT PUBLIC RESOURCE POLICIES

This section of the report describes several Coastal Act policies associated primarily with the public's use of the coast, including those related to growth-inducement, priority uses, public access, and recreation. Review of a proposed project for conformity to these policies may differ for some based on whether it is public or private; for others, the review may be the same.

4.3.1 GROWTH-INDUCEMENT

Main Points:

- ***The Coastal Act allows growth and development in the coastal zone when it will not have significant individual or cumulative impacts on coastal resources.***
- ***In some areas along the coast, the water supply provided by desalination may remove the primary constraint to growth and result in significant effects on coastal resources.***
- ***Determining the "growth-inducing" impacts of a particular desalination facility will vary based on its service area, the growth allowed under certified Local Coastal Programs or other adopted plans, its interconnections with other water supplies or water purveyors, and whether it is a public or private facility.***

One of the Coastal Act's primary principles is that growth and development within the coastal zone be allowed when it will not cause significant adverse effects to other coastal resources. In some areas along the coast, desalination could remove what may be the single largest constraint to growth, a limited supply of potable water. In turn, this additional water could result in new and unanticipated pressures on local populations and infrastructure. Without adequately evaluating these increased stresses on local carrying capacity, the additional water available could cause growth beyond identified planned local or regional growth levels, and have significant adverse effects on coastal resources.

There are two main Coastal Act policies that require review of a proposal's growth-inducing effects[22]. The crux of these policies is that development in the coastal zone not significantly diminish other coastal resources. First, Coastal Act Section 30250(a) states, in part:

> *New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to*

[22] In addition, the CEQA Guidelines at 15126.2(d) provide further guidance on how growth-inducing impacts of proposed projects should be evaluated:
"Growth-Inducing Impact of the Proposed Project. Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment."

> *accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources..."*

By requiring new development be located close to areas of existing development or in areas with adequate public services, this section of the Act is intended to prevent new development from outpacing the ability of local communities to provide necessary public services. This requirement is further supported by section 30254 of the Coastal Act, which states, in part:

> *New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division... Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.*

Taken together, these policies generally require new development be located within or next to existing developed areas able to accommodate such development or in other areas with adequate public services, and provide that public works facilities be sized based on the ability to maintain, enhance, or restore coastal resources, and that development allow all coastal resources to remain viable. New development must also conform to the policies and standards contained in any applicable Commission-certified LCPs. These policies may relate to regional water and growth management goals or how limited water resources are allocated.

In addition to these Coastal Act policies, the state Desalination Task Force, in recognizing the importance of this issue, included as one of its findings:

> *Growth inducing impacts of any new water supply project, including desalination, must be evaluated on a case-by-case basis through existing environmental review and regulatory processes.*

EVALUATING THE GROWTH-INDUCING IMPACTS OF COASTAL DESALINATION PROPOSALS

Reviewing a facility's potential growth-inducing impacts may cover a wide range of questions and issues, depending on the characteristics of the proposal. Questions and issues for desalination proposals may include:

- ***Is the project meant to provide a baseline supply of water or is it to be used only for emergencies or drought relief?*** Projects meant to provide water only during emergencies are likely to have fewer growth-related impacts than projects providing an ongoing baseline supply. If a proposed project is intended to provide only emergency or drought-related water supplies, and evaluation under the Coastal Act reviews only those intended purposes, then any permit issued for such a project will likely include conditions requiring additional review if the capacity of the project changes.

- ***Does the project replace an existing supply of water or provide a new one?*** Some facilities are meant to replace water from a supply that may no longer be available to a community, such as a surface or groundwater source that has become contaminated, or a source that is overallocated or has been overdrawn. Other desalination facilities are meant to provide water in addition to existing supplies. The scope of review for each type of proposal will differ. When a desalination facility is meant to replace an existing supply and therefore avoid or minimize growth-inducing impacts, the review will need to identify the specific measures that assure the existing supply will be retired. For example, if a facility is proposed as a means to replace water currently being withdrawn from a river, the proposal should include specific measures describing how that water will remain in the river for non-consumptive purposes, and any permit issued should ensure those measures are appropriate and enforceable. For proposals meant to augment existing supplies, project review should determine whether growth related to the increased availability of water would occur within allowable limits or projections identified in Local Coastal Programs or other local or regional planning efforts. An example of how these reviews may differ is the desalination facility currently being considered at the Moss Landing Power Plant on Monterey Bay. The primary proposal would provide just enough water to replace some currently being withdrawn from the Carmel River. An alternative proposal being considered would have the facility provide much more water to serve areas of Monterey County not currently within the service district. These two proposals will undergo very different evaluations to determine their growth-inducing impacts.

  Where applicable, the review should also evaluate benefits that may result from the proposed project. For example, desalination could reduce or eliminate withdrawals from surface water bodies, resulting in more natural streamflows and improved fish or wildlife habitat. If desalination is meant to replace groundwater withdrawals, it could in some areas reduce subsidence or seawater intrusion. In areas where surface or groundwater sources have been contaminated, desalination could provide an alternative source of potable water while allowing necessary treatment or remediation of the contaminated water source.

- ***Where will the water go?*** A desalination facility may be intended to provide water to a relatively confined service area with known end users, or may be meant to provide water to a more extensive and less well-defined service area and user base. Determining the growth-inducing impacts of a proposal must include a description of the service area, the maximum build-out of that area, and how much growth could be a result of the water supply provided by the facility. The complexity of this review will vary based on several issues. Review for growth-inducement and its effect on coastal resources will be simpler in cases where the service area is well defined, the distribution system is not connected to other systems, and where the level of development or build-out within the service area is known. Review will be much more complex and difficult for large-scale proposals that would provide water through a connected series of distribution systems to a much larger service area both within and outside the coastal zone. For example, desalinated water produced along the Southern California coast and distributed through the Metropolitan Water District's system could affect water supplies from Ventura to San Diego and inland as far as east as Riverside and San Bernardino Counties. Determining how the growth induced by this additional water will affect coastal resources will be challenging.

The review should consider whether the water produced is subject to delivery requirements and restrictions, long-term contracts, or other binding agreements. It may also be necessary to identify the capabilities and limits of the associated infrastructure, such as the ability of existing or proposed water pipelines to deliver water to the service area. The review may also consider whether the facility's location will result in changes to the delivery area. For example, a desalination facility built at some distance from its service area may result in pressure to provide a portion of that water supply nearer the facility. In some less developed areas, this could lead to growth outside of existing service boundaries and could provide for growth beyond levels identified in local planning efforts.

As trends towards water marketing and the potential for interbasin or even international water transfers increase, any difference in oversight over public or private facilities is likely to have more far-reaching growth-inducing consequences. Longer distance transfers also raise issues associated with determining whether local impacts to coastal resources can be mitigated by benefits that may accrue elsewhere, including some that may occur some distance from the coast.

- ***Will the development serve "coastal priority" uses?*** One concern to be addressed during review is how the water from a facility will be allocated. The Coastal Act mandates that certain types of development along the coast receive priority over other types. These include visitor and recreation facilities (in section 30213), facilities designed to enhance public opportunities for coastal recreation (section 30222), aquaculture facilities (section 30222.5), facilities serving commercial fishing and recreational boating (section 30234), and coastal-dependent development (section 30255). Without adequate public oversight, new development capable of providing its own water may be able to proceed while other higher priority development cannot, thus allowing non-priority development that includes desalination capability and reducing the ability of priority developments to occupy coastal areas. [See also Chapter 4.3.2.] Additionally, the review may consider the form of ownership (public or private) and the degree of oversight in how the facility's water supplies are allocated.

- ***Is there adequate public oversight for the facility?*** Public control of desalination facilities would generally provide more apparent mechanisms to ensure the capacity is linked to local growth management plans, goals, and priority uses, and would allow the necessary involvement by the interested public in decision-making. Public ownership is also likely to allow for a more comprehensive approach to resolving issues related to regional growth, the types of development to be considered, and the directions in which it occurs. As stated in sections 30250(a) and 30254 above, new development must be tied to the capabilities of public services and public works facilities. For proposed private desalination facilities, review under the Coastal Act is likely to require specific evaluation of whether they will incorporate a level of public oversight, decision-making, and consolidation of public interests necessary to ensure public resources are properly managed.

POTENTIAL MITIGATION MEASURES TO AVOID OR MINIMIZE GROWTH-INDUCING IMPACTS

Possible mitigation measures that will likely be evaluated to avoid or minimize impacts include:

- ***Implement local or regional water conservation and reclamation measures to reduce the need for new water projects:*** In some areas, effective water conservation and reclamation measures may, in many cases, provide as much or more water than a proposed desalination project at less cost and with fewer adverse effects. Review of a proposed project should identify measures such as these as part of the alternatives analysis done for a proposed facility.

- ***Link plant capacity to the planned level of development authorized by the certified Local Coastal Program for the area:*** Desalination plants and their accompanying water distribution system should be sized to match the planned level of development authorized by an area's certified Local Coastal Program. The design, review, and approval of proposed projects should include a description of the anticipated level of development, and should tie the permitted activity to that particular development level. This includes assessing the long-term growth-inducing potential of projects. It may also assess capacity of water delivery lines, delineation of the service area, identifying legal instruments available to provide a particular growth level in the area, and other similar measures.

  This issue has been addressed in some previous Commission decisions on similar projects involving growth-inducing impacts. For example, a permit for a water supply pipeline included a condition requiring the permittee to apply for an amendment if the proposed development in the area went above a specific level.

- ***Siting plants near existing water distribution systems and energy sources:*** This may allow a desalination facility to operate using existing infrastructure for both water supply and energy, and not require additional infrastructure build-out and the growth that may be associated with such a build-out.

WHAT'S LIKELY NEEDED DURING REVIEW?

Issues that may be addressed during the review include:

- Identify service area and end users (e.g., are there binding contracts for particular areas or users for certain amounts of water?).
- Identify the types of development to be served.
- If the facility is meant to provide replacement water to allow another existing source to be "retired", what mechanisms ensure the other use is discontinued?

4.3.2 PRIORITY USES

Main Points:

- ***Coastal Act review of a proposed desalination facility may need to evaluate how the facility would affect priority uses along the coast.***
- ***The review for determining conformity to the Coastal Act's priority use policies is likely to differ for public or private desalination proposals.***

The Coastal Act establishes several types of priority uses in the coastal zone. The main purpose of including these in the Act is to ensure that uses strongly associated with the coast and found to be in the public interest remain viable. These types of uses and development (and the corresponding sections of the Coastal Act where they are listed) include:

- Lower-cost visitor and recreation facilities (Section 30213).
- Visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation (Section 30222 – this section also prioritizes those facilities over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry).
- Aquaculture facilities (Section 30222.5).
- Upland areas for coastal recreation (Section 30223).
- Recreational boating and associated facilities (Section 30224).
- Commercial fishing and recreational boating facilities (Section 30234).
- Prime agricultural land (Section 30241).
- Coastal-dependent development (Section 30255).
- Priority developments must not be precluded by other development due to the limited capacity of public works facilities (Section 30254).

These designations do not mean that these are the only uses that can be located within the Coastal Zone. Part of Coastal Act review, however, may consider whether the site of a proposed development is suitable for priority uses. For a proposed desalination facility, the review may evaluate at least two aspects of priority use policies:

- ***How would the proposed facility itself directly affect priority uses?*** A desalination facility located on or adjacent to coastal zone sites suitable for higher-priority developments could remove or reduce land available for such developments. Desalination facilities may result in several types of adverse effects on coastal resources – visual, noise, public access, water quality, etc. – any of which, even if mitigated, could reduce the ability of priority developments to be sited nearby. This would in turn diminish the coastal uses associated with these priority developments, and may therefore be inconsistent with Coastal Act goals. For example, in a decision several years ago, the Commission determined that a desalination facility being considered in the coastal zone near the cities of Marina and Seaside and adjacent to a State Park would diminish public access and recreational opportunities in that area, and further concluded that a feasible, less environmentally damaging alternative site was available east of Highway 1 away from the shoreline area.

- ***How will the water supply provided by the facility affect priority uses?*** Coastal Act review may also consider how the water supply provided by a desalination facility might be used to either support priority uses or make them less viable. For example, if an inadequate water supply is limiting the opportunity for low-cost visitor serving facilities, or coastal agriculture, a desalination facility may be able to provide the water necessary for those uses. In other cases, the water from a desalination facility may be too expensive for such priority uses and only affordable by higher-cost visitor serving facilities. The increased development pressures on these areas may result in non-priority development, especially if the desalination water supply is more costly than certain priority uses can afford – for example, agriculture and low-cost visitor serving facilities are not likely to be able to afford water from a desalination facility when a high-cost visitor facility could.

  Support for priority uses could also be affected by whether the water is provided by a public or private facility. In areas where development is limited by the available water, private facilities that provide their own water might be able to proceed while other higher priority developments that do not have the ability to provide their own water might not. A private, non-priority development could therefore override Coastal Act preferences for priority coastal uses or might not be subject to water allocation decisions made by a local public water purveyor. Because desalination remains a relatively costly process, a development's ability to provide its own desalinated water may be largely based on financial considerations rather than whether the proposed development is recognized as a priority development for coastal areas. A lower-cost visitor and recreation facility, for instance, may not be able to compete with the ability of a higher-cost facility to provide its own water, and so a coastal site suitable for either type of development may end up used by the latter at the expense of the former. One other consequence of this issue could show up during difficult financial times, in that a private development dependent on its own water supply may, for various reasons, no longer be able to afford the costs of desalination and instead increase the burden on the local public water purveyor. This additional burden could further limit the ability of public agencies to allocate water or land to priority coastal uses. A similar resource-allocation issue may arise due to the relatively high electrical demand associated with desalination, in that the demand from a desalination facility used by a non-priority development could limit or preclude the ability of local electrical supplies to support priority developments.

  Public ownership and oversight of desalination facilities, especially in areas with certified LCPs, is more likely to ensure that water allocations will occur in a manner consistent with the priority developments identified in the Coastal Act and in the LCP. Allocations from public facilities are likely to be subject to more ongoing public review, whereas allocations from private facilities may be primarily market driven and might not adequately reflect Coastal Act priorities. This difference in how public or private entities might allocate water is likely to be moderated in areas where the state Public Utility Commission has provided exclusive retail rights to a municipal water district. In these areas, a private desalination facility would be able to act only as a water wholesaler and sell only to the water district where the allocation decisions would be made.

4.3.3 PUBLIC ACCESS AND RECREATION

A primary focus of the Coastal Act is its extensive provision for public access to the California coast. The Act includes a number of policies related to public access and recreation, most of which provide strong support for the public's ability to use and enjoy coastal areas (see the main policies listed on the next two pages).

Desalination facilities proposing to locate near the coast will likely require assessment of their effects on public access to the shore and their potential impacts on recreation. This review generally evaluates both relatively short-term effects, such as those related to construction, and the long-term effects related to a facility's ongoing operations. Review may include consideration of a range of issues from how the facility's location affects parking near the coast to how the facility's discharge may affect water-based recreation.

Public access and recreation issues may also be incorporated into the review of other Coastal Act policies – for example, projects proposing shoreline protection structures must generally provide information not only about the site conditions related to erosion and coastal processes, but also provide information about how the structure could affect public access to that portion of the shoreline. For facilities proposing to co-locate within the boundaries of an existing power plant or industrial site, the review may be less extensive, although it will likely need to at least identify incremental changes to the existing impacts that may be caused by the addition of the desalination facility.

WHAT'S LIKELY NEEDED DURING REVIEW?

Identification of short-term impacts, such as:

- Changes in parking and traffic
- Temporary beach closures due to construction.
- Project timing (e.g., will there be closures or traffic and parking restrictions during the peak times of visitor use?).

Identification of long-term impacts, such as:

- Effects of facility location on access.
- Effects of facility operation on recreation.

PRIMARY COASTAL ACT POLICIES RELATED TO PUBLIC ACCESS AND RECREATION:

Public Access policies:

Section 30210: In carrying out the requirement of Section 4 of Article X of the California Constitution*, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Section 30211: Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212:
(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:
(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,
(2) Adequate access exists nearby, or,
(3) Agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.
(b) For purposes of this section, "new development" does not include:
(1) Replacement of any structure pursuant to the provisions of subdivision (g) of Section 30610.
(2) The demolition and reconstruction of a single-family residence; provided, that the reconstructed residence shall not exceed either the floor area, height or bulk of the former structure by more than 10 percent, and that the reconstructed residence shall be sited in the same location on the affected property as the former structure.
(3) Improvements to any structure which do not change the intensity of its use, which do not increase either the floor area, height, or bulk of the structure by more than 10 percent, which do not block or impede public access, and which do not result in a seaward encroachment by the structure.
(4) The reconstruction or repair of any seawall; provided, however, that the reconstructed or repaired seawall is not a seaward of the location of the former structure.
(5) Any repair or maintenance activity for which the commission has determined, pursuant to Section 30610, that a coastal development permit will be required unless the commission determines that the activity will have an adverse impact on lateral public access along the beach.
As used in this subdivision "bulk" means total interior cubic volume as measured from the exterior surface of the structure.
(c) Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the Government Code and by Section 4 of Article X of the California Constitution*.

Section 30212.5: Wherever appropriate and feasible, public facilities, including parking areas or facilities, shall be distributed throughout an area so as to mitigate against the impacts, social and otherwise, of overcrowding or overuse by the public of any single area.

Section 30213: Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred. The commission shall not: (1) require that overnight room rentals be fixed at an amount certain for any privately owned and operated hotel, motel, or other similar visitor-serving facility located on either public or private lands; or (2) establish or approve any method for the identification of low or moderate income persons for the purpose of determining eligibility for overnight room rentals in any such facilities.

Section 30214:
(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:
(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.
(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.
(4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter.
(b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access pursuant to Section 4 of Article X of the California Constitution*. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution.
(c) In carrying out the public access policies of this article, the commission and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs.

Recreation policies:

Section 30220: Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Section 30221: Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.

Section 30222: The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry.

Section 30222.5: Ocean front land that is suitable for coastal dependent aquaculture shall be protected for that use, and proposals for aquaculture facilities located on those sites shall be given priority, except over other coastal dependent developments or uses.

Section 30223: Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.

Section 30224: Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.

** **Note:** Per the references in Sections 30210, 30212(c), and 30214(b), California Constitution, Article X, Section 4 states: "No individual, partnership, or corporation, claiming or possessing the frontage or tidal lands of a harbor, bay, inlet, estuary, or other navigable water in this State, shall be permitted to exclude the right of way to such water whenever it is required for any public purpose, nor to destroy or obstruct the free navigation of such water; and the Legislature shall enact such laws as will give the most liberal construction to this provision, so that access to the navigable waters of this State shall be always attainable for the people thereof."*

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CHAPTER 5: COASTAL ACT ENVIRONMENTAL POLICIES RELATED TO DESALINATION

Chapter Sections:

This chapter describes the primary environmental policies in the Coastal Act that will likely need to be addressed during review of proposed desalination facilities. The chapter's primary focus is on the Coastal Act's marine biology and water quality policies. It discusses how desalination facilities can adversely affect marine biological resources and ocean water quality, and discusses how facilities are likely to be evaluated as part of coastal development permit review. It discusses separately the effects associated with intakes and those associated with outfalls, and describes several unique issues associated with desalination facilities proposing to co-locate with coastal power plants that are cooled with ocean water.

The chapter then more briefly describes several other Coastal Act environmental policies that may be involved in reviewing proposed desalination facilities, including spill prevention, hazard prevention, and environmentally sensitive habitat areas. These policies are dealt with more briefly since reviewing a desalination facility's conformity to those policies will likely be similar to the review done for many other types of proposed development along the coast, in there will be similar issues and concerns about how a proposal may affect public access or visual and scenic resources, how to prevent hazardous conditions and avoid spills, determining the effect on nearby sensitive areas, and the like. This chapter provides only a general discussion of how a desalination facility might affect these coastal resources – this should not be construed as treating these coastal resources as less important; it means only that they are likely to be evaluated in ways similar to many other developments that have undergone review under the Coastal Act.

5.1 POTENTIAL IMPACTS ON THE MARINE ENVIRONMENT

Main Points:

- ***Desalination facilities can cause significant adverse effects on marine organisms unless properly designed, sited, and operated.***
- ***Reviewing desalination intakes and outfalls – both open-water and subsurface – will require evaluating alternative locations and mitigation measures that avoid or minimize adverse effects on marine biological resources and that, where feasible, restore those resources.***
- ***Desalination facilities proposing to co-locate with coastal power plants raise unique issues with respect to conformity to some Coastal Act policies.***

Seawater is not just water, but habitat. It provides the matrix within which innumerable organisms live, and serves a critical role in everything from the food web to the climate. Although there is a vast amount of seawater on the planet, and along the California coast, it is subject to significant adverse effects at the local or regional scale that can diminish its ecosystem value and its value to society. Common examples of these impacts range from the loss of species diversity to a decline in the number of organisms in a given area to beach closures caused by bacterial contamination in the water.

The two components of desalination with the most potential for causing direct adverse impacts to marine life and water quality are the facility's seawater intake and its discharge. The intake system can cause significant levels of impingement and entrainment[23] that can degrade the local or regional marine ecosystem, and the facility's discharge of brine and possibly other contaminants can be harmful to marine life. The severity of these impacts can be mitigated, and in some cases avoided entirely, through proper facility design, siting, and operation. Without proper measures, however, the impacts can be substantial. For example, a desalination facility producing 50 million gallons per day of drinking water would pull in at least 100 million gallons per day of seawater and discharge at least 50 million gallons per day of highly saline brine[24]. Since each gallon of seawater can contain hundreds of organisms, this amount of water could have significant adverse effects on marine life and water quality at the local or regional level.

The report first discusses the impacts associated with the intake – entrainment and impingement – and then discusses the impacts associated with the discharge – primarily increased salinity and the presence of chemicals or various contaminants. It then discusses some unique issues associated with desalination facilities proposing to co-locate with coastal power plants, and how the review of those facilities may be different from the review of projects proposed to be sited independently. Of the current proposals along the California coast, the largest are those considering co-location, and while this approach has some advantages, it also raises significant issues for Coastal Act conformity. All three of these sections emphasize the need to evaluate alternatives and mitigation measures that would avoid or minimize the associated effects.

Along with the concerns raised about its potential to cause significant adverse impacts to water quality and marine biology, there is recognition that desalination could result in some beneficial changes. One possible benefit could come by using desalinated seawater to replace water withdrawals from coastal streams. Another possible benefit, on a more conceptual level, could be that public perception and practices could change if seawater were to be seen as drinking

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[23] These terms are discussed in more detail later in this chapter. Impingement occurs when fish or larger marine animals are pulled into a seawater intake and are trapped against screens within the intake. They die or are injured due to water pressure, abrasion, thermal effects, or other causes. Entrainment occurs when an intake draws in small organisms such as plankton, larvae, fish eggs, and other animals along with seawater. These organisms are small enough to be pulled through the intake screens, and they are then heated or crushed as they are drawn through the facility. Entrainment is considered to cause 100% mortality to the entrained organisms, which occurs either as the organisms pass through the facility or shortly after they are discharged alive but injured.

[24] Reverse osmosis facilities generally operate at efficiencies between 15 and 50 percent, so for every gallon of drinking water they produce, they may need from one to about six gallons of seawater and can discharge from one to about six gallons of effluent. A 50 million gallon per day facility, for example, would pull in and discharge from 100 to 300 million gallons per day (although the lower the efficiency, the lower the salinity in the discharge).

water – this could lead to more thought and care about how the ocean is treated, what materials are allowed to or prevented from running into the ocean, and a stronger sense of connectedness between the coast and everyday practices. On a more pragmatic note, this could also result in lower treatment costs if the seawater being desalted was cleaner than it might otherwise be.

PRIMARY APPLICABLE COASTAL ACT POLICIES

The primary Coastal Act policies related to marine biological resources and water quality are:

Section 30230:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

These policies establish strong standards for protecting water quality and marine life. They require not only that biological productivity be maintained and enhanced, but that where feasible, it be restored. They also specifically require sustained biological productivity and minimization of entrainment-related effects. By requiring restoration where it is feasible, these policies recognize that coastal development permit decisions may be based on, and mitigation required for, measures that go beyond just maintaining what may be a low or poorly functioning baseline condition. Reviewing proposed desalination facilities will likely require determining an appropriate environmental baseline and evaluating appropriate alternatives and mitigation measures that avoid or minimize adverse effects to the marine community and water quality.

Other Coastal Act policies relate to protecting water quality or marine biological resources either directly or indirectly. These include Sections 30234.5, which requires supporting the marine environment for commercial and recreational fishing, and recognizes the role of marine life not only as part of the environment, but as an important part of the state's economy:

> *The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.*

They also include Section 30220, which helps establish the need to protect water quality to allow for recreation:

> *Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

Another Coastal Act policy that may significantly affect the design and operation of some facilities is the fill policy discussed in Chapter 2.2.2. The consequences of placing fill for intakes and outfalls deemed coastal-dependent may require design changes to ensure adverse effects to marine life and water quality are minimized to the maximum extent feasible.

In addition to the above policies, the recently completed work of the state's Desalination Task Force included a number of findings and recommendations related to protection of the marine environment. Among its recommendations are:

> *Ensure seawater desalination projects are designed and operated to avoid, reduce or minimize impingement, entrainment, brine discharge and other environmental impacts. Regulators, in conjunction with the public, should seek coordinated mechanisms to mitigate unavoidable environmental impacts.*
>
> *Where feasible and appropriate, utilize wastewater outfalls for blending/discharging desalination brine/concentrate.*

In addition to review by the Coastal Commission for conformity to policies specific to the Coastal Act, other agencies may be involved in reviewing different aspects of a proposed desalination facility, including the state and regional water quality boards, the Department of Fish and Game, and others. The Coastal Act policies, for example, supplement and support the requirements of the California Ocean Plan, which the state and regional boards help implement. The Ocean Plan includes narrative and numeric standards for allowable discharges, and identifies "Areas of Special Biological Significance" in which discharges are prohibited or curtailed. The complementary relationship between the various agencies, their likely role in reviewing desalination proposals, and the potential for coordination among them is discussed in Chapter 6.

5.1.1 EFFECTS OF DESALINATION INTAKES ON MARINE BIOLOGY AND WATER QUALITY

The most significant direct adverse environmental impacts of a desalination facility are likely to be caused by its intake. These impacts also can be completely eliminated by using alternative designs and mitigation measures.

Most desalination facilities currently under consideration are proposing to use an open water intake, which pulls in water directly from the water column. The primary adverse effects of these types of intakes are ***impingement*** and ***entrainment***. It is relatively easy to avoid or reduce impingement; entrainment, however, requires more substantial effort to adequately mitigate.

IMPINGEMENT

Impingement refers to causing injury or death to marine organisms by pulling them into an intake system where they cannot escape due to high water velocity, the length of the intake pipe, or other aspects of a facility's design, and they are eventually trapped against a fish screen. Rates of impingement are primarily a function of the intake's location and the velocity of water being drawn into the intake.

ENTRAINMENT

Entrainment refers to the death or injury of the relatively small marine organisms, such as plankton, larvae, and fish eggs, that are too small to be screened out by fish screens and are pulled through the screens into the processing system of a facility using seawater. Any open water intake will result in some level of entrainment. Entrainment is most commonly associated with thermal power plants (coastal or inland) that use once-through cooling systems, but also occurs in other types of facilities using open water intakes. Entrained organisms are killed due to high pressures or temperatures within the power plants, or in the case of desalination facilities, due to the high pressure when water is forced against filters or membranes.

Unlike impingement, which is relatively easy to mitigate through structural or operational changes to open water intakes, mitigating entrainment requires more significant measures. While the significance of both impacts is related to the location of an intake, impingement rates are primarily a function of intake velocity, while entrainment is more closely linked to the overall volume of water drawn into a facility.

Most studies and findings related to entrainment have been done to determine the effects of power plant once-through cooling systems on marine biology. Coastal power plants using hundreds of millions of gallons per day of ocean water can entrain and kill trillions of organisms annually and can cause substantial changes to the local or regional biological community. The mortality rate for entrainment in power plants is considered to be 100%, due to the thermal effects and pressure changes experienced by the organisms. The mortality rate for desalination facilities would be essentially the same, since the seawater they use is forced through filters or membranes at high pressures to remove particles, including the small organisms that may be in the water.

The most common way to determine entrainment effects is by conducting what is known as a "316(b)" study, named after the section of the federal Clean Water Act. These studies help determine whether power plants are in compliance with the Clean Water Act requirement to minimize adverse environmental impacts by using the "Best Technology Available." The study involves taking water samples at various depths over the course of a year at both the intake site and a nearby control site, identifying the organisms in these samples, and then using various modeling techniques to determine the types and numbers of species that would be affected and the effect on the local or regional population of marine organisms. The results help determine what alternatives and mitigation measures are needed to avoid or minimize impacts.

Three of the seventeen power plants along the California coast (Moss Landing, Morro Bay, and Diablo Canyon) recently completed 316(b) or equivalent entrainment studies, and a study is currently underway at Huntington Beach. These studies were done as part of the California Energy Commission's review of proposed power plant upgrades and installation of new power generating units. The studies helped update previous studies done in the 1970s and 80s and established the existing baseline conditions at these facilities for purposes of their recent review. The rest of the coastal power plants use studies also done about twenty-five years ago. These older studies will need to be updated to address proposed changes at these power plants, such as co-location of a desalination facility (see Chapter 5.1.3 for additional discussion). These older studies are out-of-date for several reasons – they describe physical or biological conditions that may no longer exist, they were conducted using sampling techniques and modeling approaches that do not reflect our current understanding of science and marine biology, and some were done at locations far removed from the site of the power plant that may not reflect actual conditions at the impact site. The state Desalination Task Force also recognized the need to update these studies in one of its findings:

> *The appropriate State regulatory agencies[25] have indicated that the siting of a new desalination facility, which utilizes any new or existing open water feedwater intakes, will require a current assessment of entrainment and impingement impacts as part of the environmental review and permitting process.*

An entrainment study may be fairly extensive and may be required by several different agencies as part of their permit reviews. Additionally, the findings of these types of studies may result in substantial changes to how a proposed facility is designed, sited, or operated. Therefore, it would be more effective and efficient for the studies to be done as part of a proposal's initial environmental review using protocols agreed upon by the various agencies. This would allow entrainment impacts to be identified early in project review and allow necessary mitigation measures to be incorporated into decision-makers' deliberations.

ALTERNATIVES AND MITIGATION MEASURES

There are two main approaches to avoid or minimize entrainment and impingement impacts. The first is to use a subsurface intake, such as a beach well or infiltration gallery, which would allow these impacts to be avoided entirely. Where subsurface intakes are infeasible, open water intakes may be designed and located so that entrainment and impingement are reduced, but usually not entirely eliminated.

Subsurface intakes: The primary way to avoid both impingement and entrainment is to use a subsurface intake, such as a beachwell or infiltration gallery, rather than an intake that draws in water directly from the water column. Because the way a desalination facility takes in water has the most potential to affect marine biology, the feasibility of this alternative should be one of the first considered during the conceptual design stage of a proposal, and will also likely be evaluated during environmental review.

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[25] State agencies represented on the Task Force included the Coastal Commission, the State Water Resources Control Board, a Regional Water Quality Control Board, the Department of Fish and Game, and the Bay Conservation and Development Commission.

Subsurface intakes, such as beach wells or infiltration galleries, are placed below the water column and pull in seawater through the overlying substrate, which acts as a natural filter. At least four of the existing desalination facilities along the coast use beach wells as their feedwater system, and at least six of the currently proposed facilities are considering using beach wells. Here in California, the largest existing subsurface intake for a desalination facility takes in less than one million gallons per day, but elsewhere in the world, they provide up to 25 million gallons per day.

The amount of water that can be taken in by subsurface intakes is a function of the type of substrate, its permeability, and other geotechnical characteristics. Properly designed subsurface systems are likely to completely eliminate impingement and entrainment impacts. Some can be installed so they are completely below grade at or near beach areas, and some can be located at some distance inland from the shoreline if water is available below the surface due to naturally occurring or induced seawater intrusion. Designed with appropriate intake velocities and installed at the proper depth within the substrate, beach wells or infiltration galleries can operate with little, if any, noticeable effect on local marine life.

Subsurface intakes may offer additional operational advantages, such as reduced chemical use and reduced operating costs. The natural filtering effect of the overlying substrate may provide a buffer to changes in water quality due to storms or runoff. It may also provide some part of the pre-treatment needed before the seawater goes through the desalination filters or membranes, thus eliminating part of the chemical or physical treatment that would otherwise be required. While subsurface intakes may have higher initial construction costs, they may result in long-term operational savings due to their having fewer pre-treatment and chemical requirements. They may also be able to operate during times when facilities with open water intakes would have to shut down due to water conditions.

Additionally, there is some research available that suggests wells used to dewater areas below a beach may provide some degree of shoreline stabilization[26]. While currently inconclusive, the research suggests that beach wells may in some locations increase shoreline stability or accretion rates, although it appears to depend on a number of site-specific characteristics related to the depth to groundwater, presence of a coastal aquifer, amount of sediment transport, and others.

Subsurface intakes may not be feasible in all locations. They may not work well in areas where the substrate is silt, clay, or unfractured rock. In areas with sandy substrates, the sand should be relatively stable or deep enough to the intake is not exposed during seasonal sand movement or storms, and should be permeable enough to allow seawater to be pumped through to the facility. In some areas with less permeability, larger infiltration galleries or multiple beach wells may be needed to pull in the desired amount of water. However, even in some areas where the existing substrate may make a subsurface intake infeasible, an intake could be designed with an artificial

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[26] See, for example:
Turner, Ian L. and Stephen P. Leatherman. Beach Dewatering as a 'Soft' Engineering Solution to Coastal Erosion – A History and Critical Review, Journal of Coastal Research, Fall 1997.
– and –
Waterways Experiment Station, U.S. Army Corps of Engineers. Field Evaluation/Demonstration of a Multisegmented Dewatering System for Accreting Beach Sand in a High-Wave-Energy Environment. July 1988.

substrate around the intake opening. For example, adding a concrete box around the opening of a surface intake and filling it with sand or other suitable material could transform an otherwise high entrainment intake to one with little or no entrainment. This contained cover system would likely require more extensive design considerations and some ongoing monitoring, but may still provide a feasible method to avoid all or most entrainment impacts.

Open water intakes: Where subsurface intakes are determined to be infeasible, the review of a facility proposing to use an open water intake may require evaluation of numerous measures to reduce adverse effects and may need to consider compensatory mitigation measures. For new or modified intakes, this will likely require review under both the Coastal Act's marine biology/water quality policies and its fill policy. [See Chapter 2.2.2.]

Mitigation measures to address impingement effects may be different from those meant for entrainment effects. Three effective mitigation measures for impingement are:

- ***Low intake velocity rate:*** The amount of impingement at a facility is largely a function of the intake water velocity. When intake velocities are kept below about 0.5 feet per second, fish and other organisms are generally able to avoid being pulled in, or if they are pulled in, can generally swim against the current and escape. The rate of 0.5 fps is considered a "Best Technology Available" for purposes of Clean Water Act compliance. Facilities can be designed and operated to keep the velocity at or below 0.5 fps through a combination of pumping rates and intake design.

- ***Velocity caps:*** Fish are generally better able to detect a horizontal change in water velocity than a vertical change. Many intake structures were built with openings that pull water in from above, causing a change in velocity that fish cannot sense as well. Velocity caps, which are structures usually made of concrete placed over the intake with a gap between the cap and the intake, change the predominant intake water flow from vertical to horizontal. Impingement rates often drop significantly after a velocity cap is added, and once installed, they require very little ongoing maintenance.

- ***Screens, traveling screens, and fish return systems:*** Screens are generally sized to prevent fish from entering an intake system while still allowing adequate water flow. Traveling screens allow fish to be moved out of an intake system, often unharmed. They are generally built at the landward end of an intake pipe, often in a forebay area, and are often built in conjunction with a fish return system, which routes fish and part of the intake water back to the source waterbody. These systems can be fairly effective in reducing impingement, but require ongoing maintenance and personnel to operate them.

Mitigating entrainment effects is usually more difficult. The measures above are generally not effective in minimizing entrainment, since the organisms subject to entrainment are too small to be screened out without significantly reducing water flows into the intake system, and since they are generally less responsive to changes in water velocity. Other structural measures, such as aquatic filter barriers, are still considered experimental in the marine environment and may cause substantial impacts on their own. Therefore, the primary mitigation approaches to minimize entrainment impacts have been to first determine the least environmentally damaging location for an intake and to then develop compensatory mitigation to make up for the lost marine life.

Determining an appropriate location is necessary to reduce both entrainment and impingement. This may require not only an entrainment study, but a study of currents, wave, and tidal patterns and their relationship to nearby biologically important areas to use in designing the entrainment study. The rates and types of entrainment vary significantly based on the location and depth of the intake, as well as where the intake is sited in relation to areas of biological importance (e.g., at the mouth of a bay or estuary, near kelp beds, hard bottom habitat, or areas of upwelling, etc.). Even after selecting the least environmentally damaging location and incorporating structural mitigation measures, an open water intake has the potential to cause significant entrainment effects, which in turn could require compensatory mitigation. Compensatory mitigation is usually the last and least desired form of mitigation considered as part of "mitigation sequencing", which requires first that adverse effects be avoided and then minimized; then that the affected environment be restored; and finally that impacts be compensated for by providing a replacement or substitute resource or habitat. In the past, forms of mitigation have included fish hatcheries, fishing limits, habitat enhancement, or other similar "out-of-kind" or offsite measures.

Determining the necessary level of mitigation for most proposals would be based in part on results of a 316(b) study or its equivalent. Developing such measures would require an extensive evaluation of the impacts and determination of both the feasibility and effectiveness of making up for the lost marine organisms. In some cases where significant entrainment effects remain even after all structural mitigation measures have been provided, the impacts may be so extensive as to make compensatory mitigation insufficient to adequately address the problem. For example, a large facility pulling in tens of millions of gallons of water per day may cause impacts that require dozens or hundreds of acres of habitat to replace the lost organisms or lost biological functions. It is likely to be challenging to identify enough nearby suitable areas to create, restore, or enhance the necessary amount of habitat value, and for some projects, this may result in denial of a permit.

An additional and more recent concern with using compensatory mitigation for entrainment impacts is due to a federal circuit court decision regarding cooling water intakes for power plants. The court ruled that the Clean Water Act limits the use of such measures as mitigation for those intake systems (see additional discussion in Chapter 5.1.3).

Another mitigation approach to reduce entrainment that is still under development is the use of aquatic filter barriers. These systems consist of fine-screened mesh placed around the area of an intake. To be effective in screening out organisms and at the same time allow enough water through, some of these filters at larger facilities must be up to several hundred feet long. While they have seen some use in riverine environments, they have not yet been proven effective in the ocean environment. Additionally, due in part to their size, they create additional concerns that would have to be addressed during review, including how they affect other uses in the water such as navigation, and what would happen if they were to break away from their moorings.

One additional option that may be worthwhile is to retrofit an open water intake so that it becomes a subsurface intake. This could be done by constructing a structure around the intake opening that is filled with sand, cobble, or other material that prevents or reduces entrainment.

WHAT'S LIKELY NEEDED DURING REVIEW?

Evaluate the feasibility of subsurface intakes: Given the potentially significant entrainment impacts caused by open water intakes, this will likely be one of the main parts of reviewing proposed desalination facilities. The default intake design should be one that does not cause entrainment – that is, a subsurface intake. The applicant for a proposed facility will likely bear the burden of proof as to whether a subsurface intake is feasible.

The review may require information such as:

- ***A bathymetric survey*** of proposed intake locations and sub-bottom profiles showing location and thickness of sand cover or other substrate over bedrock.
- ***Results of sediment core samples***, including grain size, vertical and horizontal transmissivity, the presence or absence of impermeable layers, etc.
- ***Written and graphic descriptions of historic and current seasonal beach profiles*** in the area of a proposed intake, including post-storm profiles.
- ***Cost estimates and comparisons*** for constructing and operating surface and subsurface intakes. This should include an evaluation of the operating cost advantages that may accrue due to desalination facilities that use subsurface intakes requiring less pre-treatment than those that use open-water intakes.
- ***Examination of regional sediment transport patterns***, sediment sources and sinks, and an analysis of the anticipated long-term stability of the substrate that would be used for the intakes.
- ***Monitoring plan*** for ensuring stability of sand cover.
- ***Mitigation plan*** for potential sand loss (e.g., augment sand cover, deepen well, reduce intake velocity, etc.).

In addition, where a standard subsurface intake is found to be infeasible, or in some cases, when considering a retrofit of an existing open water intake, evaluate the potential for constructing and maintaining artificial cover at the intake location by using a contained cover system with sand, gravel, or cobble.

For open water intakes, determine the least environmentally damaging location and mitigate the remaining entrainment and impingement effects: Where subsurface intakes are determined to be infeasible, review will likely require several studies to determine what available location is least damaging and what entrainment effects would still occur. The default protocols for an entrainment study are those used in the 316(b) studies, though in some cases, different study parameters may be proposed. In some cases, the review may be able to use other recent and local entrainment data – for example, a recently completed 316(b) study at a nearby site, if applicable to the proposed desalination site. Other studies similar to the ones listed above for subsurface intakes may be needed to identify locations with suitable substrates to support a pipeline, acceptable sand movement and deposition patterns, and the like.

Review should also evaluate potential structural and operational measures, including:

- ***Velocity caps:*** The intake structure should be designed so that water is pulled in horizontally rather than vertically to allow fish to better sense the intake.
- ***Velocity rates:*** The facility should be designed so that the size of the pipeline and the pumps result in a water velocity of less than 0.5 feet per second.
- ***Screens:*** These may include various types of screening devices, based on the type of impingement impact identified for a facility. For example, a facility with a location and design that results in very little impingement and no impingement of sensitive species may have fewer concerns about screening than a facility with more significant impingement impacts.
- ***Compensatory mitigation proposals:*** Proposed compensatory mitigation measures may include a wide range of approaches – from fish hatcheries to habitat replacement to preservation of various types of areas – depending on the effects being mitigated and the available mitigation options. Proposed measures should consider such elements of a mitigation plan as performance standard, contingencies for possible problems or failure of a particular measure, and others.

All these mitigation measures should be developed in conjunction with the various regulatory agencies involved in reviewing, permitting, or monitoring the facility. Some measures that may be more desired by the proponent – for example, certain compensatory mitigation measures – may be less acceptable to various agencies, so these issues should be worked out early in the project review stage.

5.1.2 EFFECTS OF DESALINATION DISCHARGES ON MARINE BIOLOGY AND WATER QUALITY

The desalination process results in an effluent that is high in salts and that may contain various contaminants, such as chemicals or cleaning compounds. The discharge also carries with it what may be a large volume of biomass made up of the entrained organisms that were drawn through the facility. Each of these constituents of the discharge is discussed below. There are also likely to be other types of impacts when desalination discharges are combined with other discharges from coastal power plants, wastewater treatment facilities, or others types of facilities (see the discussion in Section 5.1.3 of issues related to co-located desalination facilities).

HIGH SALINITY

The ambient salinity of seawater varies due to seasonal changes, upwellings, or other natural phenomena. Salinity in the Pacific Ocean off California, for example, averages about 33 parts per thousand, with a typical variation of about plus or minus 10%. The discharge from a desalination facility may locally increase salinity levels by up to 100%, or about double the normal salinity level for seawater. Local marine species are usually adapted to an area's natural salinity levels, but few, if any, are likely to be adapted to the increased salinity of a desalination discharge. These species may also be adapted to the natural variation in salinity that occurs seasonally or due to natural phenomena such as upwellings or freshwater inputs, but they may not be adapted to sudden exposure of those same levels when not caused by natural event out of season – for example, an organism may be able to handle a gradual 10% salinity increase on a seasonal basis but not sudden exposure to a plume with salinities of 10% above ambient conditions. Even where a higher salinity level does not kill organisms directly, it may have sublethal effects that stress them so that they are more susceptible to other stressors, such as increased levels of other pollutants. Further, organisms may be sensitive to different salinity levels based on their life stage – for instance, an adult fish may not be harmed by a higher salinity concentration or may be able to swim away from it, whereas the eggs, larvae, or juveniles of the same species may be harmed at the same concentration.

CHEMICALS OR CLEANING COMPOUNDS

Seawater desalination facilities require a variety of chemicals and compounds to treat the water, clean the desalting equipment, and prepare the desalted water for distribution through the water supply system. Many of these compounds are neutralized or removed from the waste stream before being discharged, though some may remain. Chemicals used during the desalination process included chlorine, ozone, or other biocides, various coagulants, acids, antiscalants, and others. Additionally, some materials used in the pipes, filters, or other structural elements of a desalination facility may corrode during the desalination process and add metals or other compounds to the discharge stream. Finally, compounds or elements that occur naturally in the water column, or that may be present due to pollution, will be concentrated during the desalination process and may be discharged at levels up to twice the concentration in the source water.

BIOMASS FROM ENTRAINED ORGANISMS

The desalination process involves either heating seawater or forcing it through membranes at very high pressure, as described in the previous section of this report. Both processes generally kill all of the organisms present in the seawater, and those dead organisms become part of the facility's discharge. At a large facility, this could result in a substantial amount of organic material, which can cause water quality problems by itself or can provide a matrix for growing bacteria and other organisms. This type of discharge can be harmful to human health.

ALTERNATIVES AND MITIGATION MEASURES

There are a number of ways to avoid or minimize adverse effects caused by desalination discharges, many of which can be used in combination. Mitigation measures that may be evaluated during review include:

- **Proper location:** The discharge should be located in an area where it will not harm nearby sensitive marine life. For example, discharges should be located well away from areas of kelp, hard bottom habitat, or other areas where resident species may be more sensitive to such changes in water quality.

- **Subsurface outfalls:** Similar to the benefits created by subsurface intakes, discharges from subsurface outfalls may be buffered and diffused by passing through substrate before they reach open water or the biologically active zone of the seafloor.

- **Structural measures – diffusers or multiport outfalls:** These structural components allow a discharge to be split into several streams or released over a larger area, resulting in quicker diffusion in the receiving water.

- **Minimizing chemical use or using alternative treatments:** These include using non-corrosive or less corrosive materials in the facility and adequately treating the chemicals before discharge to ensure they are neutralized. The review of proposed facilities may also consider the types and amounts of chemicals proposed to be used and evaluate whether there are less persistent or less harmful chemicals or methods that would achieve the same treatment purpose (e.g., using ultraviolet light instead of biocides).

- **Wastewater treatment systems or on-land disposal:** During some processes, such as membrane cleaning, desalination facilities may generate wastes with contaminant concentrations too high to be discharged to the ocean. Facilities can be designed to separate these flows and send them to a wastewater treatment system, or to separate out many of the solids removed from the seawater for disposal in a landfill. This same approach can be used to separate constituents in the water column that might be concentrated during the desalination process (e.g., copper or petroleum products as mentioned above), and disposed of in ways other than discharge to the ocean.

- **Co-located or combined outfalls:** In some cases, discharges from a desalination facility may be combined with other existing discharges, such as the discharge from a wastewater treatment system or a coastal power plant (see the following section of this report for additional evaluation of co-location with power plants). Combining the two discharges may result in fewer overall adverse effects compared to having separate discharges – for example, by allowing the high-saline desalination discharge to mix with a low-saline wastewater discharge, the overall discharge may mix more readily with the ocean water, allowing it to more quickly match background salinity levels. The degree to which the combined discharge will mix will vary depending on the contribution of each facility to the overall discharge – for example, wastewater flows are generally much lower at night than during the day, so a steady-state desalination discharge would provide a higher proportion of the overall amount at night.

Ocean discharges will also be subject to review and permitting by the Regional Water Quality Control Boards for an NPDES (National Pollutant Discharge Elimination System) permit, and will likely be subject to ongoing monitoring requirements.

WHAT'S LIKELY NEEDED DURING REVIEW?

The review should include descriptions and analyses of:

- Ambient or background conditions, including daily and seasonal variations, the existing level of water quality impairment, etc.
- Facility operating rates and discharge constituents at those rates.
- Types and amounts of chemicals and compounds used during the processes and maximum expected concentrations in the discharge.
- Plume modeling showing areal extent of salinity ranges in various conditions (including worst-case).
- Capacity of wastewater treatment or landfill to allow separation of solids or chemicals from the discharge.
- Fate and transport modeling showing how the discharge would interact with the receiving water.
- The "worst-case" situation – i.e., the conditions during which the facility would have the greatest adverse effects – for example, when the facility operates at full capacity with during an ebb tide and no or low currents so that very little mixing occurs.
- Marine organisms present and how they would be affected by salinity changes, including how the affects may vary by life stage.

For combined discharges, in addition to the above considerations, the review should describe the typical operating conditions for each facility and the amount of flow each would contribute to the overall discharge at various operating configurations. The "worst-case" scenarios for a combined discharge will also likely require identifying the highest and lowest levels of salinity and other contaminants that could reasonably occur during various operating conditions and the environmental characteristics of the receiving waters.

5.1.3 ISSUES RELATED TO CO-LOCATING DESALINATION FACILITIES AT COASTAL POWER PLANTS

Main Points:

- ***Desalination facilities proposing to co-locate with coastal power plants using "once-through" cooling would link providing water supply with what in many cases may be an out-of-date and environmentally harmful technique.***
- ***Most proposals for co-located desalination facilities will need updated entrainment studies, since most coastal power plants do not have current entrainment data.***
- ***Review under the Coastal Act will require identifying, at minimum, the incremental impacts caused by the desalination facility beyond those caused by the power plant.***

The largest desalination facilities currently being considered in California are proposing to use the cooling water intakes and outfalls of existing coastal power plants. While there may be a number of operational advantages when desalination facilities co-locate with power plants, there are also some unique and potentially significant issues and adverse environmental impacts different from those that would be evaluated for an independently-sited desalination facility[27].

Most coastal power plants using a "once-through" cooling system were designed and sited several decades ago when environmental issues were not as much of a concern as they are today and when the adverse effects of once-through cooling were not as well understood. Many of the intakes and outfalls are located in areas that would likely not be acceptable under current requirements, due to their significant impacts on the marine biological community or their contribution to water quality problems. Additionally, many of these power plants have never gone through a comprehensive environmental review such as that required under CEQA and have not been evaluated for Coastal Act conformity.

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[27] Many of these advantages and disadvantages of co-location are recognized in the findings and recommendations of the state Desalination Task Force, which include:

- *Advantages of co-locating desalination facilities with coastal power plants using once-through cooling may include: compatible land use, use of the existing infrastructure for feedwater intake and brine discharge, location security, use of the warmed power plant cooling water as the feedwater for the desalination facility, reduction of the power plant discharge thermal plume, and the potential to purchase power from the host power plant at prices below retail rates.*

- *Co-locating a desalination facility with a coastal power plant may provide a justification for the continued use of once-through cooling technology. Once through cooling technology has well-documented environmental impacts, including impacts on marine organisms.*

- *The appropriate State regulatory agencies have indicated that the siting of a new desalination facility, which utilizes any new or existing open water feedwater intakes, will require a current assessment of entrainment and impingement impacts as part of the environmental reivew and permitting process.*

- *For proposed desalination facilities co-locating with power plants, analyze the impacts of the desalination facility operations apart from the operations of the co-located facilities. This will identify the impacts of the desalination facility operations when there are reductions in cooling water quantities. This recommendation is not intended to dictate California Environmental Quality Act alternatives that must be evaluated.*

Even recognizing that existing baseline environmental conditions are, in part, a result of decades of power plant operation, the ongoing adverse impacts of these cooling water systems can be significant. Coastal power plants typically take in several hundred million gallons of seawater per day, with some taking in over a billion gallons each day. This is a significant amount of water by almost any measure – for example, a 500 million gallon per day cooling system takes in enough water each day to cover over two square miles of land one foot deep. When this amount of water is translated into habitat value, with densities of hundreds or thousands of organisms per cubic foot of water, this translates into a substantial loss of marine life, especially in areas where biological productivity may have already been reduced by other stressors or in important habitats such as estuarine or nearshore areas.

ADVANTAGES OF CO-LOCATION

Co-location is seen by many as providing several advantages, including:

- **Water use:** Most of the water used by a co-located desalination facility would be water also used by the power plant. For some such proposals, the incremental entrainment and impingement caused by the desalination facility might result overall in fewer additional impacts to the marine environment than a similarly sized desalination facility sited independently and drawing in water from its own intake system. This will require case-by-case evaluation, however, and would vary by location and by how each facility is operated.

- **Shared discharge:** The high salinity discharge from the desalination facility could be mixed with what would usually be a much higher volume of cooling water from the power plant. This would allow some salinity dilution before the combined discharge enters the ocean.

- **Use of existing intakes and outfalls:** By using the power plant's existing intake and outfall structures, there would be no need for additional inwater structures.

- **Available electricity:** The power plant could provide much of the energy used by the desalination facility, which could allow the desalination facility to be built with less need to increase transmission capability elsewhere on the energy grid. Additionally, in some cases, a co-located desalination facility may be able to pay less for the electricity due to low or no transmission costs.

- **Use of an existing industrial site and associated infrastructure:** Where a co-located desalination facility is located entirely within an existing power plant site, it may use much of the existing infrastructure needed for a desalination facility – such as parking, security, etc. – that is already in place. This could result in overall fewer impacts by having two facilities share an existing site rather than develop a new site. Additionally, many desalination facilities are likely to be relatively small in scale compared to the power plants, so their visual impacts may be subordinate to the existing visual effects of the power plants.

- **Existing data and studies:** For those power plants with up-to-date environmental studies, the proposed desalination facility could be reviewed based in part on those studies.

DISADVANTAGES AND CONCERNS

Along with these advantages, proposed co-location raises several concerns that are different from those involving independently-sited desalination facilities. Review for conformity to Coastal Act policies is likely to be different for proposed co-located desalination facilities than for facilities using their own intake or outfall structures. Several types of these issues are discussed below.

Entrainment, Impingement, and Discharges: One of the advantages sometimes cited for co-location is that a desalination facility would cause no additional entrainment or impingement beyond that already caused by the power plant. This is rarely likely to be the case, as the desalination facility would probably cause additional impacts for several reasons:

- ***Design and Location:*** Most of California's coastal power plant intakes were sited several decades ago in what were not necessarily the least environmentally harmful locations. Their designs and locations do not reflect current understanding of the effects of once-through cooling on the marine biological community. Some of their cooling water intakes are located in areas where the biological resources have been, and continue to be, entrained at very high rates. A co-located desalination facility using these intakes would likely continue and increase entrainment or impingement impacts at rates that might otherwise not occur at a facility that was sited based on current environmental information or that found it feasible to use a subsurface intake. Facilities proposing to co-locate should not presume that joint use of the cooling system is the best available alternative, but should conduct the necessary feasibility study to determine whether subsurface intakes would work in the area.

- ***Characteristics of Combined Operations:*** The particular operating relationship between a desalination facility and a power plant will affect their combined entrainment/impingement rate. This can take several forms:

    - A desalination facility may result in an increase in power plant operations that would not otherwise be needed – for example, a desalination facility operating twenty-four hours a day may require a power plant to operate at times when it would otherwise be shut down or operate at lower capacity due to lack of energy demand. It typically takes from 15,000 to 40,000 gallons of cooling water to produce a megawatt of electricity, and about 13 megawatts of electricity to produce a million gallons of desalted water. Therefore, a 25 million gallon per day desalination facility would require the power plant to pull in about five to 13 million gallons of cooling water each day to produce the electricity necessary to process the 50 million gallons of source water needed for the desalination process.

    - When a power plant is not producing electricity and therefore does not need water for cooling, it usually continues to pull in some amount of water to keep the intake, outfall, and various condenser components from fouling. During these times, entrained organisms may be subject to pressure changes but not thermal changes as they pass through the cooling water system, which may allow some higher percentage of these organisms to live. However, desalination facilities that are operating at these times could cause organisms that might otherwise survive to perish due to their coming into contact with the desalination filtering or pre-treatment systems.

- At some facilities, cooling water from the power plant condensers may be too hot for the desalination equipment, and the facility will have to pull in additional seawater that bypasses the power plant and allows the power plant discharge to be cooled to a temperature that does not damage the desalination filters and membranes.

Project review, therefore, should identify how the operations of the two facilities will be coordinated. Desalination facilities located at power plants that produce a baseload supply of electricity and operate continually will likely create fewer additional entrainment impacts than those located at power plants that usually operate only during peak energy demands. The review should also identify the amount of time the power plant is shut down for various lengths of time due to maintenance requirements or market conditions. At power plants with multiple generating units and multiple intakes for those units, the review for the desalination facility may also identify whether it is feasible to locate the facility at the intake that operates the most (i.e., the intake providing water for the most efficient power generating unit).

The review will need to reflect the existing conditions at the power plant, which will likely be based on representative operations at or near the time of the review. If, as in many cases, the power plant has generally operated at less than full capacity, existing conditions would likely be based on this actual level of operation rather than its maximum permitted output.

Adequate review will also depend on the recency and adequacy of entrainment data at the power plant. Entrainment studies for most of the state's coastal power plants date from the 1970s and 1980s, and the data from these studies generally do not adequately identify the existing and ongoing level of impact caused by the power plant's once-through cooling system, and do not accurately describe the existing environmental conditions as required under CEQA and the Coastal Act. These studies do not reflect more recent improvements in sampling protocols, species identification, and modeling methods, and are not based on our improved scientific understanding of marine ecosystems. Additionally, while most power plants have been reviewed at various times for conformity to state and federal water quality standards, many have not been reviewed for conformity to Coastal Act policies or CEQA[28]. In such cases, there may be no "baseline" of environmental effects that can be used for Coastal Act review, although, data collected as part of a recent entrainment study under the Energy Commission's "CEQA-equivalent" review may serve as an appropriate baseline.

- ***Temporary or permanent change in power plant operations:*** As power plants undergo review for proposed new generating units, new requirements may result in replacement of their once-through cooling systems with systems that are less harmful to the marine environment, such as dry cooling, recycled or reclaimed water, or other methods. The U.S. EPA recently adopted rules related to the allowable level of adverse entrainment and impingement effects associated with once-through cooling. These new rules require significant reductions in entrainment and impingement rates, which could reduce the advantages of co-location if the power plants must make significant design or operational changes to the power plant to decrease their cooling water use.

[28] Older power plants that have undergone review only for NPDES discharge permits also may not have established appropriate baseline conditions for CEQA, since the NPDES permit review for existing discharges is exempt from CEQA requirements (per CEQA Guidelines, Section 15263 – Discharge Requirements).

- ***Thermal discharges:*** In addition to the discharge characteristics discussed in the previous section of this report – high salinity, chemicals, and biomass – review of a combined discharge must consider the thermal discharge from a power plant's cooling system. Most coastal power plants are allowed to discharge water up to 20° F over the ambient ocean water temperature, with some having higher permit limits. The effect of combining a desalination discharge with this higher temperature discharge from the power plant will vary based on the operational characteristics of the two facilities, but could result in effects significantly different than those created by the power plant discharge alone.

"COASTAL-DEPENDENCY"

Some sites along the coast, including those of many existing coastal power plants, are designated in the applicable certified Local Coastal Program for coastal-dependent uses. Unless a desalination processing facility proposed for such a site is determined to be coastal-dependent, it may require a change in the land use designation to allow it to be sited there. The intake and outfall proposed to be used by the desalination facility are more likely to be considered coastal-dependent than the facility's processing units are. [See also Chapter 2.2.2.]

WHAT'S LIKELY NEEDED DURING REVIEW?

Along with the need for recent and applicable entrainment/impingement data, it is likely that most, if not all, the reviews for desalination facilities proposing to co-locate with power plants will need to distinguish between the power plant operating by itself and the two facilities operating together. The desalination facility will very likely operate on its own at some time during its operating life, due to power plant shutdowns for maintenance or other reasons. The review will include determining what effects the facility causes when it operates on its own, what incremental effects it may cause above and beyond those of the power plant when they are both operating, and may also involve partitioning responsibility for the environmental impacts and mitigation measures between the two facilities. This might best occur during CEQA review as part of a "reasonable worst case" evaluation of entrainment and discharge effects, or could be done during review for a coastal development permit. Once the incremental increase in entrainment and impingement is known, it can be compared to the effects that would occur at other available locations or that would result from using other intake methods.

Review of facilities proposing to co-locate will also likely include an evaluation of the combined effect of their discharges. This will likely include a determination of salinity effects, effects of combining the chemical and biological discharges of a desalination facility with the thermal discharge of the power plant, and other synchronistic effects that may occur.

5.2 OTHER COASTAL ACT ENVIRONMENTAL POLICIES

As stated at the beginning of this chapter, many Coastal Act policies are likely to apply to desalination facilities in a manner similar to how they apply to other facilities. These policies include those discussed below. Many of the studies and considerations necessary when reviewing a proposed project for conformity to these policies may be done earlier than Coastal Act review, either during CEQA or during the initial conceptual design stage of a proposal. Early consideration of these issues may result in fewer changes later in the review and permitting processes.

5.2.1 SPILL PREVENTION AND RESPONSE

Coastal Act section 30232 states:

> *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

This policy includes two primary requirements – first, that developments protect against spills; and second, that developments include effective measures to clean up spills should they occur. Desalination facilities will likely be subject to spill prevention, response, and cleanup requirements similar to those for other industrial facilities in the coastal zone. Many of the chemicals that desalination facilities will use for water treatment, membrane cleaning, and other purposes, are toxic. Spills or releases could cause significant biological damage and in some cases, severe risk to human health. Since many facilities are proposed to be located on or near the shoreline, or at locations with easy access to the water, they will be required to develop a comprehensive spill prevention and response plan.

WHAT'S LIKELY NEEDED DURING REVIEW?

The primary requirement will be submittal of an acceptable spill response plan. For proposals to co-locate a desalination facility with other existing facilities such as power plants or wastewater treatment plants, the existing spill plan for that plant may only need to be updated to incorporate issues related to the desalination facility.

5.2.2 HAZARDS AND EROSION

Coastal Act section 30253 states, in part:

> *New development shall:*
> *(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
> *(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs...*

This policy essentially requires that the risks at proposed locations due to various hazards be considered as part of project review and that the location and design of a proposed development include measures to minimize those risks. Desalination facilities should either be sited where risks associated with these hazards are minimal or be designed to reduce those risks. Review under this policy also requires a determination that the development will not require protective devices in the future.

Additionally, Coastal Act 30235 will likely apply to desalination facilities proposing to locate near the shoreline:

> *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and 1other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.*

This policy describes situations where shoreline stabilization structures may be allowed. Generally, these structures may be permitted for coastal-dependent uses or for existing developments in danger from erosion, but not for new facilities. The policy also limits these structures where they are required to protect existing development, not when such structures might be needed at some point in the future.

WHAT'S LIKELY NEEDED DURING REVIEW?

Review of desalination facilities is likely to require studies related to site geology, hydrology, and erosion, including identifying likely seismic events, the potential for tsunamis, liquefaction, shoreline erosion, and other hazards common in coastal areas. Review for facilities proposing to locate near the shoreline may also require studies to determine the rate of shoreline erosion in the area to anticipate whether shoreline protective devices might be needed to protect the facility during its operating life. These reviews may result in all or part of a facility being relocated at alternative sites or at alternative locations within a site.

5.2.3 UPLAND HABITATS AND ENVIRONMENTALLY SENSITIVE HABITAT AREAS (ESHAS)

Coastal Act Section 30240 states:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

The review will likely evaluate the physical and biological effects of the proposed facility on surface water sources, riparian and wetland communities, special habitat sites, and other similar areas with high environmental values.

WHAT'S LIKELY NEEDED DURING REVIEW?

Facilities should be located and designed to avoid sites in and near with sensitive habitat areas. Studies needed during review will likely include biological surveys and descriptions of nearby wetlands, coastal scrub-shrub habitats, and other habitat types recognized as deserving of special protections. For facilities proposing to locate near such habitats, mitigation measures to avoid and reduce potential adverse effects should be evaluated, including controlling runoff from the facility, reducing glare from facility lighting, housing machinery within sound-dampening materials to reduce noise impacts, and other similar measures.

5.2.4 VISUAL AND SCENIC RESOURCES

Proposed desalination facilities along the coast will be subject to Coastal Act section 30251:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

This policy establishes four requirements related to the visual and scenic quality of proposed developments:

1) Permitted development must be sited and designed to protect views to and along the ocean and scenic coastal areas.
2) The development must minimize the alteration of natural landforms.
3) It must be visually compatible with the character of the surrounding areas.
4) In visually degraded areas and where feasible, the development must restore and enhance visual quality. This requirement includes a three-part test:
   a) Is the area visually degraded?;
   b) If so, are there measures that would restore or enhance visual quality?; and,
   c) If so, are those measures feasible?

This review will likely include determining which locations within a site result in the fewest visual impacts. Measures meant to reduce a facility's visual impacts may also have other beneficial results – for example, putting equipment within buildings or behind screens may reduce the amount of maintenance and repair that would be necessary if the equipment were exposed to salt air or coastal winds. These considerations would likely be a part of a determination of feasibility for those facilities in visually degraded areas.

WHAT'S LIKELY NEEDED DURING REVIEW?

For coastal desalination facilities, review is likely to include the following considerations:

- Determine the views that will be affected by the proposed facility.
- Determine measures that will protect those views, such as restricting the height of the facility, selecting colors that will not detract from the views, placing elements of the facility that are "visually chaotic" (e.g., unscreened industrial equipment, machinery, pipes and tubing, etc.) either inside, behind architectural screens, or behind vegetation, and other similar measures.
- Determine whether the facility is compatible with other nearby uses or facilities.
- If the area is considered visually degraded, determine what feasible measures are available to restore or enhance the area's visual qualities, which may include measures that go beyond just screening a facility from view.

5.3 CUMULATIVE IMPACTS

The Coastal Act includes several policies requiring the evaluation of a proposed development's cumulative effects, including Section 30250(a), which states, in part:

> *New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located...where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.*

The Act defines "cumulative effects" in Section 30105.5[29]:

> *"Cumulatively" or "cumulative effects" means the incremental effects of an individual project shall be reviewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.*

Coastal desalination facilities are likely to raise substantial and complex concerns about cumulative impacts. Different elements of a desalination facility – its location, its service area, its design and operational characteristics – can contribute to different types of cumulative impacts associated with the full range of coastal resources – environmental, visual, public access, and many others. For example, regarding environmental concerns, the most likely cumulative impact analysis needed will be related to marine biology and water quality. Many coastal areas, nearshore waters, and marine ecosystems are significantly degraded due to existing levels of impacts caused by a wide variety of stressors – the effects of development, pollutant discharges, natural or synthetic shifts in local species diversity, global climatic changes, and other

[29] Note: The Coastal Act definition is broader than than the definition under CEQA Section 15355, which states: "Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.
(a) The individual effects may be changes resulting from a single project or a number of separate projects.
(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

conditions. Seawater intakes can also contribute to cumulative impacts, especially in areas of the coast that may be subject to the effects of other intake structures. The growth associated with a desalination facility may also need to be reviewed for potential cumulative impacts, although in some cases, this analysis may have been done to some degree as part of a local or regional planning document.

One significant question related to cumulative impacts that may arise for some proposals is whether a single large-scale facility has more or fewer cumulative impacts than several smaller-scale desalination facilities. Like many of the issues identified in this report, it may be best to address this question thoroughly early in the design process of proposed facilities so that significant changes aren't required later.

WHAT'S LIKELY NEEDED DURING REVIEW?

While the particular aspects of the necessary cumulative impact analysis will vary by facility and location, there are several that will likely be common to all or most proposed facilities. Examples include:

- ***Marine Biology/Water Quality:*** The review should consider, for example, the effects of nearby intakes or outfalls of various types on an area's marine biological resources and water quality, as well as the likely effects of the proposed facility on the existing conditions in the affected waterbody.

- ***Growth-related:*** For some proposed projects, this will require a relatively uncomplicated assessment – for instance, where a relatively small facility is providing water to a limited service area with a known allowable level of build-out. For other projects, assessing growth-related cumulative impacts may be much more complicated and may be, for many potential impacts, inconclusive. The types of impacts to be considered may range from assessing the effects of additional runoff reaching coastal waters, additional traffic and its affects on coastal access, the need for additional infrastructure to support that growth, and others.

- ***Power production:*** for large-scale facilities, the amount of power required to produce the desalinated water may create substantial demands on local power sources, resulting in additional air or water pollution. The review of such facilities should assess the impacts associated with this additional power production and identify ways to minimize those impacts.

CHAPTER 6: OTHER REGULATIONS AND PERMITS

Chapter Sections:

Main Points:

- ***Only after other local and state permits and approvals are received can a coastal development permit application be considered complete.***
- ***Early coordination among project applicants and the various agencies will likely result in a more efficient review process.***

Seawater desalination facilities raise issues related not only to coastal resources, but also related to public health, drinking water supply and safety, cost, energy use, land use, and others. As such, these facilities will be subject to regulations, review, and permit approval by a number of agencies. Each facility will need to conform to a different set of regulations, based on its design and location, and based on the local, state, and federal requirements that apply to it.

For purposes of review by the Coastal Commission, an applicant will need to provide other local and state permits or preliminary approvals before their coastal development permit application is considered complete. This generally results in the Commission's coastal development permit being the last of the local and state permits to be reviewed, and allows the Commission's review to benefit from knowing more complete details about a proposed project, what conditions may have been imposed by other agencies, and what measures may be incorporated into the project that affect coastal resources.

The discussion below provides a general overview of the permits that will most likely be necessary for coastal desalination facilities. Given the number of regulations involved in siting such a proposal – a facility meant to provide drinking water located in an area subject to high public scrutiny – it may be important for project proponents and the various involved agencies to coordinate closely with each other and with the interested public. For the review process to be both effective and efficient, there will likely need to be open distribution of information among the various parties to allow issues of common interest to be identified and resolved early in the process rather than later.

6.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Desalination facilities are likely to require comprehensive environmental review under CEQA, most likely through the Environmental Impact Report (EIR) process. With the number of agencies involved in desalination and the number of permits likely to be required, it is important to have a thorough and comprehensive CEQA review. Reviews for many permits, including coastal development permits, often require more detailed information than might be provided during CEQA; however, if agencies are involved in the CEQA review early and thoroughly, and much of the information they need is provided as part of that review, it may result in a more efficient and shorter decision-making process overall for a proposed facility.

TABLE 4: PERMITS/APPROVALS LIKELY REQUIRED FOR A COASTAL DESALINATION FACILITY

AGENCY	PERMIT OR APPROVAL	NOTES
Federal:		
Army Corps of Engineers	• Section 404 permit • Section 10 permit	• To place fill in navigable waters. • To place a structure in navigable waters.
Coast Guard	Consultation with Corps	
National Marine Fisheries Service	Endangered Species Act, Section 7 consultation	For federal permits that may affect endangered species.
National Oceanic and Atmospheric Administration	Permits and/or consultation	For projects in national marine sanctuaries.
U.S. Fish & Wildlife Service	Endangered Species Act, Section 7 consultation	For federal permits that may affect endangered species.
State:		
Coastal Commission	• Coastal Development Permit • Consistency with Coastal Zone Management Program	• For projects affecting coastal waters. • For projects requiring federal permits and approvals.
Department of Fish & Game	• Stream Alteration Agreement • California Endangered Species Act	
Department of Health Services	• State Safe Drinking Water Act • Federal Surface Water Treatment Rule	
Department of Parks & Recreation	Approval for facilities within or near state parks	
Department of Transportation	Encroachment permit	For utilities crossing state highways.
Department of Water Resources	Approval for use of state water conveyance facilities.	
Public Utilities Commission	Regulates water services, rates, and service areas.	
State Lands Commission	Land Use Lease	
State Water Resources Control Board / Regional Water Quality Control Boards	• Water quality certification • NPDES permit	
Local & Regional:		
City or County / Local utilities / Water Management Districts	These will vary by local jurisdiction and may include building permits, health department certifications, operating permits, or other types of approvals.	

6.2 AGENCIES WITH JURISDICTION

The list below includes agencies, laws, and regulations that are most likely to be involved in reviewing desalination proposals, along with a brief description of how they are likely to be involved.

LOCAL AND REGIONAL JURISDICTIONS

Each local jurisdiction has unique review, permit, and approval requirements. Facilities will be subject to local zoning requirements, land use ordinances, growth management objectives, and other similar approvals, and will need to meet local requirements for public notices, public hearings, appeals, and other similar requirements. Permits needed may include grading permits, building permits, approval from the local fire marshal, and the like. Other local or regional permits may be required from air pollution control agencies, water districts, local utilities, and city or county health departments.

Generally, desalination facilities will need a coastal development permit from both the local jurisdiction, if it has a certified Local Coastal Program, as well as from the Coastal Commission. In such cases, the local government's jurisdiction generally includes most upland areas within the coastal zone, while the Coastal Commission's retained jurisdiction includes areas near coastal waters, areas below the mean high tide line, and other areas[30]. Additionally, some desalination facilities will be located within the Coastal Commission's appeal jurisdiction[31]. In these situations, a local jurisdiction's decision on a coastal development permit may be appealed to the Coastal Commission. In such cases, the Coastal Commission may review the appeal to determine whether the local decision conforms to the applicable policies of the Local Coastal Program.

STATE

Desalination facilities will likely require permits or approvals from the state agencies listed below. Unless otherwise noted, these approvals are generally required before the coastal development permit application to the Coastal Commission is considered complete.

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[30] Coastal Act Section 30601: Prior to certification of the local coastal program and, where applicable, in addition to a permit from local government pursuant to subdivision (b) or (d) of Section 30600, a coastal development permit shall be obtained from the commission for any of the following:

1) Developments between the sea and the first public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tide line of the sea where there is no beach, whichever is the greater distance.
2) Developments not included within paragraph (1) located on tidelands, submerged lands, public trust lands, within 100 feet of any wetland, estuary, stream, or within 300 feet of the top of the seaward face of any coastal bluff.
3) Any development which constitutes a major public works project or a major energy facility.

[31] The Commission's appeal jurisdiction varies by locale, but is generally with 300 feet of mean high tide or between the sea and the first public road, within 300 feet of the top of coastal bluffs, within 100 feet of wetlands, streams, and other areas. Additionally, Coastal Act section 30603 provides the Commission with appeal jurisdiction over major energy facilities and major public works projects, so local decisions on most desalination facilities are likely to be appealable to the Commission, regardless of their location in the coastal zone.

State Lands Commission: The State Lands Commission manages most of the state's tidelands and lands lying under coastal waters. Desalination facilities proposing to place new intakes or outfalls on state tidelands, or to change the use of existing intakes and outfalls, will generally be required to obtain a lease or lease modification from the Commission.

In some coastal areas, the state has granted tidelands to a local jurisdiction. Coastal development permit applications to build structures in these areas will need to include a lease from the local jurisdiction. In these areas, the local jurisdiction's lease decision may be subject to review and approval by the State Lands Commission.

State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs): The SWRCB is responsible for allocating water rights within California and establishing many of the state's water quality protection measures. Nine Regional Boards develop and enforce water quality objectives and implementation plans in particular regions of the state.

- ***Water Rights:*** The SWRCB reviews and authorizes water rights in California, which are required for consumptive uses from enclosed water bodies within the state. Water rights are likely not needed for proposed desalination facilities using water from the open ocean, but may be needed by facilities proposing to use water from enclosed or semi-enclosed areas, such as bays or estuaries, or saline groundwater. Applicants and lead agencies should contact the State Board to determine whether a specific proposal will require a water right.

- ***Water Quality:*** The State Board and its nine Regional Boards share key responsibilities for implementing the state's water quality requirements. The State Board establishes statewide standards, including the state's Ocean Plan, and hears appeals of Regional Board decisions. Each of the state's nine Regional Boards is responsible for water quality permitting within its region. Parts of six Regional Boards are located along the California Coast and would regulate the discharges of desalination facilities within their jurisdiction. The two most common RWQCB permits likely to be needed for a coastal desalination facility are a water quality certification and a discharge permit:

    - Section 401 water quality certification: This permit is required when proposing to place fill in a waterbody. It is issued by the state in conjunction with a Section 404 permit from the U.S. Army Corps of Engineers (see below). "Fill" includes intake or outfall pipelines, beach wells, transmission lines, or other similar structures. Desalination facilities involving new intakes or outfalls or requiring modification of existing outfalls are likely to require a 401 water quality certification.

    - National Pollutant Discharge Elimination System (NPDES) permit: allows pollutants to be discharged to waters of the U.S. Desalination facilities proposing a new outfall will likely need a new NPDES permit. For desalination facilities proposing to use existing outfalls at already-permitted facilities, such as power plants or wastewater treatment facilities, the RWQCB may choose to modify the existing permit or may require a new permit. [For a discussion of impacts related to discharges, see Chapter 5.1.2.]

NPDES permits almost exclusively regulate the discharge of pollutants from point sources, such as industrial effluent from an outfall pipe or stormwater from a municipal storm system. The primary exception applicable to coastal desalination facilities is that NPDES permits are also used to regulate intakes used by thermal power plants that use ocean water for cooling. An NPDES permit for these facilities must determine that these systems use the best technology available to minimize adverse impacts due to their location, design, construction, and capacity. Desalination facilities proposing to co-locate with these types of power plants may therefore be subject to NPDES requirements associated with their intakes.

- ***Coordination between the Coastal Commission and the State/Regional Boards:*** The Coastal Commission often works with the Regional Boards to coordinate review when there is shared jurisdiction of proposed projects. Although the State and Regional Boards operate primarily under the California Water Code while the Coastal Commission acts pursuant to the Coastal Act, there are several areas of shared responsibility and common requirements. For example, both the Commission and the Boards are directed to maintain and restore coastal waters, although the focus and implementation of each agency in carrying out this directive may differ. Additionally, Section 30412 of the Coastal Act establishes some common policies for the Commission and the State and Regional Boards and also recognizes some of the different aspects of their jurisdictions.

  For many projects, including proposed desalination facilities, the Commission and Boards may require similar information during project review. For some aspects of a proposal, however, the Coastal Commission may require some information not requested by a Regional Board, in part because the Coastal Act has different requirements and because Coastal Act review is equivalent to CEQA, while the NPDES review process is exempt from CEQA. For proposed coastal desalination facilities, it may be best for a project applicant to request that the involved agencies identify the applicable standards, necessary studies, and likely requirements as early in the proposal process as possible, either during environmental review or even earlier during conceptual design of a proposed facility, to allow better coordination by all the involved parties.

Energy Commission: For desalination facilities proposing to locate at power plants, the Energy Commission is likely to review proposed changes to the power plant needed to accommodate the desalination facility. Some of those changes may require approval from the Energy Commission. The review may also evaluate the effects of the desalination facility on the power plant's operations, its effect, if any, on the local or regional transmission lines, and other aspects of the desalination facility's impact on energy use.

Department of Fish and Game: The Department requires a stream alteration permit for activities within inland waters and within some areas of bays and estuaries. It also reviews projects for potential impacts to listed species.

Public Utilities Commission (PUC): Desalination facilities may be subject to water rates established by the PUC. The PUC also establishes service areas for water districts, so water provided by a desalination facility may be subject to limits on where it can be sent and the price that may be set.

Department of Health Services: Equipment and processes used in desalination facilities will likely be subject to review and approval for use as drinking water. This review may include specific performance standards for construction and operation of a facility, evaluation of the integrity of equipment used at the facility, determining the required response by the facility operator to various problems, and other requirements.

Other: Other state permits may be required, depending on the facility location, from the state Departments of Parks and Recreation, Transportation, Boating and Waterways, and others.

FEDERAL

Coast Guard: Structures in navigable waters, such as intake and outfall pipelines, may require approval to ensure they don't adversely affect navigation. The Coast Guard may also require buoys or markers to be maintained over the structures. The applicant may also be required to submit information about the structures to include on nautical charts.

U.S. Army Corps of Engineers: A desalination facility may require a Section 404 permit from the Corps if it involves placing fill in navigable waters, and a Section 10 permit if the proposal involves placing a structure in a navigable waterway.

National Marine Fisheries Service and/or U.S. Fish and Wildlife Service: Facilities may require review from these services for their potential effects on endangered, threatened, or other sensitive species. They may also require review for effects on protected marine mammals and migratory birds.

Other: Other permits may also be required from the federal Bureau of Reclamation, Environmental Protection Agency, Minerals Management Service, and others.

WHAT'S LIKELY NEEDED DURING REVIEW?

Local and state approvals must be submitted as part of a complete coastal development permit application. Additionally, the applicant must provide the lease or approval of the landowner for the proposed project. For some projects, this will require approval from the upland landowner as well as from the State Lands Commission for portions of the project on state tidelands.

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APPENDIX A: GLOSSARY AND ACRONYMS

Acre-foot (AF): A unit for measuring the volume of water. One acre-foot equals 325,851 gallons (the volume of water that will cover one acre to a depth of one foot). One million gallons equals 3.07 acre-feet.

Biocide: A chemical used to kill biological organisms (e.g., chlorine).

Brackish water: Water with salt concentrations of between 5 and 20 parts per thousand (ppt). Seawater generally has salt concentrations of greater than 20 ppt.

Brine: Water that contains a high concentration of salt. Brine discharges from desalination plants may include constituents used in pretreatment processes, in addition to the high salt concentration seawater.

Coagulation: A pretreatment process used in some desalination plants. A substance (e.g., ferric chloride) is added to a solution to cause certain elements to thicken into a coherent mass, so that they may be removed.

Cogeneration: A power plant that is designed to conserve energy by using "waste heat" from generating electricity for another purpose.

Distillation: A process of desalination where the intake water is heated to produce steam. The steam is then condensed to produce product water with low salt concentration.

Entrainment: Entrainment occurs when small organisms, such as plankton, larvae, and fish eggs, are drawn into a water intake past any screening equipment and are subjected to pressure or temperature changes. Entrainment is generally considered to result in the death of all the entrained organisms, if not immediately, then shortly after they are discharged back into the environment where they become prey for other animals.

Feedwater: Water fed to the desalination equipment. This can be source water with or without pretreatment.

Impingement: Impingement occurs when fish and other aquatic organisms are trapped against screens used in intake systems. Impingement usually results in either injury or death to the organisms, although some systems include features that allow some individuals to be moved away from the screens unharmed.

Infiltration Gallery: A structure used to draw in water using perforated pipes buried below land or below the bottom surface of a water body. Water in the saturated zone of the substrate is pulled into the perforated pipes.

Kilowatt (kW): A thousand watts. The watt is a measure of power used by electricity generating plants. One watt is equivalent to 1 Joule/second or 3.4127 Btu/hour.

Megawatt (MW): A million watts.

Minimize: To reduce to the smallest possible level.

Mitigate: The California Environmental Quality Act (at Section 15370) defines "mitigation" and the sequence of mitigation as:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.

Reverse Osmosis (RO): A process of desalination where pressure is applied continuously to the feedwater, forcing water molecules through a semipermeable membrane. Water that passes through the membrane leaves the unit as product water; most of the dissolved impurities remain behind and are discharged in a waste stream.

Total Dissolved Solids (tds): Total salt and calcium carbonate concentration in a sample of water, usually expressed in milligrams per liter (mg/L) or parts per million (ppm). The state-recommended Maximum Contaminant Level (MCL) drinking water standard for total dissolved solids is 500 mg/L, the upper MCL is 1,000 mg/L, and the short-term permitted level is 1,500 mg/L. Seawater contains roughly 30,000 mg/L.

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South Coast Air Quality Management District (SCAQMD)

Permit to Construct / Operate

Application Form for Permit or Plan Approval (Form 400-A)

South Coast Air Quality Management District

Form 400-A

Application Form for Permit or Plan Approval

List only one piece of equipment or process per form.

Mail To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765-0944

Tel: (909) 396-3385
www.aqmd.gov

Section A - Operator Information

1. Facility Name (Business Name of Operator to Appear on the Permit):

2. Valid AQMD Facility ID (Available On Permit Or Invoice Issued By AQMD):

3. Owner's Business Name (If different from Business Name of Operator):

Section B - Equipment Location Address

4. Equipment Location Is: ◯ Fixed Location ◯ Various Location
(For equipment operated at various locations, provide address of initial site.)

Street Address

City , CA Zip

Contact Name Title

Phone # Ext. Fax #

E-Mail:

Section C - Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

Address

City , State Zip

Contact Name Title

Phone # Ext. Fax #

E-Mail:

Section D - Application Type

6. The Facility Is: ◯ Not In RECLAIM or Title V ◯ In RECLAIM ◯ In Title V ◯ In RECLAIM & Title V Programs

7. Reason for Submitting Application (Select only ONE):

7a. New Equipment or Process Application:

- ◯ New Construction (Permit to Construct)
- ◯ Equipment On-Site But Not Constructed or Operational
- ◯ Equipment Operating Without A Permit *
- ◯ Compliance Plan
- ◯ Registration/Certification
- ◯ Streamlined Standard Permit

7b. Facility Permits:

- ◯ Title V Application or Amendment (Also submit Form 500-A1)
- ◯ RECLAIM Facility Permit Amendment

7c. Equipment or Process with an Existing/Previous Application or Permit:

- ◯ Administrative Change
- ◯ Alteration/Modification
- ◯ Alteration/Modification without Prior Approval *
- ◯ Change of Condition
- ◯ Change of Condition without Prior Approval *
- ◯ Change of Location
- ◯ Change of Location without Prior Approval *
- ◯ Equipment Operating with an Expired/Inactive Permit *

Existing or Previous Permit/Application
If you checked any of the items in 7c., you MUST provide an existing Permit or Application Number:

* A Higher Permit Processing Fee and additional Annual Operating Fees (up to 3 full years) may apply (Rule 301(c)(1)(D)(i)).

8a. Estimated Start Date of Construction (mm/dd/yyyy):

8b. Estimated End Date of Construction (mm/dd/yyyy):

8c. Estimated Start Date of Operation (mm/dd/yyyy):

9. Description of Equipment or Reason for Compliance Plan (list applicable rule):

10. For identical equipment, how many additional applications are being submitted with this application?
(Form 400-A required for each equipment / process)

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less OR a not-for-profit training center) ◯ No ◯ Yes

12. Has a Notice of Violation (NOV) or a Notice to Comply (NC) been issued for this equipment? ◯ No ◯ Yes
If Yes, provide NOV/NC#:

Section E - Facility Business Information

13. What type of business is being conducted at this equipment location?

14. What is your business primary NAICS Code?
(North American Industrial Classification System)

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ◯ No ◯ Yes

16. Are there any schools (K-12) within 1000 feet of the facility property line? ◯ No ◯ Yes

Section F - Authorization/Signature

I hereby certify that all information contained herein and Information submitted with this application are true and correct.

17. Signature of Responsible Official:

18. Title of Responsible Official:

19. I wish to review the permit prior to issuance.
(This may cause a delay in the application process.) ◯ No ◯ Yes

20. Print Name:

21. Date:

22. Do you claim confidentiality of data? (If Yes, see instructions.) ◯ No ◯ Yes

23. Check List: ☐ Authorized Signature/Date ☐ Form 400-CEQA ☐ Supplemental Form(s) (ie., Form 400-E-xx) ☐ Fees Enclosed

AQMD USE ONLY	APPLICATION TRACKING #	CHECK #	AMOUNT RECEIVED $	PAYMENT TRACKING #	VALIDATION

DATE	APP REJ	DATE	APP REJ	CLASS I III	BASIC CONTROL	EQUIPMENT CATEGORY CODE	TEAM	ENGINEER	REASON/ACTION TAKEN

Form 400-A Instructions

Section A – Operator Information

1. Facility Name
   A special format is used on the permit to identify both the legal entity and the business name. For example:

Personal Name:	John C. King
Personal Name with DBA:	ABC Store, John C. King DBA
Partnership:	John C. King, Jim Day and Ann Smith
Partnership with DBA:	ABC Store, J. Kin, J. Day and A. Smith DBA
Corporation:	ABC Corporation or ABC, Inc.
Corporation with Division:	ABC Corporation, Office Products Division
Corporation with DBA:	ABC Corporation, ABC Trucking Co. DBA
Coporation with Limited Liability Partnership:	ABC Corporation, LLC/LLP
Governmental Agency:	Any City, Public Works Dept.
School:	John Muir High School
Colleges & Universities:	University of California at Los Angeles, Biochemistry Dept.

2. Valid AQMD Facility ID
   This is a unique 6 digit ID number assigned by the AQMD for a facility at a specific site location. If you have been previously assigned a facility ID number, enter it here. The facility ID number may be found on an invoice or a permit previously issued for the same location. For new businesses to the AQMD, leave this field blank. A facility ID number will be assigned to a new business by the AQMD.

3. Owner's business Name
   Enter the name of the owner of the business if it is different from the operator, using the same format as in Facility Name.

Section B – Equipment Location Address

4. Choose whether the equipment will be operated at a fixed location or at various locations. For fixed locations, enter the equipment location address. For various locations, enter the address of the initial site where the equipment is to be operated or the site where the equipment will be stored. Enter the name of the contact person whom we may call for information regarding the equipment.

Section C – Permit Mailing Address

5. The mailing address is for the postal delivery of permits, billing and other written correspondences. Check the box if the mailing address is the same as the equipment address. Otherwise, enter the mailing address. Enter the contact name of the person whom we may call regarding billing and other administrative issues.

Section D – Application Type

6. Choose a type of facility. If you are unsure whether your facility is in RECLAIM or Title V programs, choose "Not in RECLAIM or Title V."

7. Choose only one selection from this section:

   7a. New Equipment or Process Application
   New Construction (Permit to Construct) – new equipment which has not yet been constructed or on site and requires a Permit to Construct.
   Equipment On-Site but Not Constructed or Operational – for equipment already placed at the equipment location address but has not been constructed or operated.
   Equipment Operating Without a Permit – Equipment which has been in operation without a valid permit or equipment with a permit which has been expired for more than one year.
   Compliance Plan – For all compliance plans required by a rule, ie., Rule 403, Rule 1166, etc.
   Registration/Certification – Registration is to register equipment which has previously been issued a Certified Equipment Permit by the AQMD to the manufacturer. Certification is for equipment which the manufacturer would like to have certified by AQMD.
   Streamlined Standard Permit – For certain types of equipment or processes identified by AQMD with pre-determined permit conditions.

   7b. Facility Permits
   Title V Application or Amendment – For all Title V permits and amendments to TV permits. Also submit Form 500-TV and other applicable Title V forms.
   RECLAIM Facility Permit Amendment – For all RECLAIM or RECLAIM and Title V permit amendments.

   7c. Equipment or Process with an Existing/Previous Application or Permit
   Administrative Change – For amendments to a permit which do not result in any emissions changes and require no engineering evaluation. Examples of administrative changes are changes to equipment model name, model or serial numbers and minor corrections to permit conditions.
   Alteration/Modification – For any physical changes to be made to an equipment or process or its operating conditions with an existing Permit to Construct or Permit to Operate.
   Alteration/Modification without Prior Approval – For any physical changes already made to an equipment or process or its operating conditions with an existing Permit to Construct or Permit to Operate.
   Change of Condition – For change of permit conditions that will not result in an emission increase. If the change of condition will result in an emission increase, select Alteration/Modification.
   Change of Condition without Prior Approval – For change of permit conditions without prior approval that will not result in an emission increase. If the change of condition will result in an emission increase, select Alteration/Modification without Prior Approval.
   Change of Location – For permitted equipment which will be relocated from one site location to another. Change of location permit is not required if the equipment is on one or more contiguous properties within the District, in actual physical contact or separated solely

by a public roadway or other public right-of-way and are owned or operated by the same owner/operator.
Change of Location without Prior Approval – For permitted equipment which has been relocated from one site location to another without prior approval.
Equipment Operating with an Expired/Inactive Permit – For equipment operating with a permit which has been expired for over one year or a permit which is inactive.
Existing or Previous Permit/Application – If you select one of the items in 7c, enter the existing or previous permit/application number.

8a. Estimated Start Date of Construction – Enter the estimated start date of construction of the equipment or process or the estimated date when the equipment is to be on site.

8b. Estimated End Date of Construction – Enter the estimated date of completion of construction.

8c. Estimated Start Date of Operation – Enter the estimated date of start of operation. This includes any equipment or process testing.

9. Description of Equipment or Reason for Compliance Plan – Provide a brief description of the equipment or process for which you are seeking a permit. For plans, briefly describe the reason for plan submittal.

10. Identical Equipment – Applications submitted at the same time for identical equipment qualify for lower permit processing fees as per Rule 301. If multiple identical applications are being submitted, enter the number of the additional applications. Note: This does not apply to certified equipment applications.

11. Small Business – Small businesses qualify for 50% reduced fees as per Rule 301. A small business is defined as a business with 10 employees or less AND total gross receipts of $500,000 or less. A not-for-profit training center also qualifies as a small business.

12. NOV or NC – If a Notice of Violation or a Notice to Comply was issued for your equipment of process, check "Yes" and enter the appropriate notice number.

Section E – Facility Business Information

13. Type of Business – Provide a brief description of the type of business or operation at this facility. This information is used to determine which permit processing team will review your application.

14. NAICS (North American Industrial Classification System) Code – This is the new classification code which replaced the Standard Industrial Classification (SIC) used to classify the primary business activity. A primary business activity is based on the principal product or service rendered. Generally, the primary activity would generate 51% or more of the revenue for the business. You may obtain your business NAICS codes by visiting the Census Bureau NAICS Web site at http://www.census.gov/naics, by calling 1-888-75NAICS, or by e-mailing naics@census.gov. The AQMD uses the NAICS codes for variety of purposes, including, but not limited to, rule development, socio-economic analysis, and reports to the State Legislature.

15. Other Facilities Under Same Operator – Check "Yes" if there are other facilities operated by the same operator within SCAQMD jurisdiction.

16. Schools within 1000 ft – If there is a public or a private school from Kindergarten thru 12th grade within 1000 feet radius of the facility, check "Yes". Include Form 400-PS (Plot Plan and Stack Information Form) with your application submittal. The information will be used to determine if a public notice pursuant to Rule 212 is required.

Section F – Authorization/Signature

17. Signature of Responsible Official – A responsible official is the president, vice-president, director, manager, proprietor/owner, business partner or other person with legal authority to serve as representative of the business. For city, state, federal agencies or municipalities, a principal executive officer or ranking elected official may sign the form.

18. Title of Responsible Official – Provide the title for the Responsible Official signing the form.

19. Review of Permit – If you wish to review the permit before it is issued, check "Yes". This may cause a delay in the application process due to additional time in correspondence and revisions.

20. Print Name – Print the name of the responsible official.

21. Date – Provide the date the form is completed and signed.

22. Confidentiality –Pursuant to the California Public Records Act, your permit application and any supplemental documentation are public records and may be disclosed to a third party. If you wish to claim certain limited information as exempt from disclosure because it qualifies as a trade secret, as defined in the District's Guidelines for Implementing the California Public Records Act, you must make such claim <u>at the time of submittal</u> to the District. Check "Yes" if you claim that this form or its attachments contain confidential trade secret information.

23. Check List – The checklist is a reminder to date and sign the forms, complete and include Form 400-CEQA, complete and include any supplemental forms and information, and to include appropriate fees.

California Environmental Quality Act (CEQA) Applicability (Form 400-CEQA)

South Coast Air Quality Management District

Form 400-CEQA
California Environmental Quality Act (CEQA) Applicability

Mail To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765-0944

Tel: (909) 396-3385
www.aqmd.gov

The SCAQMD is required by state law, the California Environmental Quality Act (CEQA), to review discretionary permit project applications for potential air quality and other environmental impacts. This form is a screening tool to assist the SCAQMD in clarifying whether or not the project[1] has the potential to generate significant adverse environmental impacts that might require preparation of a CEQA document [CEQA Guidelines §15060(a)].[2] Refer to the attached instructions for guidance in completing this form.[3] For each Form 400-A application, also complete and submit one Form 400-CEQA. If submitting multiple Form 400-A applications for the same project at the same time, only one 400-CEQA form is necessary for the entire project. If you need assistance completing this form, contact Permit Services at (909) 396-3385 or (909) 396-2668.

Section A - Facility Information

1. Facility Name (Business Name of Operator To Appear On The Permit): _____

2. Valid AQMD Facility ID (Available On Permit Or Invoice Issued By AQMD): _____

3. Project Description:

_____

Section B - Review For Exemption From Further CEQA Action

Check "Yes" or "No" as applicable

	Yes	No	Is this application for:
1.	○	○	**A CEQA and/or NEPA document previously or currently prepared that specifically evaluates this project?** If yes, attach a copy of the signed Notice of Determination to this form.
2.	○	○	**A request for a change of permittee only (without equipment modifications)?**
3.	○	○	**A functionally identical permit unit replacement with no increase in rating or emissions?**
4.	○	○	**A change of daily VOC permit limit to a monthly VOC permit limit?**
5.	○	○	**Equipment damaged as a result of a disaster during state of emergency?**
6.	○	○	**A Title V** (i.e., Regulation XXX) **permit renewal (without equipment modifications)?**
7.	○	○	**A Title V administrative permit revision?**
8.	○	○	**The conversion of an existing permit into an initial Title V permit?**

If **"Yes"** is checked for any question in Section B, your application does not require additional evaluation for CEQA applicability. Skip to Section D - Signatures on page 2 and sign and date this form.

Section C - Review of Impacts Which May Trigger CEQA

Complete Parts I-VI by checking "Yes" or "No" as applicable. To avoid delays in processing your application(s), explain all "Yes" responses on a separate sheet and attach it to this form.

	Yes	No	Part I - General
1.	○	○	**Has this project generated any known public controversy regarding potential adverse impacts that may be generated by the project?** Controversy may be construed as concerns raised by local groups at public meetings; adverse media attention such as negative articles in newspapers or other periodical publications, local news programs, environmental justice issues, etc.
2.	○	○	**Is this project part of a larger project?** If yes, attach a separate sheet to briefly describe the larger project.
			Part II - Air Quality
3.	○	○	**Will there be any demolition, excavating, and/or grading construction activities that encompass an area exceeding 20,000 square feet?**
4.	○	○	**Does this project include the open outdoor storage of dry bulk solid materials that could generate dust?** If Yes, include a plot plan with the application package.

[1] A "project" means the whole of an action which has a potential for resulting in physical change to the environment, including construction activities, clearing or grading of land, improvements to existing structures, and activities or equipment involving the issuance of a permit. For example, a project might include installation of a new, or modification of an existing internal combustion engine, dry-cleaning facility, boiler, gas turbine, spray coating booth, solvent cleaning tank, etc.

[2] To download the CEQA guidelines, visit http://ceres.ca.gov/env_law/state.html.

[3] To download this form and the instructions, visit http://www.aqmd.gov/ceqa or http://www.aqmd.gov/permit

Section C - Review of Impacts Which May Trigger CEQA (cont.)			
	Yes	No	**Part II - Air Quality (cont.)**
5.	○	○	**Would this project result in noticeable off-site odors from activities that may not be subject to SCAQMD permit requirements?** For example, compost materials or other types of greenwaste (i.e., lawn clippings, tree trimmings, etc.) have the potential to generate odor complaints subject to Rule 402 – Nuisance.
6.	○	○	**Does this project cause an increase of emissions from marine vessels, trains and/or airplanes?**
7.	○	○	**Will the proposed project increase the QUANTITY of hazardous materials stored aboveground onsite or transported by mobile vehicle to or from the site by greater than or equal to the amounts associated with each compound on the attached Table 1?[4]**
			Part III – Water Resources
8.	○	○	**Will the project increase demand for water at the facility by more than 5,000,000 gallons per day?** The following examples identify some, but not all, types of projects that may result in a "yes" answer to this question: 1) projects that generate steam; 2) projects that use water as part of the air pollution control equipment; 3) projects that require water as part of the production process; 4) projects that require new or expansion of existing sewage treatment facilities; 5) projects where water demand exceeds the capacity of the local water purveyor to supply sufficient water for the project; and 6) projects that require new or expansion of existing water supply facilities.
9.	○	○	**Will the project require construction of new water conveyance infrastructure?** Examples of such projects are when water demands exceed the capacity of the local water purveyor to supply sufficient water for the project, or require new or modified sewage treatment facilities such that the project requires new water lines, sewage lines, sewage hook-ups, etc.
			Part IV – Transportation/Circulation
10.			**Will the project result in** (Check all that apply):
	○	○	**a. the need for more than 350 new employees?**
	○	○	**b. an increase in heavy-duty transport truck traffic to and/or from the facility by more than 350 truck round-trips per day?**
	○	○	**c. increase customer traffic by more than 700 visits per day?**
			Part V – Noise
11.	○	○	**Will the project include equipment that will generate noise GREATER THAN 90 decibels (dB) at the property line?**
			Part VI – Public Services
12.			**Will the project create a permanent need for new or additional public services in any of the following areas** (Check all that apply):
	○	○	**a. Solid waste disposal?** Check "No" if the projected potential amount of wastes generated by the project is less than five tons per day.
	○	○	**b. Hazardous waste disposal?** Check "No" if the projected potential amount of hazardous wastes generated by the project is less than 42 cubic yards per day (or equivalent in pounds).

****REMINDER:** *For each "Yes" response in Section C, attach all pertinent information including but not limited to estimated quantities, volumes, weights, etc.***

Section D - Signatures

I HEREBY CERTIFY THAT ALL INFORMATION CONTAINED HEREIN AND INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE. I UNDERSTAND THAT THIS FORM IS A SCREENING TOOL AND THAT THE SCAQMD RESERVES THE RIGHT TO CONSIDER OTHER PERTINENT INFORMATION IN DETERMINING CEQA APPLICABILITY.

1. Signature of Responsible Official of Firm:		**2. Title of Responsible Official of Firm:**
3. Print Name of Responsible Official of Firm:		**4. Date Signed:**
5. Phone # of Responsible Official of Firm:	**6. Fax # of Responsible Official of Firm:**	**7. Email of Responsible Official of Firm:**
8. Signature of Preparer, (If prepared by person other than responsible official of firm):		**9. Title of Preparer:**
10. Print Name of Preparer:		**11. Date Signed:**
12. Phone # of Preparer:	**13. Fax # of Preparer:**	**14. Email of Preparer:**

THIS CONCLUDES FORM 400-CEQA. INCLUDE THIS FORM AND ANY ATTACHMENTS WITH FORM 400-A.

[4] Table 1 – Regulated Substances List and Threshold Quantities for Accidental Release Prevention can be found in the Instructions for Form 400-CEQA.

Form 400-CEQA Instructions

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

FORM 400-CEQA INSTRUCTIONS

Background

The California Environmental Quality Act (CEQA) is a state law designed to inform government decision makers and the public of any potential adverse environmental effects of proposed projects. The SCAQMD has formalized its environmental review process by developing Form 400-CEQA to be completed by the applicant for each project. Form 400-CEQA is a screening tool used by the SCAQMD to determine if the project is exempt from CEQA, or if an analysis of potential environmental impacts is necessary. If a CEQA analysis is necessary, the SCAQMD will contact the project applicant to discuss and assist with the steps necessary to fulfill the requirements of CEQA.

> ***A "project" means the whole of an action which has a potential for resulting in physical change to the environment, including construction activities, clearing or grading of land, improvements to existing structures, and activities or equipment involving the issuance of a permit. For example, a project might include installation of a new, or modification of an existing internal combustion engine, dry cleaning facility, boiler, gas turbine, spray coating booth, solvent cleaning tank, etc.***

Most every permit application must be evaluated for CEQA applicability EXCEPT if the application is for:

- A CEQA and/or NEPA document previously or currently prepared that specifically evaluates this project AND a Final CEQA document and Notice of Determination is submitted;
- A request for a change of permittee only (without equipment modifications);
- A functionally identical permit unit replacement with no increase in rating or emissions; or,
- A change of daily VOC permit limit to a monthly VOC permit limit;
- Equipment damaged as a result of a disaster during state of emergency;
- A Title V (i.e., Regulation XXX) permit renewal (without equipment modifications);
- A Title V administrative permit revision;
- The conversion of an existing permit into an initial Title V permit.

If your project is one of the items listed above, you do NOT need to complete the section "Review of Impacts Which May Trigger CEQA" of Form 400-CEQA. Otherwise, all other types of permit applications must complete the entire Form 400-CEQA before your application can be deemed complete. If submitting multiple applications for the same project, only one Form 400-CEQA is necessary. Form 400-CEQA and these instructions are available by hardcopy or for downloading from http://www.aqmd.gov/permit/formspdf/basic

Instructions to complete Form 400-CEQA:

1. Provide facility-specific information and briefly describe the project.
2. Answer **all** questions in "Review for Exemption From Further CEQA Action." If there are any "Yes" responses, skip to Instruction 6, below.
3. Answer **all** questions in "Review of Impacts Which May Trigger CEQA."
4. Refer to Form 400-CEQA Table 1 - Regulated Substances List and Threshold Quantities for Accidental Release Prevention, for additional guidance with Section II, Question #7.
5. Attach pertinent information regarding any environmental topic to explain "yes" responses (e.g. estimated quantities, volume, weights, etc.).
6. Sign page 2 of the form (by the responsible official of the firm, the preparer or both, as necessary).
7. Include Form 400-CEQA and its attachments to the main project application submitted with Form 400-A and the other appropriate documents.

8. No additional fee is required for processing the 400-CEQA form.

Notice of Exemption (Optional):

Once a project is evaluated by SCAQMD staff, determined to be exempt from CEQA, and the permit is issued, the applicant has the option to file a Notice of Exemption (NOE) with the county where the project is located. Though filing a NOE is optional, doing so after the permit is issued will limit the period of time a court action can be filed challenging the approval of the project to 35 days from the filing and posting of the NOE. This is known as a "statute of limitations" for public review of the NOE. However, if a NOE is not filed, the statute of limitations will be 180 days.

If the applicant decides to file a NOE for the project, the applicant can choose to do it on their own accord, or with SCAQMD-assistance, for a fee.

To file a NOE without SCAQMD assistance, the applicant is responsible for completing the attached NOE template and submitting it directly to the appropriate county along with a certified document of exemption finding and the appropriate filing fee. The certified document of exemption finding can be obtained from SCAQMD staff and can be a copy of the SCAQMD-approved exemption of the reviewed Form 400-CEQA. Each county charges the following fees for filing a NOE with the county clerk:

County of Los Angeles $50* County Clerk, Mr. Harnell Harper 12400 E. Imperial Hwy, Room 2001 Norwalk, CA 90650 (562) 462-2054	County of Orange $43* County Clerk, EIR Desk 12 Civic Center Plaza, Room 106 Santa Ana, CA 92701 (714) 834-2461
County of Riverside $64* County Clerk, Mary Ann Meyer 2720 Gateway Drive Riverside, CA 92507 (951) 486-7012	County of San Bernardino $50* Clerk of the Boards, Elizabeth Ramos 385 N. Arrowhead Ave. San Bernardino, CA 92415 (909) 387-3841

* Since fees are subject to change, contact the county clerks at the above phone numbers to verify the correct fee.

If the applicant prefers to have SCAQMD staff prepare the NOE for their project and file the NOE with the appropriate county on behalf of the applicant after the permit is issued, the applicant will need to provide all of the following to the SCAQMD at the same time the application, including the Form 400-CEQA is submitted to the SCAQMD:

1. Completed NOE template form;
2. NOE CEQA processing fee, payable to SCAQMD, pursuant to Rule 301 (i)(1); and
3. A separate check payable to the county where the project is located for the appropriate amount shown above.

If a project is deemed exempt, submitting the appropriate preparation up front will ensure the NOE is filed in a timely manner. If the project does not qualify for an NOE, the full CEQA processing fee will be refunded to the applicant.

Questions regarding permit applications may be directed to
Permit Services at (909) 396-3385 or (909) 396-2668.

Plot Plan and Stack Information Form (400-PS)

South Coast Air Quality Management District

Form 400-PS

Plot Plan And Stack Information Form

This form must be accompanied by a completed Application for a Permit to Construct/Operate - Form 400A and Form 400-CEQA.

Mail To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765-0944
Tel: (909) 396-3385
www.aqmd.gov

Section A - Operator Information

Facility Name (Business Name of Operator To Appears On The Permit): _____

Valid AQMD Facility ID (Available On Permit Or Invoice Issued By AQMD): _____

Address where the equipment will be operated (for equipment which will be moved to various location in AQMD's jurisdiction, please list the initial location site):

_____ ○ **Fixed Location** ○ **Various Locations**

Section B - Location Data

Plot Plan

Please attach a site map for the project with distances and scales. Identify and locate the proposed equipment on the map. A copy of the appropriate Thomas Brothers page, a web-based map, or a sketch that shows the major streets and location of the equipment is acceptable.

Location of Schools Nearby

Is the facility located within a 1/4 mile radius (1,320 feet) of the outer boundary of a school? ○ Yes ○ No

If yes, please provide name(s) of school(s) below:

School Name: _____ **School Name:** _____

School Address: _____ **School Address:** _____

Distance from stack or equipment vent to the outer boundary of the school: _____ feet

Distance from stack or equipment vent to the outer boundary of the school: _____ feet

CA Health & Safety Code 42301.9: "School" means any public or private school used for purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in private homes.

Population Density

○ Urban ○ Rural (<50% of land within 3 km radius accounted for by urban land use categories, i.e., multi-family dwelling or industrial.)

Zoning Classification

○ **Mixed Use Residential Commercial Zone (M-U)** ○ **Service and Professional Zone (C-S)** ○ **Medium Commercial (C-3)**

○ **Heavy Commercial (C-4)** ○ **Commercial Manufacturing (C-M)**

Section C - Emission Release Parameters - Stacks, Vents

Stack Data

Stack Height: _____ feet (above ground level) **What is the height of the closest building nearest the stack?** _____ feet

Stack Inside Diameter: _____ inches **Stack Flow:** _____ acfm **Stack Temperature:** _____ °F

Rain Cap Present: ○ Yes ○ No **Stack Orientation:** ○ Vertical ○ Horizontal

If the stack height is less than 2.5 times the closest building height (H), please provide information on any building within 5xH distance from the stack (attach additional sheet if necessary):

Building #/Name: _____ **Building #/Name:** _____

Building Height: _____ feet (above ground level) **Building Height:** _____ feet (above ground level)

Building Width: _____ feet **Building Width:** _____ feet

Building Length: _____ feet **Building Length:** _____ feet

Receptor Distance From Equipment Stack or Roof Vents/Openings

Distance to nearest residence: _____ feet **Distance to nearest business:** _____ feet

Building Information

Are the emissions released from vents and/or openings from a building? ○ Yes ○ No

If yes, please provide:

Building #/Name: _____ **Building Width:** _____ feet

Building Height: _____ feet (above ground level) **Building Length:** _____ feet

Form 400-PS

Plot Plan And Stack Information Form

This form must be accompanied by a completed Application for a Permit to Construct/Operate - Form 400A and Form 400-CEQA.

Section D - Authorization/Signature			
I hereby certify that all information contained herein and information submittfgfed with this application is true and correct.			
Signature of Preparer:	Title of Preparer:	Preparer's Phone #:_____ Preparer's Email:_____	
Contact Person: _____ Contact's Email:_____	Contact's Phone#:_____ Contact's Fax#:_____		Date Signed:

THIS IS A PUBLIC DOCUMENT

Pursuant to the California Public Records Act, your permit application and any supplemental documentation are public records and may be disclosed to a third party. If you wish to claim certain limited information as exempt from disclosure because it qualifies as a trade secret, as defined in the District's Guidelines for Implementing the California Public Records Act, you must make such claim at the time of submittal to the District.

Check here if you claim that this form or its attachments contain confidential trade secret information. ☐

General Information Summary (Form 400-E-GI)

South Coast Air Quality Management District
P. O. Box 4944
Diamond Bar, CA 91765
(909) 396- 2000

GENERAL INFORMATION SUMMARY
FORM 400-E-GI

The following data, specifications, plans, and drawings must be submitted with each application for Permit to Construct and/or Permit to Operate. Also, if a Form 400-E-xx does not exist for a specific piece of equipment, then the information requested in this Form shall be submitted in its place.

1. EQUIPMENT/PROCESS LOCATION DRAWING

The drawing or sketch shall be submitted to scale (suggested scale: 1 inch = 100 feet; accuracy of measurements to the nearest 5 feet will be satisfactory) and shall show at least the following:

a. The property involved and outlines and heights of all buildings on it. Identify property lines plainly.
b. Location and identification of the proposed equipment on the property.
c. Property location with respect to public and private streets, and all adjacent properties. Show surrounding property owners and uses within 600 feet radius of property. Identify all buildings (as residence, apartment house, machine shop, warehouse, etc.) specifying height of each building (number of stories). Indicate direction (north) on the drawing. Identify schools which have their outer boundaries located within 1000 feet of the equipment.

2. EQUIPMENT DESCRIPTION

Provide detailed description of equipment, including but not limited to, function, make, model, dimensions, size, and maximum capacity. Attach manufacturer's catalog or brochure, if available.

3. PROCESS DESCRIPTION

Provide a general description of each process line (i.e., the process to be carried out by the equipment) or the function of the equipment with respect to a process line. The descriptions must be complete and detailed. Explain all stages in the process where there may be a discharge of emissions to the atmosphere. Supply all obtainable data regarding the nature, volumes, particle sizes, weights, and concentrations of all types of air contaminants that may be discharged at each stage in the process. Similarly, control procedures must be described in sufficient detail to show the extent of the control of air contaminants anticipated, including the expected control efficiency.

4. OPERATING SCHEDULE

Specify the average and maximum number of hours per day, days per week, days per month, and weeks per year the equipment/process is to be operated.

5. PROCESS RATE

On the basis of pounds per hour, or other specified unit of time, indicate the type and total weight of each material charged into the equipment or the process. Include Material Data Safety Sheets (MSDS), when applicable.

6. FUELS AND BURNERS USED

a. For fuel gas, indicate the type and average and maximum cubic feet per hour burned. Except for natural gas, attach fuel gas analysis.
b. For fuel oil, indicate grade and average and maximum gallons per hour burned. Also, indicate the sulfur content of fuel oil.
c. For solid fuels, indicate the type and average and maximum pounds per hour burned. Also, attach fuel analysis.
d. For burners, indicate the make, model, size, type, number of burners, and capacity of each burner.

7. FLOW DIAGRAM

The diagram should illustrate the flow of materials processed or burned either on a separate flow diagram or on the drawings accompanying the application. Show all venting of equipment (see instruction # 9).

8. DRAWINGS OF EQUIPMENT/PROCESS

Supply an assembly drawing, dimensioned and to scale, in plan, elevation and as many sections as are needed to clearly show the design and operation of the equipment/process and the means by which air contaminants are controlled. The following must be shown:

a. Locations, size, and shape of the equipment. Show exterior and interior dimensions and features.
b. Locations, size, and shape details of all features which may affect the production, collection, conveyance, or control of any air contaminant. This includes the size of pressure relief devices.
c. All data and calculations used in selecting or designing the equipment/process.

*NOTE: **Structural design calculations and details are not required. When standard commercial equipment is to be installed, the manufacturer's catalog describing the equipment may be submitted in lieu of the above items. All information required above which the catalog does not include must be submitted by the applicant.***

9. DRAWINGS OF THE EXHAUST SYSTEM

Supply drawing(s) clearly showing all ductwork and the connection between air pollution generating (basic) and control equipment. Show all of the following details which apply, using auxiliary drawings, if necessary:

a. Sizes and shapes of all hoods. Show accurately where and how the hood fits over the spot or area where air contaminants are generated or discharged. Show all openings clearly.
b. Diameters or cross-sectional dimensions and lengths of all branch and main ducts.
c. Locations, sizes and shapes of all bends, junctions and transition pieces.
d. Locations, sizes and shapes of all passageways other than ordinary ducts. Also show all cooling devices (spray chambers, heat exchangers, cooling columns, etc.).
e. Locations and descriptions of all dampers, baffles, and similar controls.
f. Locations of any by-passes around the control equipment. Describe how operated, stating under what conditions and for what lengths of time these by-passes are to be used.
g. Locations of all fans or blowers.
h. Location of control equipment and vent(s).

10. STACK/EXHAUST EMISSIONS DATA

Provide emissions data at each source. Include the following information:

a. The maximum mass emission rates (mass per hour) and stack concentrations of all air pollutants. Include emission calculations if available.
b. Stack diameter.
c. Stack height above ground level.
d. Exhaust temperature.
e. Exhaust flow rate (volumetric).

11. AIR QUALITY IMPACT

Provide an analysis of the air quality impact (including risk assessment) in accordance with specific AQMD requirements. Procedures for preparing air quality impact analysis, including screening analyses are available from the AQMD.

12. GENERAL PERMITTING INFORMATION

Further information or clarification concerning permits can be obtained by writing or calling:

South Coast Air Quality Management District
Permitting
21865 Copley Dr.
Diamond Bar, CA 91765
(909) 396 - 2000

Risk Assessment Procedures

South Coast Air Quality Management District

RISK ASSESSMENT PROCEDURES for Rules 1401 and 212

Version 7.0

July 1, 2005

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APPENDICES

ATTACHMENTS.
PERMIT APPLICATION PACKAGES INCLUDING TABLES

A: PERMIT APPLICATION PACKAGE "L"
effective July 1, 2005

INTRODUCTION

Risk assessment procedures, including procedures for a simple risk screening, were developed by South Coast Air Quality Management District (AQMD) staff for the adoption of Rule 1401 - New Source Review of Toxic Air Contaminants, in June 1990.

The purpose of this document is to:

- assist applicants and engineers to help evaluate Rule 1401 compliance;
- provide explanations and sample calculations; and
- provide industry worksheets.

This document describes the procedures for preparing risk assessments under Rule 1401 and Rule 212 – Standards for Approving Permits and Issuing Public Notice. It is intended to be a "living" document. That is, as new toxic air contaminants (TACs) are added, risk values changed, or procedures revised, the document will be updated. This version of "Risk Assessment Procedures for Rules 1401 and 212" is based on "The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments" ("Guidance Manual") finalized by the state Office of Environmental Health Hazard Assessment (OEHHA) in August 2003 and the "(California) Air Resources Board (CARB) Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk" ("Interim Policy") issued on October 9, 2003. The Guidance Manual may be found at: http://www.oehha.org/air/hot_spots/HRAguidefinal.html. The Interim Policy may be found at: http://www.arb.ca.gov/toxics/harp/docs/rmpolicy.PDF. The Guidance Manual and Interim Policy supercede the risk assessment methods presented in "The California Air Pollution Control Officer's Association (CAPCOA) Air Toxics Hot Spot Program; Revised 1992; Risk Assessment Guidelines", which was completed in October 1993. Past procedures will be archived and TAC listings have been separated by the time period of significant Rule 1401 changes (see attachments).

Background

Rule 1401, adopted June 1, 1990 and amended December 7, 1990, specified limits for maximum individual cancer risk (MICR) and excess cancer cases for new, relocated, or modified equipment which emits carcinogenic air contaminants. The rule was amended July 10, 1998 to include non-carcinogenic compounds. The rule was amended on March 17, 2000 to remove the requirement to assess cumulative risk from emissions from units permitted after 1990 located within 100 meters of the new equipment under evaluation for permit. And, the rule has been amended several times to change the list of regulated compounds (both additions and deletions) and their corresponding risk values (cancer potency factors and reference exposure levels).

Requirements

This document describes the procedures for determining cancer and non-cancer health effects.

Rule 1401 applies to applications deemed complete on or after June 1, 1990. In general, it applies only if there is an increase in TAC emissions from new, relocated, or modified equipment. However, equipment installed without a required permit to construct is also included. It applies to equipment previously exempt by Rule 219 only if the applicant fails to apply for a permit within one year following loss of exempt status. There are a few exemptions listed at the end of the rule.

Rule 1401 requires risk assessments only for TACs listed in the rule at the time the application is deemed complete. Copies of all tables for risk analysis are included at the end of this document as attachments.

The following requirements must be met before a permit is granted for affected equipment.

- The cumulative increase in maximum individual cancer risk (MICR) shall not exceed:
  one in one million (1×10^{-6}) if Best Available Control Technology for Toxics (T-BACT) is not used; or,
  ten in one million (10×10^{-6}) if T-BACT is used;

- The cumulative cancer burden (increase in cancer cases in the population) shall not exceed 0.5; and,

- For target organ systems, neither the cumulative increase in either the total chronic hazard index (HIC) nor the total acute hazard index (HIA) due to total emissions from the affected permit unit shall exceed 1.0 for any target organ system, or an alternate hazard index level deemed to be safe.

Rule 212 (c)(3) requires public notification if the MICR, based on Rule 1401, exceeds one in one million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted equipment unless the applicant can show the total facility-wide MICR is below ten in a million (10×10^{-6}). For facilities with a single permitted equipment, the MICR level must not exceed ten in a million (10×10^{-6}). The circulation and distribution of the notifications must meet the criteria in Rule 212.

The current version of AQMD rules may be obtained on the website http://www.aqmd.gov.

Revisions

The major revisions to this document include the following:

- The use of cancer potency factors (instead of unit risk factors) to allow for daily breathing rate and body weight variation;
- The accommodation of the OEHHA "tier" approach (facility data and stochastic calculations), "derived" risk calculations (two dominant pathways), and "adjusted" assumptions (most significantly, the residential breathing rate established by CARB's Interim Policy);
- The revised multipathway profiles for the resident and worker; and
- The multipathway factors for the resident and worker.

These terms are described in greater detail in the following chapters. The first three come from the recent revisions to the state Guidance Manual. The last one is unique to the AQMD and these procedures.

The following tables summarize important information regarding Rule 1401 and risk assessment requirements.

RULE 1401

New Source Review of Toxic Air Contaminants

Applicability:

- Increase in Toxic Air Contaminants (TACs) from new, relocated, or modified equipment
- Equipment installed without required permit to construct
- Equipment previously exempt by Rule 219 if applicant fails to apply for a permit within one year from loss of exempt status
- Non-carcinogenic compounds also included for applications deemed complete on or after 9/8/98 (chronic) and 2/10/99 (acute)

Requirements for health risk assessment:

- Risk assessments only for TACs that are listed in the rule when the application is deemed complete
- MICR shall not exceed one in one million if T-BACT is not installed
- MICR shall not exceed ten in one million if T-BACT is installed
- Cancer burden shall not exceed 0.5
- Chronic Hazard Index and Acute Hazard Index shall not exceed 1.0 for any target organ system

OVERVIEW

This document provides several tiers for preparing a risk assessment, from a quick look-up table to a detailed risk assessment involving air quality modeling analysis. Permit applicants may use any of these tiers to demonstrate compliance with the risk limits of Rule 1401. The applicant should include a copy of the risk assessment with the permit application.

The tiers are designed to be used in order of increasing complexity. If compliance cannot be demonstrated using one tier, the permit applicant may proceed to the next tier. A permit applicant who can show compliance by using a lower tier does not need to perform an analysis for the higher tiers. In general, for most permits, a detailed analysis is not required. The tiers are:

- Tier 1: Screening Emission Levels
- Tier 2: Screening Risk Assessment
- Tier 3: Screening Dispersion Modeling
- Tier 4: Detailed Risk Assessment

Please note that the OEHHA Guidance Manual "Tier" approach differs from these AQMD Risk Procedures "Tier" compliance. The OEHHA Tiers refer to the incorporation of facility data and stochastic modeling; however, regulatory compliance may only be demonstrated with an OEHHA Tier-1 calculation. In contrast, the AQMD Tiers refer to increasing complexity and regulatory compliance may be demonstrated with any AQMD Tier.

In addition, this document briefly discusses the Best Available Control Technology for Toxics (T-BACT) identification process for Rule 1401.

PRELIMINARY TASKS

Before conducting any of these risk assessment tiers, three preliminary tasks must be performed:

1. **Identify the toxic air contaminants (TAC) emitted by the permit unit**. The risk assessment must include those TACs emitted by the permit unit which were listed in the rule when the permit application was deemed complete by AQMD staff. Sets of tables corresponding to each rule revision are included at the end of this document as attachments. Determine the date on which the application was deemed complete and refer to the appropriate set of tables. Table 1A lists the TACs subject to Rule 1401 and Rule 212.

   For guidance, California Air Resources Board (CARB) has prepared a table listing devices and processes as they relate to the types of emissions and the specific contaminants emitted. This table is available on the CARB webpage at: www.arb.ca.gov/ab2588/ab2588.htm. Click on "Inventory Guidelines", and then on "Appendix C - Facility Guideline Index." Please note that this table is not an exhaustive list. Facilities are, therefore, advised to use this table for guidance only.

If no TACs listed in the applicable version of Rule 1401 are emitted by the equipment, no further risk assessment is required.

2. **Determine if the permitting action or equipment is exempt from the provisions of Rule 1401.** Exemptions are granted for:

- √ permit renewal or change of ownership;
- √ modifications with no increase in risk;
- √ functionally identical equipment replacement;
- √ equipment previously exempt under Rule 219 and filing for a permit to operate within one year of removing the Rule 219 exemption;
- √ modifications to terminate research projects;
- √ emergency ICEs exempt under Rule 1304.

An additional exemption is granted for demonstrations of contemporaneous emission reductions such that no receptor experiences a total increase in MICR of greater than one in one million and the contemporaneous reduction occurs within 100 meters of the equipment.

If the equipment falls under one of these exemptions, no further risk assessment is required.

3. **Estimate the quantity of emissions from the permit unit.** The appropriate emission estimation technique depends on the type of source. Techniques include emission testing, a mass balance or other engineering calculation, or emission factors for specific types of processes. The emissions used for the risk calculation should be post-control emissions (that is, reductions in emissions due to enforceable controls and permit conditions should be taken into account). AQMD permitting staff should be consulted regarding approved techniques for identifying contaminants and estimating emissions for specific sources.

The AQMD also has a broader mandate to ensure that permits are not granted to facilities which may endanger public health (California Health and Safety Code Section 41700). In addition, under Rule 212, the applicant may be required to evaluate other compounds that are determined to be potentially toxic. Therefore, an applicant may be required to evaluate risks from compounds not listed in Table I as part of the permitting process if they are a concern for a specific source. These may include substances with irritant effects or other adverse health effects.

Tier 1: Screening Emission Levels

OVERVIEW OF TIER 1

Tier 1 involves a simple look-up table (Table 1A) in which the equipment's emissions or source-specific units (Table 1B) are compared to Screening Levels. The Screening Levels are pollutant emission thresholds which are not expected to produce a MICR greater than one in one million nor a hazard index greater than one.

Tier 1 can be used by applicants to determine whether or not detailed risk analysis will be required when filing for a permit. It can also be used by applicants and AQMD staff to determine whether a permit is required based on paragraph (s)(2) in Rule 219 – Equipment not Requiring a Written Permit Pursuant to Regulation II.

Tier 1 may be used only for a single emission source and a single toxic air contaminant. However, it can be used for multiple pollutants if the Multiple Pollutant Screening Level Procedure (described below) is followed.

INSTRUCTIONS FOR TIER 1

The Tier 1 analysis is performed as follows:

1. Determine the maximum annual emissions (for cancer and non-cancer chronic TACs) or determine the maximum hourly emissions (for non-cancer acute TACs). For perchloroethylene dry cleaners, determine the average monthly perchloroethylene usage (in gallons).
2. Compare the emissions to the Screening Levels for that contaminant in Table 1A. For perchloroethylene dry cleaners, compare the monthly usage rate to the limits in Tables 1B. Columns are labeled with the distance to the nearest receptor.
3. If the maximum annual emissions or the maximum hourly emissions do not exceed the Screening Levels, the equipment will comply with Rule 1401 and not require notice under Rule 212 for toxics. For perchloroethylene dry cleaners, the monthly usage must be less than the limits in Tables 1B.
4. If the maximum annual emissions or the maximum hourly emissions exceed the Screening Levels, proceed to Tier 2.

The Screening Levels in Tables 1A or 1B were determined by back calculation, using the highest concentration values (X/Q) established in Tables 2A, 3A, 4A, 5A, 6, and 7 that would not exceed a cancer risk of one in one million or a chronic or acute hazard index of 1.

MULTIPLE POLLUTANT SCREENING LEVEL PROCEDURE

1. Calculate the Pollutant Screening Index for each pollutant (PSI_p). For each carcinogenic and/or chronic compound, divide the maximum annual emissions (in pounds per year) of each pollutant (Qyr) by the Pollutant Screening Level (PSL_p) in pounds per year, as contained in Table 1A. For

each acute compound, divide the maximum hourly emission (Qhr) of each pollutant by the Pollutant Screening Level (PSL_p) as contained in Table 1A.

$$PSI_{cancer\ and/or\ chronic} = Qyr / PSL_p$$

$$PSI_{acute} = Qhr / PSL_p$$

2. Calculate the Application Screening Index (ASI). Sum up the individual Pollutant Screening Indices for all chronic and carcinogenic pollutants (PSI_p) and, separately, for all acute pollutants.

$$ASI_{cancer\ and/or\ chronic} = \Sigma\ PSI_p$$

$$ASI_{acute} = \Sigma\ PSI_p$$

3. Neither the cumulative cancer/chronic hazard nor acute hazard index can exceed 1.

Refer to Example 1 (starting on page 24) for multiple pollutant screening.

If step 3 cannot be met, proceed to Tier 2.

Tier 2: Screening Risk Assessment

OVERVIEW OF TIER 2

Tier 2 is a screening risk assessment, which includes procedures for determining the level of risk from a source for MICR, Cancer Burden, and Acute and Chronic Hazard Indices. If the estimated risk from Tier 2 screening is below Rule 1401 limits, then a more detailed evaluation is not necessary. Examples of calculations are provided at the end of the description of Tier 4 risk assessment. (See page 24.)

If the screening risk assessment results in a risk estimate that exceeds the risk limits or the permit applicant feels that a more detailed evaluation would result in a lower risk estimate, the applicant has the option of conducting a more detailed analysis using Tier 3 or 4.

To perform a Tier 2 screening risk assessment, the following information is needed:

- Maximum annual **emissions** of each carcinogen and non-cancer chronic TAC, and the maximum hourly emissions of each non-cancer acute TAC;
- The **distance** from the permit unit to the nearest off-site receptor(s);*
- Certain source characteristics, such as **stack height** and/or **building dimensions**;
- **Operating schedule**: whether the permit unit will operate more or less than 12 hr/day; and
- **Geographic location** of the permit unit (i.e., city).

* In order to perform a screening risk assessment, it is necessary to identify the nearest receptor location. For the purpose of calculating the MICR and chronic HI, a receptor is any location outside the boundaries of the facility at which a person could experience chronic exposure. For the purpose of calculating the acute HI, a receptor is any location outside the boundaries of the facility at which a person could experience acute exposure. Receptor locations include residential, commercial and industrial areas, and other locations where sensitive populations may be located. Residential receptor locations include current residential land uses and areas which may be developed for residential uses in the future, given land use trends in the general area. Commercial/industrial receptor locations include areas zoned for manufacturing, light or heavy industry, or retail activity. Sensitive receptor locations include schools, hospitals, convalescent homes, day-care centers, and other locations where children, chronically ill individuals or other sensitive persons could be exposed to TACs.

When identifying receptor locations in order to calculate MICR or chronic hazard index, the potential for chronic (long-term) exposure should be considered. Land uses at which it is not possible for individuals to be exposed on a long-term basis, should not be considered receptor locations for purposes of calculating MICR or chronic hazard index. Examples of such locations include permanent bodies of water, flood channels, or roadways. When identifying receptor locations to calculate acute hazard index, all off-site locations where there is the potential for acute exposure should be considered.

This information is used to determine inputs into the equation for calculating MICR. The cancer burden must also be estimated. Methods for calculating MICR, cancer burden, chronic hazard index (HIC), and acute hazard index (HIA) are provided.

Tier 2 is designed for a single emission source. If this worst-case approach does not demonstrate compliance with the risk limits, proceed to Tier 3.

INSTRUCTIONS FOR CALCULATING MAXIMUM INDIVIDUAL CANCER RISK (MICR)

The MICR Calculation Worksheet in Appendix I can be used to help with the calculation. This worksheet can be included in the permit application as documentation of the MICR calculation.

MICR is calculated as follows:

MICR = Cancer Potency (CP) x Dose-Inhalation (DI) x Multipathway Factor (MP)

Where:

$$\mathbf{DI = x\ C_{air}\ x\ DBR\ x\ EVF\ 10^{-6}; and}$$
$$\mathbf{C_{air} = Q_{tons}\ x\ X/Q\ x\ AF_{ann}\ x\ MET}$$

Therefore, the equation for calculating MICR is:

$$\mathbf{MICR = CP\ x\ Q_{tons}\ x\ X/Q\ x\ AF_{ann}\ x\ MET\ x\ DBR\ x\ EVF\ x\ 10^{-6}\ x\ MP}$$

Term	Description	Where to Find
CP	Cancer Potency $(mg/kg\text{-}day)^{-1}$	Table 8A
DI	Dose through inhalation (mg/kg/day)	Calculated value
MP	Multi-pathway factor (if applicable)	Table 8A
10^{-6}	Micrograms to milligrams conversion, liters to cubic meters conversion	not applicable
C_{air}	Annual average 24 hour per day concentration in air ($\mu g/m^3$)	Calculated value
DBR	Daily breathing rate (L/kg body weight-day)	Table 9A
EVF	Exposure Value Factor (unitless)	Table 9B
Q_{tons}	Maximum emission rate (tons/yr)	Emission estimate specific to permit unit
X/Q	Dispersion factor $[(\mu g/m^3)/(tons/yr)]$	Table 2A, 3A, 4A or 5A
AF_{ann}	Annual concentration adjustment factor (unitless)	Table 2C or 3C
MET	Meteorological correction factor (unitless)	Table 2B, 3B, 4B or 5B

Step 1: Determine Appropriate Risk Tables

The first step is to determine when the application was deemed complete. Find the risk tables in the attachments corresponding to the date when the application was deemed complete. Only that set of tables should be used to calculate the risk for this equipment.

Step 2: Estimate Emission Rate (Q_{tons})

As the second step, the maximum annual emissions of the TAC in tons/year (Q_{tons}) must be estimated. The emission rate must be expressed in tons/year because the dispersion factors (X/Q) are expressed in tons/year.

Step 3: Determine Release Type

Determine whether the permit unit is best characterized as a point source or a volume source:

- A **point source** is one that releases its emissions through a stack (designed with acceptable stack height).
- A **volume source** is otherwise assumed, especially when the emissions are released unrestricted by any physical means (pipes or vents and/or vacuum or fan), including releases inside of a building or as fugitive emissions.

For permit units that have both point and volume releases, use the table that will result in the highest X/Q value, or apportion the emissions between the point and volume sources.

Step 4: Determine Release Height

For a **point source**, determine the **stack height**, which is the distance from ground level to the top of the stack.

For a **volume source**, determine the **building height**, which is the distance from ground level to the top of the building in which the permit unit is located, and the **floor area**, which is the dimensions (length x width) of the building in which the permit unit is located. If the stack or building height falls between two entries in the tables, use the lower of the two heights.

Acceptable Stack Height. Although a taller stack provides better dispersion, there are limits to the degree to which this factor can be incorporated into the risk assessment. Rule 1401 specifies that the stack height used to determine risk shall not exceed the "Acceptable Stack Height" for the permit unit. Acceptable stack height is defined as 2.5 times the height of the equipment or 2.5 times the height of the building housing the equipment, and may not exceed 65 meters (213 feet), unless the applicant demonstrates to the satisfaction of AQMD staff that a greater height is necessary. For example, for a building that is 14 feet high, the acceptable stack height is 35 feet, measured from ground level. If the physical stack height exceeds 35

feet, the risk must be calculated using the 35-foot value unless the applicant demonstrates that the greater height is necessary.

An **area source** is similar to a volume source in that the emissions take place over an area (as opposed to a point such as from a stack). However, in an area source, the pollutants are released at a uniform height. Examples of area sources are storage piles, slag dumps, lagoons or ponds, and liquid spills. Toxic hydrocarbon emissions from open top and floating roof storage tanks are also often treated as elevated area sources. Use Tier 3 or 4 for area sources.

Step 5: Determine Operating Schedule

Determine whether the equipment will operate:

- 12 hr/day or less; or
- more than 12 hr/day

Step 6: Identify Tables for Dispersion Factor (X/Q), Meteorological Correction Factor (MET), and Annual Concentration Adjustment Factor (AF_{ann})

Several tables are provided for X/Q, MET, and AF_{ann} factors. The selection of the appropriate table is discussed below:

Release Type	Operating Schedule of Equipment	Table for X/Q	Table for MET	Table for AF_{ann}
Point	≤ 12 hr/day	Table 2A	Table 2B	Table 2C
	> 12 hr/day	Table 3A	Table 3B	Table 3C
Volume	≤ 12 hr/day	Table 4A	Table 4B	Table 2C
	> 12 hr/day	Table 5A	Table 5B	Table 3C

Step 7: Identify Type of Receptor and Distance from Receptor

Identify the nearest receptor locations. Receptor locations are off-site locations where persons may be exposed to emission of a TAC from the equipment. Receptor locations include residential, commercial, and industrial land use areas, and other locations where sensitive populations may be located.

Residential receptor locations include current residential land uses and areas that may be developed for residential uses in the future, given land use trends in general areas.

Worker receptor locations include areas zoned for manufacturing, light or heavy industry, retail activity, or other locations that are regular work sites.

Sensitive receptor locations include schools, hospitals, convalescent homes, day-care centers, and other locations where children, chronically ill individuals, or other sensitive persons could be exposed.

When identifying receptor locations to calculate MICR, the potential for chronic (long-term) exposure should be considered. Land uses at which it is not possible for individuals to be exposed on a long-term basis, either presently or in the future, should not be considered receptor locations for purposes of calculating MICR. Examples of such locations include permanent bodies of water, flood channels, or roadways.

For a point source, the receptor distance is the distance from the center of the stack to the nearest receptor location.

For a volume source, the receptor distance is the distance from the center of the building to the nearest receptor location.

Experience shows that in most cases, the receptor distance will be 50 meters or more. However, the table also provides X/Q values for a 25-meter distance. The 25-meter distance should be used for circumstances in which there is a receptor located very close to the permit unit, for example, a residence located with a business, another business adjacent to the facility, or a sensitive receptor located less than 50 meters from the permit unit.

If the closest receptor location is a worker receptor, then the MICR must also be calculated for the closest residential or sensitive receptor. The greater of the two MICR values is used to determine compliance with the risk limits in the rule.

Care should be taken when estimating these distances since concentrations decrease rapidly with increasing distance. It is acceptable to linearly interpolate to estimate dispersion factors between the downwind distances given in the tables. If the receptor lies over 1,000 meters from the permit unit, use the listing for 1,000 meters.

Step 8: Select X/Q Value

Select the appropriate X/Q value from the table based on the **source characteristics** (i.e., stack height for point sources and building height and building area for volume sources) and the **receptor distance.**

What is a Dispersion Factor (X/Q)?

The concentration of a contaminant decreases as it travels away from the site of release and spreads out or "disperses." Dispersion factors (X/Q) are numerical estimates of the amount of dispersion that occurs under specific conditions.

The amount of dispersion depends on the distance traveled, the height of release and meteorological conditions such as wind speed and atmospheric stability.

The dispersion factors for the screening risk assessment procedure give the estimated annual average ground-level concentration (ug/m^3) resulting from a source emitting one ton/year of a contaminant.

An Alternative Set of Dispersion Factors (X/Q)
for Tier 2 Analysis Only
for Combustion Sources (Boilers and Internal Combustion Engines) Only

The Southern California Gas Company (working with AQMD staff) has developed a Health Risk Assessment Program for boilers and internal combustion engines fired by natural gas. This program is titled: Southern California Gas Company: Dispersion Modeling and Health Risk Assessment, External and Internal Combustion Equipment, Version 1.5. This file contains an Excel program to conduct a risk assessment (according to the previous AQMD Risk Assessment Procedures, Version 6.0) and the documentation on how to use the program. The program can be downloaded from:

http://www.socalgas.com/business/resource_center/aq_health_risk_tools.shtml.

For a **Tier 2 analysis only**, the AQMD will allow the use of the **dispersion factors** [X/Q in $(ug/m^{3)})/(gm/sec)$] **from the tables** in this file. The tables are **for Boilers with an hourly rating between 2 MMBTU/hr to 75 MMBTU/hr and Internal Combustion Engines that are rated between 50 to 550 HP**. There tables are separated by the hours of operation of the engine or boiler (less than 12 hours a day and greater than 12 hours a day)

The selection of the engine or boiler size has to meet the criteria listed in the documentation provided for this program. The X/Q values are selected based on the closest receptor distances and the closest city to the source location of the emissions for the selected engine or boiler type.

Note: The Gas Company's Health Risk Assessment Program, Version 1.5, cannot be used to prepare a health risk assessment pursuant to these revised AQMD Risk Assessment Procedures, Version 7.0, as this program has not been updated to reflect the use of cancer potency values, daily breathing rates, multi-pathway adjustment factors for workers, and other changes from Version 6.0.

For guidance on the applicability or limitations of this alternative set of dispersion factors, contact Mohan Balagopalan, (909) 396 - 2704.

Step 9: Select Meteorological Correction Factor (MET)

Figure 1, at the end of the tables, provides the locations of meteorological stations in the air basin used for these calculations. Determine the station appearing in this figure that is closest to the facility and select the MET factor from the appropriate table (Table 2B, 3B, 4B or 5B).

What is a Meteorological Correction Factor (MET)?

Because local meteorology varies from location to location, the amount of dispersion will also vary with location of the source. Meteorological correction factors (MET) adjust for differences due to the geographic location of sources.

In order to derive the MET factors, dispersion modeling was performed at all the AQMD meteorological stations (see Figure 1). It should be noted that West Los Angeles generally yielded the highest concentrations at every downwind distance and was used as the basis of the dispersion factors. Correction factors were developed for the other 34 meteorological stations by dividing their predicted concentrations with those predicted at West Los Angeles with the highest factor chosen from the receptors at 50, 75, and 100 meters for each station.

The MET factors are different for point and volume sources and for different operating schedules (> or ≤ 12 hr/day). See the table under Step 6 - Identify Tables for Dispersion Factor (X/Q) and Meteorological Correction Factor (MET).

Step 10: Identify Cancer Potency Factor (CP)

Using Table 8A, identify the cancer potency factor (CP) for the TAC.

What is a Cancer Potency Factor (CP)?

The cancer potency factor is a measure of the cancer potency of a carcinogen. It is the estimated probability that a person will contract cancer as a result of inhalation of a concentration of 1 milligram of the TAC per kilogram of body weight continuously over a period of 70 years.

The cancer potency factors in these procedures were approved by the Scientific Review Panel and prepared by the state Office of Environmental Health Hazard Assessment (OEHHA).

Step 11: Identify Multi-pathway Factor (MP)

Using Table 8A, identify the multi-pathway adjustment (MP) factor for the TAC, if applicable. If no MP factor is listed, use a MP factor of 1.

What is a Multi-pathway Adjustment Factor (MP)?

The multi-pathway adjustment factor (MP) is used for substances that may contribute to risk from exposure pathways other than inhalation. These substances deposit on the ground in particulate form and contribute to risk through ingestion of soil or backyard garden vegetables or through other routes. The MP factor estimates the total risk associated with a given inhalation risk. MP factors are provided in Table 8A.

These factors allow permit units that emit multi-pathway pollutants to use the risk screening procedure rather than proceeding directly to preparing a detailed risk assessment.

The MP factors are to be used only in urban residential or worker exposure situations. Note that there are separate MP factors for workers and residents (see Table 8A) since their potential routes of exposure varies. If the facility is in the vicinity of other potential routes of population exposure such as agricultural areas, drinking water reservoirs, lakes or ponds used for fishing, or areas used for livestock grazing, then these MP screening assumptions are not appropriate and a more detailed multi-pathway assessment (Tier 4) must be performed.

For a more detailed description of the derivation of the multi-pathway factors, please see Appendix II.

Step 12: Select Exposure Value Factor (EVF)

Using Table 9B, select the appropriate EVF.

What is Exposure Value Factor (EVF)?

In order to protect public health, and in accordance with the recommendations of OEHHA, a 70-year lifetime exposure is assumed for all receptor locations except for off-site workers (i.e., receptor locations in commercial or industrial areas), for which a 40-year lifetime exposure is assumed. In addition to the 70- and 40-year exposure duration (ED) values described above, exposure values used to calculate cancer risk are exposure frequency (EF), which is the number of days per year of exposure, and the averaging time period in days over which exposure is averaged (AT). For EF, OEHHA recommends use of 350 days/year for residential exposure and 245 days/year for worker exposure. For AT, OEHHA recommends the use of 25,550 days (70 years x 365 days/year).

OEHHA recommends calculation of EVF using the equation:

$$EVF = (EF \times ED) / AT$$

For residential/sensitive receptors, EVF = (350 days/yr x 70 years) / 25,550 days = 0.96
For worker receptors, EVF = (245 days/yr x 40 years) / 25,550 days = 0.38

EVF values are summarized in Table 9B.

Only the EVF values in Table 9B should be used in a Tier 2 calculation. No further prorating of the published EVF values or consideration of other operating schedules is allowed.

If the residential or sensitive receptor is closer than the worker receptor, only the MICR for the residential or sensitive receptor need be calculated. (An equal or more distant worker receptor would have a lower MICR (because of the lower EVF) than a comparable residential or sensitive receptor.) Otherwise, the screening risk calculations for both the commercial/industrial MICR and the residential MICR should be shown and the greater of the two values is used to determine compliance with Rule 1401.

Step 13: Select Daily Breathing Rate (DBR)

Using Table 9A, select the appropriate daily breathing rate value.

What are Daily Breathing Rate (DBR) Values?

Exposure to airborne chemicals occurs through inhalation and subsequent absorption into the body, potentially resulting in adverse health effects depending on toxicological properties of the chemical and concentration in air. The dose of a substance through inhalation is a function of the concentration of the substance and the amount of air inhaled. DBR values used in these procedures, expressed in liters per kilogram-day (L/kg-day), are recommended by OEHHA and were developed based on results from several breathing rate studies.

Step 14: Select Annual Concentration Adjustment Factor (AF_{ann})

Using Table 2C or 3C, select the appropriate annual concentration adjustment factor. Table 2C is used for exposures of 12 hours per day or less, while Table 3C is used for exposures of more than 12 hours per day.

AF_{ann} is calculated using the following equation:

AF_{ann} = (maximum number of hours of exposure per day / actual number of hours of exposure per day*) x (maximum number of days of operation per week / actual number of days of operation per week**)

For all residents, sensitive receptors, and workers at facilities operating continuously:

AF_{ann} = (24 hours of exposure per day / 24 hours per day) x (7 days of operation per week / 7 days per week) = 1

Assuming workers at a facility operating 8 hours per day, 5 days per week, AF_{ann} would be calculated as follows:

AF_{ann} = (24 hours of exposure per day / 8 hours per day) x (7 days of operation per week / 5 days per week) = 4.2

* If actual number of hours of exposure per day is ≤ 8, a value of 8 is to be used.
** If actual number of days of operation per week is ≤ 5, a value of 5 is to be used.

What is Annual Concentration Adjustment Factor (AF_{ann})?

AF_{ann} adjusts dispersion factors (X/Q), which are 24 hours per day and 7 days per week averages, to an average for the off-site worker exposure period (i.e., 8 hours per day and 5 days per week). This is necessary because the worker breathing rate of 149 l/kg-day is only applicable to the work-day and work-week exposure. It is assumed that the worker is only exposed while at work.

MICRs for Multiple Toxic Air Contaminants

If the equipment emits more than one TAC, the total MICR must be calculated. The total MICR is the sum of the MICRs for each of the TACs emitted by the permit unit.

INSTRUCTIONS FOR CALCULATING CANCER BURDEN

The cancer burden is the estimated increase in the occurrence of cancer cases in a population as a result of exposures to TAC emissions from the equipment. The cancer burden for a population unit (city, census tract, sub-area or grid) is the product of the number of persons in the population and the estimated individual risk from TACs. The cancer burden only needs to be calculated if the MICR is greater than one (1) in one million.

The following procedure may be used to perform an acceptable screening analysis for cancer burden due to a single source of TAC:

- Calculate MICR as previously outlined.

- Estimate the distance at which the MICR falls below one in one million. This distance can be estimated by back-calculating the distance that would result in a MICR of one in one million, using the X/Q values in Table 2A, 3A, 4A, and 5A.

- Define a zone of impact in the shape of a circle. The radius (r) of this circle is the distance between the permit unit and the point at which the risk falls below one in one million. The area of this circle is calculated using the equation for the area of a circle, which is $3.14 \times r^2$.

- Estimate the residential population within this zone of impact based on census data or a worst-case estimate. Generally, the residential population in the Basin is less than 4,000 persons/ km^2, but some areas are as high as 7,000 persons/ km^2. Additionally, the worker population within the commercial/industrial areas of the zone of impact should be estimated and included.

  For areas where census data is available, it should be used. Where there is no census data, 7,000 persons/km^2 should be used for the areas with high population densities and 4,000 persons/km^2 should be used for areas with low population densities. Where the population densities are unknown, use 7,000 persons/km^2.

- Calculate cancer burden by multiplying the total population (residential and worker) in the zone of impact by the maximum individual cancer risk. The screening cancer burden estimate is the sum of the excess cancer burden calculated for residential and worker populations.

If the dispersion factors in Tables 2A, 3A, 4A, and 5A are not able to estimate the distance at which MICR falls below one in one million, then a more refined risk assessment is warranted.

INSTRUCTIONS FOR CALCULATING ACUTE AND CHRONIC HAZARD INDEX (HIA AND HIC)

Some TACs increase non-cancer health risk due to short term (acute) or long term (chronic) exposures. The screening risk assessment for those TACs must estimate acute and/or chronic hazard index as applicable. Like the calculation procedure for MICR, one must first identify when the application was deemed complete and select the appropriate set of risk tables found in the attachments.

Reference Exposure Level (REL) is used as an indicator of potential adverse non-cancer health effects. An REL is a concentration level (ug/m^3) or dose (mg/kg-day) at which no adverse health effects are anticipated. RELs are provided in Table 8A.

When only one TAC is considered, the hazard index calculated is referred to as the **individual substance hazard index**. When several TACs affect the same organ system in the body (e.g., respiratory system, nervous system, reproductive system), there can be a cumulative effect on the target organ. In these cases, the **total hazard index** is evaluated. This is the summation of the individual HIs for all TACs that affect the same target organ (see Tables 10A and 10B).

Detailed procedures for calculating total hazard index are provided in the 2003 OEHHA Guidance Manual. The equations used to calculate the chronic and acute Hazard Index (HIC & HIA) per target organ are as follows:

$$\text{Total HIC}_{\text{target organ}} = \Sigma \{[\text{Qyr}_{TAC} \mathbf{x} (X/Q) \mathbf{x} \text{MET} \mathbf{x} \text{MP}]/\text{Chronic REL}_{TAC}\}_{\text{target organ}}$$

$$\text{Total HIA}_{\text{target organ}} = \Sigma \{[\text{Qhr}_{TAC} \mathbf{x} (X/Q)_{hr}]/\text{Acute REL}_{TAC}\}_{\text{target organ}}$$

Note that the chronic HI is based upon an annual average emission per year whereas the acute HI is based upon a maximum one-hour emission level (except for a few compounds) and the acute HI does not use a meteorological correction factor (MET) or a multi-pathway adjustment factor (MP).

ACUTE HAZARD INDICES FOR COMPOUNDS HAVING RELS AVERAGED OVER 4, 6, OR 7 HOURS

Currently, there are only eight acute compounds, as specified in the table below, which have RELs developed over average 4, 6, or 7 hours exposure times. All other acute compounds have RELs developed over maximum one-hour exposures.

Compounds with Acute RELs Averaged Over 4, 6, or 7 Hours

Chemical Name	CAS #	Acute REL	Avg. Time (hours)
Arsenic and arsenic compounds, inorganic	7440-38-2	1.90E-01	4
Benzene (including benzene from gasoline)	71-43-2	1.30E+03	6
Carbon disulfide	75-15-0	6.20E+03	6
Carbon tetrachloride	56-23-5	1.90E+03	7
Chloroform	67-66-3	1.50E+02	7
Ethylene glycol ethyl ether (EGEE)	110-80-5	3.70E+02	6
Ethylene glycol monoethyl ether acetate	111-15-9	1.40E+02	6
Ethylene glycol monomethyl ether	109-86-4	9.30E+01	6

For acute compounds with RELs based on maximum one-hour exposure, the equation to estimate the acute hazard indices for these compounds is:

$$HIA = [Q_{hr} \times (X/Q)_{hr}]/REL$$

For the eight compounds having RELs averaged over 4, 6, or 7 hours, adjustment factors (AF) have been developed, using air quality models for point and volume type sources, to reflect the risk based on the averaging times. These adjustment factors are listed in Tables 8B and 8C, based on the specified averaging times and source proximity to the nearest meteorological station. The acute hazard indices for these compounds are estimated using the following equation:

$$HIA = [(Q_{hr} \times (X/Q)_{hr})/REL] \times AF$$

Where, AF is the adjustment factor developed for compounds with RELs averaged over 4, 6, and 7 hours.

PROCEDURE FOR ALTERNATE HAZARD INDEX LEVEL EXEMPTION

Rule 1401 provides an exemption from the hazard index limit of 1.0 in cases in which a higher exposure level is deemed to be safe. This exemption has never been used. Under this exemption, the HIC and/or HIA limit of 1.0 does not apply if the applicant substantiates to the satisfaction of AQMD staff that at all receptor locations and for every target organ system, the total chronic and acute HI levels resulting from emissions from the equipment will not exceed alternate HI levels determined by OEHHA to be protective against adverse health effects. This applies only to TACs listed in Rule 1401 at the time the application was deemed complete. Refer to the attachments for the appropriate list of TACs.

Applicants should indicate in their permit application that they wish to apply for an exemption under the alternative hazard index provisions of the rule. The permit application should include both a risk assessment estimating the HIA and HIC levels and relevant information supporting the exemption. Depending on the particular health risks in question, additional information such as characterization of the surrounding population, the location of sensitive receptors, or other data may be required.

AQMD staff will consult with OEHHA staff regarding the request for the alternative HI level. If OEHHA staff finds that the levels of exposure to the public will not exceed levels that are protective against adverse health effects, the application will be eligible for the exemption.

In some cases, OEHHA staff may establish a general policy recommending different acceptable exposure levels for different exposed populations. For example, if exposure to a certain compound is particularly harmful to children but less of a concern for adults, OEHHA staff may determine as a general policy that higher exposure levels are acceptable in locations where children would not be exposed. OEHHA policy in these cases would be a basis for eligibility for the alternate hazard index exemption.

Tier 3: Screening Dispersion Modeling

Tier 3 uses a screening dispersion modeling computer program to estimate risk. This tier requires more expertise than Tiers 1 and 2. Applicants should consult AQMD modeling staff before conducting a Tier 3 analysis. For guidance on performing a Tier 3 analysis contact:

Staff	E-mail address	Telephone number
Yi-Hui Huang	yhuang@aqmd.gov	(909) 396-3176
Tom Chico	tchico@aqmd.gov	(909) 396-3149

Tier 3 screening modeling should only be used for a permit unit with a single emission or release point. If there are multiple emission or release points, Tier 4 must be used. In addition, Tier 3 should only be beneficial for applications involving a combustion process since plume rise is more appropriately addressed with a dispersion model. (Tiers 1 and 2 do not address the dispersion effects from plume rise of buoyant plumes.)

To perform a Tier 3 analysis, the following is needed:

- Air dispersion modeling expertise;
- An EPA-approved dispersion model program such as T-SCREEN or SCREEN3, which can be downloaded from www.epa.gov/scram001; and
- Additional equipment information such as stack gas temperature, stack gas exit velocity or flow rate, and stack inside diameter.

It should be noted that TSCREEN and SCREEN3 estimate peak one-hour concentrations for HIA calculations. These concentrations must be multiplied by 0.08 to estimate annual average concentrations for the MICR and HIC calculations.

In a Tier 3 approach, the Tier 2 equations for MICR, HIC, and HIA continue to be used except that a dispersion model is used to estimate each pollutant concentration. In addition, it is not appropriate to use the meteorological correction factor (i.e., MET) contained in the Tier 2 equations. Thus, the Tier 3 equations follows:

$$\mathbf{MICR = CP \times AveConc \times AF_{annual} \times DBR \times EVF \times 10^{-6} \times MP}$$

$$\mathbf{Total\ HIC_{target\ organ} = \Sigma\ \{[AveConc_{TAC} \times MP]/Chronic\ REL_{TAC}\}_{target\ organ}}$$

$$\mathbf{Total\ HIA_{target\ organ} = \Sigma\ \{[PeakConc_{TAC}]/Acute\ REL_{TAC}\}_{target\ organ}}$$

PeakConc is the peak one-hour pollutant concentration estimated by TSCREEN or SCREEN3 and AveConc is the annual average concentration or 0.08 times PeakConc. Refer to the section on Tier 2, Screening Risk Assessment for explanation of the other variables in the equations.

If the MICR, HIC, and HIA do not exceed the rule limits, then the equipment complies with Rule 1401 and no further analysis is required. If any risk value exceeds the rule limits, then proceed to Tier 4.

Tier 4: Detailed Risk Assessment

Tier 4 is a detailed risk assessment using ARB's Hotspots Analysis and Reporting Program (HARP). The HARP software and documentation can be obtained at http://www.arb.ca.gov/toxics/harp/harp.htm. The U.S. EPA air quality dispersion model called ISCST3 (Industrial Source Complex – Short Term, Version 3) is used by HARP for the exposure assessment. ISCST3 documentation is available at www.epa.gov/scram001. Meteorological data for use in HARP and ISCST3 can be downloaded at http://www.aqmd.gov/smog/metdata/MeteorologicalData.html.

Tier 4 is an option if neither Tier 2 nor Tier 3 can demonstrate compliance, or if the applicant wishes to obtain a more refined estimate of the cancer and non-cancer risk. Since Tier 4 involves detailed modeling using actual meteorological data from the closest air monitoring station, it will often result in a less conservative estimate of the risk than either Tiers 2 or 3.

A detailed risk assessment should be performed by individuals with experience and training in air quality modeling and risk assessment. In addition, AQMD modeling staff should be consulted before performing a detailed risk assessment. For guidance on performing a detailed risk assessment contact:

Staff	**E-mail address**	**Telephone number**
Yi-Hui Huang	yhuang@aqmd.gov	(909) 396-3176
Tom Chico	tchico@aqmd.gov	(909) 396-3149

Written guidance on preparing a detailed risk assessment is contained in an Office of Environmental Health Hazard Assessment document titled, "Air Toxics Hot Spots Program Risk Assessment Guidelines (August 2003)" which may be obtained at http://www.oehha.org/air/hot_spots/HRAguidefinal.html.

AQMD modeling staff has prepared supplemental risk assessment guidance which must be followed by all applicants submitting Tier 4 assessments. AQMD's supplemental guidance is available at http://www.aqmd.gov/prdas/AB2588/AB2588_B3.html.

EXAMPLE 1: MICR, CANCER BURDEN, HIA, & HIC CALCULATION

The equipment is a spray booth, operating 8 hr/day, located in an industrial and residential area. There are multiple TACs emitted from this booth. Some of the TACs are carcinogenic and some have chronic and acute non-cancer risks.

The application was deemed complete on July 30, 2005.
The nearest receptor distances:
Worker (Industrial) = 328 ft (100 meters)
Residential = 492 ft (150 meters)
Operating Schedule: 8 hr/day, 5 days/wk
Stack height = 28 ft
Plant location: Ontario, CA
Pollutants: Hexavalent chromium, Xylene, Cadmium, Toluene-2,4-diisocyanate, and Perchloroethylene

Emission rates for the TACs are listed in Table A below.
Note: The maximum hourly emissions should be estimated based on the maximum gallons of paint that could be sprayed in any hour.

Table A

Toxic Air Contaminant	Emission Rate		
	Qhr(Max.) (lbs/hr)	**Qyr (lbs/yr)**	**QYR (tons/yr)**
Cadmium	2.7×10^{-6}	0.0189	9.46×10^{-6}
Hexavalent chromium	2.5×10^{-6}	0.0175	8.76×10^{-6}
Perchloroethylene	3.8×10^{-4}	2.628	1.31×10^{-3}
Toluene-2,4-diisocyanate	1.1×10^{-3}	78.84	3.94×10^{-2}
Xylene	0.04	262.80	1.31×10^{-1}

(The list of TACs and their corresponding emission rates are for illustration purposes only. They may not reflect actual conditions.)

First, identify the appropriate risk assessment tables (included in the appendices) based upon when the application was deemed complete. In this case, the tables for applications deemed complete on or after July 1, 2005 (i.e., Permit Application Package "L") are used.

Second, calculate MICR for those TACs that have Inhalation Cancer Potency Values from Table 8A. Table B below identifies the TACs and their corresponding inhalation cancer potency values for MICR calculations.

Table B

Toxic Air Contaminant (TAC)	**Inhalation Cancer Potency** $(mg/kg\text{-}day)^{-1}$
Cadmium	1.50×10^{1}
Hexavalent Chromium	5.10×10^{2}
Perchloroethylene	2.10×10^{-2}
Toluene-2,4-diisocyanate	3.90×10^{-2}
Xylene	None

Based on the above table, MICR will be evaluated for residential and worker receptors for cadmium, hexavalent chromium, perchloroethylene and toluene-2,4-diisocyanate. Xylene does not have a cancer potency value and so this compound will not be included in the MICR calculations.

From Table 8A, we can also determine which of the substances is carcinogenic, chronic, and/or acute. The results are as follows:

TAC	**MICR (cancer)**	**HIC (chronic)**	**HIA (Acute)**
Cadmium	√	√ (MP)	
Hexavalent chromium	√	√	
Perchloroethylene	√	√	√
Toluene-2,4-diisocyanate	√	√	
Xylene		√	√

MP indicates that the multi-pathway adjustment factor will be different than 1.0.

Next, for chronic and acute substances, review Tables 10A and 10B to determine the target organs affected by these TACs due to chronic and/or acute toxicity. Table C below indicates the target organs affected by the chronic TACs with chronic toxicity. In the table, check marks (√) indicate the affected target organs.

Table C (Chronic Toxicity)

TAC	NS	AL	KIDNEY	RESP
Cadmium			√	√
Hexavalent Chromium				√
Perchloroethylene		√	√	√
Toluene-2,4-diisocyanate				√
Xylene	√			√

NS: Nervous System
AL: Alimentary System (Liver)
KIDNEY: Kidneys
RESP: Respiratory System

Similarly, after reviewing Table 10B for acute exposure, we find the target organs affected by the acute TACs. In Table D check marks (√) indicate the target organs.

Table D (Acute Toxicity)

TAC	NS	EYE	RESP
Perchloroethylene	√	√	√
Xylene		√	√

NS: Nervous System
EYE: Eye
RESP: Respiratory System

Tier I: Screening Emission Levels

The nearest receptor location should be used, in this case the worker location of 100m should be used. Since there are several pollutants, the Multiple Pollutant Screening Level Procedure should be used.

Please note that this step is used to approximate the equipment potential risk.

For Tier 1, the equipment's TACs emissions (annual and/or maximum hourly) should be compared with the Screening Levels for the contaminant in Tables 1A or 1B as appropriate. Since this

example has multiple pollutants, the Pollutant Screening Index should be calculated for each pollutant per procedure specified on pages 6 and 7.

For Carcinogenic and/or Chronic Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_p).

$$PSI_p = Qyr_p / PSL_p$$

The Qyr is based upon the annual emissions of each TAC (lbs/yr). The PSLs are found in Table 1A and are expressed in lb/yr. Use the PSLs for a distance of 100 meters.

Sum up the individual Pollutant Screening Indices for each pollutant ($\sum PSI_p$).

TAC	Qyr_p	PSL_p	PSI_p
Cadmium	0.0189	0.0595	0.32
Hexavalent chromium	0.0175	0.00175	10.00
Perchloroethylene	2.628	42.5	0.06
Toluene-2,4-diisocyanate	78.84	18.1	4.36
Xylene	262.80	181,000	0.0014
		$\sum PSI_p =$	14.74

Calculate the Application Screening Index (ASI).

$$ASI_{\text{cancer and/or chronic}} = \Sigma\ PSI_p = 14.74$$

For Acute Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_p).

$$PSI_p = Qhr_p / PSL_p$$

The Qhr is based upon the maximum hourly emissions (lb/hr). The PSLs for acute compounds are found in Table 1A and are expressed in lb/hr. Use the PSLs for a distance of 100 meters.

Sum up the individual Pollutant Screening Indices for each acute pollutant ($\sum PSI_p$).

TAC	Qhr_p	PSL_p	PSI_p
Perchloroethylene	3.8×10^{-4}	53.5	0.000007
Xylene	0.04	58.9	0.000679
		$\sum PSI_p =$	0.000686

Calculate the Application Screening Index (ASI).

$$ASI_{acute} = \Sigma\ PSI_p$$

Please note that the cumulative cancer/chronic risk cannot exceed 1. In this example, this facility did not pass Tier I since the ASI exceeds 1 for cancer/chronic, even though, the ASI for acute is below 1. If this Tier I screening were calculated to be less than 1, the applicant would not have to proceed with further risk screening assessment procedures.

Tier II: Screening Risk Assessment

CP, REL and MP values are taken from Table 8A in Permit Application Package "L".
(X/Q) values for cancer and chronic exposures are taken from Table 2A. This table is for a point source operating ≤ 12 hr/day, for a stack height of 28 feet, and a receptor distance of 100 meters for worker, and 150 meters for residential.
The value for the $(X/Q)_{hr}$ for acute exposures is taken from Table 6, which is for point source. If it were a volume source Table 7 would be used.
Exposure values are taken from Table 9B.
MET = 0.86 for Pomona (closest to Ontario) - from Table 2B.

These values are summarized below:
(1) Worker:

TAC	**CP** $(mg/kg\text{-}d)^{-1}$	**REL** ug/m^3 **Acute**	**REL** ug/m^3 **Chronic**	**X/Q (chronic & carcinogenic)** $(ug/m^3)/(tons/yr)$	**$(X/Q)_{hr}$ for acute** $(ug/m^3)/(lbs/hr)$	**MPw for MICR**	**MPw for HIC**
Cadmium	1.50×10^{1}	n/a	2.00×10^{-2}	4.19	n/a	1	1.12
Hexavalent chromium	5.10×10^{2}	n/a	2.00×10^{-1}	4.19	n/a	1	1
Perchloro-ethylene	2.10×10^{-2}	20,000	35	4.19	295.2	1	1
Toluene-2,4-diisocyanate	3.90×10^{-2}	n/a	7.00×10^{-2}	4.19	n/a	1	1
Xylene	n/a	22,000	700	4.19	295.2	n/a	1

n/a - not applicable

(2) Resident: This example uses a 150m distance to the closest receptor. Using Tables 2A and 6, an interpolation between the downwind distance of 100 and 200m must be done to determine the carcinogenic, acute, and chronic X/Q.

TAC	CP $(mg/kg\text{-}d)^{-1}$	REL ug/m^3		X/Q (chronic & carcinogenic) $(ug/m^3)/(tons/yr)$	$(X/Q)_{hr}$ for acute $(ug/m^3)/(lbs/hr)$	MPr for MICR	MPr for HIC
		Acute	Chronic				
Cadmium	1.50×10^{1}	n/a	2.00×10^{-2}	2.66	n/a	1	1.50
Hexavalent chromium	5.10×10^{2}	n/a	2.00×10^{-1}	2.66	n/a	1	1
Perchloro-ethylene	2.10×10^{-2}	20,000	35	2.66	202.4	1	1
Toluene-2,4-diisocyanate	3.90×10^{-2}	n/a	7.00×10^{-2}	2.66	n/a	1	1
Xylene	n/a	22,000	700	2.66	202.4	n/a	1

n/a - not applicable

MICR Calculation

$$MICR = \Sigma (CP \times Qyr \times (X/Q) \times AF_{ann} \times MET \times DBR \times EVF \times 10^{-6} \times MP)$$

(1) Worker:

TAC	CP	Qyr (tons/yr)	X/Q	AF_{ann}	MET	DBR	EVF	MP_W	MICR
Cadmium	1.50×10^{1}	9.46×10^{-6}	4.19	4.2	0.86	149	0.38	1	1.22×10^{-7}
Hexavalent Chromium	5.10×10^{2}	8.76×10^{-6}	4.19	4.2	0.86	149	0.38	1	3.83×10^{-6}
Perchloro-ethylene	2.10×10^{-2}	1.31×10^{-3}	4.19	4.2	0.86	149	0.38	1	2.36×10^{-8}
Toluene-2,4-diisocyanate	3.90×10^{-2}	3.94×10^{-2}	4.19	4.2	0.86	149	0.38	1	1.32×10^{-6}
Total									**5.29×10^{-6}**

(2) Resident:

TAC	CP	Qyr (tons/yr)	X/Q	AF_{ann}	MET	DBR	EVF	MPr	MICR
Cadmium	1.50×10^{1}	9.46×10^{-6}	2.66	1	0.86	302	0.96	1	9.41×10^{-8}
Hexavalent Chromium	5.10×10^{2}	8.76×10^{-6}	2.66	1	0.86	302	0.96	1	2.96×10^{-6}
Perchloro-ethylene	2.10×10^{-2}	1.31×10^{-3}	2.66	1	0.86	302	0.96	1	1.82×10^{-8}
Toluene-2,4-diisocyanate	3.90×10^{-2}	3.94×10^{-2}	2.66	1	0.86	302	0.96	1	1.02×10^{-6}
Total									**4.09×10^{-6}**

Please note that the higher of the worker and residential cancer risks needs to be selected. This value will be entered in MICR field in the NSR, 1401 section. In this example, the maximum cancer risk is at the worker receptor.

Cancer Burden Calculation

Cancer burden should always be calculated if the MICR exceeds 1 in a million, regardless of the type of receptor.

It is necessary to determine a cancer burden for risk at the worker receptor since the worker risk was determined to be higher than the residential risk. MICR for worker receptors was calculated to be **5.29×10^{-6}**.

Estimate of distance at which MICR falls below one in one million.
The distance at which the MICR falls below one in one million requires you to take the reciprocal of the calculated MICR multiplied by 1.0×10^{-6}. This factor (F) will be the multiplier to the X/Q value used in determining the MICR.

$$F = (1 / MICR) \times 1.0 \times 10^{-6}$$

$$F = (1 / 5.29 \times 10^{-6}) \times 1.0 \times 10^{-6}$$

$$F = 0.19$$

Determination of the new downwind distance will be based upon a X/Q value calculated from the originally used X/Q value multiplied by F.

Therefore,

New X/Q = 4.19 x 0.19

New X/Q = 0.80

Using Table 2A, the New X/Q lies between downwind distances of 200 to 300 m. Interpolating for the new downwind distance gives,

$$\text{New downwind distance} = \frac{[300\text{ m} - 200\text{ m}] \times [1.12 - 0.80]}{[1.12 - 0.50]} + 200\text{ m}$$

New downwind distance = 251.6 m = 0.2516 km

This new Downwind Distance is where the MICR will fall below one in one million.

Define Zone of Impact
The zone of impact (ZI) is calculated using the New Downwind Distance as the radius of a circle and calculating the area of that circle.

Therefore,

$ZI = 3.14\ r^2$

$ZI = 3.14\ (0.2516\text{ km})^2$

$ZI = 0.20\text{ km}^2$

Estimate the population within the ZI
ZI should include both worker and residential populations.

For areas where census data is available, it should be used. Where there is no census data, 7,000 persons/km^2 should be used for the areas with high population densities and 4,000 persons/km^2 should be used for areas with low population densities. Where the population densities are unknown, use 7,000 persons/km^2.

In this example we have no information on census data or population density, therefore,

Zone of Impact Population = ZI x Population Density

Zone of Impact Population = 0.20 km^2 x 7,000 persons/ km^2

Zone of Impact Population = 1,400 persons

Calculate Cancer Burden
Cancer Burden (CB) is the zone of impact population multiplied by the calculated MICR.

Therefore,

$$CB = 1{,}400 \text{ persons} \times 5.29 \times 10^{-6}$$

CB = 0.0074

Hazard Index Calculations

Acute and Chronic Hazard Indices should be calculated for each target organ.

Acute Hazard Index:

$$HIA = [Q_{hr} \times (X/Q)_{hr}]/REL$$

Based on Table 10B, the target organs for the TACs have been listed.

Note: The X/Q values in Table 6 are based upon the maximum hourly emission rates. It should also be noted that the X/Q for residential receptor (150 m) is estimated using interpolation between the downwind distance of 100 and 200 m.
Resident X/Q (150 m) = 202.4 (ug/m^3)/(lbs/hr)
Worker X/Q (100 m) = 295.2 (ug/m^3)/(lbs/hr)

Perchloroethylene:
Affects nervous system, eye, and respiratory organs.

The Acute Hazard Index for Perchloroethylene is calculated as follows:

Worker: HIA = $[3.8 \times 10^{-4} \times 295.2] / 20{,}000$ = **5.6×10^{-6}**
Nervous, eye, and respiratory systems: 5.6×10^{-6}

Resident: HIA = $[3.8 \times 10^{-4} \times 202.4] / 20{,}000$ = **3.8×10^{-6}**
Nervous, eye, and respiratory systems: 3.8×10^{-6}

Xylene:
Affects eye and respiratory organs.

The Acute Hazard Index for Xylene is calculated as follows:

Worker: HIA = $[0.04 \times 295.2]/22{,}000$ = **5.4×10^{-4}**
Eye and respiratory systems: 5.4×10^{-4}

Resident: HIA = $[0.04 \times 202.4]/22{,}000$ = **3.7×10^{-4}**

Eye and respiratory systems: 3.7×10^{-4}

Chronic Hazard Index:

HIC = Σ [(QYR) **x** (X/Q)chronic **x** MET **x** MP]/(Chronic REL)]

Based on Table 10A, the target organs for the TACs for chronic have been listed. The Chronic Hazard Index for the TACs in this example are calculated as follows:

Cadmium:
Affects kidneys and respiratory organs.

The residential chronic hazard index for cadmium is:

Resident: HIC = $[9.46 \times 10^{-6} \times 2.66 \times 0.86 \times 1.50] / [2.00 \times 10^{-2}]$ = **1.62×10^{-3}**
Kidney and respiratory systems: 1.62×10^{-3}

Worker: HIC = $[9.46 \times 10^{-6} \times 4.19 \times 0.86 \times 1.12] / [2.00 \times 10^{-2}]$ = **1.91×10^{-3}**
Kidney and respiratory systems: 1.91×10^{-3}

Hexavalent Chromium:
Affects respiratory organs.

The chronic hazard index for hexavalent chromium is:

Resident: HIC = $[8.76 \times 10^{-6} \times 2.66 \times 0.86 \times 1] / [2.00 \times 10^{-1}]$ = **1.00×10^{-4}**
Respiratory system: 1.00×10^{-4}

Worker: HIC = $[8.76 \times 10^{-6} \times 4.19 \times 0.86 \times 1] / [2.00 \times 10^{-1}]$ = **1.58×10^{-4}**
Respiratory system: 1.58×10^{-4}

Perchloroethylene:
Affects kidneys, alimentary system (liver), and respiratory organs.

The chronic hazard index for perchloroethylene is:

Resident: HIC = $[1.31 \times 10^{-3} \times 2.66 \times 0.86 \times 1]/35$ = **8.56×10^{-5}**
Kidney, alimentary, and respiratory systems: 8.56×10^{-5}

Worker: HIC = $[1.31 \times 10^{-3} \times 4.19 \times 0.86 \times 1]/35$ = **1.35×10^{-4}**
Kidney, alimentary, and respiratory systems: 1.35×10^{-4}

Toluene 2,4-diisocyanate
Affects respiratory organs.

The chronic hazard index for toluene 2,4-diisocyanate is:

Resident: HIC = [3.94 x 10^{-2} x 2.66 x 0.86 x 1] / [7.00 x 10^{-2}] = **1.29**
Respiratory system: 1.29

Worker: HIC = [3.94 x 10^{-2} x 4.19 x 0.86 x 1] / [7.00 x 10^{-2}] = **2.03**
Respiratory system: 2.03

Xylene
Affects nervous system and respiratory organs.

The chronic hazard index for xylene is:

Resident: HIC = [1.31 x 10^{-1} x 2.66 x 0.86 x 1] / [7.00 x 10^{2}] = **4.28 x 10^{-4}**
Nervous and respiratory systems: 4.28 x 10^{-4}

Worker: HIC = [1.31 x 10^{-1} x 4.19 x 0.86 x 1] / [7.00 x 10^{2}] = **6.74 x 10^{-4}**
Nervous and respiratory systems: 6.74 x 10^{-4}

In summary:

I. **MICR:**

Worker:

TAC	MICR
Cadmium	1.22×10^{-7}
Hexavalent Chromium	3.83×10^{-6}
Perchloroethylene	2.36×10^{-8}
Toluene-2,4-diisocyanate	1.32×10^{-6}
Xylene	n/a
Total	**5.29×10^{-6}**

Resident:

TAC	MICR
Cadmium	9.41×10^{-8}
Hexavalent Chromium	2.96×10^{-6}
Perchloroethylene	1.82×10^{-8}
Toluene-2,4-diisocyanate	1.02×10^{-6}
Xylene	n/a
Total	**4.09×10^{-6}**

II. **Cancer Burden:**

CB = 0.0074

III. **Acute Hazard Index (HIA) and Chronic Hazard Index (HIC):**

By Target Organs for Acute:

(1) Worker:

TAC	HIA		
	NS	EYE	RESP
Perchloroethylene	5.6×10^{-6}	5.6×10^{-6}	5.6×10^{-6}
Xylene		5.4×10^{-4}	5.4×10^{-4}
Total	**5.6×10^{-6}**	**5.5×10^{-4}**	**5.5×10^{-4}**

(2) Resident:

TAC	HIA		
	NS	EYE	RESP
Perchloroethylene	3.8×10^{-6}	3.8×10^{-6}	3.8×10^{-6}
Xylene		3.7×10^{-4}	3.7×10^{-4}
Total	**3.8×10^{-6}**	**3.7×10^{-4}**	**3.7×10^{-4}**

By Target Organs for Chronic:

(1) Worker:

TAC	HIC			
	NS	KIDNEYS	AL	RESP
Cadmium		1.91×10^{-3}		1.91×10^{-3}
Hexavalent Chromium				1.58×10^{-4}
Perchloroethylene		1.35×10^{-4}	1.35×10^{-4}	1.35×10^{-4}
Toluene-2,4-diisocyanate				2.03
Xylene	6.74×10^{-4}			6.74×10^{-4}
Total	**6.74×10^{-4}**	**2.05×10^{-3}**	**1.35×10^{-4}**	**2.03**

(2) Resident:

TAC	HIC			
	NS	KIDNEYS	AL	RESP
Cadmium		1.62×10^{-3}		1.62×10^{-3}
Hexavalent Chromium				1.00×10^{-4}
Perchloroethylene		8.56×10^{-5}	8.56×10^{-5}	8.56×10^{-5}
Toluene-2,4-diisocyanate				1.29
Xylene	4.28×10^{-4}			4.28×10^{-4}
Total	**4.28×10^{-4}**	**1.71×10^{-3}**	**8.56×10^{-5}**	**1.29**

RESULT:

The spray booth in this example does not contain T-BACT, fails the Rule 1401 MICR limit, and would not be granted a permit. However, if the spray booth was equipped with T-BACT, it would pass the Rule 1401 MICR limit. Notwithstanding, the spray booth in this example also fails the Rule 1401 HIC limit and would not be granted a permit based on this criteria alone. A Tier 3 or 4 analysis should be conducted.

- ***MICRs for residential and commercial receptors exceed 1×10^{-6} (one in one million) but are below 10×10^{-6} (ten in one million).***
- ***Cancer burden is less than 0.5.***
- ***HIAs for residential and commercial receptors do not exceed 1.0 for each target organ.***
- ***HICs for residential and commercial receptors exceed 1.0 for respiratory organs.***

EXAMPLE 2: MICR, HIA, HIC, & CANCER BURDEN CALCULATION FOR PLATING OPERATIONS

A metal finishing shop operates a nickel plating operation. Prior to the actual plating process, component parts are first cleaned and/or etched. The cleaning is conducted in an electro-cleaner tank containing a sodium hydroxide (NaOH) solution. Parts requiring etching are immersed in a tank containing hydrochloric acid (HCl). Finally, the parts are placed in a plating tank containing a nickel solution where the nickel metal (Ni) is deposited on the parts.

The application was deemed complete on July 30, 2005.
Volume source: Building dimensions 40'(W) x 70'(L) x 17'(H)
The nearest receptor distances are:
Worker (Industrial) = 100 meters
Residential = 500 meters
Operating Schedule: 8 hr /day, 3 days/wk, 50 wks/yr = 1200 hrs/yr
Plant location: Azusa, CA

Note: Emissions from metal finishing operations can be determined from source test data or from emission factors and correlations, as appropriate. Operational data used in developing emission factors and correlations currently used by AQMD permitting engineers include the concentration of chemicals in the process tank, the quantity of ampere-hours applied to a tank, the plating efficiency, the tank temperature, parameters affecting air-sparging emissions, and control efficiencies for air pollution control equipment or other emissions reduction techniques that are employed.

Emission rates for the TACs are listed in Table A below.

Table A

Toxic Air Contaminant	Emission Rate		
	Qhr(Max.) (lbs/hr)	**Qyr (lbs/yr)**	**Qyr (tons/yr)**
Nickel	3.8×10^{-4}	0.227	1.14×10^{-4}
Sodium hydroxide	2.15×10^{-6}	0.0021	1.05×10^{-6}
Hydrogen chloride	1.2×10^{-4}	0.841	4.2×10^{-4}

(The list of TACs and their corresponding emission rates are for illustration purposes only. They may not reflect actual conditions.)

First, Identify the appropriate risk assessment tables (included in the Attachments) based upon when the application was deemed complete. In this case, the tables for applications deemed complete on July 1, 2005 are included in Permit Application Package "L" in the Attachments to this document.

Second, The MICR is calculated for those TACs that have appropriate Cancer Potency Values from Table 8A. Table B below identifies the TACs for MICR calculations.

Table B

Toxic Air Contaminant (TAC)	Cancer Potency Value	Chronic REL	Acute REL
Nickel	9.1×10^{-1}	5.0×10^{-2}	6.00
Sodium hydroxide	None	None	8.00
Hydrogen chloride	None	9.00	2.10×10^{3}

Based on the above table, MICR will be evaluated for residential and worker receptors for nickel.

From Table 8A, determine which of the substances is carcinogen, chronic, and/or acute. The results are as follows:

TAC	MICR (cancer)	HIC (chronic)	HIA (Acute)
Nickel	√	√	√
Sodium hydroxide			√
Hydrogen chloride		√	√

Next, for chronic and acute substances, Table 10A and 10B need to be reviewed to determine the target organs affected by these TACs due to chronic and/or acute toxicity.

Tables C and D below indicate the target organs affected by the TACs with chronic and acute toxicity, respectively. In the table, check marks (√) indicate the affected target organs.

Table C (Chronic Toxicity)

TAC	HEM	RESP
Nickel	√	√
Hydrogen chloride		√

HEM: Hematologic System
RESP: Respiratory System

Table D (Acute Toxicity)

TAC	SKIN	IMMUN	EYE	RESP
Nickel		√		√
Sodium hydroxide	√		√	√
Hydrogen chloride			√	√

SKIN: Skin IMMUN: Immune system
EYE: Eye RESP: Respiratory System

Tier I: Screening Emission Levels

For Carcinogenic and/or Chronic Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_p).

$$PSI_p = Qyr_p / PSL_p$$

The Qyr is based upon the annual emissions of each TAC (lbs/yr). The PSLs are found in Table 1A and are expressed in lb/yr.

Sum up the individual Pollutant Screening Indices for each pollutant ($\sum PSI_p$).

TAC	**Qyr_p**	**PSL_p**	**PSI_p**
Nickel	0.227	0.981	0.23
Hydrogen Chloride	0.841	2330	3.6×10^{-4}
		$\sum PSI_p =$	0.23

Calculate the Application Screening Index (ASI).

$$ASI_{cancer\ and/or\ chronic} = \Sigma\ PSI_p = 0.23$$

For Acute Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_p).

$$PSI_p = Qhr_p / PSL_p$$

The Qhr is based upon the maximum hourly emissions (lb/hr). The PSLs for acute compounds are found in Table 1A and are expressed in lb/hr.

Sum up the individual Pollutant Screening Indices for each acute pollutant ($\sum PSI_p$).

TAC	Qhr_p	PSL_p	PSI_p
Nickel	3.8×10^{-4}	0.016	0.024
Sodium hydroxide	2.15×10^{-6}	0.0214	1.00×10^{-4}
Hydrogen chloride	1.2×10^{-4}	5.62	2.14×10^{-5}
		$\sum PSIp =$	0.024

Calculate the Application Screening Index (ASI).

$$ASI_{acute} = \Sigma\ PSI_p = 0.024$$

Please note that the cumulative cancer/chronic risk did not exceed 1 and the cumulative acute hazard index did not exceed 1. In this example, this facility did pass Tier I since the ASI did not exceed 1

for cancer/chronic and 1 for acute. Since this Tier I screening was calculated to be less than 1, the applicant would not have to proceed with further risk screening assessment procedures.

Tier II: Screening Risk Assessment

CP, REL and MP values are taken from Table 8A in Permit Application Package "L".
(X/Q) values for cancer and chronic exposures are taken from Table 4A. This table is for a volume source operating • 12 hr/day, for an area of less than 3000 ft^2, and a receptor distance of 100 meters for worker, and 500 meters for residential.
The value for the $(X/Q)_{hr}$ for acute exposures is taken from Table 7 because this is a volume source.
Exposure values, daily breathing rate values and annual concentration adjustment factors are taken from Tables 9B, 9A, and 2C, respectively.

MET = 0.8 for Azusa - from Table 4B.

These values are summarized below:

(3) Worker: Using 100m receptor

TAC	CP $(mg/kg\text{-}d)^{-1}$	REL (ug/m^3) Acute	REL (ug/m^3) Chronic	X/Q (chronic & carcinogenic) $(ug/m^3)/(tons/yr)$	$(X/Q)_{hr}$ for acute $(ug/m^3)/(lbs/hr)$	MP_W for MICR	MP_W for HIC
Nickel	9.1×10^{-1}	6.00	5.00×10^{-2}	3.95	309	1	1
NaOH	n/a	8.00	n/a	n/a	309	n/a	n/a
HCl	n/a	2.1×10^3	9.00	3.95	309	n/a	1

n/a – not applicable

(4) Resident: Using 500m distance to the closest receptor.

TAC	CP $(mg/kg\text{-}d)^{-1}$	REL (ug/m^3) Acute	REL (ug/m^3) Chronic	X/Q (chronic & carcinogenic) $(ug/m^3)/(tons/yr)$	$(X/Q)_{hr}$ for acute $(ug/m^3)/(lbs/hr)$	MPr for MICR	MPr for HIC
Nickel	9.1×10^{-1}	6.00	5.00×10^{-2}	0.17	24.1	1	1
NaOH	n/a	8.00	n/a	n/a	24.1	n/a	n/a
HCl	n/a	2.1×10^3	9.00	0.17	24.1	n/a	1

n/a – not applicable

MICR CALCULATION

$$MICR = \Sigma (CP \times Qyr \times (X/Q) \times AF_{ann} \times MET \times DBR \times EVF \times 10^{-6} \times MP)$$

(1) Worker:

TAC	CP	Qyr (tons/yr)	X/Q	AF_{ann}	MET	DBR	EVF	MP_W	MICR
Nickel	9.1×10^{-1}	1.14×10^{-4}	3.95	4.2	0.80	149	0.38	1	7.8×10^{-8}
Total									**7.8×10^{-8}**

(2) Resident:

TAC	CP	Qyr (tons/yr)	X/Q	AF_{ann}	MET	DBR	EVF	MPr	MICR
Nickel	9.1×10^{-1}	1.14×10^{-4}	0.17	1	0.80	302	0.96	1	4.09×10^{-9}
Total									**4.09×10^{-9}**

Please note that a comparison between the worker and residential cancer risks needs to be made and the higher value will be entered in MICR field in the NSR, 1401 section. In this example, the maximum cancer risk is at the worker receptor.

Cancer Burden Calculation

Cancer burden should always be calculated if the MICR exceeds 1 in a million, regardless of the type of receptor. For this example, cancer burden was not calculated because neither worker nor residential risk exceeded 1 in a million.

Hazard Index Calculations

Acute and Chronic Hazard Indices should be calculated for each target organ.

Acute Hazard Index:

For all acute compounds with RELs developed over 1 hour average, the acute hazard indices are estimated using the equation below:

$$HIA = [Q_{hr} \times (X/Q)_{hr}]/REL$$

Based on Table 10B, the target organs for the TACs have been listed.

Nickel:
Affects immune and respiratory systems.

Note: The X/Q values in Table 7 are based upon the maximum hourly emission rates.

The Acute Hazard Index for Nickel is calculated as follows:

Worker: HIA = $(3.8 \times 10^{-4} \times 309) / 6 = \mathbf{2.0 \times 10^{-2}}$
Immune and respiratory systems: 2.0×10^{-2}

Resident: HIA = $(3.8 \times 10^{-4} \times 24.1) / 6 = \mathbf{1.5 \times 10^{-3}}$
Immune and respiratory systems: 1.5×10^{-3}

Sodium Hydroxide:
Affects skin, eye, and respiratory systems.

Note: The X/Q values in Table 7 are based upon the maximum hourly emission rates.

The Acute Hazard Index for sodium hydroxide is calculated as follows:

Worker: HIA = $(2.15 \times 10^{-6} \times 309) / 8 = \mathbf{8.3 \times 10^{-5}}$
Skin, eye, and respiratory systems: 8.3×10^{-5}

Resident: HIA = $(2.15 \times 10^{-6} \times 24.1) / 8 = \mathbf{6.5 \times 10^{-6}}$
Skin, eye, and respiratory systems: 6.5×10^{-6}

Hydrogen chloride:
Affects eye, and respiratory systems.

Note: The X/Q values in Table 7 are based upon the maximum hourly emission rates.

The Acute Hazard Index for hydrogen chloride is calculated as follows:

Worker: HIA = $(1.2 \times 10^{-4} \times 309) / 2100 = \mathbf{1.8 \times 10^{-5}}$
Eye and respiratory systems: 1.8×10^{-5}

Resident: HIA = $(1.2 \times 10^{-4} \times 24.1) / 2100 = \mathbf{1.4 \times 10^{-6}}$
Eye and respiratory systems: 1.4×10^{-6}

Chronic Hazard Index:

HIC = Σ [(QYR) **x** (X/Q)chronic **x** MET **x** MP]/(Chronic REL)]

Based on Table 10A, the target organs for the TACs with chronic RELs have been listed. The Chronic Hazard Index for the TACs in this example are calculated as follows:

Nickel
Affects hematologic systems and respiratory organs.

The chronic hazard index for nickel is:

Resident: HIC = [1.14 x 10^{-4} x 0.17 x 0.80 x 1] / [5.00 x 10^{-2}] = **3.1 x 10^{-4}**
Hematologic and respiratory systems: 3.1 x 10^{-4}

Worker: HIC = [1.14 x 10^{-4} x 3.95 x 0.80 x 1] / [5.00 x 10^{-2}] = **7.2 x 10^{-3}**
Hematologic and respiratory systems: 7.2 x 10^{-3}

Hydrogen Chloride
Affects respiratory organs.

The chronic hazard index for hydrogen chloride is:

Resident: HIC = [4.20 x 10^{-4} x 0.17 x 0.80 x 1] / [9.00] = **6.3 x 10^{-6}**
Respiratory system: 6.3 x 10^{-6}

Worker: HIC = [4.20 x 10^{-4} x 3.95 x 0.80 x 1] / [9.00] = **1.5 x 10^{-4}**
Respiratory system: 1.5 x 10^{-4}

In summary:

I. **MICR:**

(1) Worker:

TAC	MICR
Nickel	7.8 x 10^{-8}

(2) Resident:

TAC	MICR
Nickel	4.09 x 10^{-9}

II. **Acute Hazard Index (HIA) and Chronic Hazard Index (HIC):**

By Target Organs for Acute:

(1) Worker:

TAC	HIA			
	SKIN	IMMUNE	EYE	RESP
Nickel		2.0×10^{-2}		2.0×10^{-2}
Sodium hydroxide	8.3×10^{-5}		8.3×10^{-5}	8.3×10^{-5}
Hydrogen chloride			1.8×10^{-5}	1.8×10^{-5}
Total	8.3×10^{-5}	2.0×10^{-2}	1.0×10^{-4}	2.0×10^{-2}

(2) Resident:

TAC	HIA			
	SKIN	IMMUNE	EYE	RESP
Nickel		1.5×10^{-3}		1.5×10^{-3}
Sodium hydroxide	6.5×10^{-6}		6.5×10^{-6}	6.5×10^{-6}
Hydrogen chloride			1.4×10^{-6}	1.4×10^{-6}
Total	6.5×10^{-6}	1.5×10^{-3}	7.9×10^{-6}	1.5×10^{-3}

By Target Organs for Chronic:

(1) Worker:

TAC	HIC	
	HEM	RESP
Nickel	7.2×10^{-3}	7.2×10^{-3}
Hydrogen chloride		1.5×10^{-4}
Total	$\mathbf{7.2 \times 10^{-3}}$	$\mathbf{7.4 \times 10^{-3}}$

(2) Resident:

TAC	HIC	
	HEM	RESP
Nickel	3.1×10^{-4}	3.1×10^{-4}
Hydrogen chloride		6.3×10^{-6}
Total	$\mathbf{3.1 \times 10^{-4}}$	$\mathbf{3.2 \times 10^{-4}}$

RESULT:
For this example, the evaluations indicate that MICR for residential and commercial, HIA, and HIC are all below the risk limits of Rule 1401.

Cancer Burden Calculation

For this example, an analysis is not required to determine a cancer burden because the total MICR is below 1×10^{-6}.

EXAMPLE 3: HIA CALCULATION FOR COMPOUNDS WITH RELS AVERAGED OVER 4, 6, OR 7 HRS

***Note**: Presently there are eight acute compounds (see table below) which have RELs averaged over 4, 6, or 7 hours. For these compounds the acute hazard indices are estimated using the adjustment factors that are developed for these averaging times. The acute hazard indices for these compounds are estimated using the equation listed below:*

$HIA = [(Q_{hr} \times (X/Q)_{hr})/REL] \times AF$

Where,

AF is the adjustment factor developed for compounds with RELs averaged over 4, 6, or 7 hours and listed below based on the source types (point or volume) and locations.

Compounds with Acute RELs Averaged Over 4, 6, or 7 Hours

Chemical Name	CAS #	Acute REL	Avg. Time (hours)
Arsenic and arsenic compounds, inorganic	7440-38-2	1.90E-01	4
Benzene (including benzene from gasoline)	71-43-2	1.30E+03	6
Carbon disulfide	75-15-0	6.20E+03	6
Carbon tetrachloride	56-23-5	1.90E+03	7
Chloroform	67-66-3	1.50E+02	7
Ethylene glycol ethyl ether (EGEE)	110-80-5	3.70E+02	6
Ethylene glycol monoethyl ether acetate	111-15-9	1.40E+02	6
Ethylene glycol monomethyl ether	109-86-4	9.30E+01	6

Ethylene glycol ethyl ether (EGEE) with its REL averaged over 6 hours is used in the following example.

The equipment is a spray booth, operating 8 hr/day, located in an industrial and residential area. There are multiple TACs emitted from this booth. The TACs have carcinogenic and acute non-cancer risks.

Assumptions:

The application was deemed complete on July 30, 2005
The nearest receptor distances are:
Worker (Industrial) = 500 meters
Residential = 1000 meters
Operating Schedule: 8 hr /day, 1 day/wk
Stack height = 28 ft
Plant location: West Los Angeles, CA
The coating material contains lead chromate and EGEE.
The transfer efficiency is 65%.

Maximum annual coating sprayed: 25.0 gal/yr
Maximum hourly coating sprayed: 0.5 gal/hr

From MSDS sheets:
Lead chromate: 5 wt%
EGEE: 6 wt%
Coating density: 10 lb/gal

Percent by weight of lead and hexavalent chromium in lead chromate are estimated as follows:
Lead = (MW of Pb / MW of PbCrO4) x wt% of lead chromate in paint
= (207 lb Pb/323 lb PbCrO4) x 0.05 = 0.032 = 3.2 wt%

Hexavalent chromium = (MW of Cr^{+6} / MW of PbCrO4) x wt% of lead chromate in paint
= (52 lb Cr^{+6}/323 lb of PbCrO4) x 0.05 = 0.008 = 0.8 wt%

The maximum yearly and hourly emissions are estimated as follows:
Lead:
Qyr (lb/yr) = 25 gal/yr x 10 lb/gal x 0.032 x (1 - 0.65) = 2.8
Qhr (lb/hr) = 0.5 gal/hr x 10 lb/gal x 0.032 x (1 - 0.65) = 0.056

Hexavalent Chromium:
Qyr (lb/yr) = 25 gal/yr x 10 lb/gal x 0.008 x (1 - 0.65) = 0.7
Qhr (lb/hr) = 0.5 gal/hr x 10 lb/gal x 0.008 x (1 - 0.65) = 0.014

EGEE:
Qyr (lb/yr) = 25 gal/yr x 10 lb/gal x 0.06 = 15
Qhr (lb/hr) = 0.5 gal/hr x 10 lb/gal x 0.06 = 0.3

Emission rates for the TACs are listed in Table A below.

Table A

Toxic Air Contaminant	**Emission Rate**		
	Qhr(Max.) (lbs/hr)	**Qyr (lbs/yr)**	**QYR (tons/yr)**
Lead	0.056	2.8	0.0014
Hexavalent chromium	0.014	0.7	0.00035
EGEE	0.3	15	0.0075

(The list of TACs and their corresponding emission rates are for illustration purposes only. They may not reflect actual conditions.)

Calculate the MICR and Cancer Burden using the same method as in the previous example. The results of the calculations are:

MICR:

Worker:

TAC	MICR
Lead	7.40×10^{-9}
Hexavalent Chromium	7.64×10^{-6}
Total	**7.65×10^{-6}**

Resident:

TAC	MICR
Lead	3.57×10^{-9}
Hexavalent Chromium	2.59×10^{-6}
Total	**2.59×10^{-6}**

Cancer Burden:

CB = 0.20

Hazard Index Calculations

Acute and Chronic Hazard Indices should be calculated for each target organ. The calculation of the acute hazard index for compounds with RELs developed based on 4, 6, or 7 averaging hours is slightly different than the calculation for compounds with RELs developed based on 1 hour average.

Acute Hazard Index:

For all acute compounds with RELs developed based on a 1 hour average, the acute hazard indices are estimated using the equation below:

$$HIA = [Q_{hr} \times (X/Q)_{hr}] / REL$$

For acute compounds with RELs developed based on 4, 6, or 7 hours average, the acute hazard indices are estimated as follows:

HIA= $[(Q_{hr} \times (X/Q)_{hr}) / REL] \times AF$
Where,
AF is REL adjustment factor developed for compounds with REL averaged over 4, 6, or 7 hours and listed in Table 8B or 8C based on the source types (point or volume) and location of the source.

Based on Table 10B, the target organs for the TACs have been listed.

EGEE:
Affects Developmental and Reproductive Systems.
The REL for EGEE is averaged over 6 hours. From Table 8B, the AF for EGEE is 0.83 since it is a point source in West Los Angeles.

Note: The X/Q values in Table 6 are based on the maximum hourly emission rates.
Resident X/Q (1000 m) = 8.3 (ug/m^3)/(lbs/hr)
Worker X/Q (500 m) = 24.8 (ug/m^3)/(lbs/hr)

Note: The acute REL is taken from Table 8A.
Acute REL = 370 ug/m^3

The Acute Hazard Index for EGEE is calculated as follows:

Worker: HIA = [(0.3 x 24.8) / 370] x 0.83 **= 0.017**
Developmental and reproductive systems: 0.017

Resident: HIA = [(0.3 x 8.3) / 370] x 0.83 **= 0.006**
Developmental and reproductive systems: 0.006

Chronic Hazard Index:

HIC = Σ [(QYR) **x** (X/Q)chronic **x** MET **x** MP] / (Chronic REL)]

Based on Table 10A, the target organs for the TACs for chronic have been listed. The Chronic Hazard Indices for the TACs in this example are calculated as follows:

Note: The X/Q values are taken from Table 2A.
Resident X/Q (1000 m) = 0.05 (ug/m^3)/(lbs/hr)
Worker X/Q (500 m) = 0.18 (ug/m^3)/(lbs/hr)

Note: The MET is taken from Table 2B.
MET = 1.00

Hexavalent Chromium
Affects respiratory organs.

Note: The MPs and chronic RELs are taken from Table 8A.
MPr = 1.00; MPw = 1.00
Chronic REL = 2.00 x 10^{-1} ug/m^3

The chronic hazard index for hexavalent chromium is:

Resident: HIC = [0.00035 x 0.05 x 1.00 x 1.00] / [2.00 x 10^{-1}] = **8.75 x 10^{-5}**
Respiratory system: 8.75 x 10^{-5}

Worker: HIC = [0.00035 x 0.18 x 1.00 x 1.00] / [2.00 x 10^{-1}] = **3.15 x 10^{-4}**
Respiratory system: 3.15 x 10^{-4}

Ethylene Glycol Ethyl Ether (EGEE)
Affects hematologic systems and reproductive organs.

Note: The MPs and chronic RELs are taken from Table 8A.
MPr = 1.00; MPw = 1.00
Chronic REL = 7.00 x 10^{1} ug/m^3

The chronic hazard index for EGEE is:

Resident: HIC = [0.0075 x 0.05 x 1.00 x 1.00] / [7.00 x 10^{1}] = **5.36 x 10^{-6}**
Hematologic and reproductive systems: 5.36 x 10^{-6}

Worker: HIC = [0.0075 x 0.18 x 1.00 x 1.00] / [7.00 x 10^{1}] = **1.93 x 10^{-5}**
Hematologic and reproductive systems: 1.93 x 10^{-5}

In summary:

Acute Hazard Index (HIA) and Chronic Hazard Index (HIC):

By Target Organs for Acute:

(1) Worker:

TAC	**HIA**	
	REPR	DEV
EGEE	0.017	0.017
Total	**0.017**	**0.017**

(2) Resident:

TAC	HIA	
	REPR	DEV
EGEE	0.006	0.006
Total	**0.006**	**0.006**

By Target Organs for Chronic:

(1) Worker:

TAC	HIC		
	RESP	HEM	REPR
Hexavalent Chromium	3.15×10^{-4}		
EGEE		1.93×10^{-5}	1.93×10^{-5}
Total	**3.15×10^{-4}**	**1.93×10^{-5}**	**1.93×10^{-5}**

(2) Resident:

TAC	HIC		
	RESP	HEM	REPR
Hexavalent Chromium	8.75×10^{-5}		
EGEE		5.36×10^{-6}	5.36×10^{-6}
Total	**8.75×10^{-5}**	**5.36×10^{-6}**	**5.36×10^{-6}**

RESULT:
The spray booth in this example does not contain T-BACT, fails the Rule 1401 MICR limit, and would not be granted a permit. However, if the spray booth was equipped with T-BACT, it would pass the Rule 1401 MICR limit and be granted a permit.

- ***MICRs for residential and commercial receptors exceed 1×10^{-6} (one in one million) but are below 10×10^{-6} (ten in one million).***
- ***Cancer burden is less than 0.5.***
- ***HIAs for residential and commercial receptors do not exceed 1.0 for each target organ.***
- ***HICs for residential and commercial receptors do not exceed 1.0 for each target organ.***

EXAMPLE 4: CONTEMPORANEOUS RISK REDUCTION

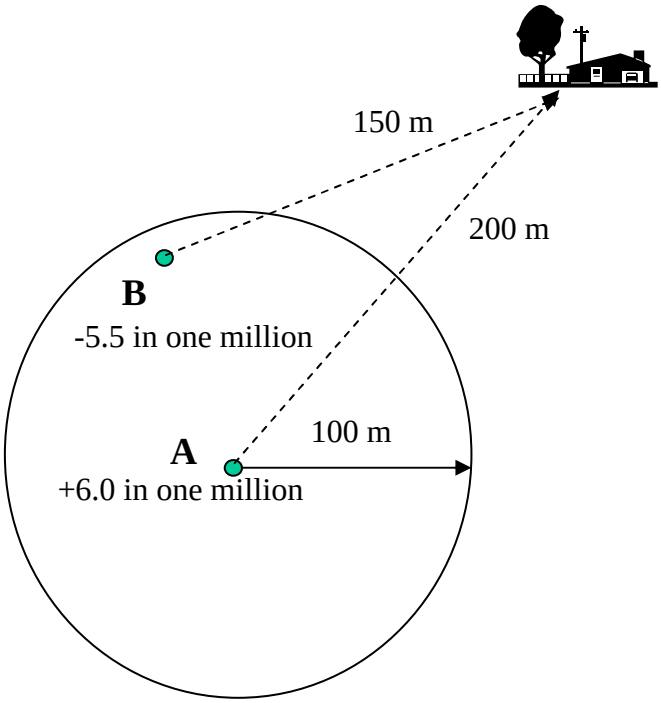
Rule 1401(g)(2)(A): The requirements of paragraph (d)(1) and (d)(4) shall not apply if the applicant demonstrates that a contemporaneous risk reduction resulting in a decrease in emissions will occur such that both of the following conditions are met:

(i) no receptor location will experience a total increase in MICR of greater than one in one million due to the cumulative impact of both the permit unit and the contemporaneous risk reduction, and

(ii) the contemporaneous risk reduction occurs within 100 meters of the permit unit.

T-BACT shall be used on permit units exempted under this subparagraph if the MICR from the permit unit exceeds one in one million (1×10^{-6}).

Note: All permit applications associated with the increases and decreases in risk for contemporaneous risk reduction must be submitted together and the reduction in risk must occur before the start of operation of the equipment that will have an increase in risk.



Assumptions:

Units A and B: Only have cancer impacts.

Unit A: New equipment, installed with T-BACT, MICR = 6.0 in one million

Unit B: Existing equipment with decreased MICR of 5.5 in one million due to change in operating conditions or process. Unit B emissions, prior to modification, resulted in an 8 in a million risk for the nearest receptor. After modification, Unit B risk is 2.5 in a million which is a decrease of 5.5 in a million.

Receptor R1: The increased risk for Receptor R1 is the MICR for Unit A less the decrease in risk for Unit B.

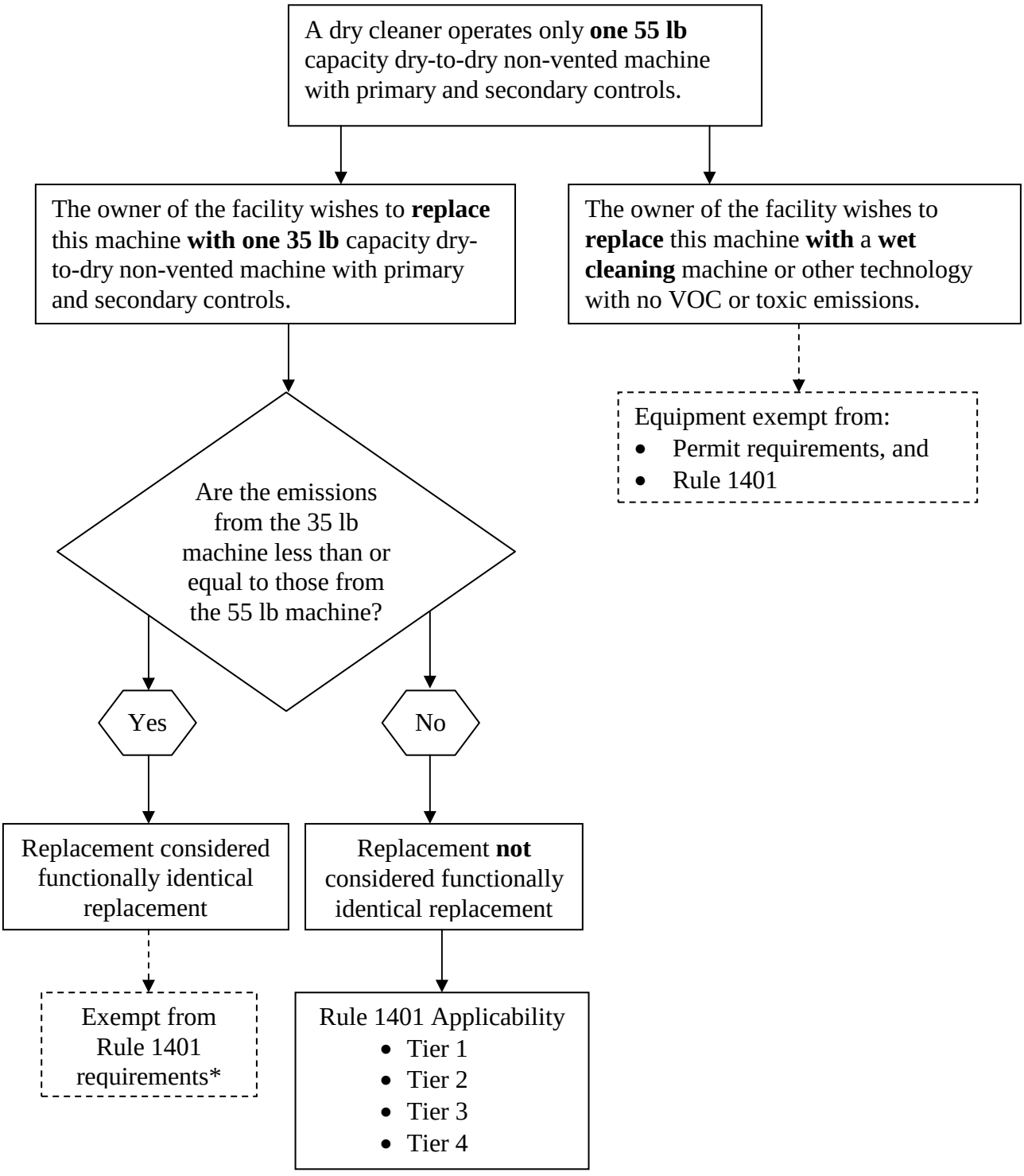
6.0 – 5.5 = **0.5 in one million**.

Note: This demonstaration is best achieved with a Tier 4 analysis (detailed air dispersion modeling) and must be performed for all possible receptors.

RESULT:

- ***Equipment was installed using T-BACT.***
- ***No receptor experiences an increase in risk greater than one in** one **million.***
- ***The contemporaneous risk reduction occurs within 100 meters of the new equipment.***
- ***If all other rule requirements are met, a permit would be issued.***

EXAMPLE 5: FUNCTIONALLY IDENTICAL EQUIPMENT REPLACEMENT



* Rule 1421(d)(1)(F) allows for the functionally identical equipment replacement of **only one** machine. Please note that all perchloroethylene machines must comply with Rule 1402 as well.

BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (T-BACT) is not required if the MICR is less than or equal to one in one million. If cancer risk is greater than one in one million, T-BACT is required and must reduce risk to less than or equal to 10 in a million.

SIC Codes, which describe industry types or classifications, or SCC Codes, which describe emitting processes or equipment, can be used to help identify T-BACT. If no standard is available, AQMD staff works with the applicant to identify T-BACT when required.

AQMD staff is continually examining and updating control technologies that comply with the definition presented in Rule 1401(c)(2). However, in many situations T-BACT is equivalent to BACT. The applicant is encouraged to contact the AQMD permit processing division for current T-BACT information.

T-BACT EXAMPLES

Type of Industry:	*Petroleum*
Type of Emitting Process:	***Sulfur Recovery Unit***
Specific TAC Emissions:	***Benzene, Formaldehyde***
Applicable BACT:	*Thermal Oxidizer*
T-BACT:	*Thermal Oxidizer*

BACT = T-BACT

With T-BACT, risk is 10 in one million or less

T-BACT is acceptable

Type of Industry:	*Metal Plating*
Type of Emitting Process:	***Nickel Plating, Chromium Plating***
Specific TAC Emissions:	***Nickel, Hexavalent Chromium***
Applicable BACT:	*Wet Scrubber*
T-BACT:	*HEPA*

With T-BACT, risk is 10 in one million or less

T-BACT is acceptable

REFERENCES

Blaisdell, Robert, et. al. 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* California Environmental Protection Agency, Office of Environmental Health Hazard Assessment.

Chico, Thomas. 1994. *Development of Modeling and Screening Risk Assessment Procedures for Dry Cleaning Facilities.* South Coast AQMD.

Chico, Thomas. 1994. *Development of Modeling and Screening Risk Assessment Procedures for Volume-Type Sources.* South Coast AQMD.

APPENDIX I

Calculation Worksheets

Maximum Individual Cancer Risk (MICR) Calculation Worksheet
Acute Hazard Index (HIA) Calculation Worksheet
Chronic Hazard Index (HIC) Calculation Worksheet

Maximum Individual Cancer Risk (MICR) CALCULATION WORKSHEET

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment is (circle one): **Point Source** or **Volume Source**

Toxic Air Contaminants Emitted by Equipment	Maximum Annual Emissions in lb/yr	Maximum Annual Emissions in tons/yr(Qtons)	CP (Table 8A)	MP MICR (Table 8A)	
				Resident	Worker
1.					
2.					
3.					

Equipment operates (circle one) ≤ **12 hr/day** or > **12 hr/day**

If equipment is a **point source**, enter **Stack Height:** _____ ft

If equipment is a **volume source**, enter **Building Height:** _____ ft & **Floor Area:** _____ ft^2

Distance **to nearest residential or sensitive receptor:** _____ m & **off-site worker receptor:** _____ m

Nearest **AQMD meteorological station:** _____ (Table 11 & Fig 1)

Select **X/Q, MET, and AF_{ann} Tables** as follows (circle tables selected)

	Point Source	Volume Source
≤ 12 hr/day	Tables 2A, 2B, 2C	Tables 4A, 4B, 2C
> 12 hr/day	Tables 3A, 3B, 3C	Tables 5A, 5B, 3C

X/Q value for nearest residential/sensitive receptor: _____ for nearest off-site worker receptor: _____

AF_{ann} value for nearest residential/sensitive receptor: 1.0 for nearest off-site worker receptor: _____

MET value _____

DBR value for nearest residential/sensitive receptor: 302 (Table 9A)

DBR value for nearest off-site worker receptor: 149 (Table 9A)

EVF value for nearest residential/sensitive receptor: 0.96 (Table 9B)

EVF value for nearest off-site worker receptor: 0.38 (Table 9B)

MICR CALCULATION

TACs	CP		Q_{tons}		X/Q		AF_{ann}		MET		DBR		EVF		10^{-6}		MP		MICR
1.		**x**		**x**		**x**		**x**		**x**		**x**		**x**	10^{-6}	**x**		=	
2.		**x**		**x**		**x**		**x**		**x**		**x**		**x**	10^{-6}	**x**		=	
3.		**x**		**x**		**x**		**x**		**x**		**x**		**x**	10^{-6}	**x**		=	
4.		**x**		**x**		**x**		**x**		**x**		**x**		**x**	10^{-6}	**x**		=	

MICR = _____

Acute Hazard Index (HIA) CALCULATION WORKSHEET

Target Organ: _____

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment is (circle one): **Point Source** or **Volume Source**

If equipment is a **point source**, enter:

Stack Height: _____ ft

If equipment is a **volume source**, enter

Building Height: _____ ft & **Floor Area**: _____ ft^2

Distance **to nearest residential or sensitive receptor:** _____ meters

Distance to **nearest off-site worker receptor**: _____ meters

Nearest **AQMD meteorological station:** _____

Select **X/Q_{hr}:** _____

Select **AF** for compounds with 4, 6, or 7 hour averaging times: _____

Select **X/Q_{hr}** from Table 6 if Point Source or from Table 7 if Volume Source

Select **Acute REL** from Table 8A

Select **AF** from Table 8B if Point Source or from Table 8C if Volume Source

Toxic Air Contaminants Emitted by Equipment	Maximum Hourly Emissions in lb/hr	Peak Hourly Dispersion Factor X/Q-hr	Acute Reference Exposure Level (REL)	Adjustment Factor (AF)
1.				
2.				
3.				

ACUTE HAZARD INDEX (HIA) CALCULATION:

$[Qhr \times (X/Q)_{hr}] / (Acute\ REL) \times AF$

Contaminants	Q_{hr}		X/Q-hr		REL		AF		HIA
1.		**x**		/		**x**		=	
2.		**x**		/		**x**		=	
3.		**x**		/		**x**		=	

Chronic Hazard Index (HIC) CALCULATION WORKSHEET

Target Organ: _____

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment operates (circle one) ≤ **12 hr/day** or > **12 hr/day**

Equipment is (circle one): **Point Source** or **Volume Source**

If equipment is a **point source**, enter:

Stack Height: _____ ft

If equipment is a **volume source**, enter

Building Height: _____ ft & **Floor Area**: _____ ft^2

Distance **to nearest residential or sensitive receptor:** _____ meters

Distance to **nearest off-site worker receptor**: _____ meters

Nearest **AQMD meteorological station:** _____

Select **X/Qyr and MET Tables** as follows (circle tables selected)

	Point Source	Volume Source
≤ 12 hr/day	Tables 2A and 2B	Tables 4A and 4B
> 12 hr/day	Tables 3A and 3B	Tables 5A and 5B

Select **Chronic REL** and **MP Chronic** from Table 8A

Toxic Air Contaminants Emitted by Equipment	Maximum Annual Emissions in lb/yr	Maximum Annual Emissions in tons/yr (Qyr)	Dispersion Factor (X/Q)	Chronic Reference Exposure Level (REL)	Meteorological Correction Factor (MET)	Multi-pathway Factor Chronic (MP Chr)
1.						
2.						
3.						

CHRONIC HAZARD INDEX (HIC) CALCULATION:

Σ [(Qyr) x (X/Q) x MET x MP] / (Chronic REL) for each TAC

Contaminants	Qyr		X/Q		MET		MP		REL		TAC
1.		**x**		**x**		**x**		/		=	
2.		**x**		**x**		**x**		/		=	
3.		**x**		**x**		**x**		/		=	

APPENDIX II

Derivation of Tier 2 Multi-pathway Adjustment Factors (MP) and Meteorological Correction Factors (MET)

DERIVATION OF TIER 2 MULTI-PATHWAY ADJUSTMENT FACTORS (MP)
AND METEOROLOGICAL CORRECTION FACTORS (MET)

MULTI-PATHWAY FACTORS (MP)

Toxic air contaminants enter the body through a number of routes: inhalation; absorption through the skin; and ingestion from contaminated food, water, milk and soil. To account for uptake of toxics through routes of exposure other than inhalation, risk assessments often include a "multi-pathway" exposure analysis.

To simplify the screening risk assessment, multi-pathway adjustment (MP) factors were developed. The inhalation risk is multiplied by the MP factors to account for the additional health risk due to other pathways of exposure.

AQMD staff has previously developed multi-pathway factors in its risk assessment and screening procedures. For this update of the risk assessment procedures, the methodology has been updated and multi-pathway factors have been developed for additional compounds.

The MP factors were developed using the Hotspots Analysis and Reporting Program (HARP), version 1.0 (build 21.09.03), a computer software package combining the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. Assumptions and parameters used to develop the MP factors are listed below:

Dispersion model options:

- Use Regulatory Default – No
- Rural or Urban – Urban
- Gradual Plume Rise – Yes
- Stack Top Downwash – Yes
- Buoyancy Induced Dispersion – Yes
- Calms Processing – No
- Emission rate = 1 pound per year

Risk assessment options:

- Deposition velocity – 0.02 m/sec
- Fraction of homegrown fruits and vegetables consumed – 5.2%
- For noncancer chronic risk estimates, the "Derived (OEHHA)" risk analysis method is used. In this approach, the two dominant (driving) exposure pathways use the high-end point-estimates of exposure, while the remaining exposure pathways use average point estimates.
- For cancer risk estimates, the "Derived (Adjusted)" risk analysis method is used. This method is identical to the "Derived (OEHHA)" method discussed above with one

exception. The "Derived (Adjusted)" method uses the breathing rate at the 80th percentile of exposure rather than the high-end point-estimate when the inhalation pathway is one of the dominant exposure pathways.

- The cancer risk estimates, including the Derived equations (both OEHHA and Adjustsed), are based on 70-year exposures.
- Pathways considered for residential exposure include inhalation, soil ingestion, dermal absorption, homegrown produce, and mother's milk.
- Pathways considered for worker exposure include inhalation, soil ingestion, and dermal absorption.
- The chronic multipathway factors (resident and worker) for the group listing of polychlorinated biphenyls (CAS number 1336-36-3) has been assigned those of its individual subspecies (18.08 and 10.27, respectively). (The group listing of PCBs does not include the Toxicity Equivalency Factors as developed by the World Health Organization 1997 and as adopted by the Office of Environmental Health Hazards Assessment in 2003.)

METEOROLOGICAL CORRECTION FACTORS (MET)

In order to derive the meteorological correction (MET) factors, detailed air dispersion modeling was performed for all 35 AQMD meteorological stations. It was noted that West Los Angeles (Figure 1) generally yielded the highest concentrations at every downwind distance. MET correction factors were developed for the other 34 meteorological stations by dividing their predicted concentrations by those for West Los Angeles, with the highest factor chosen among the receptors at 50, 75, and 100 meters for each station.

APPENDIX III

PROCEDURES FOR ADDRESSING NON-DETECTED COMPOUNDS AND BLANKS IN RISK ASSESSMENT

Procedures for Addressing Non-detected Toxic Air Contaminants and Blanks in Risk Assessment

INTRODUCTION

This appendix describes guidelines for estimating emissions of non-detected toxic air contaminants (TACs) and using blanks in emissions estimations for purposes of preparing health risk assessments for Rules 1401, 1402 and the Air Toxics "Hot Spots" program (AB 2588). Procedures are the same for preparing risk assessments for Rules 1401, 1402 and AB2588, however the lists of compounds are different. Rule 1401 uses only cancer potency factors (CPc) and reference exposure levels (RELs) approved by the Scientific Review Panel and prepared by the state Office of Environmental Health Hazard Assessment (OEHHA), whereas Rule 1402 and AB2588 use different sources for CPs and RELs, including draft numbers.

Under previous policy, the AQMD required that if a TAC could be present in emissions from a source but not detected during air testing, it must be assumed to be present below the limit of detection (LOD). This approach has been applied to stack testing, to measurements such as laboratory analysis of materials, and other monitoring and measurement methods. The concentration of non-detected TACs were to be reported as one-half (1/2) of the LOD.

Concerns were raised that this policy of carrying undetected TACs through a health risk assessment at half of the LOD could inflate risk estimates and might require facilities to install control equipment for emissions that may not be present. In addition, it would not be possible to detect the TAC after its emissions had been controlled and reduced.

Also, in the past, the AQMD did not allow any adjustments in the measured values of samples based on the results of reagent blanks. Concerns were raised that in certain cases the concentration of TACs measured in reagent blanks should be deducted from the actual measured samples.

To address these concerns, AQMD staff worked closely with affected facilities such as publicly owned treatment works (POTWs) and others during previous rulemaking efforts for Rules 1401 and 1402 to develop guidelines for addressing non-detected TACs and blanks in risk assessment.

OVERVIEW

The new approach begins with an initial level of screening to determine whether or not a TAC is likely to be present and therefore should be tested for. If the conditions in the screening guidelines are met, no further testing or analysis is required. If a TAC does not pass the screening guidelines, the facility must quantify and report the emissions of the compound through testing or other methods as approved by AQMD staff. The reported emission levels are calculated based on the number of test runs or analyses that are below the LOD.

SCREENING GUIDELINES

For a TAC to be excluded from testing or analysis and hence quantification for health risk assessment, it must meet either condition A, B, or C listed below.

Proof for exclusion of any TAC based on literature studies on physical nature or chemistry of the compounds to substantiate the findings, and any prior analysis or testing shall be deemed complete for AQMD approval. Any prior testing must have been conducted according to AQMD's approved test methods or other recognized standards, as approved by AQMD staff.

If a list of TACs to be tested for is agreed upon but is subsequently discovered by the facility or the AQMD that additional compounds may be present, AQMD staff may require that the facility test for the presence of the additional TACs.

The screening criteria to be used for determining the presence of TACs are the following.

Condition A: No likelihood of the presence of a TAC

A facility may choose to demonstrate that there is no likelihood of a TAC being present in the raw materials, process streams or materials introduced into the equipment or process. The methodology or documentation to show proof of the non-existence of the TAC must be deemed complete with the source test protocol or test method analysis protocol for AQMD approval. If the evidence to substantiate the absence of a TAC is insufficient, or AQMD staff has reason to believe that the TAC may be present, it must be tested for and quantified (see Cases 1, 2, and 3).

For example, a facility operator can demonstrate the absence of cadmium in emissions from the melting of lead ingots in a pot furnace by presenting the following documentation:

- Certified analysis of the lead ingots showing that cadmium is not a constituent of the ingot.
- Description of the process substantiating that no other material is added to the furnace that will contribute to cadmium emissions. The operator must also provide analysis for the fuel used in the process to demonstrate that it does not contain cadmium.
- Documentation substantiating that melting lead ingots without cadmium present in the ingot in a pot furnace will not result in the emissions of cadmium when the firebricks or pot liner are heated during the melting operations.

In addition, the facility operator may submit test results based on tests performed within the last two years, or a longer period if the facility can demonstrate that no significant changes have occurred to the AQMD-approved test method, process equipment or process materials, that indicate cadmium was reported as below LOD.

Condition B: Absence of a TAC or its precursors in the process

If there is any evidence that precursors, which could lead to formation of a TAC during a process or reaction, may be present, then a facility may have to test for the TAC. To be excluded from testing and quantification requirements, the facility must provide documentation to demonstrate, based on test results, that none of the essential precursors are present in the material or process. This is similar to the previous criteria and differs only in that precursor compounds that could contribute to the formation of the subject TAC must also be identified as not being present.

An example is emission of dioxins from a waste incinerator. In this case, test data may be available to show that there are no dioxins present in the waste stream being incinerated. However, the presence of chlorine and hydrocarbons in the combustion process could result in the formation of products of incomplete combustion (PICs) such as dioxins or other toxic compounds. Testing for these compounds would be required unless the facility operator demonstrates that none of the essential precursors are present in the waste stream or the process itself.

Condition C: Special TAC list for POTWs

Unlike other industrial sources whose potential toxic air emissions are relatively well defined and which contain limited species, proving the absence of TACs from emissions from POTWs is more difficult. This is because the instantaneous discharge of wastewater from various residential, commercial and industrial system users could potentially result in the presence of different toxic contaminants in the influent sewage. Therefore, it is recommended that a special TAC list be developed for POTWs to select appropriate TACs for testing and determination of health risk associated with air emissions from liquid phase and sludge treatment processes.

The special TAC list for POTWs will be approved by AQMD staff with consideration given to information including but not limited to the following:

1. The Pooled Emission Estimating Program (PEEP) identified and selected compounds under the AB 2588 emissions inventory program, as approved by AQMD staff.

2. The Joint Emissions Inventory Program (JEIP) identified and selected compounds under AQMD Rule 1179 inventory requirements, as approved by AQMD staff.

3. TACs that have a reasonable likelihood of being present in the air emissions of POTWs, based on other test results or information sources, as approved by AQMD staff.

Additionally, based on the specific sources of sewage for certain POTWs, specific TACs in addition to the ones identified through the above steps could be added or deleted from the list on a case-by-case basis.

Based on the special TAC list for POTWs as developed from the above procedure and subject to approval by AQMD staff, facilities will be required to quantify the listed compounds through testing or other methods approved by AQMD staff for inclusion in the health risk assessment. The facility will not have to test for compounds not included in the special TAC list for POTWs, and the inclusion of non-listed TACs in the health risk assessment is not required. However, if after the industry-specific list is developed and approved, the facility or the AQMD later discovers information that additional TACs may be present, AQMD staff may revise the industry-specific list and may require the facility to quantify emissions of such TACs that were previously excluded from quantification.

QUANTIFICATION OF EMISSIONS BASED ON SOURCE TEST RESULTS

The cases listed below explain the process for quantification of emissions based on the source test results.

Treatment of Test Runs Below LOD

If some test runs are below LOD, quantification of the TAC depends on the percent of the test runs and analyses that are below LOD. Three possible scenarios are discussed below. In all of these cases, all of the following three conditions must be met:

1. All tests should be performed using AQMD-approved test methods, triplicate sample runs and AQMD-approved detection limits. When non-detected values are reported, the actual analytical limit of detection for all runs and the number of sample runs shall be reported; and

2. The data from the analyses or tests were obtained within a period of two (2) years prior to the time the data is to be used by AQMD staff, unless the facility demonstrates to the AQMD's satisfaction that earlier test data remain valid due to lack of significant changes in test methods, process equipment or process materials; and

3. For cyclic operations or variations in feedstock, the tests or analyses conducted should be representative of the variations in loads, feed rates and seasons, if applicable. In such cases, an adequate number of test runs should be conducted for all cyclic or seasonal operations.

Case #1: TAC is not detected in any test runs or analyses

In situations in which all test runs and analyses consistently indicate levels below the LOD, the compound can be identified as "not detected" and its inclusion in the health risk assessment will not be required, provided all three conditions listed above are met.

Case #2: TAC is detected in less than 10% of the test runs or analyses

In situations in which a compound has been detected and the percentage of samples in which it is detected is less than ten percent, and provided that all three conditions listed above are met, the following procedure shall be used to average the results:

1. For those runs or analyses that were below LOD, assign zero.
2. Average the measured values obtained for the runs that were above LOD with zero values for the runs below LOD and report the final average result for use in the risk estimation.

Case #3: TAC is detected in 10% or more of the test runs or analyses

In cases in which ten or more percent of the test runs and analyses show measured values of a TAC above the LOD, and provided that all three condition listed above are met, the following procedure shall be used to average the results:

1. For those runs or analysis that were below LOD, assign one half (1/2) of the corresponding LOD for each run.
2. Average the measured values obtained for the runs that were above LOD with 1/2 LOD values for the runs below LOD and report the final average result for use in the risk estimation.

In cases in which there are fewer than ten samples (for example, two triplicate samples have been taken) and a TAC has been detected in one or more samples, the following procedures shall be used.

- If the TAC is detected in one sample, use Case #2.
- If the TAC is detected in two or more samples, use Case #3.

Use of Reagent Blanks

Reagent blank values may be subtracted from sample values under the conditions specified below. In order to use these procedures, it will be necessary to obtain from AQMD staff, prior to the test or analyses, a determination as to the maximum allowable value for the blank.

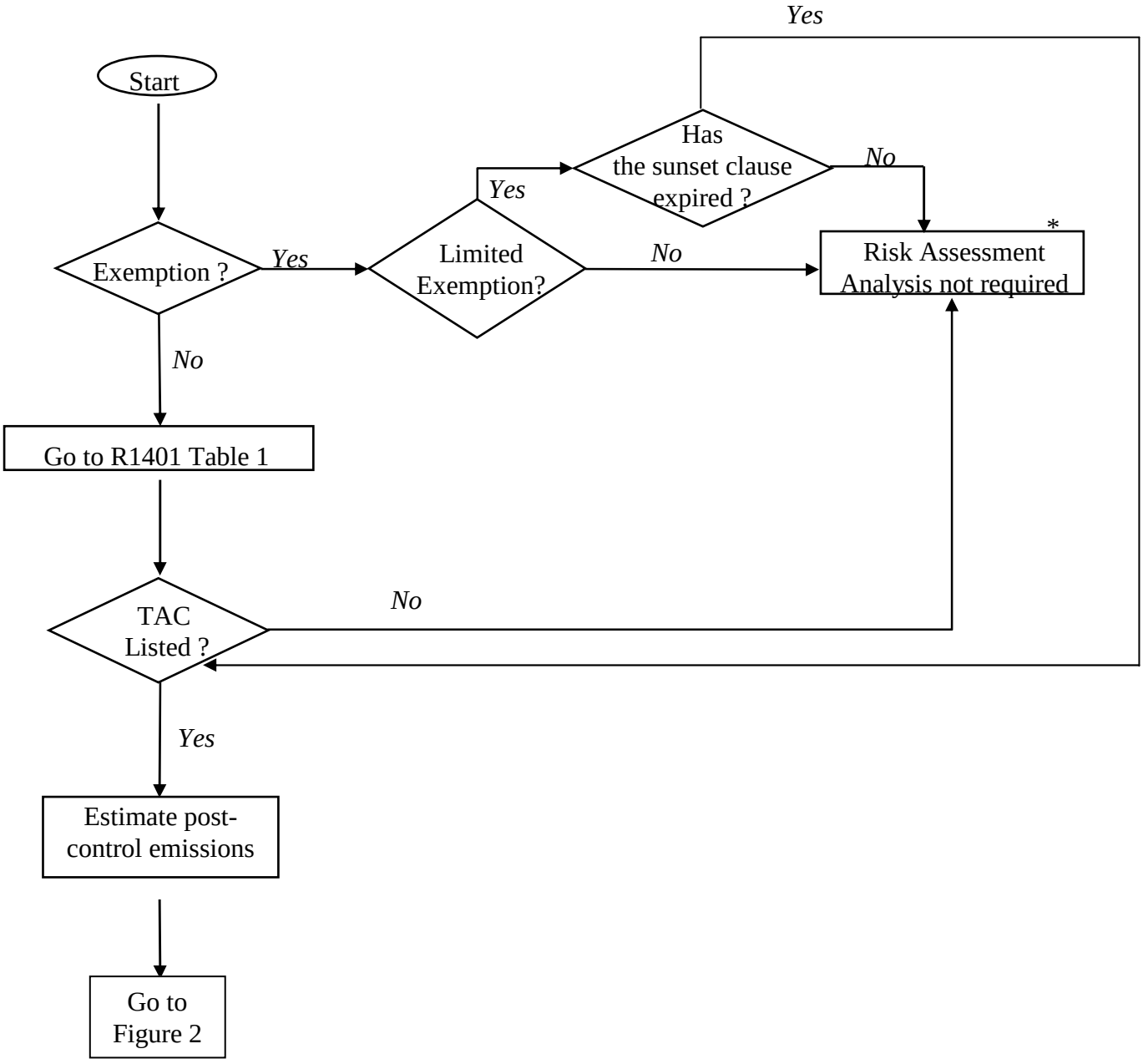
If the level of the TAC in the reagent blank is less than or equal to the maximum allowable blank, the reagent blank may be subtracted. The data must be reported with and without the correction. If the level of the TAC in the reagent blank is greater than the maximum allowable blank and the concentration of the sample is greater than 3 times the reagent blank value, then the maximum allowable reagent blank value can be subtracted. The data must be reported with and without correction.

APPENDIX IV

FLOW CHARTS AND DIAGRAMS

Note: The reader needs to ascertain the date in which the subject equipment's permit application was deemed complete. This date is used to identify the correct set of permitting tables (see Attachments) to be used for permit processing.

Figure 1
Preliminary Tasks



* Consult with AQMD staff for other TACs not listed in Table 1, which potentially endanger public health or may require a Rule 212 evaluation.

Figure 2
Tier 1 - Screening Levels

Tier 1 involves comparing emissions or source specific units from a piece of equipment to Screening Levels

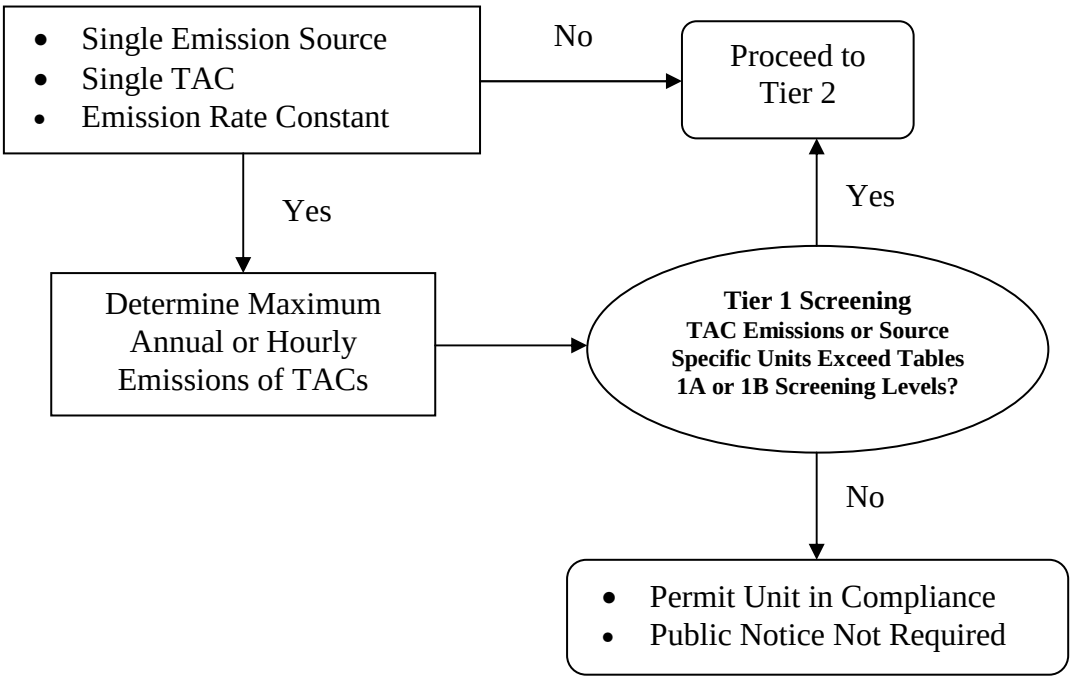
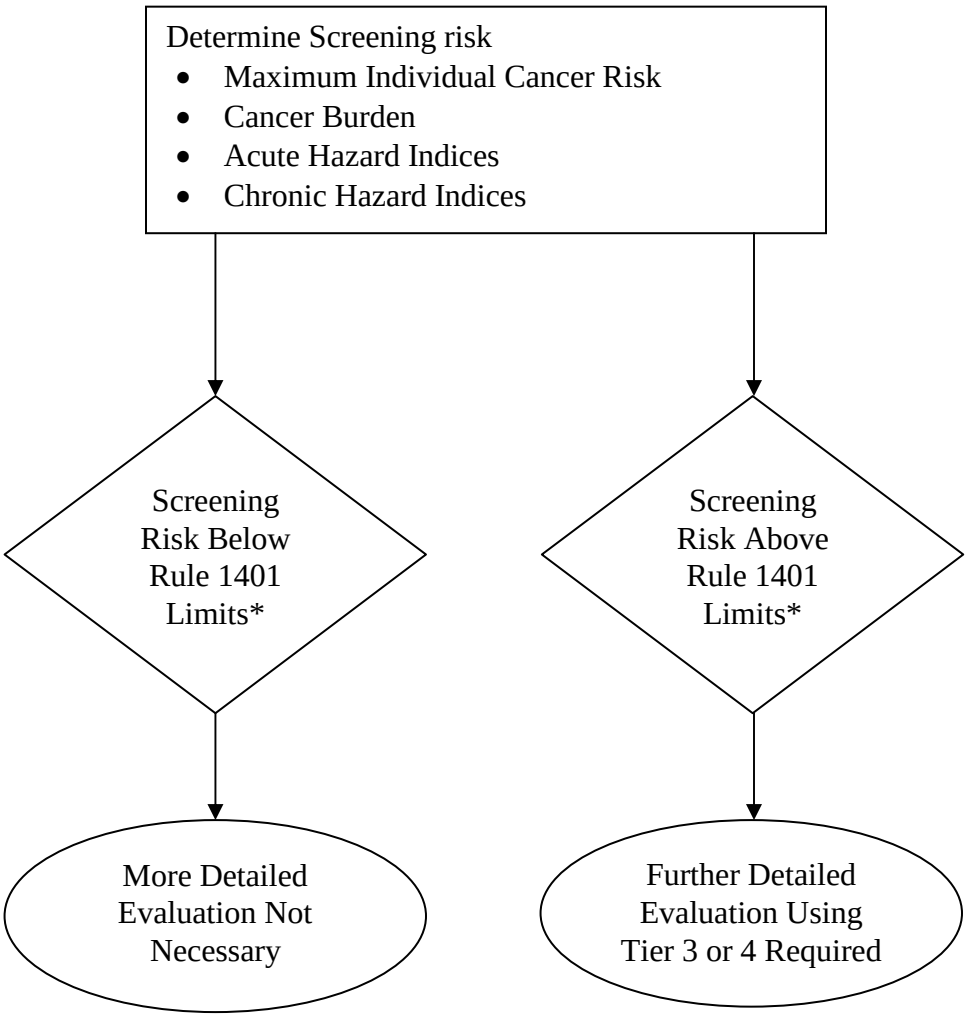


Figure 3A
Tier 2 - Screening Levels

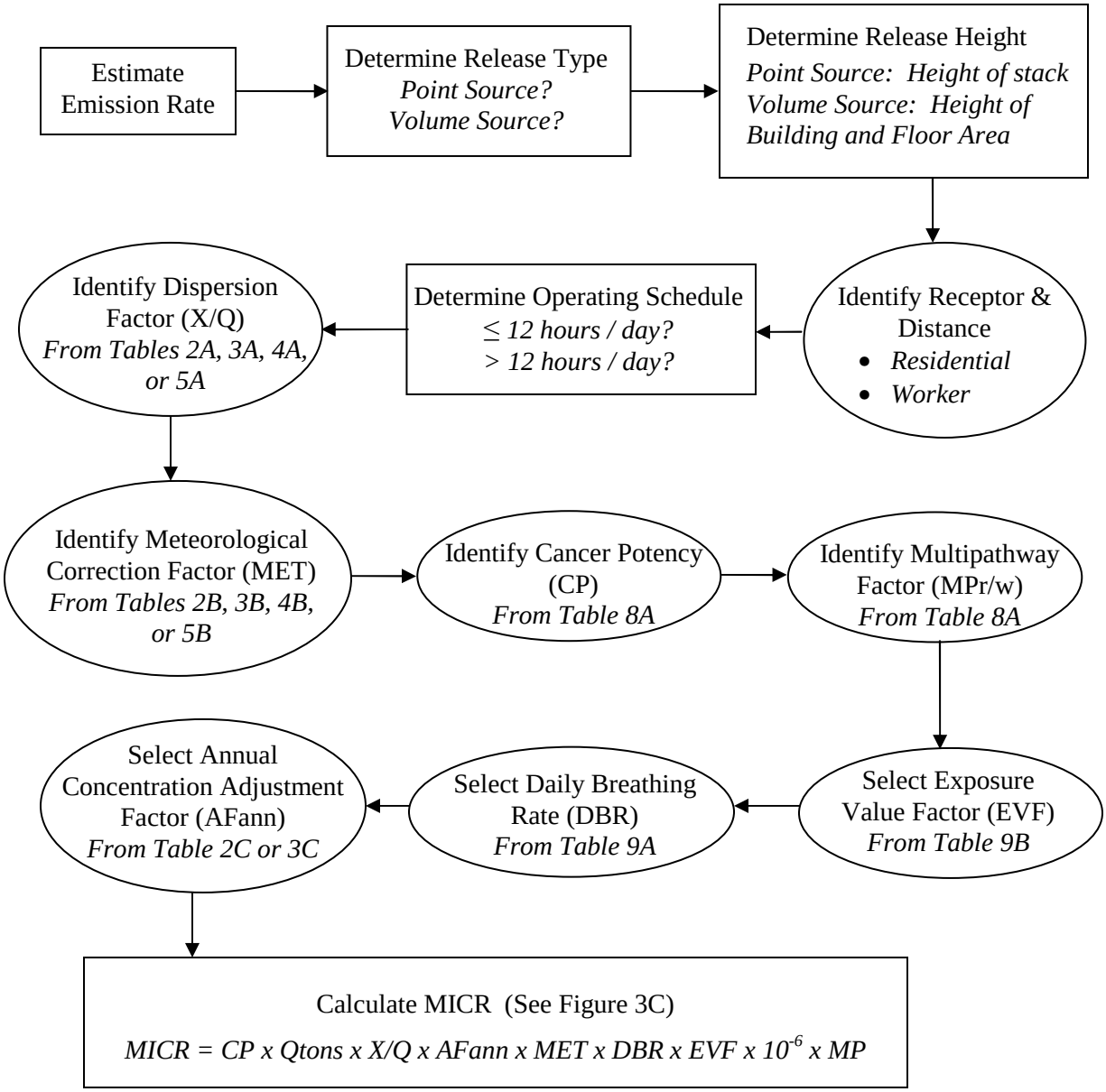
Tier 2 is a screening risk assessment, which includes procedures for determining level of risk from MICR, Cancer Burden, and Acute & Chronic Hazard Indices



* *Level of Concern:*

- *MICR exceeds one in one million with no T-BACT*
- *MICR exceeds 10 in one million with T-BACT*
- *Cancer burden exceeds 0.5*
- *HIA or HIC exceeds 1 for any target organ system*

Figure 3B
Tier 2 - Maximum Individual Cancer Risk (MICR) Calculation



If MICR exceeds one in one million, cancer burden must also be estimated. (See Figure 4.)

Figure 3C
Tier 2 - Maximum Individual Cancer Risk (MICR) Equation

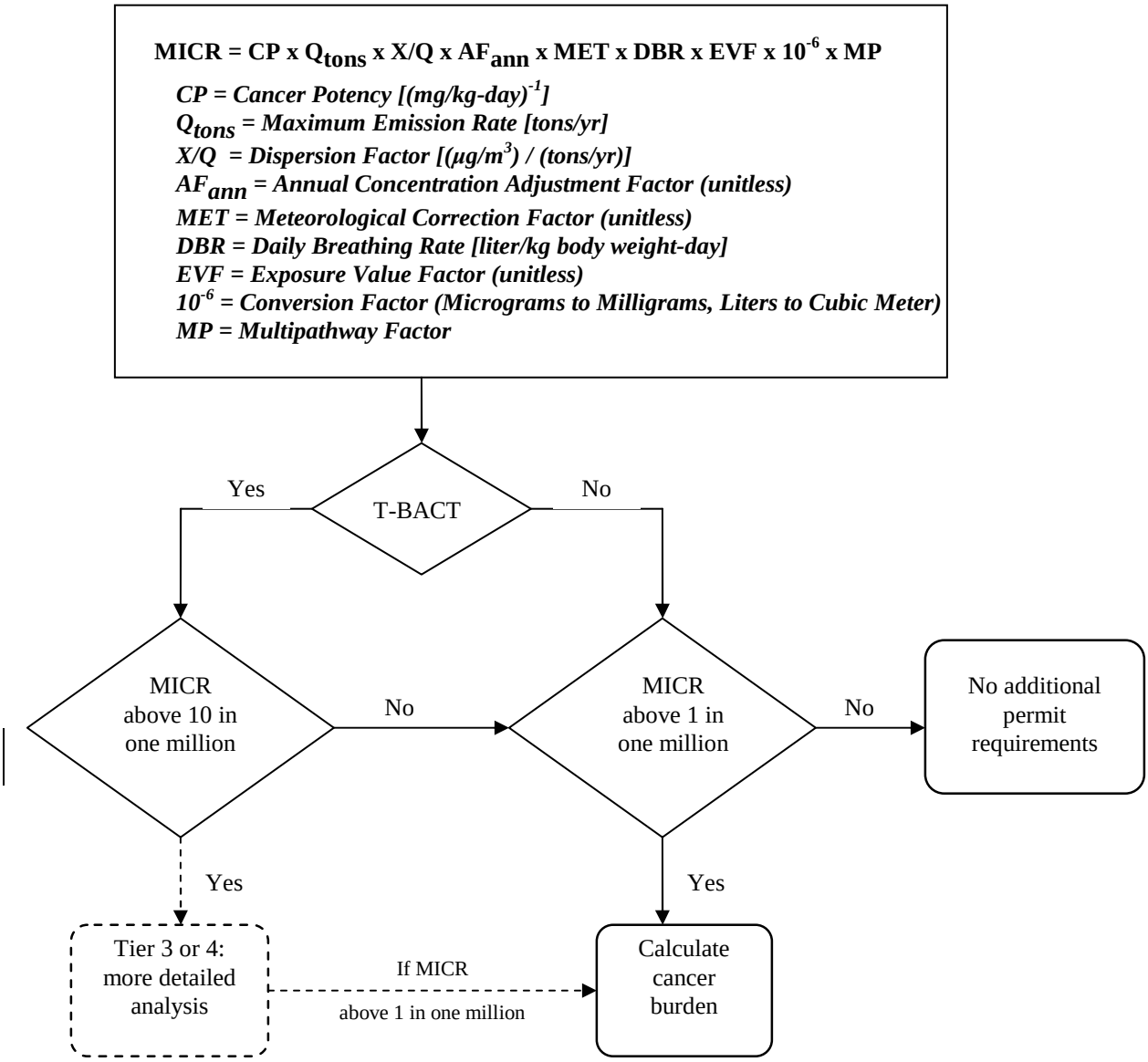


Figure 3D
Tier 2 - Dispersion Factor

Dispersion Factor (X/Q): Numerical estimates of the amount of decrease in concentration of a contaminant as it travels away from the site of release.

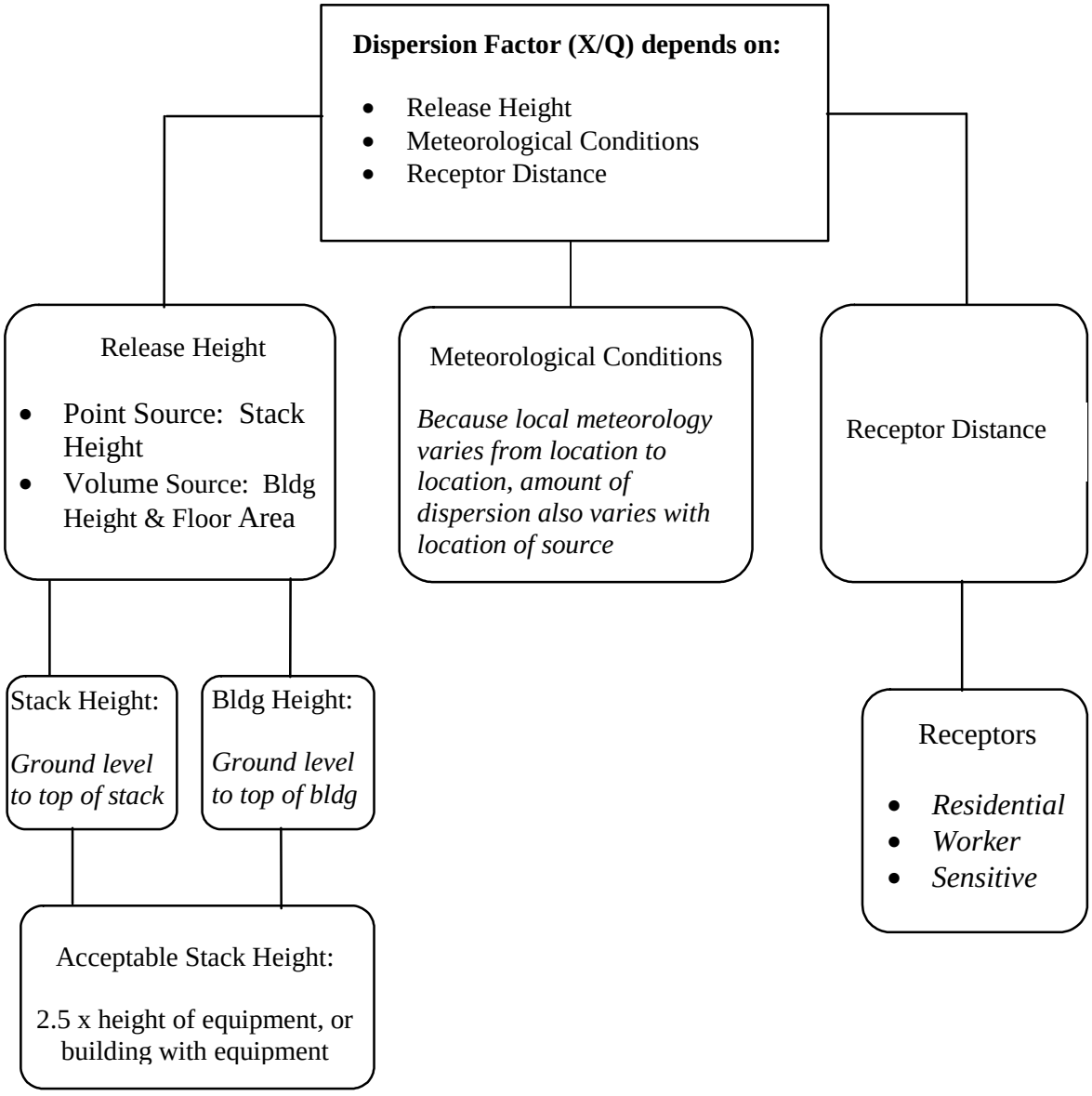


Figure 3E
Tier 2 - Cancer Potency Factor

Cancer Potency Factor (CP)

Cancer Potency Factor (CP)

- *Measure of the cancer potency of a carcinogen*

- *Estimated probability that a person will contract cancer due to inhalation of 1 milligram per kilogram of body weight of TAC continuously over period of 70 years*

Figure 3F
Tier 2 - Multi-pathway Adjustment Factor

Multi-pathway Adjustment Factor (MP)

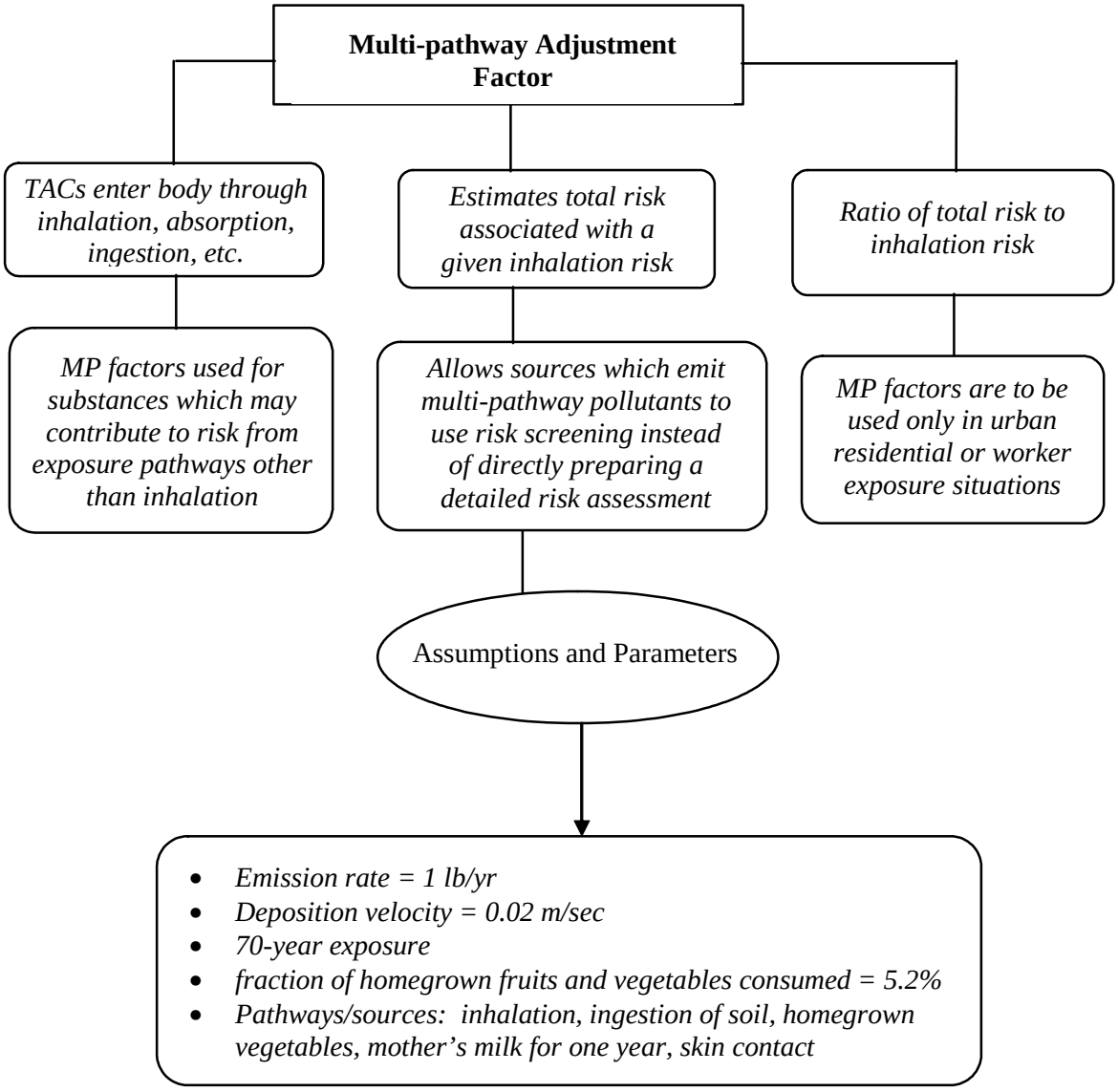


Figure 3G
Tier 2 - Exposure Value Factor

Exposure Value Factor (EVF)

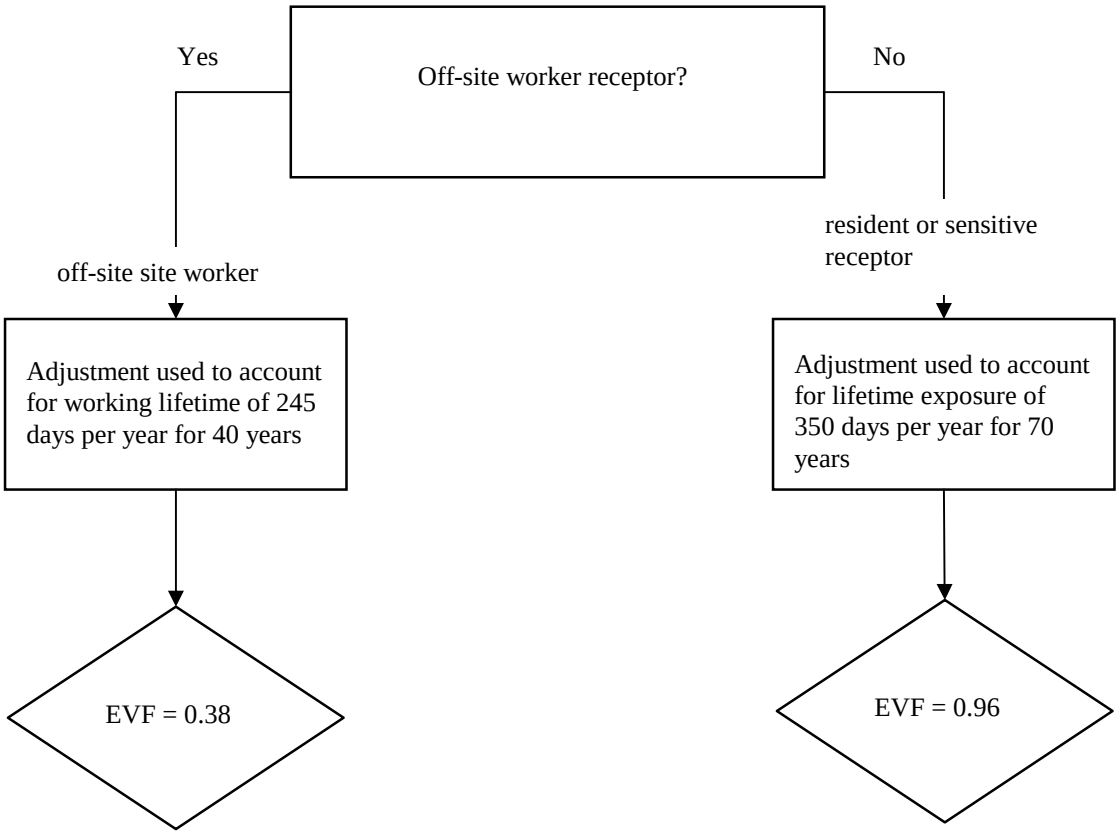


Figure 3H
Tier 2 - Daily Breathing Rate

Daily Breathing Rate (DBR)

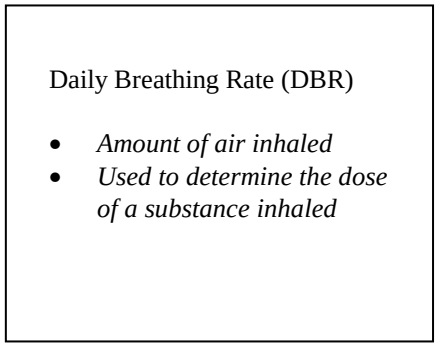


Figure 3I
Tier 2 - Annual Concentration Adjustment Factor

Annual Concentration Adjustment Factor (AF_{ann})

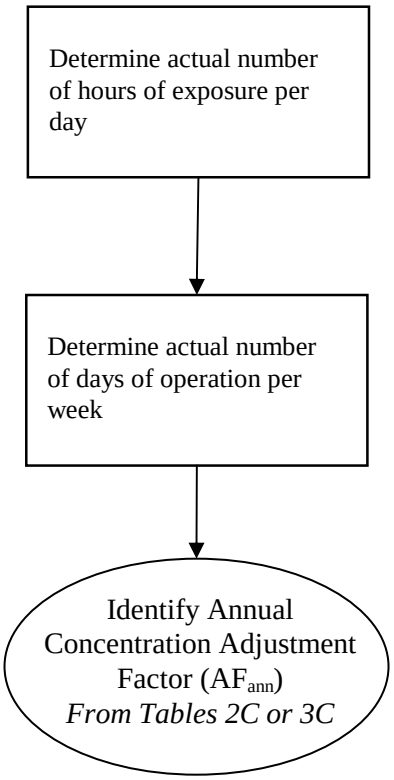


Figure 4
Cancer Burden

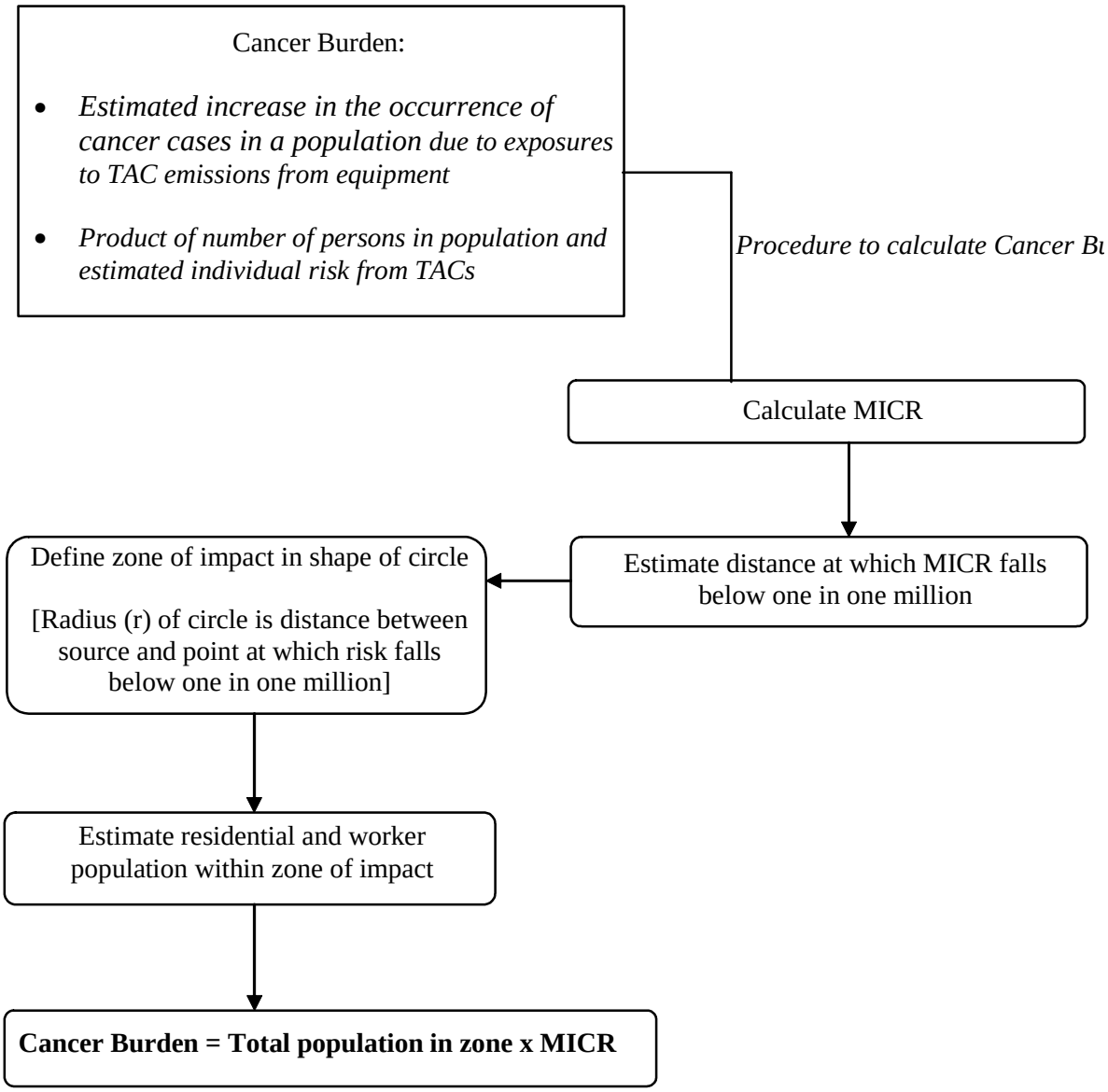
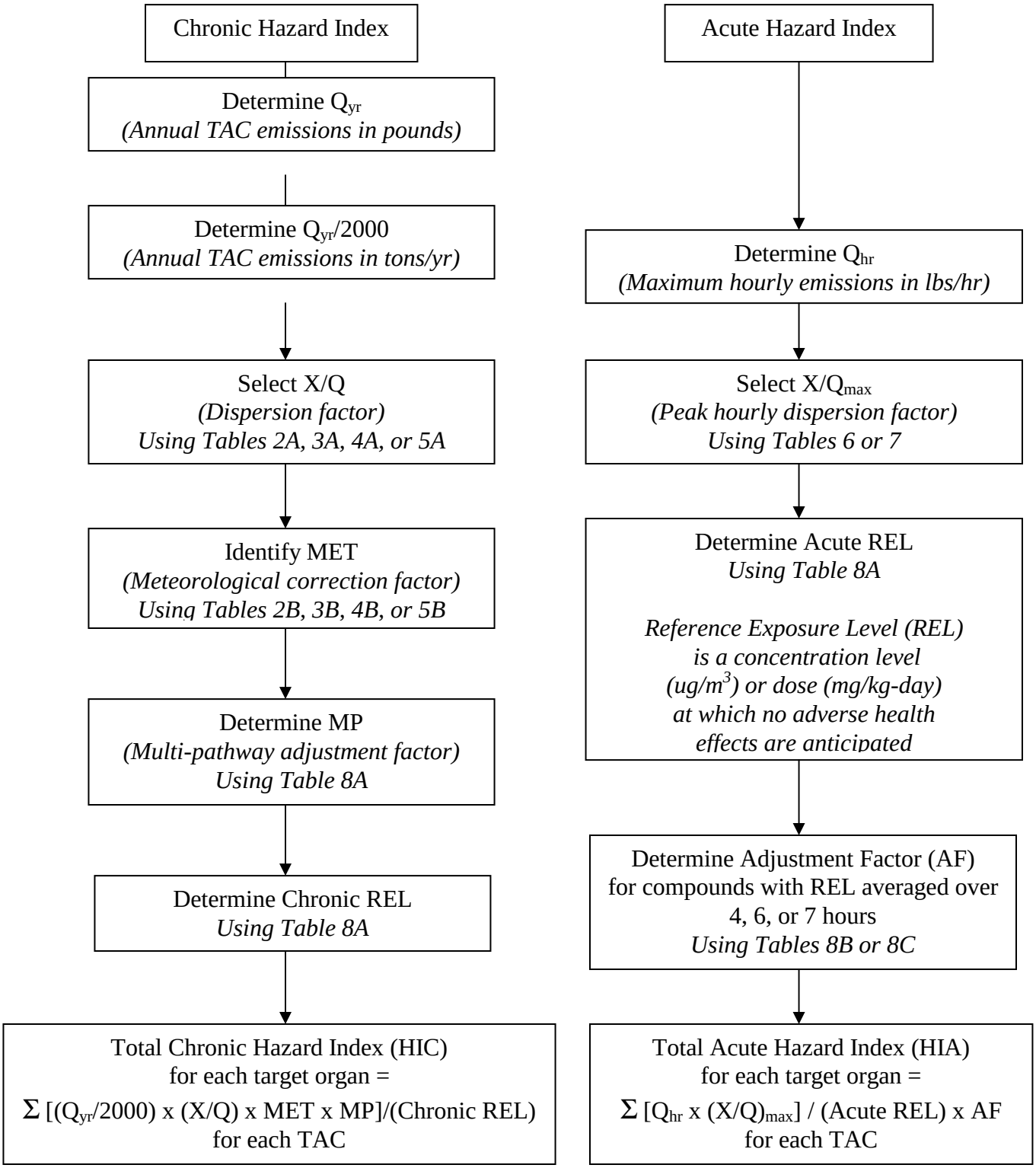


Figure 5
Chronic and Acute Hazard Index (HIC and HIA)



APPENDIX V

RULE 1401 EXEMPTION PROVISIONS

Exemption Provisions

Rule 1401 (g)(1)(A): Permit Renewal or Change of Ownership

Any equipment which is in continuous operation, without modification or change in operating conditions, for which a new permit to operate is required solely because of permit renewal or change of ownership.

Rule 1401 (g)(1)(B): Modification with No Increase in Risk

A modification of a permit unit that causes a reduction or no increase in the cancer burden, MICR or acute or chronic HI at any receptor location.

Rule 1401 (g)(1)(C): Functionally Identical Replacement

A permit unit replacing a functionally identical permit unit, provided there is no increase in maximum rating or increase in emissions of any toxic air contaminants. For replacement of dry cleaning permit units only, provided there is no increase in any toxic air contaminants.

Rule 1401 (g)(1)(D): Equipment Previously Exempt Under Rule 219

Equipment which previously did not require a written permit pursuant to Rule 219 that is no longer exempt, provided that the equipment was installed prior to the Rule 219 amendment eliminating the exemption and a complete application for the permit is received within one (1) year after the Rule 219 amendment removing the exemption.

Rule 1401 (g)(1)(E): Modifications to Terminate Research Projects

Modifications restoring the previous permit conditions of a permit unit, provided that: the applicant demonstrates that the previous permit conditions were modified solely for the purpose of installing innovative control equipment as part of a demonstration or investigation designed to advance the state of the art with regard to controlling emissions of toxic air contaminants; the emission reductions achieved by the demonstration project are not used for permitting any equipment with emission increases under the contemporaneous emission reduction exemption as specified in paragraph (g)(2); the demonstration project is completed within two (2) years; and a complete application is submitted no later than two (2) years after the date of issuance of the permit which modified the conditions of the previous permit for the purpose of the demonstration or investigation.

Rule 1401 (g)(1)(F): Emergency Internal Combustion Engines

Emergency internal combustion engines that are exempted under Rule 1304.

Rule 1401 (g)(1)(G): Wood Product Stripping

Wood product stripping permit units, provided that the risk increases due to emissions from the permit unit owned or operated by the applicant for which complete applications were submitted on or after July 10, 1998 will not exceed a MICR of 100 in one million (1.0×10^{-4}) or a total acute or chronic hazard index of five (5) at any receptor location. This exemption shall not apply to permit applications received after January 10, 2000, or sooner if the Executive Officer makes a determination that T-BACT is available to enable compliance with the requirements of paragraphs (d)(1), (d)(2) and (d)(3).

Rule 1401 (g)(1)(H): Gasoline Transfer and Dispensing Facilities (Expired)

For gasoline transfer and dispensing facilities, as defined in Rule 461 – Gasoline Transfer and Dispensing, the Executive Officer shall not, for the purposes of paragraphs (d)(1) through (d)(5), consider the risk contribution of methyl tert-butyl ether for any gasoline transfer and dispensing permit applications deemed complete on or before December 31, 2003. If the state of California extends the phase-out requirement for methyl tert-butyl ether as an oxygenate in gasoline, the limited time exemption shall be extended to that expiration date or December 31, 2004, whichever is sooner.

Rule 1401 (g)(2): Contemporaneous Risk Reduction

Simultaneous risk reduction such that an increase in MICR or HI from a equipment will be mitigated by a risk reduction from another equipment within 100 meters and the net impact on any receptor will be less than or equal to an increased MICR of 1 in 1 million or an HI of 1, provided that both applications for the increase and decrease are deemed complete together, the risk reduction occurs first, and the reduction is enforceable.

ATTACHMENTS

PERMIT APPLICATION PACKAGES
INCLUDING TABLES

**(Note: Attachment L,
EFFECTIVE FOR APPLICATIONS DEEMED COMPLETE
ON OR AFTER July 1, 2005)**

SCAQMD Tools (Links for models and Calculators)

South Coast Air Quality Management District (SCAQMD) Tools

1. **Risk Assessment Tool for Rule 1401 and 212, Version 7.0**

   This spreadsheet program was developed to assist in determining the cancer and non-cancer health effects pursuant to Rule 1401 Risk Assessment Procedures for Rules 1401 and 212, Version 7.0. It includes specific modules for boilers and internal combustion engines fired by natural gas and for diesel internal combustion engines.

   Link to Calculator and Instructions:

   http://www.aqmd.gov/permit/r1401_risk_assessment.htm

2. **URBEMIS 2007 (version 9.2.4)**

   The URBan EMISsions (URBEMIS) 2007 model (version 9.2.4), estimates air pollution emissions from a wide variety of land use projects. Seven steps are shown to guide the user from start to finish.

   Link to software for the model, as well as the user manual:

   http://www.urbemis.com/software/Urbemis2007v9_4.html

3. **CalEEMod**

   The **Cal**ifornia **E**missions **E**stimator **Mod**el™ is a statewide land use emissions computer model designed to quantify potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operational from a variety of land use projects.

   Link to software for the model, as well as the user manual:

   http://www.caleemod.com/

United States Army Corps of Engineers

Clean Water Act (CWA) Section 404 Permit

Engineering Form 4345 – Application for Department of the Army Permit

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT *(33 CFR 325)*	OMB APPROVAL NO. 0710-0003 EXPIRES: 31 August 2012

Public reporting burden for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This Information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME: First - Middle - Last – Company – E-mail Address –	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) First - Middle - Last – Company – E-mail Address –
6. APPLICANT'S ADDRESS. Address - City – State – Zip – Country –	9. AGENT'S ADDRESS Address - City – State – Zip – Country –
7. APPLICANT'S PHONE NOs. W/AREA CODE. a. Residence b. Business c. Fax	10. AGENT'S PHONE NOs. W/AREA CODE a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable) Address
15. LOCATION OF PROJECT Latitude: °N Longitude: °W	City - State – Zip -

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality
Section – Township – Range –

17. DIRECTIONS TO THE SITE

18. Nature of Activity (Description of project, include all features)

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

Or

Liner Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

24. Is Any Portion of the Work Already Complete? Yes ☐ No ☐ IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

Address –

City – State – Zip –

26. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT _____ DATE _____ SIGNATURE OF AGENT _____ DATE _____

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Rivers and Harbors Appropriation Act (RHAA) Section 10 Permit

Engineering Form 4345 – Application for Department of the Army Permit

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT *(33 CFR 325)*	OMB APPROVAL NO. 0710-0003 EXPIRES: 31 August 2012

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20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

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22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

Or

Liner Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

24. Is Any Portion of the Work Already Complete? Yes ☐ No ☐ IF YES, DESCRIBE THE COMPLETED WORK

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National Oceanic and Atmospheric Administration(NOAA)

Incidental Take Permit and Incidental Take Statement

ESA Instructions

NATIONAL MARINE FISHERIES SERVICE
APPLICATION INSTRUCTIONS FOR PERMITS FOR THE INCIDENTAL TAKE OF ENDANGERED OR THREATENED SPECIES UNDER THE ENDANGERED SPECIES ACT
In coordination with, but not substituting for 50 CFR 222.307
OMB control number (0648-0230) Expiration date for clearance: 03/31/2012

Information Required in the Application

The Assistant Administrator may issue permits to take endangered or threatened marine species incidentally to an otherwise lawful activity under section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA). The information collection associated with the following application instructions is required for the purpose of obtaining such a permit. The information provided will be used to process the incidental take permit in accordance with the ESA, including the solicitation of public comments on the justification of the take of ESA-listed species incidental to proposed activities. The information provided by an applicant in accordance with these instructions is not confidential and is subject to public exposure for comments. Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act, unless that collection of information displays a currently valid OMB Control Number. Public reporting burden for this collection of information is estimated to average 80 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the address below.

An application for a permit should provide all of the following information. The information needed in the application should be presented in the same structure and format shown below to increase processing efficiency. When a question does not apply, do not overlook the category, but indicate Not Applicable (N.A.). In some cases, a brief explanation as to why the category is not applicable may expedite processing. Please note that for the title and closing statement of the application, specific wording is required.

If the applicant represents an individual or a single entity, such as a corporation, the application should be for an individual incidental take permit. If the applicant represents a group or organization whose members conduct the same or a similar activity in the same geographical area with similar impacts on endangered or threatened marine species, the application should be for a general incidental take permit. To be covered by a general incidental take permit, each individual conducting the activity must have a certificate of inclusion issued under paragraph (f) of 50 CFR 222.307. NMFS estimates a public reporting burden of .5 hour for each certificate of inclusion. The sufficiency of applications will be determined by the Assistant Administrator in accordance with the requirements of 50 CFR 222.307.

I. One of the titles below as appropriate:

   A. Application for an Individual Incidental Take Permit under the Endangered Species Act of 1973.

   B. Application for a General Incidental Take Permit under the Endangered Species Act of 1973.

II. Date of the application.

III. The name, address, telephone, and fax number of the applicant. If the applicant is a partnership, corporate entity or is representing a group or organization, include applicable details.

IV. A description of the endangered or threatened species, by common and scientific name, and a description of the status, distribution, seasonal distribution, habitat needs, feeding habits and other biological requirements of the affected species.

V. A detailed description of the proposed activity, including, but not limited to:

   A. The anticipated dates and duration of the activity.

B. The specific location of the activity. Please include latitude/longitude coordinates if possible.

C. For a general incidental take application, include an estimate of the total level of activity expected to be conducted.

VI. The application must include a conservation plan based on the best scientific and commercial data, which specifies:

A. The anticipated impact of the proposed activity on the listed species, including:

1. The estimated number of animals of the listed species and, if applicable, the subspecies or population group, and range.

2. The type of anticipated taking, such as harassment, predation, competition for space and food, etc.

3. The effects of the take on the listed species, such as descaling, altered spawning activities, potential for mortality, etc.

B. The anticipated impact of the proposed activity on the habitat of the species and the likelihood of restoration of the affected habitat.

C. The steps that will be taken to monitor, minimize, and mitigate such impacts, including:

1. Specialized equipment, methods of conducting activities, or other means.

2. Detailed monitoring plans.

3. Funding available to implement measures taken to monitor, minimize and mitigate impacts.

D. The alternative actions to such taking that were considered and the reasons why those alternatives are not being used.

E. A list of all sources of data used in preparation of the plan, including reference reports, environmental assessments and impact statements, and personal communications with recognized experts on the species or activity who may have access to data not published in current literature.

An application for a certificate of inclusion under a General incidental take permit must include the following:

1. General incidental take permit under which the applicant wants coverage;

2. Applicant's name, address and telephone number (if the applicant is a partnership or corporate entity, then the applicable details);

3. Description of the activity the applicant wants covered under the general permit, including anticipated geographic range and season; and

4. Signed statement that the applicant has read and understood the general incidental take permit and the conservation plan, will apply with the applicable terms and conditions, and will fund the applicable measures of the conservation plan.

Modifications to Permits

Requests for modifications to incidental take permits should address all applicable sections of these instructions, including a detailed description of the proposed changes. Appropriate changes should also be made to the Conservation Plan. Modification requests involving an increased number of animals, additional species, an

increased risk to the animals, or a significant change in the location of incidental take are subject to the 30-day public review and are granted or denied at the discretion of the Assistant Administrator for Fisheries.

Where to Send the Application
The application may be submitted electronically, if possible (either by email or by mailing a disk), but one signed original of the complete application must be sent to one of the following addresses.

Send applications for incidental take of all species except sea turtles and Pacific salmon to:

Chief, Endangered Species Division
National Marine Fisheries Service, F/PR3
1315 East-West Highway
Silver Spring, Maryland 20910
Telephone 301-713-1401
Fax 301-713-0376

Send applications for incidental take of sea turtles to:

Chief, Marine Mammal and Turtle Division
National Marine Fisheries Service, F/PR2
1315 East-West Highway
Silver Spring, Maryland 20910
Telephone 301-713-2322
Fax 301-713-4060
Web Site http://www.nmfs.noaa.gov/pr/

Please see separate application instructions for incidental take permits for sea turtles, available on-line at http://www.nmfs.noaa.gov/pr/permits/esa_permits.htm

Send applications for incidental take of anadromous fish in the Pacific to one of these offices:

Pacific Salmon
Northwest Regional Office
National Marine Fisheries Service
7600 Sand Point Way NE
Building 1
Seattle, WA 98115
Phone: (206) 526-6150
Fax: (206) 526-6426

NMFS Northern California Coast Salmon
National Marine Fisheries Service
1655 Heindon Road
Arcata, CA 95521
Phone: (707) 825-5163
Fax: (707) 825-4840

NMFS Central California Coast Salmon
National Marine Fisheries Service
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404
Phone: (707) 575-6050
Fax: (707) 578-3435

NMFS California Central Valley Salmon
National Marine Fisheries Service
650 Capitol Mall, Suite 8-300
Sacramento, CA 95819
Phone: (916) 930-3600 Fax: (916) 930-3629

NMFS Southern California Salmon
National Marine Fisheries Service
501 West Ocean Blvd
Long Beach, CA 90802-4250
Phone: (562) 980-4020 Fax: (562) 980-4027

Endangered Species Consultation Handbook

HABITAT CONSERVATION PLANNING

AND

INCIDENTAL TAKE PERMIT PROCESSING

HANDBOOK

November 4, 1996

U.S. Department of the Interior
Fish and Wildlife Service

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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PREFACE

The habitat conservation planning (HCP) program under section 10(a)(1)(B) of the Endangered Species Act (ESA) has grown rapidly in recent years. In the first 10 years of the program (1983-1992), 14 incidental take permits were issued. As of the end of August, 1996, 179 incidental take permits had been issued and approximately 200 HCPs were being developed. In just a few years the HCP process has been transformed from a relatively little used option under the ESA to one of its most important and innovative conservation programs.

Another pattern has begun to emerge, as evidenced by the growing number of HCPs being developed and by the size of the conservation planning areas involved. As of late 1995, most HCPs approved were for planning areas less than 1,000 acres in size. However, of the HCPs being developed as of early 1996, approximately 25 exceed 10,000 acres in size, 25 exceed 100,000 acres, and 18 exceed 500,000 acres. This suggests that HCPs are evolving from a process adopted primarily to address single developments to a broad-based, landscape level planning tool utilized to achieve long-term biological and regulatory goals. It also suggests that the underlying spirit of the HCP process has begun to take hold.

These large-scale, regional HCPs can significantly reduce the burden of the ESA on small landowners by providing efficient mechanisms for compliance, distributing the economic and logistic impacts of endangered species conservation among the community, and bringing a broad range of landowner activities under the HCPs' legal protection. In addition, the Services have helped reduce the burden on small landowners and have made it easier for them to be involved in the HCP process through streamlining measures in the HCP process.

The HCP process was patterned after the San Bruno Mountain HCP--an innovative land-use planning effort in California's San Francisco Bay area that began in the mid-1970s with a classic conflict between development activities and endangered species protection and culminated in the issuance of the first incidental take permit in 1983. What made the San Bruno Mountain case unusual was that it attempted to resolve these conflicts through negotiation and compromise rather than continued litigation. This fundamental approach was endorsed and codified by Congress when it incorporated the HCP process into the ESA in 1982.

One of the great strengths of the HCP process is its flexibility. Conservation plans vary enormously in size and scope and in the activities they address--from half-acre lots to millions of acres, from forestry and agricultural activities to beach development, and from a single species to dozens of species. Another key is creativity. The ESA and its implementing regulations establish basic biological standards for HCPs but otherwise allow the creative potential of HCP participants to flourish. As a result, the HCP program has begun to produce some remarkably innovative natural resource use and conservation programs.

The challenge of balancing biology with economics is a complex one, but is fundamental to the HCP process. Policy and procedure have at times frustrated HCP users and hampered the program's ability to meet its full potential. The HCP process was historically viewed as procedurally difficult; permit approvals took too long in some cases and long-term regulatory certainty under HCPs was widely desired by applicants but rarely available.

However, the U.S. Fish and Wildlife Service and National Marine Fisheries Service have made significant improvements in the HCP program in recent years. We have increased section 10 staff and improved guidance about section 10 objectives and standards, clarified and streamlined permit processing requirements, and substantially raised the certainty provided to HCP permittees. This handbook incorporates all these improvements and reflects updated policies and procedures in the HCP program.

The handbook is organized as follows. Chapter 1 provides a summary and overview of the HCP process. Chapter 2 summarizes the roles of the applicant and the Fish and Wildlife Service and National Marine Fisheries Services' Field, Regional, and Washington Offices. Chapter 3 explains the process of developing an HCP. Chapter 4 explains how unlisted species may be addressed in an HCP. Chapter 5 deals with section 10 NEPA requirements. Chapter 6 explains how to process and review an incidental take permit application. Chapter 7 explains the section 10 permit issuance criteria. Finally, Chapter 8 contains a glossary of important terms used throughout the handbook.

The handbook also contains numerous appendices, which include pertinent Federal regulations and policies; a reference list of publications about HCPs; "template" HCP documents that can be used as guides; and examples of HCP documents such as a permit application form and Federal Register notices. The handbook is organized to make information readily available. All important issues have labeled sections or subsections. The reader can find specific subjects of interest by scanning the Table of Contents and turning to the appropriate page.

Acting Director
U.S. Fish and Wildlife Service

Assistant Administrator for Fisheries
National Marine Fisheries Service

CHAPTER 1
THE ENDANGERED SPECIES ACT AND INCIDENTAL TAKE PERMITS

A. Purpose of the Habitat Conservation Planning Process

The purpose of the habitat conservation planning process and subsequent issuance of incidental take permits is to authorize the incidental take of threatened or endangered species, not to authorize the underlying activities that result in take. This process ensures that the effects of the authorized incidental take will be adequately minimized and mitigated to the maximum extent practicable.

B. Purpose of the Handbook

The purpose of this handbook is to guide the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (collectively, the Services) in processing incidental take permit applications and participating in associated habitat conservation planning efforts. The goals of the handbook are threefold: (1) to ensure that the goals and intent of the conservation planning process under the Endangered Species Act are realized; (2) to establish clear standards that ensure consistent implementation of the section 10 program nationwide; and (3) to ensure that FWS and NMFS offices retain the flexibility needed to respond to specific local and regional conditions and a wide array of circumstances. Although intended primarily as internal agency guidance, this handbook is fully available for public evaluation and use, as appropriate.

C. Background and Legal Authority

Section 9 of the Endangered Species Act of 1973, as amended (ESA), prohibits the "take" of any fish or wildlife species listed under the ESA as endangered; under Federal regulation, take of fish or wildlife species listed as threatened is also prohibited unless otherwise specifically authorized by regulation. Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

In the 1982 amendments to the ESA, Congress established a provision in section 10 that allows for the "incidental take" of endangered and threatened species of wildlife by non-Federal entities. Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Prior to 1982, non-Federal parties undertaking otherwise lawful activities that were likely to result in take of listed species risked violating the section 9 prohibition but had no recourse under the law for exemption. Up to that time, only take occurring during scientific research and other conservation actions could be authorized under the ESA.

The "incidental take permit" process was established under section 10(a)(1)(B) of the ESA precisely to resolve this difficulty. Under this provision the Secretary of the Interior and Secretary of Commerce may, where appropriate, authorize the taking of federally listed wildlife or fish if such taking occurs incidentally during otherwise legal activities. The Secretaries of Interior and Commerce subsequently charged the Directors of the FWS and NMFS, respectively, with regulating the incidental taking of listed species under their jurisdiction.

Section 10(a)(2)(A) of the ESA requires an applicant for an incidental take permit to submit a "conservation plan" that specifies, among other things, the impacts that are likely to result from the taking and the measures the permit applicant will undertake to minimize and mitigate such impacts. Conservation plans under the ESA have come to be known as "habitat conservation plans" or "HCPs" for short. These terms are used interchangeably throughout this handbook. The terms incidental take permit, section 10 permit, and section 10(a)(1)(B) permit are also used interchangeably in the handbook. Section 10(a)(2)(B) of the ESA provides statutory criteria that must be satisfied before an incidental take permit can be issued.

Thus, section 10, as revised, provides a clear regulatory mechanism to permit the incidental take of federally listed fish and wildlife species by private interests and non-Federal government agencies during lawful land, water, and ocean use activities. However, Congress also intended this process to reduce conflicts between listed species and economic development activities, and to provide a framework that would encourage "creative partnerships" between the public and private sectors and state, municipal, and Federal agencies in the interests of endangered and threatened species and habitat conservation (H.R. Rep. No. 97-835, 97th Congress, Second Session).

This is critically important, for Congress was not instituting merely a permit procedure but a process that, at its best, would integrate non-Federal development and land use activities with conservation goals, resolve conflicts between endangered species protection and economic activities on non-Federal lands, and create a climate of partnership and cooperation.

Congress also intended that HCPs could include conservation measures for candidate species, proposed species, and other species not listed under the ESA at the time an HCP is developed or a permit application is submitted. This can benefit the permittee by ensuring that the terms of an HCP will not change over time with subsequent species listings. It can also provide early protection for many species and, ideally, prevent subsequent declines and in some cases the need to list such species.

Congress modeled the 1982 section 10(a) amendments after the conservation plan developed by private landowners and local governments to protect the habitat of two federally listed butterfly species on San Bruno Mountain in San Mateo County, California. Congress also

recognized that the circumstances surrounding the San Bruno Mountain HCP would not be universally applicable and that each HCP would be unique to its own factual setting.

The FWS published its final regulations for implementing the section 10 permit program in the Federal Register on September 30, 1985 (50 FR 39681-39691); NMFS published final regulations for the program on May 18, 1990 (55 FR 20603; see Appendix 1 for both regulations). However, because the process applies to a wide variety of projects and activities, the Services declined to promulgate "exhaustive, 'cookbook' regulations . . . detailing every possible element that could be required in conservation plans." Rather, the section 10 permit regulations reiterate ESA requirements and provide a framework for issuance and management of permits. Beyond that it is Service policy to promote "flexibility and ingenuity" in working with permit applicants and developing HCPs under the section 10 process.

In keeping with this policy, this handbook establishes detailed but flexible guidelines to be used in developing HCPs, processing section 10(a)(1)(B) permit applications, and managing ongoing HCP programs. It also attempts to correct the inevitable difficulties identified during the first 10 years of the section 10 program and to make it more efficient in the future. However, nothing in this handbook is intended to supersede or alter any aspect of Federal law or regulation pertaining to the conservation of endangered species.

D. Coordination Between FWS and NMFS

FWS and NMFS share joint authorities under the ESA for administering the incidental take permit program. Generally, the FWS is responsible for terrestrial and freshwater aquatic species while NMFS is responsible for listed marine mammals, anadromous fish, and other living marine resources. Thus, HCP efforts in which FWS is involved tend to be land-based, while HCPs in which NMFS is involved are generally aquatic, addressing either marine or anadromous species. NMFS also issues permits for incidental taking of listed fish species during other activities such as state-run hatchery operations and commercial or recreational fisheries. In some cases these responsibilities overlap and the agencies work closely together--for example, in the Pacific Northwest many HCPs are being developed which address terrestrial species and anadromous fish in the same planning effort.

This handbook is intended to serve the needs of each agency's incidental take permit program. Although to date the FWS has had a more active program, and some sections consequently are written more from the FWS's land-based perspective, it has been and is the intention of both agencies to develop and use the handbook jointly. It is also their intention to cooperate fully in joint administration of the section 10 program. However, there are procedural differences between the two agencies. Chapters 2 and 6 describe certain differences between FWS and NMFS with respect to organizational structure, permit delegation authority, and applicable Federal regulations, and Chapters 3 and 4 contain some information applicable to FWS only. All such differences are clearly indicated and unless

otherwise noted the policies and procedures described in the handbook apply jointly to FWS and NMFS.

E. Overview of the Incidental Take Permit Process

1. When is a Permit Needed?

The starting point for the section 10(a)(1)(B) permit process is a determination that "take" is likely to occur during a proposed non-Federal activity and a decision by the landowner or project proponent to apply for an incidental take permit. Federal activities and non-Federal activities that receive Federal funding or require a Federal permit (other than a section 10 permit) typically obtain incidental take authority through the consultation process under section 7 of the ESA. Thus, the HCP process is designed to address non-Federal land or water use or development activities that do not involve a Federal action that is subject to section 7 consultation.

In some cases, however, Federal agencies besides FWS or NMFS may be integrally involved in HCP efforts. In these cases, the action to be conducted by the Federal agency during the implementation of the HCP should be included as an additional element to be consulted on through the section 7 consultation conducted for the HCP. This allows the Services to conduct one formal consultation that incorporates the actions for the HCP and any related and supportive Federal actions into one biological opinion. The biological opinion developed for the HCP should also incorporate the necessary biological analysis on the Federal action as well as the actions in the HCP to help eliminate duplication. Thus, the single biological opinion issued by the Services would address both the Federal action and the non-Federal action, and it would include an incidental take statement that authorizes any incidental take by the Federal agency and an incidental take permit that authorizes any incidental take by the section 10 permittee. See Chapter 3, Section A.1 and A.6 for more information.

Before determining whether a section 10 permit is needed, the applicant, with Service technical assistance, should consider whether take during proposed project activities can be avoided. This is sometimes possible through relocation of project facilities, timing restrictions, or similar measures, depending on the nature and extent of the proposed activity and the biology of the species involved. If take cannot be avoided, the Services will recommend that an incidental take permit be obtained. The decision to obtain a permit lies with the prospective permit applicant. However, should the applicant ultimately elect not to obtain a permit, and an unauthorized take attributable to project activities occurs, the responsible individuals or entity would be liable under the enforcement provisions of the ESA.

2. What Kinds of Activities Can be Authorized?

A section 10(a)(1)(B) permit only authorizes take that is incidental to otherwise lawful activities. In this context, "otherwise lawful activities" means economic development or land or water use activities that, while they may result in take of federally listed species, are consistent with other Federal, state, and local laws. Take that occurs during other types of activities--i.e., take for scientific purposes, to enhance the propagation or survival of a listed species, or for purposes of establishment and maintenance of experimental populations--must be authorized by a permit under section 10(a)(1)(A) of the ESA (e.g., "Safe Harbor"or "recovery" permits). In some cases, however, take in the form of capture or harassment can be authorized under an incidental take permit, if the purpose of such actions is to minimize more serious forms of take (e.g., death or injury) or to conduct monitoring programs during activities authorized by the permit (see Chapter 7, Section B.1)

3. Phases of the Process.

Once the decision to obtain a permit has been made, the section 10 process consists of three phases: (1) the HCP development phase; (2) the formal permit processing phase; and (3) the post-issuance phase. The HCP development phase is the period during which the applicant's project or activity is integrated with species protection needs through development of the HCP. This phase is typically conducted by the applicant with technical assistance from FWS or NMFS Field Office and ends when a "complete application package" is forwarded to the appropriate permit issuing office. A complete application package consists of a permit application form, fee (if required), a completed HCP, a draft National Environmental Policy Act (NEPA) document (if required), and in some cases an Implementing Agreement (see Chapter 6, Section B.2).

The permit application processing phase involves review of the application package by the appropriate Regional Office or, in some cases, the NMFS Washington, D.C., office; announcement in the Federal Register of the receipt of the permit application and availability of the NEPA analysis for public review and comment; intra-Service consultation under section 7 of the ESA; and determination whether the HCP meets ESA statutory issuance criteria. If FWS or NMFS determines, after considering public comment, that the HCP is statutorily complete and that permit issuance criteria have been satisfied, it must issue the permit. The Field Office and Regional Office should coordinate regularly throughout these first two phases of the HCP process to avoid any renegotiation of the terms of the HCP by the Regional Office (see Chapter 6, Section C.1).

The post-issuance phase is the period during which the permittee and other responsible entities implement the HCP and its monitoring and funding programs. Service responsibilities, in addition to any identified in the HCP, are to monitor the permittee's compliance with the conservation program and other terms and conditions of the permit, and the HCP's long-term progress and success. When a permit is issued, it is also Service policy to notify the public of the outcome of the permit application through a Federal Register notice. An individual notice may be published for each permit decision, or a quarterly or

biannual list of permit decisions for that period may be published. There are also specific notification requirements under NEPA.

4. Compliance With NEPA and Section 7 of the ESA.

Issuance of an incidental take permit is a Federal action subject to National Environmental Policy Act compliance. The purpose of NEPA is to promote analysis and disclosure of the environmental issues surrounding a proposed Federal action in order to reach a decision that reflects NEPA's mandate to strive for harmony between human activity and the natural world. Although section 10 and NEPA requirements overlap considerably, the scope of NEPA goes beyond that of the ESA by considering the impacts of a Federal action on non-wildlife resources such as water quality, air quality, and cultural resources. Depending on the scope and impact of the HCP, NEPA requirements can be satisfied by one of the three following documents or actions: (1) a categorical exclusion; (2) an Environmental Assessment (EA); or (3) an Environmental Impact Statement (EIS).

An EIS is required when the project or activity that would occur under the HCP is a major Federal action significantly affecting the quality of the human environment. An EA is prepared when it is unclear whether an EIS is needed or when the project does not require an EIS but is not eligible for a categorical exclusion. An EA culminates in either a decision to prepare an EIS or a Finding of No Significant Impact (FONSI). Activities which do not individually or cumulatively have a significant effect on the environment can be categorically excluded from NEPA. Chapter 5 of the handbook discusses NEPA requirements.

Issuance of an incidental take permit is also a Federal action subject to section 7 of the ESA. Section 7(a)(2) requires all Federal agencies, in consultation with the Services, to ensure that any action "authorized, funded, or carried out" by any such agency "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of critical habitat. Because issuance of a section 10 permit involves an authorization, it is subject to this provision. Although the provisions of section 7 and section 10 are similar, section 7 and its regulations introduce several considerations into the HCP process that are not explicitly required by section 10--specifically, indirect effects, effects on federally listed plants, and effects on critical habitat. Chapter 3, Sections B.2(e)-(h) discuss these issues in detail. Chapter 6, Section C.3 explains how section 7 consultation for issuance of section 10(a)(1)(B) permits is conducted.

5. Guiding Principles.

The section 10 process is an opportunity to provide species protection and habitat conservation within the context of non-Federal development and land and water use activities. Ideally, it may also allow for the conservation and recovery of federally listed, proposed, and candidate species as well as overall biological diversity. It thus provides a

mechanism for allowing economic development that will not "appreciably reduce the likelihood of the survival and recovery of the species in the wild."

While species conservation is of course paramount, the section 10 process recognizes the importance of both biological and economic factors. Biologically, it provides FWS and NMFS with a tool to minimize and mitigate the incidental take of listed, proposed, and candidate species at the local, rangewide, or ecosystem level. For landowners and local governments, it provides long-term assurances that their activities will be in compliance with the requirements of the ESA. For both sides, the HCP process promotes negotiation and compromise and provides an alternative to conflict and litigation.

The Services recognize the importance of working in partnership with non-Federal interests under section 10 of the ESA. The Services are committed to facilitating such partnerships by participating in all phases of the HCP process, providing timely assistance to permit applicants, expeditiously processing permit applications, and generally undertaking all measures necessary to ensure that the section 10 program is able to meet the growing challenges and opportunities of integrating endangered species protection with economic activities and needs. These principles are discussed further throughout this chapter and the entire handbook.

F. Overview of Permit Processing Requirements

Processing an incidental take permit application consists of announcing the HCP and NEPA analysis in the Federal Register and making them available for public review and comment; evaluating comments received, if any; conducting a consultation under section 7 of the ESA; and determining whether the HCP meets statutory issuance criteria under section 10(a)(2)(B) of the ESA. These basic steps are required for all HCPs. However, specific document and processing requirements will vary depending on the size, complexity, and impacts of the HCP involved (see sections F.2-F.5 below). Other documents or actions that may be needed depending on the HCP include the Implementing Agreement (Chapter 3, Section B.8), Environmental Action Memorandum, a brief document that provides the Service's record of NEPA compliance for categorically excluded actions (Chapter 6, Section B.2), and legal review of the application package (Chapter 6, Section C.4).

1. Expeditious Processing of Permit Applications.

In the first ten years of the section 10 HCP program (1983-1992), 14 incidental take permits were issued. As of August, 1996, 179 incidental take permits have been issued, and approximately 200 are in development. To cope with this growing section 10 workload and anticipated continued increases in the program, the Services intend to streamline the HCP process to the maximum extent practicable and allowable by law.

To accomplish this, the handbook introduces numerous improvements to the section 10 program developed by the Services and the Departments of Interior and Commerce. First, the handbook establishes a category of HCPs called "low-effect HCPs" which will apply to activities that are minor in scope and impact; these HCPs will receive expedited handling during the permit application processing phase. Second, the handbook improves guidance to Service personnel about section 10 program standards and procedures. Third, the handbook institutes numerous mechanisms to expedite the permit processing phase for all HCPs. Fourth, the handbook establishes specific time periods for processing incidental take permit applications once an HCP is submitted to the FWS or NMFS for approval.

2. The Low-effect HCP Category.

For purposes of the section 10 program, the Services establish a special category for HCPs with relatively minor or negligible impacts. This "low-effect HCP" category is defined as follows:

Low-Effect HCPs -- Those involving: (1) minor or negligible effects on federally listed, proposed, or candidate species and their habitats covered under the HCP; and (2) minor or negligible effects on other environmental values or resources. "Low-effect" incidental take permits are those permits that, despite their authorization of some small level of incidental take, individually and cumulatively have a minor or negligible effect on the species covered in the HCP. Low-effect HCPs may also apply to habitat-based HCPs if the permitted activities have minor or negligible effects to the species associated with the habitat-types covered in the HCP. Factors relevant to the determination that an activity is a low-effect activity include, but are not limited to, the effect of the activity on the distribution or the numbers of the species.

The relationship between the geographic size of a project and the scope or severity of its impacts will not always be clear-cut. Projects that are large or small in size often will have commensurately high or low effects. However, a project may be large in size, but still be categorized as low-effect if it is expected to result in minor or negligible impacts. Similarly, a project could be small in size but capable of generating very significant impacts (e.g., if it affects a species with a highly-restricted range).

The Services must consider each HCP on a case-by-case basis in determining whether it belongs in the low-effect category, taking into account all relevant factors including biological factors. The determination of whether an HCP qualifies for the low-effect category must be based on its anticipated impacts prior to implementation of the mitigation plan. The purpose of this category is to expedite handling of HCPs for activities with inherently low impacts, not for projects with significant potential impacts that are subsequently reduced through mitigation programs. However, this determination should factor in actions taken by the applicant to avoid take, such as conducting activities during specific times to avoid the nesting season or by relocating project locations.

3. Processing Low-Effect Permit Applications.

Low-effect HCPs and permit applications often involve a single small land or other natural resource owner and relatively few acres of habitat. The impacts of such projects on federally listed species frequently are minor or negligible and the applicants often do not have the resources to withstand long delays.

Consequently, an important guiding principle of the handbook is that permit application processing requirements for low-effect HCPs, as defined above, will be substantially simplified and permit issuance for such HCPs will be expedited to the maximum extent possible, consistent with Federal law.

This will be accomplished by: (1) establishing clear processing standards for all HCP permit applications; (2) eliminating or standardizing section 10 documents for low-effect projects, wherever possible; (3) eliminating unnecessary review procedures;
(4) categorically excluding low-effect HCPs from NEPA requirements; and (5) utilizing other techniques described throughout the handbook.

4. Summary of Permit Processing Requirements.

The primary documentation and processing requirements for HCPs by category are as follows. Both categories also require the permit document with applicable terms and conditions.

Low-effect HCPs require: (1) an HCP; (2) an application form and fee ($25);
(3) publication in the Federal Register of a Notice of Receipt of a Permit Application; (4) formal section 7 consultation; (5) a Set of Findings, which evaluates a section 10(a)(1)(B) permit application in the context of permit issuance criteria found at section 10(a)(2)(B) of the ESA; and (6) an Environmental Action Memorandum, a brief document that serves as the Service's record of NEPA compliance for categorically excluded actions by explaining the reasons the Services concluded that there will be no individual or cumulative significant effects on the environment. Implementing Agreements will not be prepared for a low-effect HCP, unless requested by the permit applicant. In such cases, acceptance of the legal terms and conditions of the permit by the applicant will provide the necessary assurance that the plan will be implemented. Low-effect projects are categorically excluded from NEPA (see Chapter 5, Section A.2).

All other HCPs require: (1) an HCP; (2) an application form and fee ($25); (3) an Implementing Agreement (optional, depending on Regional Director discretion); (4) the NEPA analysis, either an EA or EIS; (5) publication in the Federal Register of a Notice of Receipt of a Permit Application and Notice(s) of Availability of the NEPA analysis; (6) Solicitor's Office review of the application package; (7) formal section 7 consultation; and (8) a Set of Findings, which evaluates a section 10(a)(1)(B) permit application in the context

of permit issuance criteria found at section 10(a)(2)(B) of the ESA and 50 CFR Part 17. Note: For NMFS, the NOAA General Counsel's Office (either in the Region or Headquarters) reviews all documents relating to all HCPs.

An EA will satisfy NEPA requirements for a section 10 permit application and will conclude with a Finding of No Significant Impact (FONSI), unless it is determined during preparation of the EA that approval of the project is a major Federal action significantly affecting the quality of the human environment. It is not necessary to prepare an EA first, if it is determined from the start that an EIS is necessary, although an HCP that requires an EIS should be uncommon. In the latter case, an EIS and Record of Decision (ROD) is required. For some HCPs, it may be possible to prepare the EA in accordance with 40 CFR 1501.4(e)(2), which requires that any Finding of No Significant Impact (FONSI) in an EA be made available for public review for 30 days before an agency makes its final decision and can eliminate the need for an EIS [see Chapter 5, Section A.3].

Figure 1 shows a diagram of the section 10 permit processing requirements from submission of the application package to permit issuance for a low-effect HCP that is categorically excluded from NEPA. Figures 2 and 3 show a diagram of the section 10 permit processing requirements from submission of the application package to permit issuance for an HCP that requires an EA and an EIS, respectively.

5. Target Permit Processing Times.

The time required to process an incidental take permit application will vary depending on the size, complexity, and impacts of the HCP involved. The Services will work to complete all steps as expeditiously as possible. Procedurally, the most variable factor in permit processing requirements is the level of analysis required for the proposed HCP under NEPA--whether an EIS, EA, or a categorical exclusion--although other factors such as public controversy can also affect permit processing times.

Figure 1: Typical Processing Steps for a Low-Effect Section 10(a)(1)(B) Incidental Take Permit Application

Figure 2: Typical Processing Steps for a Section 10(a)(1)(B) Incidental Take Permit Application Requiring an EA

Figure 3: Typical Processing Steps for a Section 10(a)(1)(B) Incidental Take Permit Application Requiring an EIS

The handbook establishes the following target permit processing requirements for HCPs based on the NEPA action. Although not mandated by law or regulation, these targets are adopted as FWS and NMFS policy and all Service offices are expected to streamline their incidental take permit programs and to meet these targets to the maximum extent practicable.

Permit processing times are defined as the period between receipt of a complete application package, as defined in Chapter 6, Section B.2(b), to the issuance of the incidental take permit, including Federal Register notifications and public comment. The targets do not include any portion of the HCP development phase.

Section 10(a)(1)(B) Permit Application Processing Times:

HCP With EIS . . . . . less than 10 months
HCP With EA . . . . . 3 - 5 months
Low-effect HCP (Categorically Excluded) . . . . . less than 3 months

These targets will apply as maximum processing times unless project controversy, staff or workload problems, or other legitimate reasons make delays unavoidable. However, in many cases it is expected actual processing times will be less than these targets and all FWS and NMFS offices are encouraged to improve on the targets whenever possible.

6. Benefits of Regional or Multi-species Conservation Planning.

Some HCP applicants may be tempted to segment (or "piecemeal") a project into parts to take advantage of reduced processing requirements for low-effect HCPs as compared to larger ones. The Services do not endorse such segmentation and will not allow use of the low-effect HCP category to avoid processing requirements without commensurate reductions in project impacts. In addition, a low-effect HCP may not be available for a segmented project or one component of a regional HCP because in determining whether an action is categorically excluded from NEPA the Services must consider cumulative effects. The Services must also consider the interrelated, interdependent, and cumulative effects analyzed through the section 7 analysis.

Potential HCP applicants considering regional or multi-species HCPs may initially conclude that such efforts are undesirable in light of more streamlined processing requirements for low-effect projects. However, regional or multi-species HCPs have many benefits. They can, for example: (1) maximize flexibility and available options in developing mitigation programs; (2) reduce the economic and logistic burden of these programs on individual landowners by distributing their impacts; (3) reduce uncoordinated decision making, which can result in incremental habitat loss and inefficient project review; (4) provide the permittee with long-term planning assurances and increase the number of species for which such assurances can be given; (5) bring a broad range of activities under the permit's legal

protection; and (6) reduce the regulatory burden of ESA compliance for all affected participants.

The cumulative total of HCP processing requirements is far greater when regional or area-wide activities are permitted individually than when addressed comprehensively under a regional HCP.

Consequently, a second guiding principle of this handbook is that FWS and NMFS will continue to encourage state and local governments and private landowners to undertake regional and multi-species HCP efforts as appropriate and will assist such efforts to the maximum extent practicable.

G. Helpful Hints

A successful HCP often requires consensus building and integration of numerous interests, especially for large-scale, regional planning efforts. Also, biological issues are not always clear-cut and sometimes are subject to interpretation. Service biologists must combine flexibility, creativity, good science, and good judgement in providing technical assistance to HCP applicants and making the section 10 program successful. The following "rules of thumb" should be helpful in meeting these challenges.

- Review recovery plans for affected species and assess the extent to which HCP mitigation programs are consistent with them. Although FWS or NMFS cannot mandate that HCPs contribute to recovery, applicants should be encouraged to develop HCPs that produce a net positive effect on a species (see Chapter 3, Section B.3). Recovery plans should be used to help identify strategies to minimize and mitigate the effects of the HCP. When recovery plans are not available, contact recovery teams or other species experts to obtain information pertinent to HCP development. When appropriate, the development of the HCP could involve more active participation by recovery team members and species experts by providing technical assistance to the applicant.

- Keep up-to-date on applicable statutes and policies, including the ESA, its implementing regulations, this handbook, and court decisions. Understand the authorities and limitations of the ESA and NEPA. Be up-to-date on new biological developments and state-of-the-art techniques such as population viability analysis. Keep reference materials on hand concerning legal and biological issues applicable to the section 10 program (Appendix 2 contains a list of reference materials).

- The HCP is initiated by the applicant and is the applicant's document, not FWS's or NMFS's. The Services should assist the applicant and help guide the process by providing sufficient staff and technical advice. However, if the applicant insists on measures that would not allow the HCP to meet the section 10 issuance criteria, the

Service will inform the applicant of the deficiencies in writing and offer assistance in developing a solution. If deficiencies are not corrected, the FWS or NMFS may ultimately have to deny the permit (see Chapter 6, Section F.1). Providing technical assistance early and continuously through the HCP development process will hopefully prevent such situations from occurring.

- Help the applicant determine early in the process what species are to be addressed in the HCP. This will depend on what species occur in the project area, whether they are likely to be affected by project activities, their listing status (listed, proposed, or candidate), the applicant's objectives, and other factors (see Chapter 3, Section A.5). The Service will encourage permit applicants to address any species in the plan area likely to be listed within the life of the permit. This can benefit the permittee in two ways: (1) the "No Surprises" policy applies to unlisted species that are adequately addressed in an HCP (see Chapter 3, Section B.5(a)); and (2) it prevents the need to revise an approved HCP should an unlisted species that occurs within the plan area but was not addressed in the HCP subsequently be listed (see Chapter 4). The Services should advise the applicant on this issue, but ultimately the decision about what species to include in the HCP is always the applicant's.

- Work with the applicant to get important issues on the table as early as possible in the HCP development stage. Make sure the applicant understands the section 10 issuance criteria and any regulatory or biological issues that will need to be addressed in the HCP. Avoid "eleventh-hour" surprises that result in delays and bad feelings on all sides.

- HCP mitigation programs will be as varied as the projects they address. Some will be simple while those for large-scale, regional planning efforts may be quite complicated. There are few ironclad rules for mitigation programs but make sure they address specific needs of the species involved and that they are manageable and enforceable. A monitoring plan should be developed that establishes reporting requirements, biological criteria for measuring program success, and procedures for addressing deficiencies in HCP implementation (see Chapter 3, Sections B.3-B.5).

- Service Field Offices and Regional Offices must coordinate regularly throughout the HCP process and work as a team, not as isolated, separate players. This is essential to ensure that FWS or NMFS, as applicable, provide consistent, dependable assistance to the applicant in developing the HCP and that internal differences in approach are resolved prior to the submission of an HCP proposal to the Regional office for formal processing (see Chapter 6, Section C.1).

- The same principle cited immediately above applies to coordination between FWS and NMFS when an HCP includes the jurisdiction of both agencies. It is also important to

obtain the views of the state wildlife and conservation agencies early and to address their comments.

- Make sure the Services' section 7 obligations as they apply to issuance of a section 10 permit are explained to the permit applicant(s) and that section 7 considerations are introduced into the HCP from the beginning of the planning process. Compliance of the HCP with section 7 and 10 of the ESA should be regarded as concurrent, integrated processes, not as independent and sequential. (see Chapter 3, Section B.2(e) and Chapter 6, Section C.3).

- The activities addressed under an HCP may be subject to Federal laws other than the ESA, such as the Coastal Zone Management Act, Archeological Resource Protection Act, and National Historical Preservation Act. Service staff should check the requirements of these statutes and ensure that Service responsibilities under these laws, if any, are satisfied, and that the applicant is notified of these other requirements from the beginning. The Service's staff should, to the extent feasible for all HCPs other than low-effect HCPs, integrate analysis done in compliance with other environmental and cultural review requirements into the NEPA analysis prepared for the proposed HCP.

- Work with the permit applicant in good faith but ensure that the HCP established clearly measurable and enforceable compliance standards, including written documentation of all applicable biological results.

- Once an incidental take permit has been issued, monitor permit compliance, and make sure monitoring activities are conducted and monitoring reports are submitted as defined by the HCP. Develop a tracking and accountability system for issued permits. Report all violations of permit conditions to the appropriate law enforcement personnel.

CHAPTER 2
OVERVIEW OF FWS AND NMFS ROLES AND RESPONSIBILITIES

A. Delegation of Permit Authority

In the past, the FWS's Office of Management Authority (OMA) in the Washington, D.C. area processed and issued all section 10(a)(1)(A) and 10(a)(1)(B) permits. Effective February 12, 1992, the FWS Director delegated incidental take permit responsibilities to the Regional Directors. For NMFS, the responsibility for issuing incidental take permits is divided between the Office of Protected Resources in Silver Spring, Maryland (Washington, D.C. area), and its west coast Regions.

B. Roles and Responsibilities

FWS and NMFS offices at the regional, field, and Washington, D.C. level, and the permit applicant, all have specific responsibilities in implementing the HCP program. This section summarizes the roles and responsibilities of each of these participants.

Keep in mind that specific HCP procedures may vary somewhat between FWS Regions or between FWS and NMFS. This is because the circumstances faced by individual HCP participants may differ widely across regional boundaries or agency jurisdictions, and this handbook, while establishing consistent program standards, also seeks to maintain the flexibility to adjust to specific local needs. Thus, while fundamental legal and policy issues will be consistent nationwide, individual procedures (e.g., document handling requirements) may vary depending on the decisions of FWS Regional Directors or the NMFS Regional or Washington, D.C. Offices.

1. Applicant.

The applicant is responsible for compliance with the take prohibition and exceptions under sections 9, 4(d), and 10(a) of the ESA. Once the decision to obtain a permit has been made, the applicant is also responsible for preparing the HCP and, if approved, for implementing it. Requesting technical assistance from FWS, NMFS, and other interests during preparation of the HCP is strongly recommended to ensure the HCP ultimately submitted for approval is biological sound and meets statutory requirements. The applicant:

- Should coordinate with FWS, NMFS, affected Federal and state agencies, tribal governments, and where appropriate, affected private interests and organizations in preparing an HCP that satisfies the requirements of section 10(a)(1)(B) of the ESA and Federal regulations.

- o Generally, develops a draft Environmental Assessment (EA) with technical assistance from the Services, and draft Federal Register notices for Service use during the permit processing phase. Normally, EISs are also prepared by the applicant, or through a contractor, or an HCP applicant, under certain circumstances and strict guidance from FWS or NMFS, can assist in developing an EIS. However, FWS or NMFS is ultimately responsible for the content of all section 10 NEPA documents.

- o Submits a permit application (Form 3-200), a $25 application fee (unless applicant is fee exempt), a completed HCP, draft NEPA analysis (optional) and an IA (as needed) to the appropriate FWS Field or Regional Office or NMFS Regional or Washington, D.C. Office (see Chapter 6, Section B.3).

  For FWS applications, note that Federal regulation [50 CFR 13.11(b)] calls for the application to be submitted to the Arlington, Virginia office; however, these regulations are being amended to reflect delegation of the permit program to the Regional Directors. NMFS regulations [50 CFR 222.22] state that applications should be sent to the Silver Spring, Maryland Office, but applications involving west coast anadromous fish should be submitted to the Southwest or Northwest Regional Directors.

- o During the permit processing phase, coordinates with the appropriate FWS or NMFS Field Office to amend or correct the HCP or associated documents, as necessary. Also should provide the Field Office with additional information necessary for the Services to respond to public comments when appropriate.

- o If the permit is issued, implements all measures and programs required by the HCP permit and submits all documentation, monitoring reports, etc. as required over the life of the permit.

2. Field Office.

FWS Responsible Party - Field Supervisor.

NMFS Responsible Party - Field Supervisor.

The Field Office is responsible for assisting the applicant in preparing the HCP; ensuring that the HCP and associated documents are complete; and coordinating with the appropriate Regional Office (or NMFS Washington, D.C. Office) throughout HCP development, approval, and implementation. The Field Office:

- o Provides technical assistance to the permit applicant and serves as applicant's point of contact for information concerning HCP, permit processing, and NEPA

requirements during the HCP development phase. Provides assistance to the applicant's HCP steering committee, if any, as requested (see Chapter 3, Section A.3).

- Encourages permit applicant to include affected state and Federal agencies and tribal governments to participate in the HCP process. Other Federal agencies might be involved, for example, if they are involved in adjacent planning areas or would administer mitigation lands under the HCP. Inclusion of affected state agencies insures efficient consideration of any additional requirements of state law.

- Coordinates review of HCP development with FWS or NMFS Law Enforcement agents involved in enforcing permit conditions.

- Stays informed on planning progress, problems, significant issues, and decisions; routinely advises the Regional Office of HCP progress on key policy and substantive issues (see Chapter 6, Section C.1).

- Reviews drafts of the HCP and IA for adequacy and comments as necessary. Draft HCPs should be returned to the permit applicant within 30 days of submission, to the maximum extent possible.

- Prepares NEPA analysis, or reviews draft documents if prepared by the applicant or contractor. Draft NEPA analysis should also be returned to the permit applicant within 30 days of submission, to the maximum extent possible.

- Certifies to the Regional Office in writing that HCP documents have been reviewed by Field Office staff and are found to be statutorily complete, when the "complete application package" is transmitted to the Regional Office (see Chapter 6, Section B.2).

- Reviews public comments received, if any, and coordinates necessary changes to the HCP or IA with the FWS or NMFS Regional HCP Coordinator during the permit application processing phase; notifies applicant(s) of recommended revisions to the draft HCP or IA, if any, identified as a result of legal or public review; and discusses remedies. Coordinates with FWS or NMFS Regional Office Environmental Coordinator, NMFS Washington, D.C. Office HCP Coordinator, or the applicant or applicant's contractor to make revisions to the NEPA document, if necessary.

- For FWS, briefs the Regional Director, appropriate Assistant Regional Director, ARD for Law Enforcement, and the Solicitor's Office concerning HCP issues as

requested. For NMFS, briefs the Regional Director, Deputy Director, Law Enforcement, and General Counsel's Office, as requested.

o Drafts the following documents (see Chapter 6, Section B.2):

NEPA analysis, either an EA or EIS that is integrated with the proposed HCP (unless drafted by the applicant or contractor).

Federal Register Notice of Receipt of permit application and Notice(s) of Availability of EA or EIS.

Biological opinion concluding formal section 7 consultation. The biological opinion concluding formal section 7 consultation may be done by the FWS or NMFS office that assisted in HCP development or by another office. To avoid possible biases, the staff member conducting the section 7 consultation should not be the section 10 biologist providing technical assistance to the HCP applicant. This will help ensure that the intra-Service section 7 consultation is an independent analysis of the proposed HCP. If, because of staff time constraints, this is not possible, then the biological opinion should be reviewed by another knowledgeable biologist before it is signed by the approving official. It is very important that the staff member that completes the section 7 consultation be involved in the initial stages of the HCP process. This will help ensure that the section 7 requirements are addressed in the HCP and that the two processes are integrated which will help expedite the permitting process. If the Regional Director has delegated the authority, the biological opinion may be signed by an approving official in the Field Office.

Set of Findings (see Chapter 6. Section B.2).

An Environmental Action Memorandum for low-effect HCPs that are categorically excluded from NEPA, Finding of No Significant Impact (FONSI) for the EA, or Record of Decision (ROD) for the EIS.

News releases as appropriate or requested by the Regional Office.

Responses to comments, as necessary.

Permit Terms and Conditions for inclusion in the permit (FWS's Form 3-201), if requested by the Regional Office or NMFS Washington, D.C. Office.

o Monitors compliance with HCP provisions and permit terms and conditions and evaluates success of the HCP at least annually. Arranges for independent biological peer review, as appropriate.

- Provides an accounting of fund expenditures administering the section 10 program to the Regional Office as requested.

3. Regional Office.

FWS Responsible Parties - Regional Director (RD); Deputy Regional Director (DRD); appropriate Assistant Regional Director (ARD); and Assistant Regional Director for Law Enforcement (ARD-LE).

NMFS Responsible Parties - Regional Director (RD); Deputy Regional Director (DRD).

For FWS, the Regional Office oversees and administers the incidental take permit program for its respective region. For NMFS, this is true for the Northwest and Southwest Regions only, and only for activities concerning west coast anadromous fish species; the Washington, D.C. Office administers the balance of the permit program. Currently, the only HCPs in development in these NMFS regions are for anadromous species. The FWS and applicable NMFS Regional Office is responsible for coordinating with the Field Office throughout the HCP process, reviewing and processing the permit application; and issuing or denying the permit. It is also responsible for ensuring that permit processing targets described in Chapter 1 and Chapter 6 are met. The Regional Office:

- Receives complete permit application package with supporting documents from the Field Office or applicant, and accounts for fee processing (see Chapter 6, Section B.3).

- Processes application check.

- Coordinates with ARD-LE to have permit number assigned through LEMIS (Law Enforcement Management Information System); coordinates review of permit application by ARD-LE, as necessary (FWS only).

- Reviews permit application package for adequacy and reports any deficiencies to the Field Office (Section 10 Coordinator reviews HCP and IA; Environmental Coordinator reviews NEPA analysis) (see Chapter 6, Section B.4 and C.1). Prior periodic Field Office review and reporting on key policy and substantive issues should result in the identification and elimination of most deficiencies prior to formal Regional Office review.

- Transmits Federal Register notices to the Office of the Federal Register for publication (see Chapter 6, Section D).

- o Files copies of any draft and final EIS with the Environmental Protection Agency [see Chapter 5, Section A.4].

- o Reviews draft and finalizes internal section 7 consultation, if the biological opinion was drafted by the Field Office that participated in HCP development, or incorporates biological opinion completed by the Field Office into the administrative record.

- o Reviews and finalizes Set of Findings (unless finalized by the Field Office).

- o Prepares the Environmental Action Memorandum (EAM) for low-effect HCP permit applications (see Chapter 6, Section B.2).

- o Coordinates with the Assistant Director for Ecological Services for major policy issues to ensure the interpretation of the policy is legally sufficient and within the overall National policy guidance for the HCP program.

- o Briefs the Director or Washington, D.C. Office on all significant HCP developments, permit application processing, and post-issuance efforts, as necessary. Reports HCPs in development and section 10 permits issued to Washington Office, as requested.

- o Coordinates with lead Region responsible for the species prior to issuance of the permit to ensure agency-wide consistency for species that overlap more than one FWS or NMFS Region.

- o Prepares permit and associated documents (IA, FONSI, ROD, EAM) for RD or DRD signature, as necessary or requested (see Chapter 6, Section C.5).

- o Issues or denies the permit and (FWS only) updates LEMIS. Sends the signed permit with terms and conditions or a denial letter to the permittee or applicant. Sends copies of these documents to the Field Office, other affected offices, and Division of Endangered Species (FWS) and Office of Protected Resources (NMFS) in Washington, D.C.

- o Sends Notice of Permit Issuance to the Office of the Federal Register for publication on a quarterly or biannual basis.

- o Coordinates Freedom of Information Act (FOIA) requests.

4. Washington Office.

FWS Responsible Parties - Director; Assistant Director of Ecological Services (AES); and Chief, Division of Endangered Species (DTE).

NMFS Responsible Parties - Director, Office of Protected Species; Chief, Endangered Species Division.

The FWS Washington Offices provide guidance and oversight to the Regional and Field Offices. It is responsible for nationwide administration of the program:

- o Develops regulations and national policy guidance.
- o Assists in resolving issues or disputes when requested by the Regional Offices.
- o Briefs Director or other authorities or coordinates such briefings as necessary.
- o Prepares HCP, NEPA, and other related training and technical assistance to Regional Offices and Field Offices, as needed.
- o Maintains and updates national list or data base of HCPs in development and permits issued.

The NMFS Washington, D.C. Office of Protected Resources has the same functions as described for FWS. It also processes all permit applications and issues or denies all permits, except for those concerning anadromous species in the Northwest or Southwest Regions. NMFS permits for activities such as state fish hatcheries, and commercial or recreational fisheries must comply with all statutory provisions of section 10(a)(1)(B) of the ESA, but may have fewer documentation requirements than other types of incidental take permits. (Refer to NMFS final regulations for the program contained in Appendix 1 (55 FR 20603)). The NMFS Washington, D.C. Office should be contacted for assistance in handling any such permits. Generally, all other NMFS-issued incidental take permits are subject to the documentation requirements described in this handbook.

5. Solicitor’s Office/General Counsel Office.

FWS Responsible Parties - Solicitor’s Office

NMFS Responsible Parties - General Counsel’s Office

For FWS, the Solicitor's Office need review only those parts of the permit application package that the Regional Director request be reviewed--typically the HCP and Implementing Agreement. Coordination with the Regional Solicitor's Office on a permit application package should begin as soon as possible in the permit processing phase and during the HCP development phase. After Solicitor review is complete, the

Regional Solicitor's office should forward a memorandum to the RD or appropriate ARD stating that he or she has reviewed the IA and other documents, as applicable, and that they meet statutory and regulatory requirements. The Regional Solicitor's Office should review the documents, as necessary, throughout the HCP process to ensure regulatory and statutory compliance and to avoid "last minute" identification of problems in documents submitted for final approval. For NMFS, the General Counsel's Office (either in the Region or Headquarters) must review the entire application package and all supporting ESA and NEPA documentation.

The purpose of legal review of the permit application package is to ensure that the HCP and associated documents meet the strict requirements of the ESA and its regulations. This is especially important for the HCP, which has specific legal requirements, and the Implementing Agreement, which legally binds the applicant to complying with the HCP and permit terms. For NMFS, legal review of all documents must be conducted by either the Headquarters or Regional General Counsel's Office.

CHAPTER 3
PRE-APPLICATION COORDINATION AND HCP DEVELOPMENT

Congress intended the HCP process to be used to reduce conflicts between federally listed species and non-Federal development and land use, and to provide a framework for "creative partnerships" between the public and private sectors in endangered species conservation. Congress also intended the FWS and NMFS to be not just regulators of the HCP program, but active participants in providing technical assistance, and that "comprehensive" HCPs could be developed jointly by the FWS, NMFS, the private sector, and local, state, and Federal agencies, with the Services as a technical advisor (H.R. Rep. No. 97-835, 97th Congress, Second Session).

This chapter discusses the Services' roles in the HCP process during the pre-application and HCP development phase. From a technical standpoint, this involves advising the permit applicant on the biological needs of the species involved, statutory HCP requirements and permit issuance criteria, NEPA requirements, and other technical issues.

The Services also have an important "leadership" role to play in the HCP program, which involves not only technical expertise but attitude and philosophy. Although FWS or NMFS typically do not initiate HCP efforts, they can and should encourage them and once initiated support them to the maximum extent possible. This means being actively involved during HCP development; providing advice on mitigation programs, monitoring measures, and reserve designs; providing timely review of draft documents; helping find solutions to contentious issues; and generally helping bring the HCP together.

A. Getting Started

Once a private or non-Federal entity (or entities) has decided to obtain a section 10(a)(1)(B) permit the first task that it needs to undertake are determining the appropriate applicant, deciding whether or not to establish a steering committee, and preparing a list of species to be addressed in the HCP.

1. Who Can Apply For a Section 10 Permit?

Section 10 permits can be issued to state, municipal, or tribal governments, corporations or businesses, associations, and private individuals. They can also be issued to entities that are a combination of these, such as joint power authorities, watershed councils, and other planning authorities.

The standard method of authorizing take for Federal agencies is through the section 7 consultation process. Actions authorized, funded, or carried out by Federal Agencies must go through the section 7(a)(2) consultation process. There are cases where a Federal agency

is a partner in an HCP, and has a minor, but integral role in the HCP. Examples of these types of HCPs would include HCPs where a Federal agency is involved in a cooperative planning effort in which both Federal and private lands are addressed under a single HCP but the Federal agency is not the applicant or the primary partner in the plan. In these cases, the specific identified actions to be conducted by the Federal agency during the implementation of the HCP should be consulted on as part of the section 7 consultation conducted for the HCP. This allows the Services to conduct one formal consultation that incorporates the actions for the HCP and any specified or identified cooperative Federal action into one biological opinion. The biological opinion developed for the HCP should also incorporate the necessary biological analysis on the Federal action as well as the actions in the HCP to help eliminate duplication. Thus, the single biological opinion issued by the Services would address both the Federal action and the non-Federal action, and it would include an incidental take statement that authorizes any incidental take by the Federal agency and an incidental take permit that authorizes any incidental take by the section 10 permittee.

Before processing a section 10 permit application involving a Federal agency, Service staff should consult with the appropriate Regional Director's or Solicitor's Office (FWS), or the Regional Director's Office or Washington, D.C. Office of Protected Resources Office (NMFS).

2. Determining the Appropriate Applicant.

The first step is to determine who the applicant is who ultimately will hold the permit. In many cases this is relatively straightforward--the applicant is the land or other natural resource owner who proposes the project or activity and is responsible for implementing the HCP.

In regional HCPs, the plan often relies upon local or regional authorities to implement the plan and regulate the taking of listed species addressed in the plan. The permittee must therefore be capable of overseeing HCP implementation and have the authority to regulate the activities covered by the permit. For large-scale planning efforts involving only one or two landowners or types of activities, the landowners themselves are usually the appropriate permittee. For planning efforts involving numerous property owners and activities, the permittee is usually a local public agency--e.g., a city or county government or several local agencies acting jointly. In other cases, a state agency may obtain and hold a section 10 permit for certain types of state-regulated private activities (e.g., forestry activities).

When no government agency is available or interested in assuming the responsibility for an HCP, private groups wishing to obtain a permit for large-scale or multi-faceted projects may initiate an HCP without government involvement. They may, for example, form a consortium to develop the HCP, in which case the consortium would be the permittee. Or, they may jointly fund development of the HCP but maintain their individual identities by applying for separate permits, using the same HCP or individual HCPs modified from a

jointly-developed "template." Either approach is acceptable so long as the permittees have the authority to regulate or control all or applicable parts of the HCP program and the conditions of the HCP are enforceable.

3. Steering Committees.

An HCP "steering committee" is a group of persons who represent affected interests in a broad-scale HCP planning area and generally oversee HCP progress and development. Steering committees are not required by law and the Services do not require them, although they have proven useful to applicants in a variety of HCP settings. However, the Services cannot be the entities which establish them without compliance with the Federal Advisory Committee Act. It is important to remember that a steering committee's purpose is to advise the applicant in the development of the HCP, not to advise the Service on permit issuance.

The steering committee approach may not be appropriate for all situations. For some applicants, it may be too formal or complicated, or they may view it as giving "outside interests" too much access to proprietary data involving private lands. If this is the case during the pre-application phase, the Services should encourage the applicant to provide opportunities to brief or inform representatives of interested parties of key elements or issues to be addressed in the proposed HCP. This can be accomplished in several ways, such as formal or informal meetings, newsletters, etc.

When used in the HCP process, steering committees are usually appointed by the permit applicant and can fulfill several roles--they can assist the applicant in determining the scope of the HCP (size of the planning area, activities to include, etc.), help develop the mitigation program and other HCP conditions, provide a forum for public discourse and reconciling conflicts, and help meet public disclosure requirements. Steering committees are particularly useful in regional HCPs, especially those in which the prospective permittee is a state or local government agency, and are recommended for these types of HCP efforts. However, they are generally not utilized for low-effect HCPs or most single landowner projects.

Ideally, a steering committee should include representatives from the applicant; state agencies with statutory authority for endangered species; state or Federal agencies with responsibility for managing public lands within or near the HCP area (including other Service program areas such as the FWS's Refuges Division); tribal interests where applicable; affected industries and landowners (especially those with known or possible endangered species habitats); and other civic or non-profit groups or conservation organizations with an interest in the outcome of the HCP process.

For regional HCPs it is not practical to include every affected landowner or interest group on the steering committee. Instead, industry groups should be encouraged to assign a professional or trade organization to the committee to represent them--e.g., a farm bureau, cattlemen's association, or building industry association--though corporations with extensive

land holdings in the plan area may want to represent themselves. The steering committee needs to be representative, but its size must be manageable.

Another way to control numbers of participants in the HCP process is by using sub-committees. Sub-committees act as small working groups on behalf of the main committee and are an excellent means of addressing specific issues and developing specific components of the HCP. Sub-committees are more efficient than the larger steering committee for conducting certain tasks and generally help move the HCP process forward.

Prior to initiating an HCP effort, the newly-appointed steering committee may elect to develop a Memorandum of Understanding (MOU) or similar document to record "up front" the goals of the HCP, the composition of the committee, expectations of HCP participants, and other information unique to the locality or defined by the committee. Appendix 3 shows the MOU developed by participants of the Kern County, California HCP.

The question of whether to establish a steering committee may be difficult for non-governmental applicants. State or local governments typically embrace the steering committee idea early in the process because of their desire to obtain consensus from the community. On the other hand, private landowner applicants may feel that creation of a steering committee will lead to confrontation or the intrusion of outside interests into proprietary or sensitive economic matters. However, applicants should be aware of the potential benefits of a steering committee. These include identification and resolution of issues before they cause delays later in the process, development of an HCP that enjoys greater support in the community, and the cooperation of agencies or private conservation organizations that may be needed to help implement the conservation program. Permit applicants ultimately must weigh the risks of establishing or not establishing a steering committee with the expected benefits.

For large-scale or regional HCPs, one of the main functions of the steering committee is to build consensus among diverse organizations and interests, so it is important to promote good working relationships among committee participants. This does not mean that reaching agreement in complex HCP efforts will be easy! Often it is not. However, development of the HCP will be most effective when all interests in the community are represented in steering committee activities and their views and needs are given a fair hearing. A few suggestions:

- Steering committee meetings should be open to the public. This allows interested persons who do not actually sit on the committee to attend meetings, monitor progress, and generally feel they are part of the process.

- HCP participants should avoid creating an impression that they are pursuing unstated agendas or negotiating in bad faith. The trust developed between diverse and sometimes antagonistic HCP participants can be fragile, and this

impression can be damaging to a productive HCP even if untrue. Participants need to be sensitive to perception and avoid the impression of bad faith.

- The FWS and NMFS should not assign inexperienced staff to provide technical assistance to large-scale or regional HCP steering committees. This can result in mistakes, lost opportunities, and suggests to the applicants that the agencies are disinterested in the planning process. Inexperienced staff should learn the HCP process by working on small HCPs and by assisting other staff on larger efforts. If no staff have specific HCP experience, then individuals who are otherwise seasoned FWS or NMFS professionals should be assigned. If such individuals are not available, other staff should be sent to monitor HCP progress but not to actively participate. In such cases, staff sent to monitor the HCP should make clear to the applicants the limitations of their participation and resist rendering advice on important issues. However, they can and should act as liaisons to more experienced staff in the Field Office in answering questions or obtaining advice.

- The composition of the steering committee will depend on the type of HCP involved. Regional HCPs involving numerous activities and in which the applicant is a government entity ideally should include representatives from all affected interests. Steering committees for non-government HCPs can be organized according to the specific needs of the applicant, but at the least should include representatives from each permit applicant.

- A good facilitator or consultant who is skilled at moderating committee meetings, building consensus, and handling uncooperative parties can help significantly to move the HCP process forward.

4. The Services' Roles on Steering Committees & HCP Efforts.

Neither the FWS nor NMFS is required by statute or regulation to serve on HCP steering committees. Nevertheless, it is strongly advised that section 10 applicants invite the Services to participate as technical advisors on their steering committees. This will help ensure that adequate biological standards are incorporated into the HCP and that the HCP and associated documents meet procedural requirements when the permit application is

submitted. An HCP prepared in the absence of Service technical participation could be judged inadequate late in the process and unnecessary delays could result. The same caveat applies to all HCPs, regardless of size or whether a steering committee is established.

However, a careful balance needs to be drawn between constructive Service involvement in HCP efforts and overly aggressive involvement. Too little involvement can leave the impression that FWS or NMFS are disinterested or unhelpful, while too much can create the perception that the Services are inflexible in their approach to the HCP process, rigidly dictating the mitigation program.

To avoid either impression, Service HCP representatives need to understand their role and make that role clear to the applicant and the steering committee. Their function as agency representatives is to provide guidance about statutory and policy standards and to help facilitate development of a suitable mitigation program that satisfies the requirements of section 10; it is not to dictate every element in the HCP. The option to ignore or modify Service recommendations remains with the applicant; of course, doing so might result in subsequent difficulties during the permit application processing phase and the disapproval of an inadequate HCP. Service representatives at the Field Office level cannot pre-approve an HCP because section 10 permits are issued by the Regional Office (or, for NMFS, the Washington, D.C. Office), and, although advance coordination between the Field and Regional Offices should ensure their agreement on the HCP's adequacy, the permit application must still be evaluated fully during the public comment period.

The Services' steering committee members should also abstain from formal voting procedures on HCP issues if the committee conducts such votes. This will prevent confusion and reinforce the Services' proper role as advisor. Until the HCP is completed and submitted for approval, specific HCP development decisions are up to the steering committee and the applicant.

During the HCP development phase, the Services should be prepared to advise section 10 applicants on the following (regardless of whether there is a steering committee):

- Preparing the species list and identifying project scope and impacts.
- Biological studies and data needed to assess project impacts;
- NEPA requirements and the applicant's potential role in developing the NEPA analysis.
- Applicability of state endangered species law and requirements, and any other Federal laws that may be applicable, if any.

- o Project modifications that would minimize take and reduce impacts, or, ideally, and with concurrence of the applicant, would generate an overall measurable net benefit to the affected species;

- o Design of mitigation, habitat enhancement, or mitigation programs;

- o Reserve design criteria and assistance in population viability assessments, if desired.

- o Methods for monitoring HCP progress and project impacts on affected species;

- o Biologically acceptable take limits and how to define them;

- o Criteria to track or determine success of the HCP; and,

- o Procedural and other HCP issues as requested by the committee.

5. Preparing the HCP Species List.

In many HCPs, there are one or two primary species that "trigger" the need for an incidental take permit (e.g., the northern spotted owl or salmon in the Pacific Northwest, desert tortoise in southwestern deserts, or red-cockaded woodpecker in the southeast), though other listed species may occur in the same planning areas. After the decision has been made to obtain a permit, one of the first decisions an HCP applicant must make is what species to address in the plan. Generally, permit applicants should be advised to include all federally listed wildlife species likely to be incidentally taken during the life of the project or permit. If the applicant does not address such species, it may not be possible to issue the permit (if the issuance of a more limited permit would violate section 7(a)(2) for the listed species not covered) or the project activities could be stopped or delayed after the permit has been issued if a listed species that was not addressed in the HCP is likely to be taken during project activities.

There are also advantages in addressing unlisted species in the HCP (proposed and candidate species as a minimum), particularly those that are likely to be listed within the foreseeable future or within the life of the permit. Doing so can protect the permittee from further delays--e.g., having to revise the HCP and amend the permit--should species that were not listed at the time the original HCP was approved subsequently become listed. In addition, the "No Surprises" policy (see below, Section B.5(a)), applies to listed as well as unlisted species if they are adequately addressed in the HCP.

The more species addressed in the HCP, the more potentially complicated the HCP may become. For example, in most state systems, primary jurisdiction over candidate species rests with the affected State fish and wildlife agency, thereby increasing the advisability of

that agency's participation in the HCP process. Thus, selecting the species list can become an exercise in balancing the need to obtain maximum regulatory certainty, with practical considerations such as manageability, availability of biological information, and cost. The Services should be prepared to advise the applicant about which listed species should be highest priority in the HCP, which unlisted species are most likely to be listed in the future, and which species, listed or unlisted, can otherwise be advantageously addressed in the HCP. Ultimately, the decision about what species to address in the HCP lies with the applicant. In any case, the species list should be developed and agreed upon early in the HCP process, since it forms much of the basis for future plan development.

When preparing the species list the applicant should be informed that the ESA generally does not prohibit the incidental take of federally listed plants. Nevertheless, the Services should encourage the applicants to consider including listed plants in HCPs because, although incidental take of plants may not be prohibited by section 9, the section 7(a)(2) prohibition against jeopardy does apply to plants. If the section 7 consultation on a section 10 permit application concludes that issuance of the HCP permit for wildlife species would jeopardize the existence of a listed plant species, the permit could not be issued. To avoid this outcome, the applicant should ensure that actions proposed in the HCP are not likely to jeopardize any federally listed plant species. In addition, not all species under the jurisdiction of NMFS listed as threatened are subject to the section 9 take prohibitions. Such prohibitions are applied through regulation, on a case-by-case basis. Therefore, an incidental take permit may not be required for these species. Specific regulations are provided at 50 CFR Part 227.

6. Involving Other Federal and State Agencies.

During the development stage of an HCP, the Services will provide technical assistance and information concerning regulatory and statutory requirements to the applicants to ensure completeness of the application. Throughout this developmental process, the Services will encourage applicants to invite and include other Federal and State agencies who can utilize their existing authorities, expertise, or lands, in support of the HCP development and implementation process. It is particularly important to encourage participation of other Federal and State agencies that manage nearby lands into the HCP development process, if the applicant is willing to do so. However, the Service must ensure that activities are not identified in the HCP that obligate other agencies to conduct mitigation or minimization activities for species covered by the HCP, unless specifically negotiated with the agency, and the agency was a partner in the development and implementation of the HCP.

The "No Surprises" policy, which provides the applicant with regulatory certainty, calls for the Services to assist with correcting any unforeseen circumstance that may arise. This means that in the face of unforeseen circumstances the FWS and NMFS will not require additional mitigation in the form of additional lands or funds from any permittee who is adequately implementing or has implemented an approved HCP. Once the permit is issued and its terms

are being complied with, the applicant will not be required to accept additional obligations of this type. The policy also protects the permittee from other forms of additional mitigation except in cases where "extraordinary circumstances" exist.

The Services can, however, encourage other Federal or State agencies to assist with any unforeseen circumstances. Other agencies will be better able to assist if they have been involved throughout the entire HCP development. Any Federal or State agency that could ultimately be affected by the implementation of an HCP will be notified during the developmental process, and once the HCPs are completed and the incidental take permit is issued the Services will provide copies to the affected agencies. This will help these agencies effectively manage their lands in a way that could support the HCP and promote the conservation and recovery of listed and unlisted species.

7. Treaty Rights and Trust Responsibilities.

A unique and distinctive relationship exists between the United States and Native American Tribes, as defined by treaties, executive orders, statutes, court decisions, and the United States Constitution. This relationship differentiates tribes from other entities that deal with, or are affected by, the Federal government.

Indian tribes are recognized under Federal law as separate sovereigns with governmental rights over their lands and people. These governmental rights and authorities extend to natural resources that are reserved by or protected in treaties, executive orders, and Federal statutes. Such reserved rights may include off-reservation rights to hunt, fish, or gather trust resources.

The United States has a Federal trust obligation towards Indian tribes to preserve and protect these rights and authorities. The Federal Indian trust responsibility is a legal enforceable fiduciary obligation, on the part of the United States, to protect tribal lands, assets, resources, and treaty rights, as well as a duty to carry out the mandates of Federal law with respect to American Indian tribes and Alaskan Natives.

During habitat conservation planning negotiations with non-Federal landowners, the Services must consider whether proposed plans might affect tribal rights to trust resources. Whenever the Services have a reasonable basis for concluding that such effects might occur, they must notify the affected tribes and consult government to government in a meaningful way. Consultation with the affected tribe shall be completed within a timely manner. After careful consideration of the tribe’s concerns, the Services must clearly state the rationale for the recommended final decision and explain how the decision relates to the government’s trust responsibilities. In light of this obligation, it is important that the Services identify and evaluate during the planning process, any anticipated effects of a proposed HCP upon Indian trust resources.

B. Developing the HCP

1. Mandatory Elements of an HCP.

Under the Endangered Species Act [Section 10(a)(2)(A)] and Federal regulation [50 CFR 17.22(b)(1), 17.32(b)(1), and 222.22], a conservation plan submitted in support of an incidental take permit application must detail the following information.

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested;

- Measures the applicant will undertake to monitor, minimize, and mitigate such impacts; the funding that will be made available to undertake such measures; and the procedures to deal with unforeseen circumstances;

- Alternative actions the applicant considered that would not result in take, and the reasons why such alternatives are not being utilized; and,

- Additional measures FWS or NMFS may require as necessary or appropriate for purposes of the plan.

Each of these conservation plan elements are discussed in detail in the sections below. NMFS regulations (50 CFR 222.22) also require a list of all sources of data used in preparation of the plan.

Section 10 HCP requirements and permit issuance criteria must be clearly explained to any prospective permit applicant at the outset of an HCP effort. This is essential to ensure that the applicant understands the HCP process and that the HCP is developed within required legal parameters.

2. Identifying Project Impacts.

Four subtasks must be completed to determine the likely effects of a project or activity on federally listed or candidate species: (a) delineation of the HCP boundaries or plan area; (b) collection and synthesis of biological data for species to be covered by the HCP; (c) identifying activities proposed in the plan area that are likely to result in incidental take; and (d) quantifying anticipated take levels. To help expedite the section 7 process, the HCP should also assist the Services in: (e) satisfying the requirements of section 7 of the ESA; (f) addressing significant indirect effects of the project on federally listed species, if any; (g) addressing jeopardy to federally listed plants, if anticipated; and (h) addressing effects on critical habitat, if any. Section 7 should be addressed as early as is practicable in the HCP development process.

a. Delineation of HCP Boundaries. HCP boundaries should encompass all areas within the applicant's project, land use area, or jurisdiction within which any permit or planned activities likely to result in incidental take are expected to occur. HCP boundaries should also be as exact as possible to avoid later uncertainty about where the permit applies or where permittees have responsibilities under the HCP. For low-effect and many other HCPs, the plan area is usually synonymous with the project or land use site or the landowner's property. For regional HCPs, the size and configuration of the plan area will depend on various factors. Sometimes a regional HCP boundary will simply be a county line because a county government is the applicant. In other cases, it will be drawn to deliberately include or exclude certain areas or activities, depending on the participants' objectives [see Section B.2(c) below].

Generally, HCP applicants should be encouraged to consider as large and comprehensive a plan area as is feasible and consistent with their land or natural resource use authorities. Regional and other large-scale HCPs allow the permittee to address a broad range of activities and to bring them under the "umbrella" of the permit's legal protection. They also allow analysis of a wider range of factors affecting listed species, maximize flexibility needed to develop innovative mitigation programs, and minimize the burden of ESA compliance by replacing individual project review with comprehensive, area-wide review.

On the other hand, considering a large and complicated planning area has its own potential difficulties. Attempts to satisfy too many land use or endangered species issues in one effort can be frustrated by excessive complexity, shortages of biological information, and difficulties in securing the consensus of HCP participants. However, these are judgment calls, and the final size and configuration of an HCP planning area will often be a compromise between the need to be as comprehensive as possible and the inherent risks of an over-extended, protracted HCP effort.

Regional HCPs sometimes can be simplified by dividing the planning area into separate planning units with different conditions and requirements for each area. This approach was adopted in the San Bruno Mountain HCP. Coordination with individual landowners and local land use authorities will help determine when subdivision of a plan area will yield substantial advantages.

In any case, neither the ESA nor its implementing regulations limits the size of an HCP planning area. No matter how large or small, HCP areas are acceptable so long as the HCP is statutorily complete and meets the section 10 issuance criteria. With respect to small projects, the FWS section 10 regulations state that, "The Service believes that Congress did not intend to exclude projects from the incidental take provisions of section 10(a) merely because the projects were of more limited duration or geographical scope [than the San Bruno Mountain HCP]" (50 FR 39681-39691).

The HCP plan area might also include areas necessary for the mitigation. The exception to this general rule may be where the mitigation consists of reserves apart from the area in which incidental take is authorized. This will entail various considerations--e.g., the distance from permitted activities to reserve areas (see below, Section B.2(c)) and the ability of the permit applicant or its designee to regulate activities inside the reserve. Private, state, or locally-owned lands should never be considered for inclusion in HCPs as reserves without the concurrence of the landowners or their representatives.

b. Collection and Synthesis of Biological Data. Preparing an acceptable HCP requires the availability of up-to-date biological information on the species being considered within the plan area. First, the applicant should collate and review existing information about species distribution, occurrence, and ecology. FWS or NMFS can assist in this process by directing the applicant to available information. Second, the applicant should determine whether the available information is adequate to proceed with the planning process. If not, FWS or NMFS should recommend the type, scope, and design of biological studies that can reasonably be developed to support the HCP. However, research efforts on behalf of an HCP should be confined to distribution studies or other studies with a direct bearing on the needs of the HCP. Permit applicants should not be expected to undertake studies that do not directly affect the outcome of the HCP. Determining the availability of existing information is especially important for regional HCPs, since they may involve species whose biology is not well known. Low-effect HCPs typically will not require additional studies beyond surveys needed to determine the distribution of the species within the plan area.

Another approach to consider for HCPs is habitat-based HCPs (see Chapter 3, Section C.1) in which the presence of a particular species can be assumed based on the presence of its habitat type; if that habitat type is then addressed in the HCP and included in the mitigation program, additional distribution studies may not be necessary.

c. Determination of Proposed Activities. The applicant should be encouraged to include in the HCP a description of all actions within the planning area that: (1) are likely to result in incidental take; (2) are reasonably certain to occur over the life of the permit; and (3) for which the applicant or landowner has some form of control. For many HCPs, this will usually involve a specific well-defined project (e.g., home construction; water use development) or land use activity (e.g., forestry). For regional and other large-scale planning efforts, the applicants will need to determine what activities they wish to include in the HCP and, if necessary, which ones they wish to exclude. Generally, applicants should be encouraged to include as comprehensive a set of activities in the HCP as is practicable. This will maximize the permittee's long-term planning assurances, broaden legal coverage, and minimize the possibility that some future activity will not be covered by an issued permit.

What is being authorized in a section 10 permit is incidental take, not the activities that result in the take. Similarly, a violation of the permit occurs only if the amount or extent of authorized take is exceeded or if the terms and conditions of the HCP or the permit are not

implemented, not necessarily because some unspecified activity has occurred. The legality of an incidental take occurring during a specific activity will depend on how the HCP is structured. In some regional HCPs, the permit may specify that a certain number of habitat acres may be modified during construction activities, but the specific types of construction are unspecified--in which case the construction type *per se* would not affect the legality of any resulting incidental take. However, other HCPs may analyze incidental take in the context of a specified activity to be conducted across the HCP area, such as forest management. In such cases, incidental take is only authorized in association with specifically analyzed activities.

Even in the former case, an activity type that is not implicitly or explicitly covered by an HCP should not be allowed to "use" portions of the incidental take authorization at the expense of activities that are described. Unless broadly defined types of activities are described in the HCP (e.g., timber harvest, agriculture, or construction activities), then incidental take occurring during such activities within the plan area generally would not be authorized. In any case, the specificity with which activities are described in the HCP will depend on the applicant's objectives. They should be sufficiently described (as included or excluded) that the permittee or landowners subject to the permit can determine the applicability of the incidental take authorization to the activities they undertake.

Determining appropriate activities to include in the HCP can involve the same considerations as those described in Section B.2(a) concerning the HCP boundary. Here again the desire for a comprehensive HCP must be balanced against the risk of over-complicating the plan. Also a factor is the willingness of any particular group to participate in the HCP process. No group can be forced to participate. Of course, not participating in the responsibilities of the HCP also means not enjoying the benefits of protection from the incidental take prohibition and regulatory streamlining.

In some cases, specific landowners or industries may be reluctant to become involved in the HCP process. In such cases, Service representatives should assist the remaining participants in good faith, while encouraging "sideliners" to observe the benefits of the program. Of course, "non-participants" should understand that if their activities are not addressed in the HCP, either specifically or generically, they will not be covered by the incidental take permit. Moreover, if the permit applicant is a state, regional, or local governmental agency, "non-participants" may ultimately be affected by the terms and conditions of an HCP once the permittee begins to implement the HCP through the exercise of its regulatory powers. In other cases, a landowner may elect not to participate in an HCP for other reasons--for example, if they are negotiating a separate agreement or are operating under an existing permit.

These factors can result in HCPs with unusual inclusions and exclusions. For example, in the Metropolitan Bakersfield HCP in California, oil development activities are specifically excluded from the planning area but are proposed for inclusion in the Kern County HCP,

which overlays the Bakersfield HCP (see Appendix 3). Sometimes a new HCP will overlay multiple existing HCPs, or some applicants may elect to pursue an HCP on their own even though a regional HCP is being developed in the same area. Also, more than one regional HCP may occur near each other within the same bio-regional province, or two such HCPs may occur within the range(s) of the same species. Such inclusions and exclusions are perfectly acceptable. Nevertheless, participants should be aware of coordination problems that can develop between HCPs in these types of cases. For example, it is important to ensure that mitigation programs for the same species are identical in adjacent HCPs. Also, the Services should not issue more than one permit for identical activities in the same area at the same time, since this could result in two differing sets of conditions for the same activities. In cases where a new HCP overlays an existing one, neither the Services nor the new permit-holder can force existing permittees to adopt conditions of the new permit without their consent--(however, there may be exceptions, such as when the new permittee is a state or local government with its own regulatory authority). Generally, however, the Services will not seek additional mitigation from existing HCP permit holders for the same activities affecting the same species under a broad regional plan.

d. Determining Anticipated Incidental Take Levels. In determining the amount of incidental take that will be authorized during the life of the permit, three things must be determined: (1) how incidental take will be calculated; (2) the level of incidental take and related impacts expected to result from proposed project activities; and (3) the level of incidental take that the section 10 permit will actually authorize.

The first depends on the ability of HCP participants to determine, to the extent possible, the number of individual animals of a covered species occupying the project or land use area or the number of habitat acres to be affected. Depending on this information, proposed incidental take levels can be expressed in the HCP in one of two ways: (1) in terms of the number of animals to be "killed, harmed, or harassed" if those numbers are known or can be determined; or (2) in terms of habitat acres or other appropriate habitat units (e.g., acre-feet of water) to be affected generally or because of a specified activity, in cases where the specific number of individuals is unknown or indeterminable. The latter is typically expressed as all individuals occupying a given area of habitat, in whatever habitat unit is being used.

The next aspect depends on the number of animals or habitat units that occur in the project or planning area, and the likelihood that any given activity will result in take. This can be determined by first "overlaying" data on proposed activities--often in the form of maps--with biological data compiled from existing sources and collected in the field by the applicant. When this is completed, the effects of particular activities on species occupying project areas can be analyzed.

Under Federal regulation (50 CFR 17.3), "harm" in the definition of take can include "significant habitat modification or degradation where it actually kills or injures wildlife by

significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." Therefore, habitat modification or destruction, to the extent the above effects occur, can constitute take and must be detailed in the HCP and authorized by the permit.

"Harassment" is defined by regulation as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." As with "harm," any action qualifying as harassment under this definition must be described in the HCP and authorized by the permit (see Chapter 7, Section B.1).

After expected take levels have been estimated based on a comparison of proposed activities with species distribution in the plan area, the applicant and the Services can begin to determine the final outcome of the HCP. In general terms, this is done by determining what incidental take levels can be authorized that are consistent with the section 10 issuance criteria (i.e, that will not "appreciably reduce the likelihood of the survival and recovery of the species in the wild"), and developing a mitigation program that is also consistent with the issuance criteria (i.e., that will minimize and mitigate "to the maximum extent practicable"). If, in the Services' judgment, initially anticipated incidental take levels exceed what can be permitted under the section 10 issuance criteria, additional take avoidance and other mitigation measures must be developed.

These processes--determining anticipated incidental take, development of the mitigation program, and establishing authorized incidental take levels--are dynamic and do not necessarily occur in consecutive order as the above description might infer.

e. Coordinating the HCP With Section 7 of the ESA. Section 7(a)(2) of the ESA requires all Federal agencies "in consultation with and with the assistance of the Secretary" to ensure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of designated critical habitat. The section 7 implementing regulations (50 CFR Part 402) require, among other things, analysis of the direct and indirect effects of a proposed action, the cumulative effects of other activities on listed species, and effects of the action on critical habitat, if applicable.

Consultation under section 7 of the ESA is the Federal agency's responsibility, not the applicant's. In the case of issuance of a section 10(a)(1)(B) permit, FWS or NMFS must conduct an intra-Service (or internal) consultation to ensure compliance of permit issuance with the provisions of section 7. However, although the consultation responsibilities is not the permit applicants, the applicant should help ensure that those considerations required of the Services by section 7 have been addressed in the HCP. Otherwise, the Services' section 7 consultation on proposed permit issuance might result in a jeopardy or adverse modification finding with respect to indirect or cumulative effects, listed plants, or critical habitat if the HCP has inadequately considered these issues.

However, despite these additional considerations, in most cases the applicant will not actually experience a significant increase in responsibilities under the HCP because of the Services' associated section 7 responsibilities. This is because there are relatively high thresholds under section 7 (i.e., jeopardy), and many of the same relevant biological considerations are already integrated into the HCP process [see Sections B.2(f)-(h) below].

In many cases, the procedural aspects of the section 7 consultation are more important to the applicant's interests than its substantive outcome. In the past, some have viewed the section 7 consultation for a section 10(a)(1)(B) permit as an independent review process that occurs after the HCP has been prepared and during the permit application processing phase. However, this approach left the permit applicant with no guarantee that the process of meeting the requirements of section 10(a)(1)(B) would result in issuance of the permit, since a section 7 consultation conducted late in the process could result in the discovery of unresolved issues, the return of an inadequate HCP to the applicant, or a jeopardy biological opinion.

To avoid this, it is now Service policy to begin integrating the section 7 and section 10 processes from the beginning of the HCP development phase, and to regard them as concurrent and related, not independent and sequential, processes.

In procedural terms, this means that considerations of section 7 consultation requirements should start at the beginning of the HCP development phase, not during the permit processing phase. It also means that if the Services and the applicant work together to develop an adequate HCP--one that meets the section 10 issuance criteria as well as the Services' applicable section 7 standards--then a "no jeopardy" biological opinion at the close of the section 7 consultation should be virtually assured. Service representatives should explain to HCP applicants at the outset of any HCP effort the Services' section 7 obligations, how those obligations affect the applicant, and how the two processes (sections 7 and 10) will be integrated.

f. Addressing Indirect Project Effects. In some cases, it may be determined that activities being considered in an HCP would be likely to result in indirect effects to listed species. The implementing regulations of section 7 of the ESA define indirect effects as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." In the HCP context, this would typically mean that activities under the HCP are expected to affect species outside the HCP plan area, or species that are inside the plan area but are not otherwise directly covered by the terms of the HCP. If expected indirect effects are serious enough to result in jeopardy or result in adverse modifications to critical habitat, and they have not been adequately treated in the HCP, the Services would have to deny the permit. Thus, indirect effects issues must be treated carefully during any HCP negotiation process.

From a practical standpoint, one problem is that large-scale projects of the type addressed in many HCPs can have "ripple" effects that continue long past their point of origin. Following

a causation chain of indirect effects from their point of origin to some specific effect, or vice versa, can be difficult, and assigning responsibility for all potential subsequent effects to the originator of a particular action may not be justified or practical.
For example, some species addressed in HCPs occupy small habitat areas or have narrow habitat requirements and are therefore unusually vulnerable to biotic and abiotic factors such as fire, vegetation succession, predation, and interspecific competition. In these cases, human alteration of the landscape in and around such habitats can have heightened adverse effects or specific indirect effects that must be addressed if the habitats are to be considered viable and affected populations are to persist. A good example is development in endangered beach mice habitat, which results in increased pet populations and then increased predation on beach mice. The HCP in such cases must address these types of effects. In the southeast, for example, some approved HCPs have been predicated on the successful control of post-project, human-induced effects on endangered species populations that remain or are protected after development of adjacent areas. Permittees have agreed to provide funding to control predators and competitors of listed species, nuisance or exotic vegetation, or pollution, and to meet education and information needs in the local community.

With these considerations in mind, the following guidance is provided about how to address indirect effects issues in HCPs. If a species is likely to be jeopardized as a result of the indirect effects of activities proposed in an HCP, the Services may not issue the permit unless these effects are adequately addressed. However, before an HCP is required to contain additional requirements to adequately address indirect effects under section 7: (1) the risk of jeopardy should be clear and reasonably certain to occur; and (2) the indirect effects in question must be reasonably foreseeable and a proximate consequence of the activities proposed under the HCP. The standard for imposing additional requirements on an HCP is the likelihood of jeopardy, not just the existence of indirect effects.

g. Consideration of Plants in the HCP and Permit. The take prohibition for federally listed plants under the ESA is more limited than for listed animals. Section 9(a)(2)(B) prohibits the removal of listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed plants on non-Federal areas in violation of state law or regulation. Thus, the ESA does not prohibit the incidental take of federally listed plants on private lands unless the take or the action resulting in the take is a violation of state law (which in most cases eliminates the need for an incidental take permit for plants).

Nevertheless, the Services recommend that permit applicants consider listed plants in HCPs. This is because the section 7(a)(2) prohibition against jeopardy applies to plant as well as wildlife species; and if the section 7 consultation on a section 10 permit application concludes that issuance of the permit for wildlife species would jeopardize the existence of a listed plant species, the permit could not be issued. To avoid this outcome, the applicant should ensure that actions proposed in the HCP are not likely to jeopardize any federally listed plant species.

However, if it is determined that the proposed HCP is not likely to jeopardize the continued existence of any federally listed plant species, then any such plants present within the HCP area that are on private or other non-Federal lands are protected against incidental take only to the extent that state law applies. Beyond that the applicant has no further responsibility with respect to listed plants. In the spirit of the conservation planning process, however, the Services will encourage applicants to address endangered or threatened plants in their HCPs.

Although take of listed plants does not require a section 10 permit in most cases, the names of any plants addressed in the HCP can be placed on the permit at the request of the applicant when it is issued. This might be done: (1) because a particular plant is protected by state law and is subject to the section 9 take prohibition; or (2) to protect the permittee's interests should the legal status of any plant change during the life of the permit as a result of changes to the ESA. This approach is acceptable and is encouraged if the permit applicant requests it or it otherwise increases the applicant's confidence in the long-term assurances under the permit. It is also consistent with the treatment of unlisted wildlife species in section 10 permits as described in Chapter 4.

h. Addressing Effects on Critical Habitat. Section 7(a)(2) prohibits the "destruction or adverse modification" of designated critical habitat by any action authorized, funded, or carried out by a Federal agency. The section 7 regulations define "destruction or adverse modification" as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." The regulations for section 4 of the ESA (50 CFR 424.12) describe the "constituent elements" of critical habitat as "those that are essential to the conservation of the species" including, but not limited to, "roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types."

Thus, in issuing section 10 permits, the Services must ensure that the constituent elements of critical habitat will not be altered or destroyed by proposed activities to the extent that the survival and recovery of affected species would be appreciably reduced. However, these section 7 obligations typically impose few restrictions on the HCP applicant in addition to those required by section 10, because the section 10 issuance criteria also prohibit appreciably reducing the "likelihood of the survival and recovery of the species in the wild" [section 10(a)(2)(B)]. In other words, the inherent biological value of areas designated as critical habitat typically would prevent significantly greater alteration of their constituent habitat elements under section 10 than would be permissible under section 7. Nevertheless, to the extent that a proposed HCP might result in impacts to critical habitat, such impacts should be described and evaluated in the biological opinion concluding section 7 consultation on the permit application.

Some HCPs encompass areas that have been or have the potential to be designated as critical habitat. To fulfill the Service’s section 7 compliance responsibilities, all HCPs must be

reviewed to determine whether they are likely to jeopardize the continued existence of the species or cause adverse modification to designated critical habitat. The Services will provide technical assistance and work closely with the applicant throughout the development of the HCP to reduce the probability of developing an HCP that would not meet these criteria.

It is possible to approve an HCP that authorizes land use or development activities within an area designated as critical habitat. The activities approved under an HCP could include a variety of land or natural resource use activities that modify critical habitat on a large scale without the activities being deemed an adverse modification contrary to the requirements of section 7(a)(2). The authorization of activities in critical habitat through the HCP process is possible because the adverse modification of critical habitat is analyzed by determining the effects on the entire area designated as critical habitat or an administrative part or unit of the critical habitat, not on a smaller scale of particular individual acres. In addition, the HCP permittee must minimize and mitigate for any effects caused by the authorized activity, which would offset or reduce the significance of adverse effects to the critical habitat. Thus, the overall net affect of authorized land use activities for a particular HCP can be brought within the range of effects which is allowable under section 7.

3. Mitigation Programs & Standards.

Mitigation programs under HCPs and section 10 permits are as varied as the projects they address. Consequently, this handbook does not establish specific "rules" for developing mitigation programs that would limit the creative potential inherent in any good HCP effort. On the other hand, the standards used in developing HCPs must be adequate and consistent regardless of which Service office happens to work with a permit applicant. Mitigation programs should be based on sound biological rationale; they should also be practicable and commensurate with the impacts they address. This section sets forth some fundamental standards for mitigation programs and suggests some broad mitigation strategies, but leaves the development of specific programs to individual applicants and Service personnel.

Mitigation actions under HCPs usually take one of the following forms: (1) avoiding the impact (to the extent practicable); (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; or (5) compensating for the impact. For example, project effects can be (1) avoided by relocating project facilities within the project area; (2) minimized through timing restrictions and buffer zones; (3) rectified by restoration and revegetation of disturbed project areas; (4) reduced or eliminated over time by proper management, monitoring, and adaptive management; and (5) compensated by habitat restoration or protection at an onsite or offsite location. In practice, HCPs often use several of these strategies simultaneously or consecutively. Other types of mitigation not mentioned may also be used.

a. Regulatory Standards & Relationship to Recovery.

Issuance criteria under section 10 of the ESA require that the HCP applicant "minimize and mitigate" the impacts of any incidental taking authorized by a section 10 permit, and that issuance of the permit not "appreciably reduce the likelihood of the survival and recovery of the species in the wild" (see Chapter 7). Section 7(a)(2) of the ESA requires that issuance of a permit does not "jeopardize the continued existence of" any federally listed species, or result in "destruction or adverse modification" of designated critical habitat. The implementing regulations of section 7 define "jeopardize" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of that species"--this is essentially identical to the section 10 issuance criterion cited above. Section 7(a)(2) also requires use of "the best scientific and commercial data available" in fulfilling its provisions. No other specific mitigation standards for HCPs are specified under the ESA.

Issuance of a section 10 permit must not "appreciably reduce" the likelihood of the survival and recovery of the species in the wild. Note that this does not explicitly require an HCP to recover listed species, or contribute to their recovery objectives outlined in a recovery plan. This reflects the fact that HCPs were designed by Congress to authorize incidental take, not to be mandatory recovery tools.

However, recovery is nevertheless an important consideration in any HCP effort. This is because, some HCPs may encompass all or much of a species' range and address crucial biological issues; because of the inherent biological significance of such planning areas, a poorly designed HCP could readily trigger the "appreciably reduce" or "jeopardize" standard. Second, many HCPs, even smaller ones, can be said to contribute to recovery to the extent that individually or collectively they provide for dependable conservation actions and long-term biological protections. Thus, contribution to recovery is often an integral product of an HCP, but it is not an explicit statutory requirement.

To put this in practical terms, applicants should be encouraged to develop HCPs that produce a net positive effect for the species or contribute to recovery plan objectives. The Services should also assess the extent to which an HCP's mitigation program is consistent with recovery plans. In general, conservation plans that are not consistent with recovery plan objectives should be discouraged.

Similarly, HCPs that might preclude a significant recovery option, unless they otherwise contribute substantially to the goal of recovery should also be discouraged. In cases where a recovery plan is not available, the Services must use other available biological information and its best judgement to encourage the development of HCPs that would aid in a species' recovery.

b. Must An HCP Benefit the Species?

Whether or not an HCP must benefit a species is similar to its relationship to recovery objectives. No explicit provision of the ESA or its implementing regulations requires that an HCP must result in a net benefit to affected species. However, just as they can contribute to recovery, HCPs can also benefit the species they address because of the conservation programs they establish and the long-term assurances they provide. This is especially true of regional and other large-scale HCPs that address all or much of a species' range. Wherever feasible, the FWS and NMFS should encourage HCPs that result in a "net benefit" to the species.

c. Mitigation for Habitat Loss.

Activities conducted under HCPs frequently involve permanent habitat losses (or temporary habitat disturbances), for which the permittee mitigates by acquiring or otherwise protecting replacement habitat at an onsite or offsite location. Commonly referred to as "habitat mitigation," this strategy is acceptable under the HCP process so long as such mitigated habitat losses are consistent with the section 10 issuance criteria.

One form of habitat mitigation is the "habitat bank" approach, in which habitats are "banked" (protected through conservation easement or other means) prior to a project. These lands are then utilized as needed for mitigation purposes. A variation on this scheme is the "mitigation credit" system--in which "banked" habitats are established as "credits" (usually on a per-acre basis), and the habitat banker then uses the credits as needed or sells them to other parties requiring mitigation lands at a fair market price. The latter system has considerable promise as a mitigation strategy because: (1) it allows owners of endangered species habitat to derive economic value from their land as habitat; (2) it allows parties with mitigation obligations to meet their obligations rapidly (mitigation lands are simply purchased as credits); and (3) the mitigation lands are provided prior to the impact (eliminating uncertainty about whether a permittee might fail to fulfill the HCP's obligations after the impact has occurred). Still another approach is the "mitigation fund," in which a permittee pays a cash amount as determined by the HCP into an account administered by a suitable entity, and where other such contributions are pooled into a habitat acquisition fund.

The type of mitigation habitat and its proximity to the area of impact will need to be considered. Generally, the location of replacement habitats should be as close as possible to the area of impact; it must also include similar habitat types and support the same species affected by the HCP. However, there may be good reason to accept mitigation lands that are distant from the impact area--e.g., if a large habitat block as opposed to fragmented blocks can be protected or if the mitigation lands are obtained through a mitigation fund. Ultimately, the location of mitigation habitat must be based on individual circumstances and good judgement.

Potential types of habitat mitigation include, but are not limited to: (1) acquisition

of existing habitat; (2) protection of existing habitat through conservation easements or other legal instruments; (3) enhancement or restoration of disturbed or former habitats; (4) prescriptive management of habitats to achieve specific biological characteristics; and (5) creation of new habitats. Here again, the specific strategy or combination of strategies used will depend on the species and type of habitat involved. In some cases, acquisition of high-quality existing habitat will be the best approach--for example, where the habitat type takes years to develop (e.g., old-growth forest). However, if such habitat is continually being lost, a strategy based on this method alone could result in net loss of habitat value. In other cases, restoring degraded habitat or creating new ones is the best strategy--for example, where the habitat type is relatively easy to manipulate (e.g., grasslands). Where affected species depend on natural disturbance regimes that can be replicated through management regimes (e.g., prescribed fire or flooding), prescriptive management may be preferable to habitat acquisition or protection alone.

Certain caveats may apply to these strategies, however. For example, when a mitigation program involves creation of new habitat or restoration of degraded habitats, HCP participants should ensure that techniques used are proven and reliable or, if relatively new, that contingency measures or adaptive management procedures are included to correct for failures.

Sometimes, the HCP applicant may need to conduct activities prior to the time when replacement habitats can be provided. This is acceptable so long as the HCP provides legal or financial assurances that the permittee will fulfill the HCP's obligations. One way to accomplish this is through Letters of Credit controlled by the government until the mitigation lands have been provided. Another method is requiring a specified cash payment into a mitigation fund prior to commencement of HCP activities. However, such payments alone are not regarded as acceptable mitigation. Unless the fund is ultimately used and habitat is otherwise acquired. Mitigation funds have often been used in regional HCPs in which the responsible party for habitat mitigation under the HCP is a state or local government agency. Other examples are mitigation funds or other well-established mitigation programs utilized by small-landowners [see below, Section B.3(d)]. In such cases, the responsibilities of individual contributors may end with the payment, and any additional performance requirement would either be waived or would belong to the permitted agency.

One common issue raised during HCP negotiations is how long mitigation lands must be conserved. When habitat losses permitted under an HCP are permanent, protection of mitigation lands normally should also be permanent (i.e., "in perpetuity"). Mitigation for temporary habitat disturbances can be treated more flexibly; however, management logistics and other considerations may still dictate permanent mitigation for temporary impacts, though typically at a lesser rate than for permanent ones.

d. Funding Recovery Measures as Mitigation.

Another issue in cases where habitat is lost during HCP activities is whether funds contributed for purposes other than habitat acquisition or protection--e.g., species research--can serve as habitat mitigation. First and foremost, mitigation should address compensate for habitat lost through the permitted activities of the HCP by establishing suitable habitat for the species that will be held in perpetuity, if possible. For example, the mitigation requirement for low-effect HCPs that have a negligible effect on habitat could be to enhance existing habitat so that it meets the species' requirements. Generally, research is not considered a preferred mitigation strategy, since the type of mitigation is usually related directly to the type of effect.

It is acceptable in some cases for funding to be provided to State or Federal agencies to implement recovery actions within critical habitat, to restore degraded habitat, to address anthropogenic influences, and for conservation actions on larger, more secure populations of the affected species on public lands. In some cases, matching Federal/private funding has been developed under HCPs for such purposes.

e. Mitigation for Small-Scale, Low-Effect Projects.

It is important that methods be established by state and Federal wildlife agencies and other organizations that allow proponents of small projects or small-scale land use proposals to participate in larger HCPs, or that make convenient mitigation strategies accessible to low-effect HCPs. For example, it is often difficult for an individual to locate and acquire a few acres of mitigation habitat, since lands are usually sold by the lot or in large segments. A good way to accommodate this problem is to establish mitigation fund accounts that accumulate funds until relatively large-scale acquisitions can be effected [see above, Section B.3(c)]. Habitat banks are another good way to handle this situation. Avoid requiring permittees to meet habitat mitigation requirements without a practical, accessible means of meeting that requirement. In general, flexibility is needed in addressing the unique circumstances often associated with small landowners and small-scale, low-effect HCPs.

f. Consistency in Mitigation Standards.

Mitigation measures required by individual FWS or NMFS offices should be as consistent as possible for the same species. This can be challenging when a species encompasses multiple offices or regions, but is essential. The first step is good communication between offices. The next is establishment of specific standards--e.g., for survey methods, buffer zones, or mitigation methods--and consistent implementation of those standards. Field Offices should coordinate these standards between biologists in the same office; Regional Offices should ensure consistency among Field Offices. Mitigation standards should also be developed in coordination with state wildlife agencies. The Service should not apply inconsistent mitigation policies for the same species, unless differences are based on biological or other good reasons and are clearly explained. Consistent mitigation strategies help streamline the

HCP development process--especially for smaller HCPs--by providing readily available standards which applicants can adopt in their HCPs.

g. Adaptive Management.

The Services often incorporate adaptive management concepts into the HCP process to minimize the uncertainty associated with listed or unlisted species where there are gaps in the scientific information or their biological requirements. Over the years, there has been an increase in the diversity and geographical size of HCPs. As of late 1995, most HCPs approved were for planning areas of less than 1,000 acres. However, of the 200 HCPs being developed as of early 1996, approximately 25 exceed 10,000 acres, 25 exceed 100,000 acres, and 18 exceed 500,000 acres. This suggests that HCPs are evolving from a process developed primarily to address single developments to broad-based, landscape level planning tools utilized to achieve long-term conservation goals for listed and unlisted species, while allowing applicants to proceed with their land use and development.

For some species, not all of the scientific information needed to develop comprehensive long-term conservation strategies to conserve species may be available at the time of HCP development. Where these data gaps occur, not all of the questions regarding the long-term effects of implementing these HCPs can be answered. When significant uncertainty exists, it can be addressed through the incorporation and implementation of adaptive management measures into HCPs. For those HCPs with significant uncertainty, incorporating adaptive management provisions into the HCP becomes important to the planning process and the long-term interest of affected species. For example, an applicant's commitment to conduct watershed analyses (scientifically examining the conditions within watersheds and making site-specific recommendations) and then adjusting management strategies based on the results of the analyses for part or all of their lands is one form of adaptive management that has been applied to HCPs in the Pacific Northwest.

Through adaptive management, the biological objectives (or goals) of a conservation strategy are defined using techniques, such as models of the ecological system that includes its components, interactions, and natural fluctuations. If existing data makes it difficult to predict exactly what mitigation is needed to achieve a biological objective, then an adaptive management approach can be used in the HCP. The primary reason for using adaptive management in HCPs is to allow for changes in the mitigation strategies that may be necessary to reach the long-term goals (or biological objectives) of the HCP, and to ensure the likelihood of survival and recovery of the species in the wild. Under adaptive management, the mitigation activities of the HCP could be monitored and analyzed to determine if they are producing the required results (e.g., properly functioning riparian habitats). If the desired results were not being achieved, then adjustments in the mitigation strategy could be considered through an adaptive management clause of the HCP.

Research can fill data gaps and/or test the effectiveness of management and mitigation strategies, which can then be modified as new information is obtained. Adaptive management, if used, can provide a reliable means for assessing the mitigation and minimizing strategies outlined in HCPs, producing better ecological knowledge, and developing appropriate modifications that would improve the mitigation strategy for a species.

The base mitigation strategy or initial minimization and mitigation measures which are implemented must be sufficiently vigorous so that the Service may reasonably believe that they will be successful. An adaptive management approach is particularly useful when significant questions remain regarding an HCP's initial mitigation strategy. The Services should not approve an HCP using conservation strategies that have a low likelihood of success.

Monitoring is an important tool in an adaptive management approach and should be designed in a way that ensures data will be properly collected, analyzed, and used to adjust mitigation strategies, as appropriate. A key element of adaptive management is the establishment of testable hypotheses linked to the conservation strategies and their biological objectives. If monitoring determines that biological conditions are outside specific parameters or thresholds, which are defined in the HCP, the conservation strategies should be reviewed. The "thresholds" for review should be linked to key elements of the HCP and should be obtainable through monitoring data collected during the implementation of the HCP. These "threshold" levels should be clearly defined in the HCP and should be based upon measurable criteria, and monitoring should be clearly linked to those measurable criteria. The establishment of measurable criteria would dictate the type of monitoring including the number of samples, distribution of samples, and use of controls.

Prior to the issuance of a permit, there should be a clear understanding and agreement between the Services and the permittee as to the mitigation range of adjustments which might be required as a result of any adaptive management provisions. A mechanism for determining the magnitude of strategy change to be employed, based upon the results of the monitoring and the level of deviation significance from the desired condition, should be developed in advance so all parties are clear in this regard and can react at the appropriate time.

Corrective actions to any of the conservation strategies in the HCP should be based on significant "non-achievement" of the HCP's base mitigation. This does not preclude the Services from working with the applicant to develop a strategy to compensate for external factors (e.g., catastrophic fires) or requesting the applicant to voluntarily increase the base mitigation strategy because of these external factors.

4. Monitoring Measures.

The section 10 regulations require that an HCP specify the measures the applicant will take to "monitor" the impacts of the taking resulting from project actions [50 CFR 17.22(b)(1)(iii)(B) and 50 CFR 222.22(b)(5)(iii)]. Monitoring measures described in the HCP should be as specific as possible and be commensurate with the project's scope and the severity of its effects.

For regional and other large-scale HCPs, monitoring programs should include periodic accountings of take, surveys to determine species status in project areas or mitigation habitats, and progress reports on fulfillment of mitigation requirements (e.g., habitat acres acquired). Monitoring plans for HCPs should establish target milestones, to the extent practicable, or requirements throughout the life of the HCP, and where appropriate, adaptive management options (see Chapter 3, Section B.3(g)).

The following steps are logical elements for consideration in developing HCP monitoring programs for regional or other large-scale HCPs:

- Develop objectives for the monitoring program. Any monitoring program associated with HCPs should answer specific questions or lead to specific conclusions. If the objectives are well-developed, they will help shape a complete monitoring program.

- Describe the subject of the monitoring program--e.g., effects on populations of affected species, effects on the habitat of the species, or effects on both.

- Describe variables to be measured and how the data will be collected. Make sure these are consistent with the objectives of the monitoring program.

- Detail the frequency, timing, and duration of sampling for the variables. Determining how frequently and how long to collect data is important to the success or failure of the monitoring program. If the interval between samples is too long or too short, the monitoring program may not detect an effect. The frequency, timing, and duration of the sampling regimen should also relate to the type of action being evaluated, the species affected by the action, and the response of the species to the effects produced by the action.

- Describe how data are to be analyzed and who will conduct the analyses. A monitoring program is more effective when analytical methods are integrated into the design. For example, parametric and non-parametric statistical analyses require different sample sizes, which affect the frequency, timing, and duration of sampling.

- Monitoring must be sufficient to detect trends in species populations in the plan area but should be as economical as possible. Avoid costly monitoring schemes that divert funds away from other important HCP programs, such as mitigation.

- Monitoring programs can be carried out by a mutually-identified party other than the permittee, so long as this is specified in the HCP, funding is provided, and the party is qualified.

The FWS and NMFS also have a responsibility to monitor the implementation and success of HCPs. The Services may agree to specific monitoring responsibilities under the HCP, Implementing Agreement, or as part of the incidental take statement issued in conjunction with the section 7 biological opinion. Even if not specified in this manner, the agency still has the responsibility to monitor compliance with the terms of particular HCPs, including any adaptive management commitments incorporated into the HCP, and the section 10 program generally. One way to achieve this is to ensure that requirements for monitoring and status reports are included in HCPs where needed and by ensuring that such reports are submitted by permittees and reviewed by FWS or NMFS staff.

For regional HCPs, another way is to establish technical review teams to periodically evaluate HCP compliance and the success of adaptive management programs. Such teams could include species experts and representatives of the permittee, FWS, NMFS, and other affected public agencies. To maintain the credibility of the HCP, it may be beneficial to submit the technical team's findings to occasional review by recognized experts in pertinent fields (e.g., conservation biologists, re-vegetation specialists, etc.).

Not all of the above steps are necessary for small-scale, low-effect HCPs, and should only be used as appropriate.

5. Unforeseen Circumstances/Extraordinary Circumstances.

Congress recognized in the section 10 amendments that "...circumstances and information may change over time and that the original plan might need to be revised. To address this situation the Committee expects that any plan approved for a long-term permit will contain a procedure by which the parties will deal with unforeseen circumstances." (H.R. Rep. No. 97-835, 97th Congress, Second Session). Accordingly, Federal regulation requires such procedures to be detailed in the HCP [50 CFR 17.22(b)(1)(iii)(C)]. At the same time the legislative history states that:

> The Committee intends that the Secretary may utilize this provision to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species and long-term assurances to the proponent of the conservation plan that the terms of the plan will be

> adhered to and that further mitigation requirements will only be imposed in accordance with the terms of the plan. In the event that an unlisted species addressed in the approved conservation plan is subsequently listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act." (H.R. Report No. 97-835, 97th Congress, Second Session, and 50 FR 39681-39691.)

This Congressional history illustrates the potential tension between two primary goals of the HCP program: (1) adequately minimizing and mitigating for the incidental take of listed species, and (2) providing regulatory assurances to section 10 permittees that the terms of an approved HCP will not change over time, or that necessary changes will be minimized to the extent possible, and will be agreed to by the applicant. How to reconcile these objectives remains one of the central challenges of the HCP program.

"Unforeseen circumstances," also referred to as "extraordinary circumstances," in the past have been broadly defined to include a variety of changing circumstances that may occur over the life of an ongoing HCP. However, it is important to distinguish between the terms "unforeseen circumstances," or "extraordinary circumstances," versus "changed circumstances." "Changed circumstances" are not uncommon during the course of an HCP and can reasonably be anticipated and planned for (e.g., the listing of new species, modifications in the project or activity as described in the original HCP, or modifications in the HCP's monitoring program). "Unforeseen circumstances" or "extraordinary circumstances" however, means changes in circumstances surrounding an HCP that were not or could not be anticipated by HCP participants and the Services, that result in a substantial and adverse change in the status of a covered species.

With respect to anticipated and possible changed circumstances, the HCP should discuss measures developed by the applicant and the Services to meet such changes over time, possibly by incorporating adaptive management measures for covered species in the HCP. HCP planners should identify potential problems in advance and identify specific strategies or protocols in the HCP for dealing with them, so that adjustments can be made as necessary without having to amend the HCP.

The "Unforeseen/Extraordinary Circumstances" section of the HCP should be more limited. It should discuss how those changes in the circumstances surrounding the HCP that cannot effectively be anticipated by HCP negotiators will be dealt with in the future. It must also be consistent with the Department of Interior's and Department of Commerce's "No Surprises" policy.

a. <u>The "No Surprises" Policy</u>.

To address the problem of maintaining regulatory assurances and providing regulatory certainty in exchange for conservation commitments, the Department of the Interior (DOI) and Department of Commerce (DOC) have jointly established a "No Surprises" policy for HCPs.

The "No Surprises" policy sets forth a clear commitment by the FWS, NMFS, DOI, and DOC that, to the extent consistent with the requirements of the Endangered Species Act and other Federal laws, the government will honor its agreements under an approved HCP for which the permittee is in good faith implementing the HCP's terms and conditions. The specific nature of these provisions will vary among HCPs depending upon individual habitat and species needs.

The "No Surprises" policy provides certainty for private landowners in ESA Habitat Conservation Planning through the following assurances:

- In negotiating "unforeseen circumstances" provisions for HCPs, the Fish and Wildlife Service and National Marine Fisheries Service shall not require the commitment of additional land or financial compensation beyond the level of mitigation which was otherwise adequately provided for a species under the terms of a properly functioning HCP. Moreover, FWS and NMFS shall not seek any other form of additional mitigation from an HCP permittee except under extraordinary circumstances.

This means that if unforeseen circumstances occur during the life of an HCP, the FWS and NMFS will not require additional lands, additional funds, or additional restrictions on lands or other natural resources released for development or use, from any permittee, who in good faith, is adequately implementing or has implemented an approved HCP. Once a permit has been issued and its terms are being complied with, the permittee may remain secure regarding the agreed upon cost of mitigation, because no additional mitigation land, funding, or land use restrictions will be requested by the Services. The policy also protects the permittee from any <u>other</u> forms of additional mitigation, except where extraordinary circumstance exist.

Other methods of responding to the needs of the affected species, such as government action and voluntary conservation measures by the permittee, remain available to assure the requirements of the ESA are satisfied.

Consequently, the "No Surprises" policy also provides that:

- If additional mitigation measures are subsequently deemed necessary to provide for the conservation of a species that was otherwise adequately covered under the terms of a properly functioning HCP, the obligation for such measures shall not rest with the HCP permittee.

This means that in cases where the status of a species addressed under an HCP worsens, the primary obligation for implementing additional conservation measures would be borne by the Federal government, other governmental agencies, private conservation organizations, or other private landowners who have not yet developed an HCP.

"Adequately covered" for listed species refers to any species addressed in an HCP which has satisfied the permit issuance criteria under section 10(a)(2)(B) of the ESA. For unlisted species, the term refers to any species which is addressed in an HCP as if it were listed pursuant to section 4 of the ESA, and in which HCP conditions for that species would satisfy permit issuance criteria under section 10(a)(2)(B) of the ESA if the species were listed. "No Surprises" assurances apply only to species that are adequately covered in the HCP. Species should not be included in the HCP permit if data gaps or insufficient information makes it impossible to craft conservation/mitigation measures for them. Such data gaps can be overcome, however, through the inclusion of adaptive management clauses in the HCP (See Chapter 3, Section 3.B(g)).

- If extraordinary circumstances warrant the requirement of additional mitigation from an HCP permittee who is in compliance with the HCP's obligations, such mitigation shall maintain the original terms of the HCP to the maximum extent possible. Further, any such changes shall be limited to modifications within Conserved Habitat areas or to the HCP's operating conservation program for the affected species. Additional mitigation requirements shall not involve the payment of additional compensation or apply to parcels of land available for development or land management under the original terms of the HCP without the consent of the HCP permittee.

This means that if extraordinary circumstances are found to exist, the Services will consider additional mitigation measures; however, such measures must be as close as possible to the terms of the original HCP and must be limited to modifications within Conserved Habitat areas or the HCP's operating conservation program or to lands that are already protected by the HCP. New mitigation measures should not include requirements for additional land protection, payment of funds, or apply to lands available for development or use under the HCP, unless the permittee consents to such additional measures. "Modifications within Conserved Habitat areas or to the HCP's operating conservation program" means limiting such changes to plan areas explicitly designated for habitat protection or other conservation uses, or redirecting or increasing the intensity, range, or effectiveness of conservation efforts in such areas, provided that any such changes do not impose new restrictions or financial compensation on the permittee's activities. For example, if a developer had agreed to dedicate a certain amount of funding annually in support of a particular conservation program (e.g., habitat restoration) but subsequent research demonstrated that greater conservation benefits could be achieved by redirecting funding into depredation control, and extraordinary circumstances warranted such a shift, the No Surprises policy would allow the modification since it would impose no new funding burden on the permittee.

The policy also sets out criteria for determining whether and when extraordinary circumstances arise where the government could request review of certain aspects of the HCP's conservation program.

- The FWS and NMFS shall have the burden of demonstrating that such extraordinary circumstances exist, using the best scientific and commercial data available. Their findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the affected species.

- In deciding whether any extraordinary circumstances exist which might warrant requiring additional mitigation from an HCP permittee, FWS and NMFS shall consider, but not be limited to, the following factors: (a) size of the current range of affected species; (b) percentage of range adversely affected by the HCP; (c) percentage of range conserved by the HCP; (d) ecological significance of that portion of the range affected by the HCP; (e) level of knowledge about the affected species and the degree of specificity of the species' conservation program under the HCP; (f) whether the HCP was originally designed to provide an overall net benefit to the affected species and contained measurable criteria for assessing the biological success of the HCP; and (g) whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

The first of these two measures, on the burden of proof, is self-explanatory. The second identifies some factors to be considered by the Services in determining whether extraordinary circumstances exist. Generally, the primary focus of inquiry would be level of biological peril to species covered by the HCP in question, and the degree to which the welfare of those species is tied to a particular HCP. For example, if the species is declining rapidly, and the HCP in question encompasses an ecologically insignificant portion of the species' range, then extraordinary circumstances typically would not exist. Conversely, if the HCP in such circumstances encompasses a majority of the species' range, then extraordinary circumstances justifiably could be said to exist.

- The FWS and NMFS shall not seek additional mitigation for a species from an HCP permittee where the terms of a properly functioning HCP agreement were designed to provide an overall net benefit for that species and contained measurable criteria for the biological success of the HCP which have been or are being met.

This provision means that the Services will not attempt to impose additional mitigation measures <u>of any type</u> where and HCP was intentionally designed to have a net positive impact upon a species. It is intended to encourage HCP applicants to develop HCPs that provide an overall net benefit to affected species. It does not mean that any HCP must in

fact have already achieved a net benefit before the "No Surprises" policy applies. Rather, the achievement of such benefits should be measured through a clearly articulated set of biological goals and an adequate monitoring program for measuring progress for achieving those goals.

"Properly functioning HCP" means any HCP whose provisions have been or are being fully implemented by the permittee and in which the permittee is in full compliance with the terms and conditions of the permit.

- Nothing in this policy shall be construed to limit or constrain the Services or any other governmental agency from taking additional actions at its own expense to protect or conserve a species included in an HCP.

This means the Services can intercede on behalf of a species at their own expense at any time and be consistent with the assurances provided the permittee under this policy and the permit. Neither is there anything in the "No Surprises" policy that prevents the Services from requesting a permittee to voluntarily undertake additional mitigation on behalf of affected species, though of course the permittee is under no obligation to comply.

FWS and NMFS have a wide array of authorities and resources that can be utilized to provide additional protection for threatened or endangered species included in an HCP. Therefore, in meeting their commitment under the "No Surprises" policy (consistent with their obligations under the ESA), it is extremely unlikely that the Services would have to resort to protective or conservation action requiring new appropriations of funds by Congress. In such an unlikely event, such actions would necessarily be subject to the requirements of the Anti-Deficiency Act and the availability of funds appropriated by the Congress.

Sample language for including "No Surprises" assurances in the HCP or Implementing Agreements is provided in Sections 8.4 and 13.3(a) of the "template" Implementing Agreement in Appendix 4.

b. HCP Amendments.

Amendment of a section 10(a)(1)(B) permit is required when the permittee wishes to significantly modify the project, activity, or conservation program as described in the original HCP. Such modifications might include significant boundary revisions, alterations in funding or schedule, addition of a species to the permit that was not addressed in the original HCP, or adjustments to the HCP necessitated by unforeseen circumstances. A permit amendment consists of the same process as the original permit application, requiring an amendment to the HCP addressing the new circumstance(s), a Federal Register notice, NEPA compliance, and an intra-Service section 7 consultation.

Some amendments to an HCP commonly needed over the life of a permit are minor and can be incorporated in a more expedited fashion. These types of amendments include corrections in land ownership; minor revisions to survey, monitoring, or reporting protocols; and minor changes in reserve boundaries that result in no net loss of reserve land or do not otherwise alter the effectiveness of the HCP. They can be incorporated into the HCP in one of two ways.

First, the HCP and permit can be formally amended just as with more significant changes. However, documentation requirements are often less for a permit amendment than for the original permit application. For example, the NEPA analysis for the amendment can be tiered off the NEPA analysis for the original permit (40 CFR 1502.20), or the original NEPA analysis can be incorporated by reference into the amendment's supporting documents (50 CFR 1502.21). Also, where an original permit application required an EIS, the amendment application might require an EA only. Where appropriate, a permit amendment can also be treated as a low-effect HCP, which is categorically excluded from NEPA [see Chapter 1, Section F.2].

The HCP can also be amended administratively without formal amendment of the permit itself. This type of expedited amendment procedure is encouraged, but only when: (1) the amendment has the unanimous consent of the permittee and FWS or NMFS; (2) the original HCP established specific procedures for incorporating minor amendments so that the public had an opportunity to comment on the process, and such amendments are consistent with those procedures; (3) the HCP defines what types of amendments are considered minor; (4) a written record of any such amendments is prepared; and (5) the net effect on the species involved and level of take resulting from the amendment is not significantly different than analyzed under the original HCP and the Service's decision documents.

It is important to distinguish between amendments to the HCP and amendments to the permit itself. Changed circumstances might require an amendment to both, but an amendment to either the HCP or the permit without an associated amendment to the other is possible. Minor changes in the HCP can be completed administratively without amending the permit. Similarly, amendment to the permit without a change in the HCP can also occur--for example, when an unlisted species that was addressed in the HCP is subsequently listed and is added to the permit, though permit amendments in such cases are not always necessary. Chapter 4 describes the procedures for addressing unlisted species in section 10 permits. Chapter 6, Section G contains further discussion about permit amendments generally.

6. Funding.

The ESA requires that the HCP detail the funding that will be made available to implement the proposed mitigation program. Measures requiring funding in an HCP typically include onsite measures during project implementation or construction (e.g., pre-construction surveys, biological monitors, exclusion fences, etc.), as well as onsite and offsite measures

required after completion of the project or activity (e.g., revegetation of disturbed areas and acquisition of mitigation lands). Large-scale, regional HCPs should require funds for long-term needs such as biological monitoring and habitat acquisition programs. Some will even require perpetual funding mechanisms to support long-term management of mitigation lands or for monitoring. For low-effect HCPs with minor impacts, funding needs may be limited to activities such as pre-construction, post-construction, habitat restoration, or surveys and payment into a mitigation fund; longer-term funding measures typically are not needed.

For relatively small- to medium-sized projects involving only one or two applicants, the funding source is usually the permittee and funding is provided immediately before project activities commence, immediately after, or in stages. However, when habitat modification or other take occurs before mitigation measures (e.g., acquisition of mitigation lands) are implemented, completion of the mitigation requirements should be ensured through a Letter of Credit or other means [see above, Section B.3].

Funding of regional HCPs can be more complicated because they generally cover large areas, many activities, and require significant budgets. Consequently, regional HCPs usually are funded jointly rather than by any single contributor. Funding strategies for regional HCPs can include: (1) development fees paid on a per-acre (or other) basis; (2) other types of mitigation fees (e.g., water surcharges, fees targeted to specific activities or industries); (3) funds contributed by non-profit or private interests; (4) state or Federal funds; (5) assessment districts under state law or county ordinance; and (6) tax check-off programs.

Because of their size and scope, regional HCPs often face two funding challenges--the costs of developing and implementing the HCP. Funding problems for these HCPs can be especially difficult during the HCP development phase, which typically occurs before funding mechanisms for the completed HCP are in place. Where appropriate, FWS and NMFS personnel should assist local governments in seeking out HCP funding assistance. However, the demand for such funds is likely to grow and the availability of funds to be limited; consequently, guarantees cannot be provided to any particular HCP applicant that funding would be available. Consistent with the requirements of the Anti-Deficiency Act, any commitment of Federal funding is always subject to the availability of appropriated funds.

When perpetual funding is needed, the HCP must establish programs or mechanisms to generate such funds. One way of achieving this is through payment of development fees by the applicant or other affected parties into an interest-bearing bank account, from which the interest, not the principal, is used to fund the program. The HCP should detail fund collection and management mechanisms for this purpose, as well as remedies for failure to meet funding obligations by signatory members. The IA must always contain a provision stating that any Federal funding is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds.

Whatever the proposed funding mechanism is, failure to demonstrate the requisite level of funding prior to permit approval or to meet funding obligations after the permit is issued are grounds for denying a permit application or revoking or suspending an existing permit, respectively.

In some cases, conservation funds may be transferred to a government agency to be utilized in furthering the purposes of the HCP. FWS or NMFS can accept contributed funds for mitigation purposes, monitoring, research, permit administration, and other activities. However, because of Federal procedural requirements in administering such funds and the potential for an appearance of a conflict of interests, the FWS Administrative Services Division and Department of the Interior Solicitor's Office (or equivalent office for NMFS) should be consulted before agreeing to any such mechanism.

7. Alternatives Analyzed.

Some applicants find this a difficult element of the HCP because they are uncertain about which or how many alternatives to consider. In some cases, the HCP process may not be initiated until the applicant has planned the project, only to discover that endangered species are present on the project site and an incidental take permit is needed.

The Act requires a description of "alternative actions to such taking." Thus two alternatives commonly included in the "Alternatives Analyzed" section of the HCP are: (1) any specific alternative, whether considered before or after the HCP process was begun, that would reduce such take below levels anticipated for the project proposal; and (2) a "no action" alternative, which means that no permit would be issued and take would be avoided or that the project would not be constructed or implemented. For low-effect HCPs in which the project or impact on endangered or threatened species is minor or negligible, a "no action" alternative alone may suffice.

For some HCPs, several alternatives may have been considered during project development. Each should be discussed in the "Alternatives Analyzed" section; or, where they are too numerous, the principal ones should be discussed. The applicant also must explain in this section why these alternatives were not adopted. If the applicant ultimately selects an alternative that the FWS or NMFS agrees will not result in take, no section 10 permit or NEPA compliance is needed. Chapter 3, Section B.7 explains how the alternatives analysis requirements under section 10 and NEPA compare.

Permit applicants commonly ask whether economic considerations can be cited as a reason for rejecting project alternatives. Such considerations are permissible, especially when the effects on the applicant would be significantly adverse or economically infeasible. However, if economic considerations are the basis for rejecting alternatives, data supporting this decision must be provided to the extent that it is reasonably available and non-proprietary. While applicants may be hesitant to provide such information, it can be important in making

the required finding that the HCP represent minimization and mitigation to the maximum extent practicable.

Neither the FWS nor NMFS have the authority to impose a choice among the alternatives analyzed in the HCP. The Services' role during the HCP development phase is to advise the applicant in developing an acceptable HCP, and, when necessary to try to dissuade the applicant from selecting alternatives not consistent with permit issuance criteria. Nevertheless, if the applicant proceeds with such an alternative, recognizing the increased chance of denial of the permit, the Services must process the application and provide an opportunity for Federal Register notice and public comment (see Chapter 6, Section D).

8. Additional Measures - Implementing Agreements.

Whether or not an Implementing Agreement should be prepared for a given HCP will depend on the size and scope of the HCP and the wishes of either the Services or the applicant. Implementing agreements are not required for low-effect HCPs, and should be done only when one is requested by the permit applicant. In other HCPs, the development of the IA is left to the discretion of the Regional Director. Implementing Agreements are recommended for regional or other large-scale HCPs that address significant portions of a species range or involve numerous activities or landowners, for HCPs with long-term mitigation and monitoring programs, or where habitat protection programs are complicated or have other special features.

Section 10(a)(2)(B) of the ESA--which describes issuance criteria for incidental take permits--authorizes the Services to obtain "such other assurances as [they] may require that the plan will be implemented." This provision allows the Services broad latitude to require measures as necessary to accommodate the wide variety of circumstances often encountered in HCPs.

Implementing Agreements can help assure the government that the applicant will implement the mitigation program and other conditions of the HCP, while assuring the applicant that agreed upon procedures will be followed for any changes in the conditions of the permit or the conservation measures for species addressed in the HCP. Although the Services and permit applicant possess these rights and responsibilities under the permit, both sides may prefer the additional specificity of an Implementing Agreement because the Agreement is tailored for the HCP in question, can be more detailed than the permit conditions, and is signed by all parties, thus providing the explicit consent of each party to abide by the terms of the HCP.

Implementing Agreements can also strengthen a Finding of No Significant Impact under NEPA by ensuring implementation of the mitigation program. This can be especially important for "mitigated EAs" [see Chapter 5, Section A.3(a)]. They can also extend responsibilities under an HCP beyond the life of the permit itself (e.g., by requiring perpetual

protection of mitigation lands) and can set out a process for implementing the assurances under the "No Surprises" policy [see above, Section B.5(a)].

Typically, an Implementing Agreement includes one or more of the following elements: (1) defines the obligations, benefits, rights, authorities, liabilities, and privileges of all signatories and other parties to the HCP; (2) assigns responsibility for planning, approving, and implementing specific HCP measures; (3) specifies the responsibilities of the FWS, NMFS, or other state and Federal agencies in implementing or monitoring the HCP's conservation program; (4) provides for specific measures when habitat acquisition, transfer, or other protections are part of the HCP's mitigation program; (5) establishes a process for amendment of the HCP, where necessary; and (6) provides for enforcement of HCP measures and for remedies should any party fail to perform on its obligations under the HCP.

The handbook delegates to the Regional Directors (or, where appropriate, the NMFS Director, Office of Protected Resources in Washington, D.C.) the discretion to decide if HCP Implementing Agreements are beneficial on a case-by-case basis. IAs are not done for low-effect HCPs unless requested by the applicant. Each Regional Director or the NMFS Office of Protected Resources Director shall determine the circumstances under which Implementing Agreements may be required for HCPs under his or her respective jurisdiction.

Chapter 6, Section B.2(g) provides further information about developing and processing Implementing Agreements. Appendix 4 contains a "template" Implementing Agreement that can be used to develop Agreements for individual projects. The template is intended to expedite development of Implementing Agreements for HCPs, because it identifies the basics needed for developing Agreements. The template has all necessary legal elements for Agreements for HCPs except project-specific information, which can be filled in as indicated.

C. Alternative HCPs

1. Addressing Species Through Habitat-Based HCPs.

Most of the HCPs that are being developed address the requirements of section 10(a)(2) on a species-by-species basis. A smaller number of HCPs, however, have focused on specific types of habitat rather than on a particular listed species. The rationale for a habitat-based approach is that if certain habitat-types are scientifically selected and assessed, and adequately protected under the terms of the HCP, the HCP could protect a broader range of species than the few "target" species that might otherwise be addressed by a conventional HCP. This approach may address all species within habitat-types within the plan area, or habitat-types in conjunction with a specific list of species that will be covered by the permit.

HCPs developed in conjunction with the Natural Communities Conservation Program in Southern California are examples of habitat-based HCPs. The State of California, under the Natural Community Conservation Planning Act of 1991 (NCCP), has initiated a program to

conserve populations of California native animal and plant species and their habitats in areas large enough to ensure their long-term viability. The initial NCCP effort is focusing on the coastal sage scrub community in southern California for the development of subregional HCPs.

In the habitat-based approach, a particular habitat type within a planning area is selected and then adequately addressed in the HCP, based on criteria agreed to by the Services and the applicant. The Service and the applicant generally use indicator species to set management parameters for the covered habitat in the HCP. A further test must be completed to ensure that the needs of all endemic and sensitive species (listed, proposed, candidate, or species of concern) associated with the covered habitat types are adequately addressed in the HCPs.

An entire list of known covered species (listed and unlisted) adequately addressed in the habitat-based HCP could also be included on a permit. This list may include proposed and candidate species; however, since such species are only subject to State--as opposed to Federal--jurisdiction, there should be a delayed effective date for the permit for such species. That delayed effective date should be the date the affected species is subsequently listed. Including an unlisted species on the permit in this way requires that the Services analyze the effects of the proposed HCP on that species under sections 7 and 10 of the ESA, just as if that species were listed. Under this method, the assurances of the "No Surprises" policy would apply to all covered species associated with the habitat-type as described in the list of species that are adequately covered in the HCP. If an unlisted species, which was adequately covered by the HCP and listed on the permit, is subsequently listed after permit issuance, the HCP permit would not have to be formally amended because all procedural permit requirements for these species were met when the permit was originally issued and the species was included on the permit with the delayed effective date (the subsequent date of listing). However, if an unlisted species associated with a habitat-type adequately covered in the HCP is subsequently listed, and it was not originally included on the permit, the Services would have to formally amend the permit and satisfy all procedural permit amendment requirements before it could authorize incidental take.

Prior to amending the permit, the applicant would have to make sure the species was adequately addressed in the HCP, and the Services would have to conduct independent assessments of the proposed actions under section 7 of the Act, make findings under section 10 of the ESA, and also ensure that the HCP complies with NEPA. Including covered species (listed and unlisted) in the original permit will help eliminate additional work associated with amending the permit, minimize duplication of effort, and minimize the cost associated with developing an HCP.

Habitat-based HCPs are new to the section 10 program and the Service is exploring this approach carefully. Adaptive management clauses (see Chapter 3, Section B.3(g)) may be helpful in defining where data gaps or uncertainty exists and, thus, areas where the Service and the applicant agree future modifications to the HCP may be needed. For further

information about habitat-based HCPs, contact the Washington, D.C. Division of Endangered Species Section 10 Coordinator (FWS) or the Washington, D.C. Office of Protected Resources (NMFS).

2. Programmatic HCPs.

The programmatic HCP is a relatively new concept that has begun to emerge recently in HCPs developed with the FWS. The FWS has begun to develop programmatic HCPs for County and State governments, such as the "state-wide" HCP being developed with the State of Georgia for the red-cockaded woodpecker. The programmatic HCP allows numerous entities to be involved in the HCP through "Certificates of Inclusion" or "Participation Certificates," which convey the take authorization of the official section 10(a)(1)(B) permit to the certificate recipient. A programmatic HCP can be used to address a group of actions as a whole, rather than one at a time in separate HCPs. For example, a programmatic HCP might address a single related action occurring in many different places (e.g., the development of single family houses in the same vicinity or the harvesting of trees in the presence of red-cockaded woodpeckers), or address a group of different actions occurring in the same place. Programmatic HCPs can reduce staff and preparation time, but are appropriate only in certain types of situations.

The central problem in preparing a programmatic HCP is having sufficient information to determine and evaluate effects when the exact number and scope of actions taking place may be uncertain. As a result, programmatic HCPs will be successful only when the activities being addressed are well-defined, similar in nature, and occur within a described geographical area or at similar points in time.

Because this is a relatively new concept, the Service strongly encourages that programmatic HCPs be developed in conjunction with the Regional and Washington Office. In addition, this type of a section 10(a)(1)(B) permit should not be issued to representatives of Federal agencies since section 7 is the correct avenue for dealing with "may effect" situations and possible incidental take by Federal agencies.

NMFS provides for "Certificates of Inclusion" in its regulations (50 CFR 222.22(f)). Certificates are issued by NMFS to any individual who wishes to conduct an activity covered by a general incidental take permit. The general permit can be applied for by any group or organization whose members conduct the same or similar activity and have the same or similar impacts on endangered marine species. For example, a fisheries organization or a state regulatory agency may apply for a general incidental take permit so that "Certificates of Inclusion" would then be required by its members or regulated entities. These groups also may apply for a standard permit. Applicants should discuss the alternatives with NMFS to determine which is the most appropriate.

D. Addressing Migratory Birds and Eagles (FWS Only)

In the past, section 10 applicants faced an additional issue when listed migratory birds or bald eagles occurred in an HCP planning area. The Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA) prohibit the take of migratory birds and bald eagles, respectively. Consequently, questions have arisen as to whether a section 10 permittee remained legally liable for the incidental take of listed species protected by the MBTA and BGEPA, if take of the same species was authorized by an ESA section 10 permit.

This situation has now been clarified. The FWS has concluded that under certain conditions, a section 10 permit for listed migratory birds is sufficient to relieve an HCP permittee from liability under the MBTA and BGEPA for those species covered by the HCP permit. For the MBTA, this is accomplished by having the HCP permit double as a Special Purpose Permit authorized under 50 CFR § 21.27. For BGEPA, it is accomplished by utilizing the FWS's prosecutorial discretion to state that FWS would not prosecute an incidental take under the BGEPA if such take is in compliance with an ESA section 10 permit. However, the following conditions must be satisfied before either of these protections apply: (1) any species to be so treated with respect to the MBTA and BGEPA must also be listed under the ESA; and (2) the incidental take of any such species must be authorized, subject to applicable terms and conditions, under section 10(a)(1)(B) of the ESA (see Appendix 5). The Service believes that this approach is warranted because the permittee already would have agreed to a package of mitigation measures designed to minimize and mitigate the take of the listed species of migratory birds to the maximum extent practicable.

In qualifying cases, the following language concerning MBTA- and BGEPA-protected species shall be included in the terms and conditions of a section 10 permit when the above conditions have been satisfied:

> *[For listed species other than the bald eagle]* This permit also constitutes a Special Purpose Permit under 50 CFR § 21.27 for the take of *[provide species' common and scientific names; species must be ESA-listed and may not include the bald eagle]* in the amount and/or number and subject to the terms and conditions specified herein. Any such take will not be in violation of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712).
>
> *[For the bald eagle]* The Service will not refer the incidental take of any bald eagle, *Haliaeetus leucocephalus*, for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

E. Coordinating HCPs With National Wildlife Refuges (FWS Only)

National Wildlife Refuges (NWRs) occur nationwide, and HCPs are now being developed in most areas of the country. When planning efforts under these two programs occur in the same geographic vicinity, it creates significant opportunities for joint NWR/HCP habitat protection programs in which the two programs can support and complement each other. However, it also raises important questions regarding the relationship between the two programs--e.g., what are the government's and permittee's respective roles and responsibilities in such joint NWR/HCP efforts, and how should such programs be jointly managed?

The FWS has developed a policy to assist its offices and staff in integrating the NWR and HCP programs. In brief, the policy states that the primary objective of integrating any NWR with an HCP is to increase benefits to the species involved, and that a NWR is not to be established or integrated with an HCP merely to substitute for the mitigation responsibilities of the section 10 permittee. This policy and additional guidance about integrating HCPs with National Wildlife Refuges is provided in Appendix 6.

F. "Safe Harbor" Policy: Linking Safe Harbor Assurances to Habitat Conservation Plans

The "Safe Harbor" approach is a strategy that provides private landowners, who undertake voluntary conservation actions on their lands, assurances that their future land-use activities will not be restricted further as a result of these proactive conservation efforts. If a landowner voluntarily enters into an agreement to manage his or her lands in a manner that attracts endangered or threatened species or otherwise increases their presence, the "Safe Harbor assurances" guarantee no additional regulatory requirements for those lands will be imposed on the landowners as a result of the proactive conservation measures. The purpose of the "Safe Harbor" approach is to reduce the disincentives (e.g., fear of regulatory restrictions) that often cause landowners to avoid or prevent land use practices that would otherwise benefit endangered species.

If it is determined that it is appropriate to link Safe Harbor assurances with HCPs, specific directions for incorporating will be described in a forthcoming final Safe Harbor policy (see Appendix 7). [Note: If the draft Safe Harbor policy has not been published in the Federal Register by the time this guidance is published, Appendix 7 will be reserved for this policy.]

The Services are currently considering whether, and if so, under what circumstances, it may be appropriate to allow a landowner to link a Safe Harbor Agreement to an HCP. The Services intend to submit this issue for further public analysis and comment.

CHAPTER 4
TREATMENT OF UNLISTED SPECIES

Treatment of unlisted species is a crucial issue for HCPs and the section 10 process. One of the most common questions asked by permit applicants is, "What happens if a new species is listed after my section 10 permit has been issued?" Congress considered this issue during the 1982 ESA amendments and clearly intended that the section 10 process would provide for conservation of unlisted and listed species, and protect section 10 permittees from the uncertainties of future species listings:

> "Although the conservation plan is keyed to the permit provisions of the Act, which only apply to listed species, the Committee intends that conservation plans may address both listed and unlisted species...In the event that an unlisted species addressed in the approved conservation plan subsequently is listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act." (H.R. Report No. 97-835, 97th Congress, Second Session, and 50 FR 39681-39691.)

A. Addressing Unlisted Species in the HCP

While HCPs are developed for listed species, they can also cover proposed, candidate or other rare or declining unlisted species. The inclusion of proposed, candidate, or unlisted species in an HCP is voluntary and is the decision of the applicant. The Services should explain to any HCP applicant the benefits of addressing unlisted species in the HCP and the risks of not doing so, and should strongly encourage the applicant to include as many proposed and candidate species as can be adequately addressed and covered by the permit. The primary reasons for addressing unlisted species with the listed species are: (1) to provide more planning certainty to the permittee in the face of future species listings; and (2) to increase the biological value of HCPs through comprehensive multi-species or ecosystem planning that provides early, proactive consideration of the needs of unlisted species. When including species other than listed species the applicant must ensure that these species are adequately covered in the HCP. (See the discussion of what it means for a species to be "adequately covered" under an HCP in the "No Surprises" policy section of this handbook and section A.3 of this Chapter).

If an unlisted species that was not addressed in an HCP becomes listed after the permit for that HCP has been issued, and if project activities are likely to result in take of the species, the permittee remains subject to the take prohibitions under section 9 or 4(d) of the ESA for the new species regardless of the fact that a permit is held for other listed species. In such a case, the permittee must either avoid take of the species or revise the existing HCP and

associated documents and obtain a permit amendment to take the newly listed species. This can result in unwanted complications and delays.

However, if the newly-listed species had been adequately addressed in the original HCP--even though it was unlisted--the permittee's situation would be different. Depending on how the unlisted species was treated in the HCP and the permit, the permittee may need to amend the permit only (not the HCP), or may need to take no additional action whatever to be in compliance with the ESA for the new species. Addressing unlisted species in an HCP provides the permittee with regulatory certainty in the event of future species listings, simplifies (or eliminates the need for) the permit amendment process, and provides the unlisted species with conservation benefits before they could be legally required under the ESA.

There are also significant biological advantages. At their best, HCPs can be comprehensive planning documents that address species conservation needs collectively on a community, habitat-type, or even ecosystem level. Increasingly, HCP applicants are turning to these types of planning efforts as an alternative to inefficient, piecemeal approaches to land-use planning, because they believe that in the long run addressing the interests of wildlife serves their interests as well (e.g., by protecting ecosystem health, protecting the natural qualities of their communities, or preventing species declines in the first place), and to increase regulatory certainty and minimize future Federal requirements.

The Services must also explain to the applicant that the primary jurisdiction over unlisted species usually rests with the affected state fish and wildlife agency, and that it is advisable to have the appropriate state agency's participation in the HCP process. This increases the likelihood that the HCP will adequately address both State and Federal mitigation requirements for the affected species in one unified set of mitigation measures, thus providing further regulatory certainty to the applicant.

1. Deciding How to Address Unlisted Species.

Procedurally, there are two possible ways to handle unlisted species: (1) do not address them at all in the HCP; and (2) address them in the HCP and name them on the permit.

With respect to unlisted species that are adequately addressed in the HCP, most applicants prefer to have such species named on the original permit albeit with a delayed effective date tied to the date of any future listing. Others prefer to leave such species off the permit and to amend the permit later if necessary. Either way is acceptable, although, an applicant is well advised to include on the permit unlisted species that are proposed or likely to be listed within the foreseeable future. If the applicant strongly opposes the inclusion of unlisted species covered under the HCP on the permit, then exceptions can be made, but are not recommended. Most applicants would be expected to prefer that all covered unlisted species be included on the permit.

To some extent, the decision whether or not to address unlisted species will be influenced by the likelihood of whether a particular species will be listed in the foreseeable future or otherwise within the life of the permit. Generally, the permit applicant is well advised to address those species most likely to be listed--e.g., species that are proposed for listing, candidate species, and other species for which conservation concerns exist. The decision may also depend on the applicant's objectives in the HCP. If the object is a comprehensive ecosystem-based HCP, the applicant may elect to address unlisted species even if they are not likely candidates for listing. In any case, if the applicant elects not to address unlisted species in the HCP and such species are subsequently listed and could be incidentally taken within the planning area, the permittee may have to substantially amend and supplement the HCP to cover that species to remain in compliance with the requirements of the ESA.

2. Addressing Unlisted Species in the HCP and Permit.

If the permittee has elected to address unlisted species in the HCP and to have them included on the permit with a delayed effective date (the date of future listing), and such species are subsequently listed, the permittee will be in full ESA compliance for those species and no further action by the permittee is required.

In such cases, the name of the unlisted species should appear directly on the permit, even though, technically, they are not protected against take and no Federal permit is needed to incidentally take them at that time. The permit terms and conditions must make clear that the permit does not become effective with respect to unlisted species named on it until they are listed. The following language is suggested:

> The permittees, and their designated agents, are authorized to incidentally take (kill, injure, harm, harass) the *[provide species common and scientific names]*, which are listed or may be listed in the future under the Federal Endangered Species Act of 1973, as amended (Act), to the extent that take of these species would otherwise be prohibited under section 9 of the Act, and its implementing regulations, or pursuant to a rule promulgated under section 4(d) of the Act. Such take must be incidental to *[name the type of activity]* as described in the permit application and associated documents and as conditioned herein. This permit is immediately effective for species currently listed under the Act. This permit shall become effective for currently unlisted species named above upon any future listing of these species under the Act.

Compliance with the entire HCP and associated documents is a condition of the permit. Furthermore, if measures described in an HCP for the conservation of unlisted species are not implemented, and the species is subsequently listed, the permittee would be found to be out of compliance with the permit with respect to that species and the incidental take of the species would therefore not be authorized. Consequently, it is in the permittee's best interests to implement conservation measures described in an HCP for unlisted species.

3. Standards for "Covering" Species Under a Permit.

Under the "No Surprises" policy (see Chapter 3, Section B.5(a)) an unlisted species is said to be "adequately covered" by an HCP and subject to the assurances of "No Surprises" when the species is addressed in the HCP "as if it was listed pursuant to section 4 of the ESA, and in which HCP measures for that species would satisfy permit issuance criteria under section 10(a)(1)(B) of the ESA if the species was listed." For purposes of this chapter the term "adequately covered" shall have the same meaning as it does under the "No Surprises" policy. Unlisted species must be "adequately covered" under the original HCP before FWS or NMFS will name (i.e., "cover") such species on a permit or provide assurances that, upon the request of the permittee, a permit will be amended to include such a species upon the listing of such species and compliance with section 7.

B. Challenges in Treating Unlisted Species

Development of HCPs that treat unlisted species as though they were listed constitutes good conservation planning, but it is not without its challenges. One problem in treating unlisted species is similar to the problem of determining the HCP plan area as discussed in Chapter 3, Section B.2(a)--i.e., balancing the need for a comprehensive plan with one that is manageable in size and scope. Here too there are no simple formulae and inclusion of candidate species may be a compromise between these two goals.

Another problem is that biological information on candidate and other unlisted species can be more limited, making it more difficult to determine project impacts, develop suitable mitigation programs, and meet the section 10 issuance criteria. There are several ways this situation can be addressed. The applicant may elect to acquire additional biological information prior to the issuance of the permit. The permittee could also agree to adaptive management provisions designed to adjust management prescriptions or land use practices to reflect enhanced information on an unlisted species. Or, HCP planners can elect to address the species to the extent that information is available, but agree to reduced coverage for that species under the permit in the absence of further study data. Remember that for legal coverage under the permit to apply for unlisted species, the species must be "adequately addressed" in the HCP--i.e., treated as if it was listed and was otherwise able to satisfy the section 10 criteria.

CHAPTER 5
ENVIRONMENTAL ANALYSIS AND DOCUMENTATION

The National Policy Act of 1969 as amended (NEPA), is this country's basic charter for the protection of the environment. It established policies, goals, and a mechanism for reaching these goals. The Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (at 40 CFR §§ 1500-1508) require all agencies to analyze the impacts of their proposed actions and to include other agencies and the public in the process.

A. General Information

The goals and mechanisms of NEPA and the ESA, as they relate to incidental take permits and HCPs are similar and functionally compatible in many respects. It is important to recognize the similarities and differences in the requirements and to integrate those requirements in a manner that provides useful information to the decisionmaker and to the public. While some NEPA compliance for proposed HCPs has been well integrated with the HCP process and the HCP documentation, in other cases, NEPA compliance has been treated as a process requiring separate public meetings and separate documentation that in large part is duplicative of work already done. Such practices are neither useful or efficient. The FWS's amended procedures implementing NEPA and this handbook provide important new direction on implementing the requirements of these two environmental statutes.

1. Scope of the NEPA Analysis.

When thinking about the NEPA analysis as it relates to an incidental take permit and an HCP, it is important to be precise about the nature of the underlying action. The purpose of an HCP process is to provide an incidental take permit to the applicant that authorizes the take of federally listed species in the context of a conservation plan. The HCP will specify the impacts that will likely result from the taking, what steps the applicant will take to minimize and mitigate such impacts, what alternative actions are not being utilized and such other measures as may be required by the Services.

The scope of the NEPA analysis therefore covers the direct, indirect, and cumulative effects of the proposed incidental take and the mitigation and minimization measures proposed from implementation of the HCP. The specific scope of the NEPA analysis will vary depending on the nature of the scope of activities described in the HCP. In some cases, the anticipated environmental effects in the NEPA analysis that address the HCP may be confined to effects on endangered species and other wildlife and plants, simply because there are no other important effects. In other cases, the NEPA analysis will focus on the effects of the minimization and mitigation actions on other wildlife and plants and will examine any alternatives or conservation strategies that might not otherwise have been considered. In

other cases, the minimization and mitigation activities proposed in the HCP may affect a wider range of impacts analyzed under NEPA, such as cultural resources or water use. It is important to keep in mind, however, that the NEPA analysis for an HCP should be directed towards analyzing direct, indirect, and cumulative impacts that would be caused by the approval of the HCP, that are reasonably foreseeable, and that are potentially significant.

2. Categorical Exclusions.

CEQ regulations (40 CFR 1508.4) define categorical exclusions as "...a category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency in implementation of these regulations (§ 1507.3) and for which, therefore, neither an environmental assessment nor an environmental impact statement is required."

U.S. Fish and Wildlife Service procedures for implementing categorical exclusions are found in the Department of Interior Manual (516 DM 6, Appendix 1; and 516 DM 2, Appendix 1 & 2). The Departmental manual categorically excludes the issuance of permits involving fish, wildlife, or plants, when such permits cause no or negligible environmental disturbance. National Marine Fisheries Service procedures for implementing categorical exclusions are found in the NOAA Administrative Order Series 216-6, Sections 602b.3 and 602c.3. That order categorically excludes permits for scientific research and public display under the ESA and Marine Mammal Protection Act, and other categories of actions which would not have significant environmental impacts including routine operations, routine maintenance, actions with short-term effects, or actions of limited size or magnitude. However, a memo for the record should be made listing the categorical exclusion.

Low-effect HCPs are defined as those involving: (1) minor or negligible effects on federally listed and candidate species and their habitats; and (2) minor or negligible effects on other environmental values or resources. "Low-effect" incidental take permits are those permits that, individually or cumulatively, have a minor or negligible effect on the species covered in the HCP. Low-effect HCPs may also apply to habitat-based HCPs if the permitted activities have minor or negligible effects to the species associated with the habitat-types covered in the HCP.

Another consideration in meeting the requirements of this categorical exclusion is cumulative impacts. CEQ regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (50 CFR 1508.7). Once the draft NEPA procedures (516 DM 6, Appendix 1) are revised, section 10 permits developed with technical assistance from the FWS may be categorically excluded from NEPA, subject to meeting specific criteria. The current NEPA procedures in 516 DM 6, Appendix 1 shall remain in effect, until the final revised procedures are published in the Federal Register. When

categorically excluding a section 10 permit application, the Services must ensure that the impacts of the project, considered together with the impacts of other permitted projects, will not be "significant." For example, if numerous low-effect projects in a given species' habitat are categorically excluded, the Services must ensure that issuance of section 10 permits for these projects does not result, over time, in cumulative habitat losses to the extent that such losses become significant.

3. Environmental Assessments.

The FWS has also determined in the proposed revised NEPA procedures that most HCPs, other than those that are low-effect, will normally require preparation of analysis that meets the requirements for an EA [516 DM 6, Appendix 1]. The purpose of an EA is to briefly analyze the impacts of a proposed action to determine the significance of the impacts and to determine whether an EIS is needed, to analyze alternatives for proposals which involve unresolved conflicts concerning uses of available resources, and to aid an agency's compliance with achieving NEPA's purposes when preparation of an EIS is not necessary.

An EA consists of a brief discussion or description of: (1) the purpose and need for the proposed action; (2) the nature of the proposed action; (3) alternatives to the proposed action that were considered; (4) the environmental impacts of the proposed action and its alternatives; and (5) a list of agencies and persons consulted in the NEPA review process. Public review procedures for EAs vary depending on the scope of the proposed action [see this chapter, Section A.3 and A.5]. The culmination of the EA process is a Finding of No Significant Impact (FONSI) or a decision to prepare an EIS.

a. Use of EAs When Mitigation Reduces Significant Impacts.

Normally, the Service believes that analysis at the level of an EA will be sufficient for HCPs. At times, an HCP that might otherwise require an EIS can be analyzed with an EA, if mitigation measures that would ensure that environmental impacts do not reach the significant level are part of the original project proposal (in this case, part of the HCP) and are enforceable. This type of EA can be used when an HCP would otherwise be expected to have significant environmental impacts but, with mitigation, those impacts can be reduced to less than significant levels. The basis for this type of EA is found at 40 CFR 1501.3(b), 1501.4(e)(2), and 1508.9(a)(2). A brief discussion of the subject also occurs in the CEQ publication, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (46 FR 18026-18038, Nos. 39 and 40).

Under the right conditions, EAs of this type are a useful tool for complying with NEPA and saving paperwork and time. In fact, HCPs are excellent candidates for this type of EA since most of the requirements ("up front" mitigation and enforceability) are already standard HCP components. The main differences between this type of EA and other EAs prepared for HCPs are that: (1) the impact of the project would result in significant environmental impacts

but for the mitigation program (in many EAs, the environmental effects would be less than significant even without the mitigation program); and (2) a 30-day public comment period must be observed before the decision is made not to prepare an EIS (CEQ regulations otherwise require no delay in deciding not to prepare an EIS). This 30 day period should be combined with the 30 day public notice of the proposed section 10 permit.

If the Services decide to use this provision to issue an EA and a FONSI for a particular proposed HCP, they should be able to make a clear finding that the HCP, considered together with mitigation measures that are part of the HCP submitted with the permit application and would be enforceable, will not result in significant environmental effects.

FWS and NMFS encourage preparation of this type of EA as a way of streamlining the section 10 and NEPA processes. However, FWS and NMFS staff should consult the Regional Director's Office, Environmental Coordinators in the Regional Office, or the Washington, D.C. Office before initiating this type of EA for the first time.

b. Programmatic EAs.

A programmatic EA is an EA that addresses a group of actions by different applicants as a whole, rather than one at a time in separate EAs. For example, a programmatic EA might address a group of different actions occurring in the same place, or a single action occurring in many different places. Programmatic EAs can save great amounts of staff and preparation time, but are appropriate only in certain types of situations.

The central problem in preparing a programmatic EA is having sufficient information to determine and evaluate effects when the exact number and scope of actions taking place may be uncertain. As a result, programmatic EAs typically will be successful only when the activities being addressed in proposed HCPs are relatively well-defined and not overly conjectural, are similar in nature or geography, and occur at similar points in time or within a predictable time line. Programmatic EAs can be prepared at the time a group of actions is proposed. To expedite small-scale actions, they can also be prepared prior to specific project proposals if the proposals can be defined in advance and are reasonably foreseeable.

Because of the problem of analyzing effects, FWS and NMFS staffs should consult their Regional Office Environmental Coordinator or other NEPA experts when preparing a programmatic EA.

4. Environmental Impact Statements.

If the conclusion is reached that a particular HCP will have a significant environmental impact and thus requires preparation of an EIS, refer to the procedures outlined in the FWS's NEPA guidance (30 AM 2-3 and 550 FW 3), and Director's Order No. 11, dated April 18, 1985 or for NMFS the NEPA procedures are found in the NOAA Administrative

Order Series 216-6, dated June 21, 1991. For further assistance, consult the appropriate Regional Office or NMFS, Washington Office D.C. Environmental Coordinator.

B. Techniques for Streamlining Section 10 and NEPA Planning

CEQ regulations encourage agencies to focus on the purpose of the NEPA process; making better decisions. Amassing needless detail is discouraged; integration of the analysis with the other planning and environmental review requirements so that all procedures run concurrently rather than consecutively is explicitly encouraged. The Services fully endorse these goals. All FWS and NMFS offices are expected to streamline their section 10 permit and NEPA analyses to the maximum extent practicable, while ensuring compliance with both ESA and NEPA. The process should be streamlined by integrating the analyses in the same document, to the extent possible, by running the processes concurrently, not consecutively, and by conducting joint processes with state and local agencies as applicable.

1. Combining HCP/NEPA Analysis.

The CEQ regulations specifically permit NEPA documents to be combined with other agency documents to reduce duplication and paperwork (40 CFR§§1506.4). The Services policy is to combine the HCP and NEPA analysis into a single document titled, "Proposed HCP and Environmental Assessment for the [insert name of the HCP document]."

This technique should not be viewed as preparation of two separate documents that are then published under the same cover, but rather one integrated analysis that meets the requirements of both NEPA and ESA. For example, the alternatives section of the combined document should include alternatives that satisfy both the requirements of section 10 and NEPA. Similarly, the discussion of effects should include analysis of both the impacts of the proposed HCP as well as other environmental effects that should be analyzed under NEPA.

FWS and NMFS should work closely with the applicant(s) so that any environmental documents they draft meet NEPA and section 10 permit application requirements. Appendix 8 contains a example of an integrated HCP/EA. This is one way of integrating the two documents. Another way of integrating the analysis even more would be to include the full text of the proposed HCP in the alternative section as the preferred alternative.

2. Joint Federal-State Processes.

Some states have enacted laws that parallel or expand NEPA requirements at the state or local level (e.g., the California Environmental Quality Act). CEQ regulations (40 CFR 1506.2) and Department of Interior procedures (516 DM 4.18) and NOAA require its

agencies to cooperate, to the fullest extent possible, with the applicant and state and local officials to reduce duplication between NEPA, state and local environmental requirements, and ESA requirements.

FWS and NMFS should cooperate with state and local agencies to avoid duplication and reduce the time and costs of planning by:

- Conducting joint planning;
- Conducting joint environmental research and studies;
- Conducting joint public hearings; and
- Producing joint environmental documents (however, FWS or NMFS is responsible for submitting Federal Register notices).

3. Incorporation By Reference.

Incorporation by reference can be used in an EA or EIS to avoid including bulky documents or written material in support of conclusions. Material incorporated by reference from another source into the NEPA analysis must be cited and its contents briefly described. It should not be incorporated by reference unless it is reasonably available for inspection by interested parties within the time allowed for public comment.

C. Internal Service Guidance and Assistance

FWS procedures for complying with NEPA are found in 30 AM 2-3, and 550 FW3. The Regional Environmental Coordinator should be familiar with these techniques and be able to assist Regional and Field Office personnel on NEPA matters. NMFS procedures are found in the NOAA Administrative Order Series 216-6, dated June 21, 1991.

CHAPTER 6
APPLICATION REQUIREMENTS AND PROCESSING PROCEDURES

Important Notice: On September 5, 1995, the Fish and Wildlife Service published a proposed rule in the Federal Register amending the general regulations for its permit program (50 CFR Part 13 and Part 17). The Service is currently drafting additional language to clarify the relationship between the Part 13 and Part 17 procedures and a proposed rule will be published in the near future. Consequently, some information contained in this chapter--particularly with respect to permit denial, suspension, and revocation procedures--may be outdated upon publication of a final rule. Users of this handbook should check the revised permit procedures when available or contact the Service's Division of Law Enforcement to ensure that the handbook's description of permit administration is consistent with the new regulations.

Except where noted, the procedures described in this chapter apply to both FWS and NMFS. For NMFS, 50 CFR 222.22 contains regulations specific to incidental take permits. General permit procedures are found in 50 CFR 217, 220, as well as 222. NMFS is also in the process of revising its ESA regulations at 50 CFR parts 217-227. Therefore, citations to NMFS regulations may change from those provided in this handbook.

A. Guidance to the Applicant

1. What to Provide the Applicant.

The following documents should be provided to any prospective permit applicant or applicant's consultant.

- For FWS, Federal Fish and Wildlife License/Permit Application (Form 3-200) with "Incidental Take Permit Application" supplement, instructions, and Notice of Permit Application Fee/Privacy Act Notice (Appendix 9).

- For NMFS, incidental take application instructions (Appendix 9).

- This handbook, if appropriate (some applicants may find it too technical; although it may be useful to experienced consultants).

- List of candidate, proposed, endangered, and threatened species of wildlife and plants for the prospective planning area.

- List of appropriate local, state, and federal contacts, such as state conservation agencies.

- General Permit Procedures - for FWS, 50 CFR Part 13; for NMFS, 50 CFR 217, 220, and 222 (Appendix 11).

- Endangered and Threatened Wildlife and Plant Permit procedures - for FWS, excerpts from 50 CFR Part 17; for NMFS, 50 CFR 222.22 (Appendix 11).

2. Application Form and Instructions.

For FWS, an applicant must complete and submit an official Form 3-200 [50 CFR 17.22(a)(1)]. Instructions for this form are provided below and in Appendix 9. The appropriate Regional Office address and phone number should be typed on the top of the form where it reads "Send Application To." NMFS does not have an official permit application form but provides instructions for what information the applicant needs to submit and where (see Appendix 9). A list of FWS and NMFS Regional Offices is provided in Appendix 12.

3. Name of the Applicant.

For FWS, if the applicant is an individual, that person must sign the application and complete block 4 of Form 3-200. If the applicant is a city, county, business, or consortium, the application must be signed by the appropriate authority responsible for actions granted under the permit and block 5 must be completed. In all cases, there must be an **original** signature and date in the certification block. An application form may be faxed to begin the permit processing phase, but only if the original application with an original signature is submitted immediately afterward. The application will not be considered complete without the original application form. For NMFS, the applicant should follow the application instructions in Appendix 9.

4. Application Fee.

The processing fee for FWS and NMFS is $25.00 for each new permit application, amendment request, or renewal, except as noted below. Money orders or checks should be made payable to the "U.S. Fish and Wildlife Service" or "National Marine Fisheries Service." The fee is for processing the application, not for the permit, and therefore is non-refundable if the application is abandoned or the permit is denied. The fee may be refunded only if the applicant withdraws the application in writing before any significant processing of the application has occurred. For FWS, if the check has been forwarded to the Denver Finance Center, request the Finance Center to send a refund to the applicant. State or local government agencies or any individual or institution under contract to such agency to conduct proposed activities are fee exempt.

Checks and money orders must be safeguarded as if they are cash; they should be placed in a fire-proof safe except when being processed by employees designated as collection officers.

Application fees need to be deposited in a timely manner and each Regional Office should establish deposit procedures. For FWS, since Regional Division of Law Enforcement offices already have such procedures, the Assistant Director for Ecological Services may wish to coordinate with the Assistant Director for Law Enforcement in handling application fees.

5. Providing the General Permit Requirements.

The applicant should be provided copies of the general permit procedures and pertinent excerpts from the procedures for endangered and threatened species permits. By signing Form 3-200, the applicant is certifying (1) that the applicant has read and is familiar with applicable regulations; (2) that the information submitted in the application is complete and accurate; and (3) that the applicant understands that any false statements may result in criminal penalties.

50 CFR Part 13 provides conditions for the general administration of FWS's fish, wildlife, and plant permit program. 50 CFR Part 17 provides conditions for endangered and threatened species incidental take permits specifically. It should be explained to the applicant that if any general provision of Part 13 is inconsistent with Part 17 or with provisions of section 10(a) of the ESA governing incidental take permits, it is the intention of the FWS to seek regulatory clarifications which would provide that the more specific provisions of Part 17 or the statute apply. This also applies to NMFS, except that 50 CFR Part 222 takes precedent over Parts 217 and 220. The FWS is currently drafting language to clarify and resolve the differences between the Part 13 and 17 and a proposed rule will be published in the near future.

B. Processing the Application

1. Processing Time.

No mandatory time frames for processing incidental take permit applications have been established under Section 10 or its implementing regulations. However, this handbook establishes the following target processing times, depending on the type of NEPA action associated with the permit application [see Chapter 1, Section F.1].

Permit processing times are defined as the period between receipt of a complete application package by the responsible Regional Office and issuance of the incidental take permit, including Federal Register public comment notifications. The targets do not include any portion of the HCP development phase.

HCP With EIS . . . . . less than 10 months
HCP With EA . . . . . 3 to 5 months
Low-effect HCP (Categorically Excluded) . . . . . less than 3 months

These targets will apply as the maximum processing times unless project controversy, staff or workload problems, or other legitimate reasons make delays unavoidable. All affected FWS and NMFS offices are expected to streamline their incidental take permit programs and to meet these processing targets to the maximum extent practicable. In many cases it is expected actual processing times will be less than these targets and Service offices are encouraged to improve on the targets whenever possible.

2. Timing of Document Preparation and Submission.

The Section 10 permit process consists of three phases: (1) the HCP development phase; (2) the formal permit application processing phase; and (3) the post-issuance phase.

The length of the HCP development phase will vary depending on the complexity and scope of the project and length of time required to prepare the HCP. It concludes when a "complete application package" with a Field Office certification that it has reviewed the HCP and found it to be statutorily complete is forwarded to the appropriate Regional Office [see below, Sections B.2(b)-(c)]. The formal permit application processing phase begins with receipt of the complete application package by the Regional Office. Permit processing requirements will also depend on the scope and complexity of the HCP.

a. Description of Required HCP Documents.

The following documents are needed (or are optional as indicated) to apply for and issue an incidental take permit:

Must be Provided Before Federal Register Notice Can Be Published

- A Habitat Conservation Plan including the elements required by section 10(a)(2)(A) of the ESA.

- For FWS, a permit application form (3-200) and fee (see Appendix 9). For NMFS, an application according to the instructions in Appendix 9.

- A NEPA analysis (either an EA or EIS, unless the HCP is categorically excluded) pursuant to the National Environmental Policy Act. The section 7 biological opinion should be prepared in conjunction with the NEPA analysis.

- Certification by the Field Office that assisted the applicant with the HCP to the issuing Regional Office that the HCP and associated documents are statutorily complete.

- An Implementing Agreement, if requested by the applicant or otherwise required by Regional Director policy (see Chapter 3, Section B.8).

- o Federal Register Notices; a Notice of Receipt of a Permit Application and Notices of Availability of the NEPA analysis (see Appendix 16).

Can Be Prepared During or After the Public Comment Period

- o A biological opinion concluding formal section 7 consultation and providing the Services' findings with respect to the effects of the action on federally listed species.

- o If required by Regional Director policy, a Set of Findings documenting how the HCP meets statutory issuance criteria and optionally including the Field Office's recommendation about whether to issue the permit [see Section B.2(d) below and Appendix 13).

- o For FWS, an Environmental Action Memorandum (EAM) describing what action the FWS took with respect to NEPA and explaining the reasons why the action is considered categorically excluded. (For low-effect, categorically excluded HCPs only (see Appendix 14 and definition in Chapter 8)). Public comments will be addressed and, if applicable, will help shape the final decision.

- o For FWS, the draft permit (Form 3-201) with proposed terms and conditions; for NMFS, the permit is printed on agency letterhead with terms and conditions and a cover letter. The draft permit and terms and conditions must be further reviewed in light of any substantive public comments received.

b. Submitting a Complete Application Package.

The formal application phase begins with receipt by the appropriate Regional Office of a "complete permit application" package consisting, at a minimum, of the application form, application fee (if applicable), the proposed HCP, the Implementing Agreement (if required), draft NEPA analysis (EAM, EA, or EIS), which was submitted by the applicant, and a certification by the Field Office that it has reviewed these documents and finds them to be statutorily complete. Prompt submission of each of these documents is essential to efficient processing of the permit application because they either initiate the processing phase or are required for the Federal Register notice initiating the 30-day public comment period.

The Implementing Agreement (if required) should be submitted as part of the complete application package and is usually included as an appendix to the HCP. Since the IA can help enforce the implementation of the HCP, it should be included with the complete package so the public can get a sense of how implementation of the HCP will be managed. It should also be included when the HCP is provided to persons wishing to comment on the permit application.

c. Certification of Application Documents By the Field Office.

When the Field Office that assisted the applicant in developing the HCP forwards the application package to the Regional Office for processing, it should include a certification memo. The Regional Office should not initiate the formal permit processing phase without this certification. (see below, Section B.5 for a discussion of what to do when the Field Office believes the HCP to be inadequate but the applicant wishes to submit the package for formal processing against Field Office recommendation). This certification should include: (1) a statement that the Field Office has conducted a preliminary review of the application package and believes it to be complete; (2) the date of the HCP documents to which the memo refers; (3) a recommendation by the Field Office that the HCP qualifies for the "low-effect" category, if applicable [see Chapter 1, Section F.2]; (4) exceptions to standard processing procedures it recommends, if any, and the reason for those exceptions; and (5) other pertinent information as needed. The Field Office certification can be in memorandum format, a signed standardized form, or any other format mutually agreed to by the Field and Regional Offices.

d. Timing of Other Application Documents.

Another document needed early in the process is the Notice of Receipt of an Incidental Take Permit Application for publication in the Federal Register. Typically, this is drafted and forwarded to the Regional Office by the Field Office. The Regional Office then finalizes and signs the notice and sends it to the Federal Register (see below, Section D). The draft Federal Register notice is not a required part of the complete application package. It can be prepared while the HCP, NEPA analysis, and Implementing Agreement are being reviewed in the Regional office so long as it is completed when these documents are ready for transmission to the Federal Register. To expedite the public notification process, the Federal Register Notice of Availability of the NEPA analysis should be published jointly with the Notice of Receipt of the permit application (see Appendix 16).

In addition to the above documents, processing the permit application will require a: biological opinion on the proposed incidental take; Set of Findings; for FWS, an Environmental Action Memorandum (EAM) for categorically excluded HCPs only; and the permit (for FWS, Form 3-201) or permit letter (for NMFS). The Set of Findings provides an administrative record of how the HCP program satisfies each of the section 10(a)(2)(B) issuance criteria, responses to public comments received, if any, and may include a recommendation from the appropriate ARD to the Regional Director's Office (for FWS) whether to issue or deny the permit. However, it is not required by regulation or Director's Order and whether to include it as a processing requirement is at the discretion of the Regional Directors (see Appendix 13 for examples of a Set of Findings). The EAM is a record of FWS's NEPA decision and is required by Director's Order No. 11, but only for HCPs that are categorically excluded (see definition, Chapter 8, and Appendix 14).

How these documents are handled may vary. Typically, the Field Office drafts the biological opinion [see below, Section C.3(b)], FONSI or ROD, and Set of Findings, and forwards the draft documents to the Regional Office to be finalized. The applicant should not draft these documents because they involve internal Service decisions. The Regional Office typically prepares the EAM and permit. The permit usually includes an attachment incorporating terms and conditions of the HCP and referencing applicable Federal regulations and other conditions, including the permitted incidental take levels and terms and conditions.

In the interests of efficient processing, the Field Office should prepare a draft biological opinion and draft Set of Findings and forward them to the Regional Office as soon as possible during the permit processing phase--typically during or immediately after the close of the 30-day public comment period. The biological opinion can be finalized by the Field Office. The Regional Office should not finalize and sign the biological opinion, FONSI or ROD, or Set of Findings until after the public comment period has terminated and public comments have been addressed.

To meet the target section 10 permit processing times, it is essential that formal application processing steps overlap, not run consecutively. The formal processing phase begins when the Regional Office receives the application form, fee (if applicable), HCP, IA (if required), draft NEPA analysis, and certification memo from the Field Office. Publication of a notice in the Federal Register requires the HCP, IA, NEPA analysis, and Federal Register notice. Issuing the permit requires all the above plus the biological opinion, signed FONSI or ROD, Environmental Action Memorandum (for low-effect HCPs only), Set of Findings, and the permit.

Try to complete each document as early as possible in the process, but do not hold up one stage while waiting for non-essential components of the previous stage. Whenever possible, complete the components of one stage while another is underway. The Field Office can begin drafting the FR Notice while the Regional Office reviews the application package; the Field Office can draft the biological opinion and Set of Findings during the public comment period; and so on.

e. Labeling the Documents as Draft/Final.

The HCP and IA (if required) are subject to change during Regional Office review and the public comment period, and for this reason they need to be labeled as "drafts" and dated when submitted for processing. The EA should be labeled draft until the Regional Office Environmental Coordinator or HCP Coordinator has reviewed the document, and until the public comments, if any, are incorporated; the accompanying FONSI should be labeled as "preliminary" until public comment, if any, are incorporated into the HCP and EA. An EIS must always be announced in the Federal Register as a draft and final EIS and must be so labeled.

f. Dating Section 10 Documents.

Since HCPs can go through many drafts during the HCP development phase, all HCP copies, draft and final, should bear a date on the front page or inside title page that includes the month, year, and day. This will confirm at any stage in the process what HCP draft or version is being referenced in correspondence or discussions and which is the most up-to-date.

To ensure a complete administrative record, the Field Office and Regional Office should state in writing what measures and revisions they recommend to the applicant or Field Office, respectively, throughout the HCP development and formal application processing phases. Also, all Offices should reference the date of the specific HCP to which it refers in any written correspondence or other records.

g. Finalizing the Implementing Agreement.

The following process should be followed, if the applicant and Regional Director have decided to complete an IA; remember this document is optional, left to the discretion of the Regional Director, and not required for a low-effect HCP. The timing of finalization of the Implementing Agreement is essential, because improper handling of the Agreement can result in unnecessary delays. All signatories to the Implementing Agreement should have reviewed draft versions of the Agreement and all non-federal signatories should have agreed to its provisions before it is forwarded to the Regional Office with the complete application package. It should not be signed at that point because it must still be submitted for public comment with the HCP and may require Solicitor's Office review. If the Agreement was already signed when submitted with the application package, and subsequent changes are required, re-circulation for a second signing may be necessary. This is frustrating for permit applicants, particularly when the Agreement requires approval by local authorities (e.g., a county Board of Supervisors), which must then re-approve the Agreement. However, the Agreement must be signed prior to permit issuance. The Implementing Agreement should be circulated for signature after the public comment period has closed and changes to the HCP or IA, if any, have been incorporated. An original signature copy of the Implementing Agreement should be provided to each signatory to the Agreement. For FWS, signature authority for the Implementing Agreement lies with the Regional Director's Office. For NMFS, this authority lies with either the Regional Director or the Director of the Office of Protected Resources, Washington, D.C.

3. Who Submits the Application Package?

There are several ways the complete application package can be submitted to the Regional Office. The HCP, IA, and draft NEPA analysis (if not prepared by the FWS or NMFS), can be forwarded by the applicant to the Field Office, and the Field Office then forwards these materials, together with its certification memo, to the Regional Office. Or, the Field Office

and applicant can forward to the Regional Office, respectively, the documents for which they are responsible; in this case the Regional Office would compile the complete application package and supply the Field Office with the final versions of the HCP and IA. There are other possible variations; however, most FWS Offices prefer that the Field Office submit the entire application package to the Regional Office.

This handbook delegates to the Regional Offices the task of establishing specific methods by which permit application packages will be submitted. Each Regional Office must develop clear protocols for this procedure, and notify all affected Field Offices.

4. Judging the Application for Completeness.

The applicant must provide all information requested on the application form or in the application instructions for NMFS (Appendix 9). If the form has not been completed correctly, the applicant should be notified, in writing or by phone with an accompanying memo that should be filed in the administrative record, and asked to correct the deficiency or submit additional information. Requests for information should include notification that if the information is not received within the allotted time, the application will be deemed inactive [50 CFR 13.11(e) or 50 CFR 220.13]. The applicant should refer to the inactive application if he or she reapplies in the future. This paragraph refers only to data required on the application form; it does not apply to requests for further biological information or other information upon which a substantive decision with respect to the permit application would be made.

To determine whether the HCP is complete, see Chapter 3, Section B.1, B.8, and Chapter 6, Section B.4. To determine whether the NEPA analysis is complete, see Chapter 5, Sections A.1-4. In most HCPs, however, the adequacy of these documents will be evaluated during the HCP development phase, not after the permit application is submitted. Only in relatively rare cases--e.g., when an applicant has prepared the HCP without Service assistance--will their adequacy need to be evaluated for the first time at the beginning of the formal permit processing phase.

5. Problems Identified During the HCP Development.

Problems identified during the HCP development phase should be elevated to the Regional Offices early in the process for suggestions that might be helpful to the applicant and the Field Office for resolving differences. Even if the Services perceive that problems remain, the applicant is entitled to submit a permit application. The Services should publish a Notice of Receipt of the permit application in the Federal Register and duly process the application. However, prior to announcing receipt of such an application in the Federal Register, FWS or NMFS may detail the HCP's deficiencies and the reasons for them to the applicant in writing.

The above discussion applies to biological issues and issues of scientific judgement only. The Services need not process a permit application that lacks statutory HCP components or other application components required by Federal regulation.

6. FWS Law Enforcement LEMIS System.

For FWS, all permits and permit numbers issued under the ESA must be issued through LEMIS (Law Enforcement Management Information System), managed by the FWS Law Enforcement Division. LEMIS contains the following information for each permit and permit application:

- Basic information on the permit applicant (e.g., name, address, telephone number);
- Pertinent dates (e.g., application receipt date, issuance and expiration dates, report due dates, and revocation dates);
- Permit authorizations and/or conditions;
- Species involved;
- Location of the authorized activities; and,
- Identity of the permit issuing office.

Once the application review process is complete and a decision is made to issue the permit, the permit must be issued with a LEMIS number and the issuance must be recorded in LEMIS. The terms and conditions that go with the permit are often printed on a separate sheet of paper and are attached to the permit (see Appendix 15 for a sample permit form and Appendix 17 for examples of issued permits).

C. Internal FWS/NMFS Review

1. Early Coordination Between the Field and Regional Office.

To ensure timely processing of permit applications, the Regional Office, Field Office, Solicitor's Office (FWS) or General Counsel's Office (NMFS), and in some cases the NMFS Office of Protected Resources, should begin communicating about an HCP effort as soon as possible after serious discussions on the HCP begin. Early coordination helps avoid processing delays by identifying and resolving internal disagreements and other problems before the HCP is completed. This allows Regional Office staff to provide technical assistance to the Field Office as needed, and ensuring Regional Office familiarity with the HCP when the application is received by that office and formal permit processing begins.

Management should always be involved early in the process. Under no circumstances should the Field Office and Regional Office find themselves in serious disagreement on the substantive aspects of an HCP after a permit applicant who has requested Field Office assistance in developing the HCP has submitted the application to the Regional Office for approval.

There are various ways that coordination between the Field Office and Regional Office on a developing HCP can occur: (1) periodic briefing statements from the Field Office to the Regional Office; (2) meetings between Field Office and Regional Office staff; (3) joint Field/Regional review of HCP drafts; and (4) participation by Regional Office staff management in important meetings (sometimes referred to as "milestone" meetings). Specific methodologies are left to the discretion of the individual Regions.

At a minimum, during the HCP development phase the Field Office should regularly apprise the Regional Office about: (1) the proposed project or activity; (2) the species involved; (3) current status of the planning effort including primary features of the mitigation program; (4) positions with respect to the planning effort of affected public and private interests; (5) any obvious or underlying controversies or issues that could affect the final outcome of the HCP or the permit processing phase; and (6) any pertinent information that would help the Regional Office understand the HCP and process the application when it is submitted. Questions about HCP policy interpretation or procedure by the Field Office should be elevated quickly to the Regional Office when they arise. The Regional Office should discuss the incorporation or implementation of any new policies, which are introduced while preparing an HCP, with the Assistant Director for Ecological Services to ensure the interpretation of the policy is sufficient and within the overall National policy guidance for the HCP program. The Regional Office should also keep the Solicitor's or General Counsel's Office informed and request assistance on legal issues promptly when needed.

If the Regional Office, Solicitor's Office, or General Counsel's Office has specific concerns about ongoing or pending HCPs or foresees any problems with pending permit applications in light of section 10 permit issuance criteria or other requirements, it should notify the Field Office as soon as possible. The Field Office and Regional Office must then jointly resolve any outstanding internal concerns. Briefing statements and other written records of coordination between the Field and Regional Office during the HCP development phase should be maintained as part of the administrative file. They may also be forwarded to other FWS/NMFS Regions to aid inter-Regional awareness of HCP activities.

2. Distribution of the Application Package.

The Regional Office that receives the permit application package should send the package to the following offices for review, generally requesting comments within 30 days; this should be done as early as possible so that this review period can run concurrently with the 30-day public comment period:

- The appropriate Solicitor's (FWS) or General Counsel's (NMFS) Office with a written request for review, unless legal review is waived (see Section C.4 below).

- For FWS, the Assistant Regional Director(s) of Law Enforcement with jurisdiction over the applicant's Region of residence, and the Region(s) where the proposed taking would occur. The appropriate ARD and ARD-LE should jointly determine whether, and under what circumstances, FWS law enforcement personnel need to review the entire application package. Such review is advised if there are questions about the enforceability of the HCP or the HCP involves other potential law enforcement issues.

  For FWS, check with Law Enforcement whether LEMIS gives a "PRIOR INVESTIGATION RECORD" warning about the applicant. If such a warning appears, a permit may not be issued until the ARD-LE approves.

  For NMFS, the Regional Law Enforcement Division with jurisdiction over the applicant's Region of residence, and the Region where the proposed taking would occur. The Regional Director and Law Enforcement Division will determine whether further review is necessary.

- If the application package is submitted to a Regional Office other than the Regional Office with lead responsibility for the affected species, comments from the lead Region and other Regions in the species' range should be requested.

- The Field Office conducting the internal section 7 consultation, if that office is different than the Field Office that assisted in developing the HCP [see Section C.3(b) below].

- The state fish and wildlife conservation agencies of states in which the proposed taking will occur, as well as any Federal agencies that are directly involved in or affected by the HCP program. This may not be necessary if these agencies received the package directly from the permit applicant.

- Where appropriate, technical scientific comment could be solicited from species experts within or outside the Services and from the recovery team if one is available.

3. Internal Section 7 Consultation.

Under section 7 of the ESA, issuance of an incidental take permit by FWS or NMFS is a Federal action subject to section 7 compliance. This means the Services must conduct an internal (or intra-Service) formal section 7 consultation on permit issuance. For FWS, this

can be conducted between the Regional Director's office, which issues the permit, and the Ecological Services office, which is responsible for the endangered species program. It may also be conducted between the Assistant Regional Director for Ecological Services and the Field Office that assisted the applicant in developing the HCP. It is strongly encouraged to include the section 7 biologist in the developmental process of the HCP, so that the section 7 requirements can be addressed early in the process to eliminate possible difficulties or the potential call of jeopardy at the end of the process. The Services regard these two processes as concurrent and related.

For NMFS, consultation may be conducted between the Field Office and the Regional Director or between the Endangered Species Division and the Office of Protected Resources in Washington, D.C. In the HCP context, informal consultation may be considered to include all Service Field Office/Regional Office coordination and assistance to the applicant during the HCP development phase. Formal consultation on a section 10 permit typically is not initiated until the permit processing phase.

a. Role of the Section 7 Consultation.

The purpose of any formal consultation is to insure that any action authorized, funded, or carried out by the Federal government is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. Formal consultation terminates with preparation of a biological opinion, which provides the Services' determination as to whether the proposed action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Internal consultation on a section 10 action ensures that issuance of the permit meets ESA standards under section 7. In practice, because one of the section 10 issuance criteria is the same as the regulatory definition of jeopardy under section 7 (see Chapter 7, Section B.4), the section 7 consultation represents a last internal "check" that the fundamental standard of avoiding jeopardy has been satisfied.

Another purpose of formal section 7 consultation is to develop reasonable and prudent measures and terms and conditions to minimize anticipated incidental take, or, if necessary, reasonable and prudent alternatives to eliminate the risk of jeopardy. These are included with the biological opinion. However, since the Services ordinarily will have provided technical assistance in developing the HCP, and included all necessary mitigation, reasonable and prudent measures or alternatives rarely will need to be developed during the section 7 consultation. This should be necessary only in cases where an applicant did not consult with the FWS or NMFS in developing the HCP or did not incorporate Service recommendations and such measures or alternatives are necessary to satisfy the requirements of section 7.

Reasonable and prudent measures are defined as required actions identified during formal intra-Service consultation which the Regional Director believes necessary or appropriate to minimize the impacts of incidental take. Reasonable and prudent measures, if necessary, can

be used to modify the HCP. However, such adjustments should be made only if they are minor in scope, and they ensure compliance with the requirements of the ESA. There should be very few cases where the Services introduce reasonable and prudent measures at the end of the HCP process since such matters should have been fully discussed with the permit applicant prior to the submission of the HCP. Any changes necessitated by the reasonable and prudent measures should be discussed in advance with the applicant.

b. Who Conducts the Section 7 Consultation?

The Services must be held to the same rigorous consultation standards that other Federal agencies are required to meet under section 7. This means, in part, that internal consultations on section 10 permit applications should be as impartial as possible. However, it is also important that section 7 consultation on a permit application does not result in otherwise avoidable delays when meeting target permit processing times. Such delays may result if the section 7 consultation is assigned to an office too far removed from the location and circumstances of the HCP. The biological opinion concluding formal section 7 consultation may be done by the FWS or NMFS office that assisted in HCP development or by another office. To avoid possible biases, the staff member conducting the section 7 consultation should not be the section 10 biologist providing technical assistance to the HCP applicant. This will help ensure that the intra-Service section 7 consultation is an independent analysis of the proposed HCP. If, because of staff time constraints, this is not possible, then the biological opinion should be reviewed by another knowledgeable biologist before it is signed by the approving official. It is very important that the staff member that completes the section 7 consultation be involved in the initial stages of the HCP process. This will help ensure that the section 7 requirements are addressed in the HCP and that the two processes are integrated which will help expedite the permitting process. If the Regional Director has delegated the authority, the biological opinion may be signed by an approving official in the Field Office. The biological opinion is then reviewed and finalized by the Regional Office processing the permit application. This ensures a good balance between independent review and timely permit processing. The biological opinion may also be finalized and signed by the Field Office, if the Regional Director has delegated the authority to do so.

This handbook allows FWS and NMFS Regional Offices and Field Offices the discretion to use any reasonable method for conducting internal section 7 consultations, so long as (1) the resulting determination is reviewed or finalized by Service staff other than the Field Office staff HCP representative; and (2) the method does not result in failures to meet permit processing times described on pages 1-14 and 6-3.

c. Conferences on Proposed Species.

Under Section 7(a)(4) of the ESA and 50 CFR 402.10, a Federal agency must "confer" with the FWS or NMFS "...on any agency action which is likely to jeopardize the continued

existence of any species proposed to be listed under section 4 or result in the destruction or adverse modification of critical habitat proposed to be designated for such species." Thus, the Services must confer, formally or informally, on any HCP and section 10 permit application that addresses proposed species or proposed critical habitat. Technically, this needs only be done if issuance of the permit is likely to result in jeopardy to a proposed species or adverse modification of proposed critical habitat; this should not occur if the FWS or NMFS has assisted the applicant in preparing the HCP. Nevertheless, the Services should document any conclusion reached that issuance of the section 10 permit is not likely to jeopardize proposed species or adversely modify proposed critical habitat. This information can be included with the biological opinion prepared for listed species addressed in the HCP, thus avoiding the need for a second section 7 document. The FWS/NMFS section 7 handbook contains further information about preparation of section 7 conference documents.

For purposes of section 10 permit applications, FWS and NMFS will treat candidate species or any species (e.g., unlisted species) that are adequately covered in an HCP (see Chapter 4, Section A) in the same manner as proposed species with respect to conferencing procedures. This will ensure that such species have been addressed by the Services with respect to section 7 requirements should they become listed after the permit has been issued. Refer to the FWS's Endangered Species Act Intra-Service Consultation Handbook for further guidance.

d. Biological Opinion Formats/Requirements.

It is essential that section 7 consultation on a section 10 permit application be expeditiously completed and that the resulting biological opinion is legally sound. The following suggestions are provided.

Incorporation by Reference between the Biological Opinion & Set of Findings A biological opinion for an HCP and the Set of Findings (which describes how the HCP meets statutory issuance criteria) can also be duplicative. To avoid this, the Set of Findings may incorporate the biological opinion by reference to the extent that they duplicate each other. This may include incorporating the description of the project and the jeopardy analysis.

Cross Referencing An HCP contains many of the same components typically provided in biological opinions--including a project description, assessment of impacts, and description of a mitigation program. Significant consolidations to the HCP, through cross referencing, should be avoided since the HCP must meet the statutory requirements of section 10(a)(2)(A) and be a stand alone document, however, the biological opinion can be treated more flexibly. When possible without the loss of clarity or legal adequacy, the biological

opinion could cross-reference technical information provided in the HCP rather than repeat the same information.

Requirements of the Biological Opinion Under Federal regulation [50 CFR 402.14(h)-(i)] and section 7(b)(3) and 7(b)(4) of the ESA, the biological opinion for a section 10(a)(1)(B) permit application must contain, at a minimum:

- A summary of the information on which the opinion is based. This should include a brief description of the HCP and other documents prepared with the HCP, including memoranda of understanding, biological reports, and the NEPA analysis.

- A detailed discussion of the effects of the action on listed species or critical habitat.

- The Services' opinion on whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. This constitutes the Service's "jeopardy" or "no jeopardy" determination with respect to the permit application.

In most cases, reasonable and prudent measures and terms and conditions will simply require compliance with the permit, HCP, or IA, since these documents typically have identified the equivalent of such measures and ensured their implementation. The only exception to this is if the Services determine that additional measures are needed to minimize the impact of taking, or the Services and applicant agree to include additional terms and conditions not otherwise specified in the HCP. Reasonable and prudent alternatives are only needed in those rare cases when the Services determine that permit issuance would be likely to jeopardize the continued existence of the species involved.

The Incidental Take Statement Section 7(o)(2) states that "any taking that is in compliance with the terms and conditions specified in a written statement provided under subsection (b)(4)(iv) of this section [referring to the terms and conditions] shall not be considered to be a prohibited taking of the species concerned." This "incidental take statement" provides a take authorization mechanism for Federal actions similar to section 10(a)(1)(B) for non-Federal actions.

What is the role of the incidental take statement in a biological opinion for an HCP application? This can create considerable confusion among HCP reviewers since the take proposed under an HCP ultimately is authorized by the section 10(a)(1)(B) permit, not the incidental take statement. At the same time, the section 7 implementing regulations [50 CFR 402.14(i)] require an incidental take statement in a biological opinion where the Federal action is expected to result in take but will not violate section 7(a)(2).

Clearly, the Service action of issuing an incidental take permit will result in take. Thus, inclusion of an incidental take statement with a biological opinion for an HCP application is necessary to avoid any uncertainty about regulatory compliance with 50 CFR 402.14(I). At the same time, any reasonable and prudent measures or terms and conditions included with an incidental take statement for an HCP application should be consistent with the conservation program in the HCP and any terms and conditions included with the permit except in instances described above. It is also wise to avoid unnecessary duplication between the terms and conditions of the permit and those of the incidental take statement.

With these considerations in mind, the following language is recommended for the incidental take statement for any section 10(a)(1)(B) permit application:

> Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.
>
> The proposed [*name*] HCP and its associated documents clearly identify anticipated impacts to affected species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts. All conservation measures described in the proposed HCP, together with the terms and conditions described in any associated Implementing Agreement and any section 10(a)(1)(B) permit or permits issued with respect to the proposed HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR 402.14(I). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the permittee fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed [*name*] HCP, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP and its accompanying section 10(a)(1)(B) permit[*s*].

In some cases, the Service(s) must specify authorized levels of incidental take in the incidental take statement as well as in the HCP and permit. However, the incidental take

levels specified in the HCP and permit and those specified in the incidental take statement should be consistent with each other. In such cases, the following introductory paragraph should be included:

> Based on the proposed [*name*] HCP and on the analysis of the effects of the proposed action provided above, the Service[*s*] anticipates that the following take may occur as a result of the proposed action:

If requested by the applicant, the following paragraph may be included where plants are addressed in the HCP and are named on the permit.

> Generally, section 9 take prohibitions do not apply to listed plant species on non-Federal lands. Therefore, listed plants typically do not have to be included in the incidental take permit. However, State law may have take prohibitions associated with the HCP. In addition, the Service must review the effects of its own actions on listed plants, even when those listed plants are found on private lands. In approving an HCP and issuing an incidental take permit during the intra-Service section 7 consultation, the Service must determine that the permit will not "jeopardize the continued existence" of listed plants. In the interest of conserving listed plants, the Service may request that the landowner voluntarily assist the Service in restoring or enhancing listed plant habitats that are present within the area covered by the HCP.

4. Legal Review of the Application Package.

The purpose of legal review of the permit application package is to ensure that the HCP and associated documents meet the legal requirements of the ESA. This is especially important for an HCP, which has specific requirements, and for Implementing Agreements which address unique or first impression issues. It is also important for large-scale or regional HCPs which are often complex and address a variety of activities. The need for legal review of "low-effect" HCPs is less critical, since these projects are by definition minor in scope and impact (see Chapter 8).

For NMFS, all section 10 permit applications must receive legal review by the General Counsel's Office. For FWS, it is agency policy to require Solicitor's Office review of all section 10 permit applications, with the exception noted below. This will be true unless additional exceptions are allowed by a line authority no lower than the Assistant Regional Director for Ecological Services. However, Solicitor's review of HCPs categorized as "low-effect" can be waived if the HCP meets all applicable criteria for low-effect HCPs as defined in Chapter 1, Section F.2. The template in Appendix 4 can be used as a basis for developing Implementing Agreements for HCPs that are not low-effect, though Solicitor's Office review would be required in such cases.

For FWS, the Solicitor's Office need review only those parts of the permit application package that the Regional Director request be reviewed--typically the HCP and Implementing Agreement. Coordination with the Solicitor's Office on a permit application package should begin as soon as possible in the permit processing phase and ideally during the HCP development phase. After Solicitor review is complete, the Solicitor's Office should forward a memorandum to the RD or appropriate ARD stating that it has reviewed the IA and other documents, as applicable, and that they meet statutory and regulatory requirements.

5. Preparing the Signature Package.

When all HCP and NEPA analyses have been completed and reviewed by appropriate Service staff, the Regional Ecological Services Office (FWS), or Endangered Species Division or Environmental and Technical Services Division (NMFS), should sign those for which it has signature authority and assemble those and all others that are necessary for permit issuance into a "signature package." This package is then forwarded to the Regional Director's Office for finalization and signature (for FWS), or to the Regional Director's Office or Office of Protected Resources in Washington, D.C. (for NMFS). Signature authority for HCP documents may vary somewhat from Region to Region. Typically, for FWS documents requiring signature by the appropriate ARD are the: (1) biological opinion (unless signed by the Field Office) and (2) Set of Findings. Documents requiring signature by the Regional Director or Deputy Regional Director are the: (1) Implementing Agreement; (2) NEPA decision document (EAM, FONSI, or ROD); and (3) the permit. The signed biological opinion and Set of Findings should be attached to the signature package for the Regional Director's or Deputy Regional Director's reference. Where applicable, the Solicitor's memorandum stating that the HCP and associated documents meet statutory requirements also should be attached to the signature package. For NMFS, the permit documents will require the signature of the Chief, Endangered Species Division, and Director, Office of Protected Resources, if the permit is issued in Washington, D.C., or the Regional Director and Environmental and Technical Services Division if it is issued by the Regional Office. All of the supporting documents must be signed prior to the issuance of the permit.

The incidental take permit is considered effective as of the date and time the permit is signed. Immediately upon signature, the original permit and one original copy of the Implementing Agreement (if required) must be forwarded to the new permittee.

6. New Policies or Legal Questions.

Both FWS and NMFS should discuss the incorporation or implementation of any new policies, which are introduced while preparing an HCP, with the appropriate legal counsel and the Assistant Director for Ecological Services (FWS) to ensure the interpretation of the policy is legally sufficient and within the overall National policy guidance for the HCP

program or the new policy. Additionally, it is imperative to discuss any legal questions (e.g., statutory or regulatory issues) or uncertainties with the appropriate legal counsel (the Solicitor for FWS and the General Counsel for NOAA) early in the permit development or permit processing phases.

D. Federal Register Notices of Receipt

1. Timing of the Notice.

Under section 10(c) of the ESA and Federal regulation [50 CFR 17.22 and 17.32(b)(1) (ii) or 50 CFR 217], publication of a Notice of Receipt of a permit application in the Federal Register is required for each section 10 permit application received by the FWS or NMFS. NEPA regulations or FWS policy also require publication of Notices of Availability of NEPA analysis (see Chapter 5, Section A). These Federal Register notices should be published after submission of the complete application package and final review of the application package by Regional Office staff, but as early in the formal processing phase as possible. The notices must offer the public at least 30 days to comment on the documents where an EA is being prepared. A longer review is required for a draft EIS.

To streamline the public review process, the Notice of Receipt of a Permit Application and Notice of Availability of the NEPA analysis should be published concurrently.

2. Content of the Notice.

The Federal Register Notice of Receipt of an Incidental Take Permit Application must include the following information (see Appendix 16 for sample Notices of Receipt):

- Applicant's name and city and state of residence;
- For FWS, the application file number (PRT-____) as issued by LEMIS;
- A brief description of the proposed activity, the species involved, estimated number of individual animals or habitat quantity to be taken, affected locations, and proposed length of the permit, if known;
- Length of the comment period (minimum is 30 days from date of publication); for a draft EIS, a minimum 45-day comment period is required;
- Name and mailing address of the office(s) from which a copy of the application package may be obtained; street address and business hours where persons may view the application in person; and address of office where comments are to be submitted, including FAX number, if available;

- The name, address, and telephone number of a Service employee to contact for further information; and

- Supplementary information including a brief description of the measures the applicant will implement to minimize, mitigate, and monitor the incidental taking; a summary of the alternatives considered; a description of long-term funding, if any; and a summary of significant environmental effects. The notice should be brief but of sufficient detail to convey the main aspects of the proposed activity.

3. Submission to the Office of the Federal Register and PDM.

For FWS, when the Federal Register notice is ready for publication, **three** copies of the notice with **original** signatures by the appropriate ARD on all copies, and the name and title of the signatory below the signature, must be submitted to the Office of the Federal Register at the address below. A transmittal letter is usually included.

U.S. Mail
National Archives & Records Administration
Office of the Federal Register
Washington, D.C. 20408
(Telephone 202/523-3187)

Overnight/Courier Delivery
Office of the Federal Register
Room 700
800 North Capitol Street, Northwest
Washington, D.C. 20002
(Telephone 202/523-3187)

Federal Register notices generally are published within 3 working days after receipt by the Office of the Federal Register, if received prior to 2:00 p.m.

A copy of the Federal Register notice, with the originating office's billing code, should also be sent to the FWS Division of Policy and Directives Management (PDM) in Washington, D.C. at the address below. The notice should be sent to PDM no later than the time it is sent to the Office of the Federal Register. The purpose of this is to allow the Washington D.C., PDM Office to assist in prompt publication of the notice in case questions arise after the notice has been submitted.

U.S. Fish and Wildlife Service
Division of Policy and Directives Management
ARLSQ-224
4401 N. Fairfax Drive

Arlington, VA 22203
FAX: 703-358-2269

For NMFS, all Federal Register notices must be cleared through the Office of Fisheries Conservation and Management in Washington, D.C. (see Appendix 12 for address).

If the Regional Office believes an HCP permit application is potentially controversial, faces a likelihood of legal challenge, or otherwise address issues deserving of Secretarial attention, it should notify the Regional Public Affairs Office and request the Regional Public Affairs Officer to coordinate with appropriate FWS or Department personnel in Washington, D.C. For NMFS, the Office of Protected Resources should be notified (see Appendix 12 for address).

4. Providing HCP Documents to the Public/FOIA Considerations.

Once a permit application is received, the Service should encourage the applicant to involve all appropriate parties. This is especially true for complex and controversial projects. The Service should also notify interested parties when documents (e.g., NEPA analysis or HCP) become available for public review. In addition, during the public comment period the Service may wish to hold informational meetings and answer questions that members of the public may have regarding the HCP or permit issuance.

During the comment period, the Services should provide the permit application package to those requesting copies. The Services should provide information that documents compliance with the requirements of section 10 (a)(2) of the ESA. The Service should not release confidential, proprietary, or individual privacy information which may be protected under 43 CFR 2.13(c)(4) and (6) respectively. If the applicant is a business or sole proprietorship, the Services should review the application for any information that may be deemed "confidential business information" or could cause "competitive harm." In such cases, the program should release information in accordance with guidance found in 43 CFR 2.15(d). If the applicant is an individual, the information in block 4 of the application (date of birth, social security number, etc.) must be blocked out before mailing in accordance with the Privacy Act and FOIA (see Appendix 11). The program should also review the remainder of the application for information that could invade personal privacy.

In both cases, the Services should send the requestor a note explaining what was deleted and that it may be available under the FOIA. If the requestor filed a FOIA request initially for the information, the program in consultation with the Solicitor's office, must provide an explanation of what material was exempted and why; and provide appeal rights to the requestor in accordance with the FOIA.

Documents that reflect intra-agency or inter-agency deliberations are most likely exempt under the FOIA. Exemption would depend on whether the agency can show such

information is predecisional and deliberative, foreseeable harm will result in their release; and apply to both the deliberations and any other information which is not reasonably segregated from them.

After the comment period, the Services should provide copies of applications and related material to those requesting a copy. Though a FOIA request is not required to receive information, release of the information should still be done in accordance with the FOIA.

The application package, including the NEPA analysis, must be provided to all affected interests who request the package or have a record of significant interest in the planning program. For EISs it is wise to prepare a distribution list before the EIS is printed, since an adequate number of copies must be printed to meet the demand. For HCPs, Field Offices should estimate the number of copies needed to send to commenters and the affected public and arrange for duplication.

When requested, copies of the application package should be mailed immediately since the public has a limited time to review documents and submit comments.

If additional significant information is submitted by the applicant after the 30-day comment period has closed, which requires a change to the application, the comment period should be reopened through a second Federal Register notice.

The Services are not obligated to consider comments received after the 30-day comment period has closed, but may elect to do so, especially if they contain significant biological information or if discussions with the applicant have continued after the close of the comment period. All late comments must then be considered, however. If any new information received from either commenters or the applicant is of relevance to the decision regarding issuance of the permit, it will be necessary to reopen the public comment period.

5. Objection to the Permit.

Any individual may object to issuance of an incidental take permit for an **endangered** species during the 30-day comment period. An objection should be in writing, refer to the permit application number, and provide specific, substantive reasons why the individual believes the application does not meet the permit issuance criteria or other reasons why the permit should not be issued. For FWS, if the objector requests notification of the final action in writing and the FWS decides to issue the permit, the agency must notify the objector in writing that the permit will be issued. A reasonable effort must be made to accomplish this notification at least 10 days before permit issuance. If notification is verbal, it must later be followed in writing. If notification prior to permit issuance could lead to harm to the endangered species or population involved, or unduly hinder proposed activities to be authorized, FWS may dispense with prior notification; however, written explanation for doing so must be provided to the objector following permit issuance.

The objection process described above does not apply to **threatened** species. Under 50 CFR 17.32(b)(1)(ii), the FWS must publish notice in the Federal Register for each application to incidentally take a threatened species, and the notice should invite written comments from interested parties during a 30-day comment period. The FWS is not required to address objections to permit issuance for threatened species in the manner described above, though doing so is recommended.

6. Notice of Permit Issuance, Amendment, Denial, or Abandonment.

Although not required by law or Federal regulation, it is FWS policy to notify the public of their section 10 permit application decisions. NMFS is required by its regulations at 50 CFR 222.24(c) to publish a notice of the decision within 10 days after the date of issuance or denial. Notices of permit issuances, denials, and amendments should be published in the Federal Register on a quarterly or biannual basis. A 45-day waiting period is recommended prior to publication of permit denial notices to allow time for appeals by the applicant. Appendix 18 contains "templates" for preparing Notices of Issuance for a single permit and for multiple permits. Notice of the abandonment of a permit application by the applicant need not be published.

E. Permit Issuance Conditions and Reporting Requirements

The permit (for FWS, Form 3-201; for NMFS, agency letterhead) must identify the species, stipulate the activities authorized, and indicate the location(s) where the activities can be conducted. The permit, together with its attached terms and conditions, must contain sufficient information so that no question remains by the permittee or an enforcement officer as to the scope of the authorized taking. Appendix 17 contains examples of issued FWS incidental take permits.

1. Permit Conditions.

The Services have the authority to impose terms and conditions in the permit necessary to carry out the purposes of the permit, including but not limited to, monitoring and reporting requirements necessary for determining whether such terms and conditions are being complied with. The terms and conditions placed in the permit should be the same as, or a re-statement of, those described in the final HCP, with the exception of standard conditions that go into all permits. However, in some cases FWS or NMFS may need to incorporate additional conditions resulting from the section 7 consultation. Reasonable and prudent alternatives, if provided in the section 7 consultation to avoid jeopardy, as well as reasonable and prudent measures and terms and conditions, if included in the incidental take statement, must be included in the permit conditions. Permits should also identify protocols for handling dead and/or injured specimens of protected species taken under authority of the permit.

2. Permit Duration. [See 50 CFR 13.21(f) or 50 CFR 222.22(e)]

The Conference Report for the 1982 Section 10 amendments states, "The Secretary is vested with broad discretion in carrying out the conservation plan provision to determine the appropriate length of any section 10(a) permit issued pursuant to this provision in light of all of the facts and circumstances of each individual case" (H.R. Rep. No. 97-835, 97th Congress, Second Session).

Thus, the allowable duration of a permit is flexible but an expiration date **must** be specified (for FWS, in block 7 of the permit Form 3-201). The duration of planned activities, the potential positive effects to listed species provided under the permit, and the potential negative effects to the species that may result from premature permit expiration should be considered in determining permit length. Also, local government agencies may wish to tie the permit expiration date to local land use plans. Development or land use activities and the conservation program proposed in the HCP may require years to implement. The Services must assure the applicant that authorizations under the permit will be available for the life of the project, and the public that conservation measures under the permit will remain in effect for as long as necessary to implement the conservation program.

3. Distribution of Copies of the Permit.

A copy of the issued permit should be provided to the Endangered Species Division in Washington, D.C. (FWS and NMFS), applicable Field Offices, other Federal agencies involved in the HCP, and affected state wildlife and conservation agencies.

4. Reporting Requirements. [See 50 CFR 13.45; 50 CFR 17.22(b)(3) and 17.32(b)(3) or 50 CFR 222.22(d)(1)]

The permit should include reporting requirements necessary to track take levels occurring under the permit and to ensure the conservation program is being properly implemented. Federal regulation (50 CFR 13.45) requires annual reports unless otherwise specified by the permit. The HCP itself will often specify reporting requirements. Unless reporting requirements in addition to those in the HCP are deemed to be necessary, reporting requirements in the HCP and the permit should be the same. Failure to submit adequate reports as required by the permit is a violation of the permit and may lead to permit suspension or revocation.

- Each permittee must file a report, even if no activity was conducted under the permit in that reporting interval.

- No permittee should be required to include in a report information of a private or personal nature (for individuals). Sensitive business information or information

that is otherwise considered proprietary (for businesses) should also generally not be required.

- o If a report required by the permit is not submitted or is inadequate, the permittee should be notified in writing and offered at least 30 days to demonstrate compliance. If the permittee fails to comply within the allotted time, permit suspension procedures (50 CFR 13.27) or revocation procedures (50 CFR 13.28 for FWS, 50 CFR 222.27 for NMFS) should be initiated.

- o Report due dates should be flexible and wherever possible tailored to the activities being conducted under the permit (e.g., due at the end of a particular stage of the project). If possible, the due date should also be coordinated with other (e.g., state) reporting requirements so the permittee can satisfy more than one reporting requirement with a single report. For low-effect HCPs in which the project or activity is completed in less than a year or in which annual reporting is otherwise deemed to be unnecessary, a single "post-activity" or "post-construction" report is often adequate.

- o A copy of the report, or a notice that it is available should be sent to state wildlife agencies and other appropriate parties, either by the applicant or the FWS or NMFS.

- o Reports should be monitored closely to ensure that they contain adequate information and the permittee is complying with the authorizations and conditions of the permit. For FWS, information about apparent violations should be forwarded to the appropriate ARD-LE Office and Law Enforcement special agent. The Regional Office, in coordination with Law Enforcement, should immediately notify the permittee of apparent noncompliance and request an explanation. For NMFS, permit violations should be reported to the appropriate Regional Law Enforcement Division and NOAA General Counsel for Enforcement and Litigation.

F. Permit Denial, Review, and Appeal Procedures

1. Permit Denial.

If the HCP and associated documents do not satisfy issuance criteria under the ESA and Federal regulation, the permit application must be denied. The applicant must be notified of the denial in writing and the reasons for the denial, of applicable regulations resulting in the denial, and of the applicant's right to request reconsideration of the permit application. For NMFS, denials must be made in accordance with 15 CFR part 904.

2. Review Procedures. [See 50 CFR 13.29 or 50 CFR 220.21]

A section 10 applicant has access to a two-tiered system of review of a permit denial within the issuing office: (1) if the permit is denied, the applicant can request reconsideration of the permit application; and (2) if the request for reconsideration is denied, the applicant can appeal the decision. To ensure independent review of a permit denial at each stage, review decisions and signature authority should be as follows:

- For FWS, initial permit denials should be signed by the appropriate Assistant Regional Director;
- Decisions on requests for reconsideration should be signed by the Deputy Regional Director (DRD);
- Appeal decisions (the final administrative action) should be signed by the Regional Director (RD).

For NMFS, the above decisions must be signed by the Regional Director or the Director of the Office of Protected Resources Division in Washington, D.C.

3. Requests for Reconsideration. [See 50 CFR 13.29(a)-(d) or 50 CFR 220.21]

For FWS, a permit applicant may request reconsideration of (1) denial of a permit application, renewal, or amendment request; and (2) amended, suspended, or revoked permits, except for permit actions required by changes in statute or regulations. The applicant's request must meet the criteria outlined in 50 CFR 13.29, be in writing, be signed by the applicant or a designated representative, and be addressed to the Deputy Regional Director.

When the DRD's office receives a request for reconsideration, the ARD that issued the denial must forward a copy of the applicant's file, along with a summary of the file's pertinent points, to the DRD. If the DRD determines that permit issuance criteria have been satisfied, the denial is reversed and a permit may be issued. If the denial is sustained, the DRD must notify the applicant of the decision within 45 calendar days of receipt of the request. This notification must be in writing, state the reasons for the decision, and describe the evidence used to make it. The letter must also provide information concerning the applicant's right to appeal, the office to which the appeal should be made, and the procedures for making the appeal.

For NMFS, procedures for requests for reconsideration are addressed in 50 CFR 220.21.

4. Appeal. [See 50 CFR 13.29(e)-(f)]

For FWS, an applicant may appeal a second denial of the permit in accordance with 50 CFR 13.29(e)-(f). The written appeal request must be signed by the applicant or a designated

representative and be addressed to the Regional Director. Before a decision is made, the appellant may present oral arguments before the RD if the RD believes this could clarify issues raised in the written record.

The RD shall provide the appellant with written notification of the appeal decision within 45 calendar days of receipt of the request. This time frame may be extended with good cause if the appellant is notified of and concurs with the extension. The RD's decision on a permit appeal constitutes the final administrative decision of the Department of the Interior.

5. Copies of Denials.

For FWS, a copy of all section 10 permit denials, including denial of reconsideration and appeal requests, should be sent to all affected Field Offices, the ARD-LE, and the Division of Endangered Species in Washington, D.C. For NMFS, copies should be sent to affected Field Offices and Regional Offices and the Endangered Species Division in Washington, D.C.

G. Permit Amendments [See 50 CFR 13.23 or 50 CFR 222.25]

For FWS, amendment of existing permits may be requested by a dated letter signed by the applicant and referencing the permit number. The $25 application fee is required unless the applicant is fee exempt (see Appendix 10). Procedurally, a permit amendment application is treated in the same way as the original permit application. However, documentation needed in support of a permit amendment will vary depending on the nature of the amendment and the content of the original HCP. If the amendment involves an action that was not addressed in the original HCP, Implementing Agreement, or NEPA analysis, these documents may need to be revised or new versions prepared addressing the amendment submitted. If the circumstances necessitating the amendment were addressed in the original documents (e.g., a previously unlisted species adequately addressed in the HCP is subsequently listed), then only amendment of the permit itself is generally needed. See Chapter 4 for a discussion of how previously unlisted species are treated if they are listed.

For NMFS, applications to modify a permit are subject to the same issuance provisions as an original permit application as provided in 50 CFR 222.22.

H. Permit Renewal [See 50 CFR 13.22 or 50 CFR 220.24]

For FWS, Federal fish and wildlife permits may be renewed if indicated in block 4 of the permit. Whether or not the permit is renewable should be determined by the Regional Office when the permit is issued.

If the permittee files a renewal request and the request is on file with the issuing FWS office at least 30 days prior to the permit's expiration, the permit will remain valid while the renewal is being processed, provided the existing permit is renewable. The permittee may

not take listed species beyond the quantity authorized by the original permit, however. A renewal request must:

- Be in writing;
- Reference the permit number;
- Certify that all statements and information in the original application are still correct or include a list of changes;
- Provide specific information concerning what take has occurred under the existing permit and what portions of the project are still to be completed; and
- Request renewal.

If a permittee fails to file a renewal request 30 days prior to permit expiration, the permit becomes invalid after the expiration date. If the permittee seeks extension of the expiration date only and proposes no additional taking, a public comment period generally is required. A permittee must have complied with annual reporting requirements to qualify for renewal.

For NMFS, requirements for permit renewal are contained in 50 CFR 220.24.

I. Permit Transferals

Important Notice: On September 5, 1995, the Fish and Wildlife Service published a proposed rule in the Federal Register amending the general regulations for its permit program (50 CFR Part 13 and Part 17). The Service is currently drafting additional language to clarify the relationship between the Part 13 and Part 17 procedures and a proposed rule will be published in the near future. Consequently, some information contained in this section may be outdated upon publication of a final rule. Users of this handbook should check the revised permit procedures when available or contact the Service's Division of Law Enforcement to ensure that the handbook's description of permit administration is consistent with the new regulations.

Congress amended section 10(a)(1) of the Act in 1982 to authorize new incidental take permits associated with HCPs. Many HCP permits involve long-term conservation commitments that run with the affected land for the life of the permit. The Services negotiate such long-term permits recognizing that a succession of owners may purchase or resell the affected property during the term of the permit. In other HCP situations, the HCP permittee may be a State or local agency that intends to issue subpermits that authorize the incidental take for the permit to those entities involved in the HCP.

The Services do not view these situations as problems since the terms of such permits frequently run with the land, binding successive owners to the terms of the HCP. Landowners similarly do not view this as a problem as long as the Services can easily transfer incidental take authorization from one purchaser to another. However, the new landowners must be able and willing to assume the responsibilities associated with the permit (i.e., the minimization/mitigation strategy and the terms and conditions of the permit) to receive the assurances of the permit.

If a landowner, who is a section 10(a)(1)(B) permittee, transfers ownership of the land that occurs within an approved HCP, the Services will regard the new owner as having the same rights with respect to the permit as the original landowner, provided that the new owner agrees to be bound by the terms and conditions of the original permit. Actions taken by the new landowner resulting in the incidental take of species covered by the permit would be authorized if the new landowner agrees to the permit and continues to implement the minimization and mitigation strategies of the HCP.

To ensure that original permittees inform new landowners of their rights and responsibilities, a section 10(a)(1)(B) permit must commit the permittee to notify the Services of any transfer of ownership of any lands subject to the permit before the transfer is finalized. The Services should attempt to contact the new landowner to explain the prior permit, and determine whether the new landowner would like to continue the original permit or enter into a new permit. In addition, the original permittee needs to work with the new landowner(s) to ensure they understand the obligations associated with permit transfer. The Services will provide any technical assistance necessary to ensure that all parties understand their rights and responsibilities.

If, however, the new landowner <u>does not</u> agree to the terms and conditions of the original permit, the original permittee must work with the Services to determine whether, and under what circumstances, the permit can be terminated. In order to terminate the permit, the Services must determine if the minimization and mitigation measures that were conducted up to that point were commensurate with the amount of incidental take that occurred during the term of the permit. If the incidental take occurred during the initial stages of implementing the permit, but the minimization and mitigation measures occur throughout the term of the permit, the Services shall require that the remainder of the minimization and mitigation measures be implemented before the permit is terminated. In this fashion, the Services will be able to ensure that there is adequate and sufficient minimization and mitigation for the incidental take that occurred during the term of the permit.

J. Permit Violations, Suspensions, and Revocations

On occasion, the Services may find that a permittee has violated conditions of the permit. This may become evident through review of a permittee's annual report, a field inspection, or

other means. Implementing Agreements sometimes contain provisions concerning the failure of signatory parties to perform their assigned responsibilities under an HCP.

1. Notifying Law Enforcement.

In the event of a known or suspected permit violation, the appropriate ARD-LE and Law Enforcement Special Agent must be notified before any official action is taken (for FWS). If the violation is deemed technical or inadvertent in nature, the ARD-LE may advise that the permittee be sent a notice of noncompliance by certified mail or may recommend alternative action to regain compliance with the terms of the permit. Concurrence from the ARD-LE should be obtained before mailing any correspondence concerning an alleged permit violation to avoid wording that could compromise a current or future investigation. For NMFS, the appropriate Law Enforcement Division and NOAA General Counsel for Enforcement and Litigation should be notified.

2. Permit Suspension/Revocation. [See 50 CFR 13.27 and 13.28]

The Services may suspend or revoke all or part of the privileges authorized by a permit, if the permittee does not:

- Comply with conditions of the permit or with applicable laws and regulations governing the permitted activity; or
- Pay any fees, penalties, or costs owed to the government.

If the permit is suspended or revoked, incidental take must cease and wildlife held under authority of the permit must be disposed of in accordance with Regional Office instructions. For further information, consult the regulations on procedures to suspend or revoke permits.

CHAPTER 7
ISSUANCE CRITERIA FOR INCIDENTAL TAKE PERMITS

Upon receiving a permit application and conservation plan completed in accordance with the requirements of section 10(a)(2)(A) of the ESA and Chapter 3 above, FWS and NMFS must consider the issuance criteria described at section 10(a)(2)(B) of the ESA in determining whether to issue the permit. All applicable criteria must be satisfied before a permit may be issued. If the application fails to meet <u>any</u> of the criteria, the permit must be denied. In addition, the FWS must ensure that general permit issuance criteria described at 50 CFR 13.21 and criteria specific to section 10(a)(1)(B) permits described at 50 CFR 17.22(b)(2) and 50 CFR 17.32(b)(2) are satisfied. However, issuance criteria under at 50 CFR Part 17 are essentially identical to those under the ESA. For NMFS, general permit criteria in 50 CFR 217 and 220 must be met in addition to criteria specific to incidental take permits in 50 CFR 222. For NMFS, general permit criteria in 50 CFR 217 and 220 must be met in addition to criteria specific to incidental take permits in 50 CFR 222, and denials of permits must be made pursuant to Subpart D of 15 CFR part 904.

A. General Permit Issuance Criteria

The FWS cannot issue a permit if any of the following apply:

(1) The applicant has been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed, if such assessment or conviction evidences a lack of responsibility;

(2) The applicant has failed to disclose material information, or has made false statements as to any material fact in connection with the application;

(3) The applicant has failed to demonstrate a valid justification for the permit and a showing of responsibility;

(4) The authorization requested threatens the continued existence of a wildlife or plant population.

(5) The FWS finds through further inquiry or investigation, or otherwise, that the applicant is not qualified to conduct the proposed activities.

In addition to the above, FWS regulations cite four factors relating to felony violations of national wildlife laws and violation of conditions within other permits that could disqualify an

applicant from receiving a section 10 permit. These factors are described at 50 CFR 13.21(c). NMFS regulations describe similar conditions under which a permit could not be issued (see 50 CFR 220.21).

B. Endangered/Threatened Species Permit Issuance Criteria

Section 10(a)(2)(B) of the ESA requires the following criteria to be met before the FWS or NMFS may issue an incidental take permit. If these criteria are met and the HCP and supporting information are statutorily complete, the permit must be issued.

1. The taking will be incidental.

Under the ESA, all taking of federally listed fish and wildlife species as detailed in the HCP must be incidental to otherwise lawful activities and not the purpose of such activities. For example, deliberate shooting or wounding a listed species ordinarily would not be considered incidental take and would not qualify for an incidental take permit. Conversely, the destruction of an endangered species or its habitat by heavy equipment during home construction or other land use activities generally would be construed as incidental and could be authorized by an incidental take permit.

a. Authorizing Take Associated With Mitigation Activities.

Mitigation and monitoring programs sometimes require actions that, strictly speaking, may be construed as a deliberate take. A good example is trapping endangered or threatened animals at a project site to re-locate or protect them in some fashion or to monitor their presence or activities.

Generally, actions that result in deliberate take can be conducted under an incidental take permit, if: (1) the take results from mitigation measures (e.g., capture/relocation) specifically intended to minimize more serious forms of take (e.g., killing or injury) or are part of a monitoring program specifically described in the HCP; and (2) such activities are directly associated in time or place with activities authorized under the permit. Examples include capture of endangered animals from a project site and removal to adjacent or nearby habitat, capture and release of animals accidentally entrapped at the site (e.g., in a pipeline trench), capture/release studies for monitoring purposes, even permanent capture for purposes of donation to a captive breeding or research facility. However, where such activities require special qualifications, the HCP should require written FWS or NMFS authorization before any individual is permitted to conduct the work.

b. Authorizing Take For Scientific Purposes.

Other types of activities cannot be authorized by an incidental take permit because they include actions that are not generally needed to implement an HCP or include long-term components that are not "incidental" to the activity described in the HCP. Examples of these types of activities include holding endangered or threatened animals in captivity for propagation purposes or scientific research; euthanizing them for research purposes; and taking tissue samples for laboratory testing. However, such activities qualify as take for "scientific purposes" or purposes of "enhancement of propagation or survival" and can be authorized under section 10(a)(1)(A) of the ESA.

If an HCP calls for activities of this type, the applicant should specify that the project will result in incidental take and take for scientific purposes or for purposes of enhancement of propagation or survival. Application requirements for scientific permits must then be addressed. These are described at 50 CFR 17.22(a)(1)(i-ix) for endangered species and 50 CFR 17.32(a)(1)(i-ix) for threatened species (FWS) and 50 CFR 217, 220, and 222 (NMFS). In addition, FWS must address issuance criteria under 50 CFR 17.22(a)(2) for endangered species and 50 CFR 17.32 (a)(2) for threatened species to issue permits for these purposes. Generally, if proposed activities are well-described in the HCP, including those requiring a scientific permit, and if all incidental take permit application requirements have been met, the only additional information needed for a scientific permit is resumes of individuals who would be conducting permitted activities. The permit issued can be a joint section 10(a)(1)(A) section 10(a)(1)(B) permit--i.e., only one permit need be issued.

2. The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.

The applicant decides during the HCP development phase what measures to include in the HCP (though, obviously, the applicant does so in light of discussions with and recommendations from FWS or NMFS). However, the Services ultimately decide, at the conclusion of the permit application processing phase, whether the mitigation program proposed by the applicant has satisfied this statutory issuance criterion.

This finding typically requires consideration of two factors: adequacy of the minimization and mitigation program, and whether it is the maximum that can be practically implemented by the applicant. To the extent maximum that the minimization and mitigation program can be demonstrated to provide substantial benefits to the species, less emphasis can be placed on the second factor. However, particularly where the adequacy of the mitigation is a close call, the record must contain some basis to conclude that the proposed program is the maximum that can be reasonably required by that applicant. This may require weighing the costs of implementing additional mitigation, benefits and costs of implementing additional mitigation, the amount of mitigation provided by other applicants in similar situations, and the abilities of that particular applicant. Analysis of the alternatives that would require additional mitigation

in the HCP and NEPA analysis, including the costs to the applicant is often essential in helping the Services make the required finding.

3. The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.

These issuance criteria are identical to HCP requirements discussed in Chapter 3. The Services must ensure that funding sources and levels proposed by the applicant are reliable and will meet the purposes of the HCP, and that measures to deal with unforeseen circumstances are adequately addressed. Without such findings, the section 10 permit cannot be issued. Examples of funding mechanisms and methods of ensuring funding are discussed in Chapter 3, Section B.6.

The "Unforeseen or Extraordinary Circumstances " discussion in the HCP must be consistent with the joint Department of Interior/Department of Commerce "No Surprises" policy and should impose no higher standard on the permit applicant with respect to unforeseen circumstances than that described under this policy (see Chapter 3, Section B.5(a)).

4. The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.

This is a critically important criterion for incidental take permits because it establishes a fundamental "threshold" standard for any listed species affected by an HCP. Furthermore, the wording of this criterion is identical to the "jeopardy" definition under the section 7 regulations (50 CFR Part 402.02), which defines the term "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that the Services will determine whether or not to grant a permit, "in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services'] regulations." Congress also directed the Services to "consider the extent to which the conservation plan is likely to enhance the habitat of the listed species or increase the long-term survivability of the species or its ecosystem." (H.R. Report No. 97-835, 97th Congress, Second Session).

Thus, since the issuance of a section 10 permit is a Federal action subject to section 7 of the ESA (see Chapter 3, Section B.2(e)), the law prohibits any non-Federal activity under an HCP from "jeopardizing" a species under two standards: (1) the section 7 jeopardy standard; and (2) the incidental take permit issuance criteria. There is one difference between these two standards--the section 10 issuance criteria apply only to listed fish and wildlife species (because listed plants typically are not protected against take on non-Federal lands), while

the jeopardy standard under section 7(a)(2) applies to plants as well as animals. However, the practical effect is the same--the ESA requires a "no-jeopardy" finding for all affected federally listed species as a precondition for issuance of an incidental take permit. The basis for this finding is the Service's biological opinion.

5. The applicant will ensure that other measures that the Services may require as being necessary or appropriate will be provided.

This criterion is equivalent to the requirement that HCPs include other measures as necessary or appropriate for purposes of the plan. Because the HCP process deals with numerous kinds of proposals and species, this criterion authorizes the Services to impose additional measures to protect listed species where deemed necessary. Although these types of measures should have been discussed during the HCP development phase and incorporated into the HCP, FWS or NMFS must ensure that the applicant has included all those measures the Services consider necessary "for purposes of the plan" before issuing the permit. The principal additional measure that the Services may require at this time is the Implementing Agreement. Other measures the Services might recommend during HCP negotiations could include those necessary to guarantee funding for the mitigation program and monitoring and reporting requirements to ensure permit compliance. Also, any incidental take permit issued will be subject to the general permit conditions described at 50 CFR Part 13, Subpart D (FWS) or 50 CFR Part 220 (NMFS) regarding the display of permits, maintenance of records, filing of reports, etc.

6. The Services have received such other assurances as may be required that the HCP will be implemented.

The applicant must ensure that the HCP will be carried out as specified. Since compliance with the HCP is a condition of the permit. The authority of the permit is a primary instrument for ensuring that the HCP will be implemented. When developed, Implementing Agreements also provide assurances that the HCP will be properly implemented. Where a local government agency is the applicant, the Agreement should detail the manner in which local agencies will exercise their existing authorities to effect land or water use as set forth in the HCP. Under an HCP, government entities continue to exercise their duly constituted planning, zoning, and permitting powers. However, actions that modify the agreements upon which the permit is based (e.g., rezoning an area contrary to land uses specified in the HCP) could invalidate the permit. In addition, failure to abide by the terms of the HCP and Implementing Agreement (if required) is likely to result in suspension or revocation of the permit.

Some HCPs may involve interests other than the applicant or permittee. In these cases, the applicant must have specific authority over the other parties affected by the HCP and be willing to exercise that authority, or must secure commitments from them that the terms of the HCP will be upheld. In the latter case, agreements between the FWS or NMFS and the

other groups, or legally binding contracts between the applicant and such individuals or interests, may be necessary to bind all parties to the terms of the HCP.

Any Implementing Agreement submitted in support of an HCP should be consistent with the discussion in Chapter 3, Section B.8, and, where applicable, with the Implementing Agreement "template" in Appendix 4.

CHAPTER 8 - DEFINITIONS

Candidate species - Under FWS's ESA regulations, "...those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to the list them as endangered or threatened species. Proposal rules have not yet been issued because this action is precluded..." (See Federal Register, Volume 61, No. 49, page 7598.) For those species under the jurisdiction of NMFS, candidate species means a species for which concerns remain regarding their status, but for which more information is needed before they can be proposed for listing.

Categorical exclusion - Under NEPA regulations, a category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to NEPA. (40 CFR 1508.4)

Complete application package - Section 10 permit application package presented by the permit applicant to the Field Office or Regional Office for processing. It contains an application form, fee (if required), HCP, EA or EIS. In order to begin processing, the package must be accompanied by a certification by the Field Office that it has reviewed the application documents and finds them to be statutorily complete.

Conservation plan - Under section 10(a)(2)(A) of the ESA, a planning document that is a mandatory component of an incidental take permit application, also known as a Habitat Conservation Plan or HCP.

Conservation plan area - Lands and other areas encompassed by specific boundaries which are affected by the conservation plan and incidental take permit.

"Covered species" - Unlisted species that have been adequately addressed in an HCP as though they were listed, and are therefore included on the permit or, alternately, for which assurances are provided to the permittee that such species will be added to the permit if listed under certain circumstances. "Covered species" are also subject to the assurances of the "No Surprises" policy.

Cumulative impact or effect - Under NEPA regulations, the incremental environmental impact or effect of the action together with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. (40 CFR 1508.7) Under ESA section 7 regulations, the effects of future state or private activities not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02).

Delist - To remove from the Federal list of endangered and threatened species (50 CFR 17.11 and 17.12) because such species no longer meets any of the five listing factors provided under section 4(a)(1) of the ESA and under which the species was originally listed (i.e., because the species has become extinct or is recovered).

Development or land use area - Those portions of the conservation plan area that are proposed for development or land use or are anticipated to be developed or utilized.

Downlist - To reclassify an endangered species to a threatened species based on alleviation of any of the five listing factors provided under section 4(a)(1) of the ESA.

Effect or impact - Under NEPA regulations, a direct result of an action that occurs at the same time and place; or an indirect result of an action which occurs later in time or in a different place and is reasonably foreseeable; or the cumulative results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (40 CFR 1508.8). Under ESA section 7 regulations, "effects of the action" means "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02).

Endangered species - "...any species [including subspecies or qualifying distinct population segment] which is in danger of extinction throughout all or a significant portion of its range." [Section 3(6) of ESA]

Endangered Species Act of 1973, as amended - 16 U.S.C. 1513-1543; Federal legislation that provides means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, and provides a program for the conservation of such endangered and threatened species.

Environmental Action Memorandum (EAM) - A FWS document prepared to explain the Service's reasoning in finalizing an action that is categorically excluded form NEPA; decisions based on EAs for which a notice is not published in the Federal Register; emergency actions under CEQ's NEPA regulations (40 CFR 1506.11); EAs which conclude that an EIS is necessary (since no FONSI is prepared in such cases); and any decision where additional documentation of the Service's decision is desirable (Director's Order No. 11).

Environmental Assessment (EA) - A concise public document, prepared in compliance with NEPA, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact (40 CFR 1508.9).

Environmental impact statement (EIS) - A detailed written statement required by section 102(2)(C) of NEPA containing, among other things, an analyses of environmental impacts of a proposed action and alternative considered, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11 and 40 CFR 1502).

Finding of no significant impact (FONSI) - A document prepared in compliance with NEPA, supported by an EA, that briefly presents why a Federal action will not have a significant effect on the human environment and for which an EIS, therefore, will not be prepared (40 CFR 1508.13).

Formal permit application phase - The phase of the section 10 process that begins when the Regional Office receives a "complete application package" and ends when a decision on permit issuance is finalized.

Habitat - The location where a particular taxon of plant or animal lives and its surroundings, both living and non-living; the term includes the presence of a group of particular environmental conditions surrounding an organism including air, water, soil, mineral elements, moisture, temperature, and topography.

Habitat conservation plan (HCP) - See "conservation plan."

"Harm" - Defined in regulations implementing the ESA promulgated by the Department of the Interior as an act "which actually kills or injures" listed wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." (50 CFR 17.3) NMFS has not defined "harm" by regulation.

"Harass" - Defined in regulations implementing the ESA promulgated by the Department of the Interior as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering." (50 CFR 17.3) NMFS has not defined "harass" by regulation.

Implementing Agreement - An agreement that legally binds the permittee to the requirements and responsibilities of a conservation plan and section 10 permit. It may assign the responsibility for planning, approving, and implementing the mitigation measures under the HCP.

Incidental take - Take of any federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities (see definition for "take") [ESA section 10(a)(1)(B)].

Incidental take permit - A permit that exempts a permittee from the take prohibition of section 9 of the ESA issued by the FWS or NMFS pursuant to section 10(a)(l)(B) of the ESA. In this handbook, also referred to as a section 10(a)(1)(B) or section 10 permit.

Listed species - Species, including subspecies and distinct vertebrate populations, of fish, wildlife, or plants listed as either endangered or threatened under section 4 of the ESA.

Mitigation - Under NEPA regulations, to moderate, reduce or alleviate the impacts of a proposed activity, including: a) avoiding the impact by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action; c) rectifying the impact by repairing, rehabilitating or restoring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; e) compensating for the impact by replacing or providing substitute resources or environments (40 CFR 1508.20).

National Environmental Policy Act (NEPA) - Federal legislation establishing national policy that environmental impacts will be evaluated as an integral part of any major Federal action. Requires the preparation of an EIS for all major Federal actions significantly affecting the quality of the human environment (42 U.S.C. 4321-4327).

Person - "...an individual, corporation, partnership, trust association, or any other private entity; or any officer, employee, agent, department or instrumentality of the Federal government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States" [Section 3(12) of the ESA].

Plan area - See "conservation plan area."

HCP development phase - The period in the section 10 process during which the applicant works with the FWS or NMFS Field Office to develop the HCP and associated documents. This phase ends when the Field Office forwards a "complete application package" to the Regional Office.

Proposed action - Under NEPA regulations, a plan that has a goal which contains sufficient details about the intended actions to be taken or that will result, to allow alternatives to be developed and its environmental impacts to be analyzed (40 CFR 1508.23).

Proposed species - A species for which a proposed rule to add the species to the Federal list of threatened and endangered species has been published in the Federal Register.

Record of Decision - Under NEPA regulations, a concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification and discussion of all factors used by the agency in making its decision,

identification of all alternatives considered, identification of the environmentally preferred alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement measures where applicable for any mitigation (40 CFR 1505.2).

Section 7 - The section of the ESA which describes the responsibilities of Federal agencies in conserving threatened and endangered species. Section 7(a)(1) requires all Federal agencies "in consultation with and with the assistance of the Secretary [to] utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." Section 7(a)(2) requires Federal agencies to "ensure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of..." designated critical habitat.

Section 9 - The section of the ESA dealing with prohibited acts, including the "take" of any listed species without specific authorization of the Fish and Wildlife Service or the National Marine Fisheries Service for species under the jurisdiction of each agency.

Section 10 - The section of the ESA dealing with exceptions to the prohibitions of section 9 of the ESA.

Section 10(a)(1)(A) - That portion of section 10 of the ESA that allows for permits for the taking of threatened or endangered species for scientific purposes or for purposes of enhancement of propagation or survival.

Section 10(a)(1)(B) - That portion of section 10 of the ESA that allows for permits for incidental taking of threatened or endangered species.

Set of Findings - FWS document (also used by NMFS) that evaluates, for the administrative record, a section 10(a)(1)(B) permit application in the context of permit issuance criteria found at section 10(a)(2)(B) of the ESA and 50 CFR Part 17.

Species - "...any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" [Section 3(15) of the ESA].

Steering committee - Group or panel of individuals representing affected interests or stakeholders in a conservation planning program, the private sector, and the interested public, which may be formed by the applicant to guide development of the HCP, recommend appropriate development, land use, and mitigation strategies, and to communicate progress to their larger constituencies. FWS and NMFS representatives may participate to provide information on procedures, statutory requirements, and other technical information.

Take - Under section 3(18) of the ESA, "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with respect to federally listed endangered species of wildlife. Federal regulations provide the same taking prohibitions for threatened wildlife species [50 CFR 17.31(a)].

Threatened species - "...any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" [Section 3(19) of the ESA].

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Parts 13 and 17

Endangered and Threatened Wildlife and Plants; Prohibitions and Permits

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: This Fish and Wildlife Service (Service) revises its regulations to implement the incidental take permit and other provisions of the 1982 amendments to the Endangered Species Act (EAS) of 1973. The final rule is not significantly different from the proposed rule. The final rule (1) provides, under limited cirumstances, for permits to take endangered and threatened species incidental to, and not the purpose of, otherwise lawful activities, and (2) adds a prohibition against removing and reducing to possession endangered and threatened plants from areas under Federal jurisdiction. An applicant for an incidental taking permit must submit a conservation plan that specifies: (1) The impacts that will likely result from such taking; (2) what steps the applicant will take to minimize and mitigate those impacts; (3) what other alternatives were analyzed that would not result in the takings; and (4) why those

alternatives were not adopted. To issue the permit, the Service must find that the taking will be incidental, that the applicant will minimize and mitigate the impact of the taking, that the applicant will ensure that there will be adequate funding for the conservation plan, and that appropriate measures will be taken by the permittee to successfully conduct the activities authorized by the permit.

EFFECTIVE DATE: October 30, 1985.

FOR FURTHER INFORMATION CONTACT: Mr. Larry LaRochelle, Staff Biologist, U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, 1000 N. Glebe Road, Room 611, Arlington, Virginia 22201 (703/235-1903).

SUPPLEMENTARY INFORMATION:

I. Background

On July 8, 1983 (48 FR 31417), the Service published proposed regulations to implement certain aspects of the 1982 amendments to the Endangered Species Act of 1973 (ESA). The first, an amendment to section 10(a) of the ESA, 16 U.S.C. 1539(a), allows permits for takings of endangered species incidental to, but not the purpose of, otherwise lawful activities. The second, addition of a new section 9(a)(2)(B) of the ESA, 16 U.S.C. 1538(a)(2)(B), prohibits removal and reduction to possession of protected plants from areas under Federal jurisdiction. The July 8, 1983, notice discussed the need, purpose and details of the Service's proposal and invited comments from interested parties until August 8, 1983.

The Service received comments from 13 parties: 1 port authority, 2 Federal agencies, 2 electric utility organizations, 3 conservation organizations, and 5 oil or gas corporations. Some comments were brief while others were lengthy, substantive, and analytical. All generally supported the Service's proposed rule though various clarifications were sought and alternate procedures and regulatory language were offered. Two commenters recommended that the Service's final rule be identical to the proposed rule. Each comment has been considered in preparing this final rule. In addition, the Service has relied upon its substantial experience in developing and implementing programs affecting endangered species. The significant comments pertinent to the Service's Notice of Proposed Rule are summarized and discussed below together with the Service's responses.

II. Comments

A. Incidental Take Regulations

The preamble to the proposed regulations contained an extended quotation from the Conference Report on the 1982 amendments to the ESA. This material was included in the notice of proposed rulemaking because it illuminates in detail Congress' intent in enacting the incidental take permit provisions. Unfortunately, and inadvertently, only the first paragraph of the quotation was properly typeset to show that it was a quotation, creating among many commenters the impression that the rest of the material was drafted by the Service. In fact, all of the material from the bottom of the third column of 48 FR 31417 through the top of the first column of 48 FR 31419 is a quotation from the Conference Report and therefore represents Congress' detailed views on incidental take permits. The Service apologizes for the misunderstandings that were created by this typographical error.

1. Joint Promulgation of These Regulations by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (NMFS)

Four commenters urged the Service and NMFS to coordinate their efforts so as to develop similar or identical requirements if each chose to develop its own regulations, to have NMFS adopt the Service's regulations, or to promulgate joint regulations. Certain species of fish, whales, seals, sea turtles, and other marine species listed as endangered or threatened under the ESA are under the jurisdiction of NMFS (50 CFR Parts 222 and 227). All of the ESA-listed marine mammals are subject to the Marine Mammal Protection Act (MMPA), however, which prohibits, except for scientific research, any takings of endangered or threatened species because they are considered "depleted" within the meaning of the MMPA, 16 U.S.C. 1371(a)(3)(B). ESA incidental take permits therefore may be available for only a few of the species under the jurisdicition of NMFS.

The Service agrees that coordination with NMFS on incidental take permit issues is important. The Service has consulted with NMFS throughout the process of drafting these regulations in order to ensure that the final regulations take into account the special aspects of NMFS's responsibility for regulating marine species and therefore are suitable for adoption by NMFS. The final regulations reflect this effort. NMFS will consider adopting the Service's regulations for species under its jurisdiction at a later date.

2. San Bruno Mountain Permit as a Model

The only incidental take permit that the Service has processed to date is associated with residential and commerical development on San Bruno Mountain in the San Francisco metropolitan area. The legislative history of the 1982 incidental take permit amendment states that the San Bruno Mountain plan served as the model for the amendments to section 10(a) of the ESA. H.R. Rep. No. 835, 97th Cong., 2nd Sess. 31 (1982) (hereafter "Conf. Rep. at ____"). Several commenters asserted, however, that the San Bruno plan is uncommonly complex and controversial and is therefore not a proper model for the Service's regulations. These commenters cited the difficulty of extrapolating from the San Bruno experience to other situations and activities.

Congress, not the Service, modeled the section 10(a) incidental take permit amendment on the San Bruno Mountain project. The courts that have reviewed and upheld the San Bruno incidental take permit agree that Congress intended that project to serve as a model. *See, e.g., Friends of Endangered Species* v. *Jantzen*, 76. F.2d 976 (9th Cir. 1985). The Service does, of course, have the discretion and the responsibility to implement the requirements of section 10(a) in regulations that are not only consistent with section 10(a), but which are also flexible and versatile. In drafting the regulations, the Service has naturally drawn upon its experience in processing and granting the San Bruno permit. The Service believes that the final regulations, which are largely identical to the express language of section 10(a), will accommodate projects that differ substantially from the San Bruno project in size; planned duration; the number of different local, State, and Federal agencies that have jurisdiction over some aspect of the project; or the number of listed and unlisted species that may be involved. The promise offered by the incidental take amendment—a means of reconciling conflicts which would otherwise exist between development and endangered species conservation—is available to a large variety of projects, provided they protect and conserve the affected species.

3. An all-inclusive Final Rule

Several commenters encouraged the Service to develop "cookbook" regulations that would include specific procedures, types of alternatives to be considered, detailed criteria and definitions, and a number of other items to cover the entire range of incidental take permit applications that might be filed. These commenters believed this approach would protect applicants from

arbitrary or inordinate requirements and protect listed species from exploitation. The Service recognizes that the incidental take permit provisions will have numerous and diverse applications, and that the administration of the provisions will require considerable ingenuity and flexibility. The wide-ranging experience of the Service in managing fish, wildlife, and plant resources has demonstrated, however, that it is neither possible nor practical to provide for every situation that might occur through the promulgation of detailed regulations such as the commenters suggested. Broader regulations will ensure that the Service is able to handle all incidental take situations that arise. The Service has therefore chosen to promulgate the final regulations in relatively broad terms consistent with the statutory language and Congressional intent.

It should be noted that the Service processed the complex San Bruno Mountain incidental take permit application and negotiated the implementing agreement among the involved parties without the benefit of incidental taking regulations and solely on the basis of the language of section 10(a), as amended.

4. Consideration of Unlisted Species in Conservation Plans

Several commenters addressed the issue of whether a conservation plan submitted in support of an incidental take permit application may (or should or must, depending upon the commenter) consider the impacts of the proposed activity on unlisted as well as listed species. While the proposed regulation was silent on this issue, its preamble quoted pertinent portions of the Conference Report. That language demonstrates Congressional intent that treatment of unlisted species in conservation plans be voluntary.

It also made clear however, that incidental take permit applicants will benefit in many, if not most, instances from consideration of unlisted species:

> Although the conservation plan is keyed to the permit provisions of the Act, which only apply to listed species, the Committee intends that Conservation plans may address both listed and unlisted species.
>
> The Committee intends that the Secretary may utilize this provision to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species and long-term assurances to the proponent of the conservation plan that the terms of the plan will be adhered to and that further mitigation requirements will only be imposed in accordance with the terms of the plan. In the event that an unlisted species addressed in an approved conservation plan is subsequently listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act.

[Conf. Rep. at 30]. In other words, failure to consider an unlisted species in a conservation plan exposes the permit applicant to the risk that if the species is subsequently listed, the activities covered by the permit might have to be halted pending amendment of the incidental take permit to incorporate the newly listed species.

The final regulations therefore do not impose a requirement that unlisted species, whether candidate, proposed, or not be considerd in a conservation plan. The regulations do, however, refer explicity to the option of considering unlisted species in order to encourage proponents of conservation plans to do so.

5. Interaction of Sections, 7, 9, and 10 of the Endangered Species Act

Numerous commenters raised issues concerning the interaction of the section 10(a) incidental take permit provision with the requirement in section 7(a)(2) for Federal interagency consultation on actions that may affect listed species and the prohibition in section 9 on takings of listed species. These comments were engendered in large part by the fact that section 7 was also affected by the 1982 amendments to the Act.

A few commenters asserted that because incidental take permit applicants are private parties, no section 7 consultation will be required with respect to an incidental take permit and associated conservation plan. This is clearly wrong, for any action undertaken pursuant to such a permit would be an action authorized by a Federal agency, the U.S. Fish and Wildlife Service, and the permit decision would therefore be subject to the section 7(a)(2) consultation requirement. Moreover, Congress expressly linked incidental take permits with the consultation requirement by including one of the section 7(a)(2) standards as a necessary criterion for issuing an incidental take permit. [Conf. Rep. at 29–30; H.R. Rep. No. 567, 97th Cong., 2nd Sess. 31 (1982)]. The section 10(a)(2)(B)(iv) criterion, whether "the taking will . . . appreciably reduce the likelihood of the survival and recovery of the species in the wild," is identical to the Service's regulatory definition of the section 7(a)(2) "jeopardize the continued existence of" standard (See 50 CFR 402.03). Thus, section 10(a) reinforces the consultation requirement with respect to incidental take permits by requiring a non-jeopardy finding (or a jeopardy finding with reasonable and prudent alternatives that are implemented by the Federal agency or applicant) as a precondition to issuance of a permit.

Other commenters discussed the interrelationship of section 10(a) and section 7(b)(4), which refers to incidental taking identified in section 7(a)(2) consultations that have resulted in "no jeopardy" opinions, including the issue of whether section 7(b)(4) empowers the Secretary to recommend substantial alternatives to a proposed project where a no jeopardy opinion has been prepared for the project as originally planned. Section 7(b)(4) was added to the Act and section 7(o) was amended:

> To resolve the situation in which a Federal agency or a permit or license applicant has been advised that the proposed action will not violate section 7(a)(2) of the Act but the proposed action will result in the taking of some species incidental to that action—a clear violation of section 9 of the Act which prohibits any taking of a species. The Federal agency or permit or license applicant is then confronted with the dilemma of having a biological opinion which permits the activity to proceed but is, nevertheless, proscribed from incidentally taking any species even though the incidental taking was contemplated in the biological opinion and determined not to be violation of section 7(a)(2)

[H.R. Rep. No. 567, 97th Cong., 2nd Sess. 26 (1982)]. Section 7(b)(4) provides that if section 7(a)(2) consultation results in a "no jeopardy" opinion, yet the proposed action would nevertheless involve incidental taking of a listed species but at a level low enough so that it would not violate section 7(a)(2), the Secretary must provide a written statement that:

> (i) Specifies the impact of such incidental taking on the species,
>
> (ii) Specifies those reasonable and prudent measures that the Secretary considers necessary or appropriate to minimize such impacts, and
>
> (iii) Sets forth the terms and conditions (including, but not limited to, reporting requirements) that must be complied with to implement the measures specified under (ii).

Section 7(o)(2) further provides that any incidental taking in compliance with the terms and conditions set forth in section 7(b)(4)(iii) shall not be a taking prohibited by the Act or its implementing regulations.

One commenter argued that the section 7(b)(4) "reasonable and prudent measures" specified to minimize the impact of the incidental taking can include substantial alternatives to the proposed action and that the Service

would therefore be obliged to recommend alternatives to a proposed project that would cause incidental takes even though it meets the section 7(a)(2) standard. The Service notes that if consultation demonstrates that a proposed action is likely to jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of critical habitat, the Secretary must, under section 7(b)(3)(A), suggest "reasonable and prudent alternatives" that would not violate section 7(a)(2). Section 7(b)(3)(A) *Alternatives* may involve substantial changes in the routing and design of a project so long as they can be implemented in a manner consistent with the intended purpose of the proposed action. Section 7(b)(4) reasonable and prudent *measures,* on the other hand, must be limited to minor design changes that would not substantially alter the project as proposed. The Service therefore disagrees with the commenter.

Section 10(a)(2)(A)(iii) does require that each conservation plan submitted in support of an incidental take permit application must identify and analyze alternatives to the incidental taking and discuss why they are not being utilized. This provision does not, however, authorize the Service to impose one of these alternatives on an applicant for an incidental take permit. Rather, without the concurrence of the permit applicant, the Service's only recourse upon receiving an inadequate plan is to deny the permit application. Such a denial must be in accordance with § 13.21(d) and will detail the reasons for the denial. Parties so denied may appeal the Service's decision in accordance with § 13.32, addressing the Service's reasons therefore and may provide new information or justification why the action in question should not have been taken.

One commenter urged the Service to employ not only the jeopardy standard, but also the adverse modification of critical habitat standard of section 7(a)(2) as a criterion for determining whether to grant an incidental take permit. The Service has not accepted this comment because it was not included by Congress as one of the permit issuance criteria in section 10(a)(2)(B). The Service agrees, however, that since all incidental take permit applications will be subject to section 7(a)(2) consultation, they would not be approved if they resulted in the destruction or adverse modification of the critical habitat of a listed species.

6. Interaction With Other Statutes

Several commenters expressed concern that the Service had exceeded its statutory authority under the ESA in referring to the Fish and Wildlife Act of 1956 and the Fish and Wildlife Coordination Act in the preamble to the proposed rule (48 FR 31418). As discussed previously in this notice, that language is in fact quoted from the Conference Report on the 1982 amendments to the Endangered Species Act, though it was inadvertently typeset as if it were not a quotation. The essential observation made by the Conference Committee is extremely useful: Individual species should not be viewed in isolation. Neither should the section 10(a) requirements be viewed in isolation from the other statutory and regulatory requirements that may apply to the proposed project. Section 10(a) does not itself expressly require compliance with such laws as the National Environmental Policy Act, the Clean Water Act, or the Fish and Wildlife Coordination Act, but it provides an excellent opportunity for a project proponent to prepare and implement a comprehensive, integrated plan that addresses for the present and for the future all of the various requirements that apply to the project. In the words of the Conference Committee, section 10(a) will "encourage creative partnerships between public and private sectors and among governmental agencies in the interest of species and habitat conservation." [Conf. Rep. at 30].

7. Monitoring Implementation of Conservation Plans

One commenter argued that both the applicant and the Service should monitor the implementation of a conservation plan in order to ensure that its requirements and those of section 10(a) are met. Such monitoring can also serve to identify areas in which modification of a conservation plan may be necessary, particularly with incidental take permits of long duration. The Service agrees. Sections 17.22(b)(1)(iii)(B), 17.22(b)(3), 17.32(b)(1)(iii)(B), and 17.32(b)(3) have therefore been revised to require that conservation plans specify the monitoring measures to be used and to authorize imposition of necessary monitoring as a condition of each permit.

8. Modification of Conservation Plans

The same commenter noted that the proposed regulations contained no express provisions pertaining to modifications in conservation plans required by changed or unforeseen circumstances. The Service agrees that such a provision is needed. As stated in the Conference Report:

> . . . circumstances and information may change over time and . . . the original plan might need to be revised. To address this situation, the committee expects that any plan approved for a long-term permit will contain a procedure by which the parties will deal with unforseen circumstances.

[Conf. Rep. at 31]. The Service believes that, while such provisions may be of most value for long-term permits, circumstances requiring modification of a conservation plan could arise even during the life of a permit with a relatively short term. Incorporation of modification procedures into a conservation plan at the outset should ensure both that the affected species will be conserved regardless of changed conditions and that the applicant's activities are not unduly interrupted when the new conditions take effect. Sections 17.22(b)(1)(iii)(B) and 17.32(b)(1)(iii)(B) therefore require conservation plans to include specific measures for addressing unforeseen circumstances and §§ 17.22(b)(2)(iii) and 17.32(b)(2)(iii) make the existence of these measures a precondition to permit issuance.

9. Other Elements of Conservation Plans

Several parties commented that the statement in section 10(a)(2)(A)(iv) of the Act that a conservation plan must include "such other measures that the Secretary may require" obliges the Service to include in these regulations a full list of the measures the Service may so require. Other commenters asked that examples of such measures be included in the regulations, while still others asserted that this provision must be deleted from the regulations. Still another commenter suggested that this provision will be workable only if the Service is available for pre-application consultation and advice as to measures that might be required. The Service agrees with he latter commenter while respectfully disagreeing with the other commenters.

As noted previously in this notice, the Service has declined to promulgate exhaustive, "cookbook" regulations detailing every possible element that could be required in a conservation plan. The variety of projects that might be the subject of a conservation plan is wide, and features appropriate for some conservation plans will be unworkable for others. It is unrealistic to think the Service could develop a list of conservation plan elements applicable to all potential incidental take permits.

Congress, however, modeled section 10(a), at least generally, after the San Bruno plan and was well aware that the Service and the San Bruno permit applicants engaged in extensive pre-application discussions extending well over a year. The Service believes a sensible and practical reading of section 10(a)(2)(A)(iv) is that the unique and, in most cases, fairly complex nature of an incidental take permit will require discussions between a potential applicant and the Service. Through this process, the Service will identify specific measures, in addition to those listed in section 10(a)(2)(A)(i) through (iii), that are necessary and appropriate for the proposes of the conservation plan.

10. Public Notice of and Public Comment on Incidental Take Permit Applications

Section 10(a)(2)(B) of the ESA mandates an opportunity for public comment prior to any decision on an incidental take permit application. Several commenters expressed concern that the proposed regulations did not adequately implement this requirement. They noted that section 10(c) also requires public notice and comment for any section 10 endangered species permit application.

The Service agrees that the ESA requires notice and an opportunity for comment for these permit applications and has revised the introductory paragraphs to §§ 17.22, 17.23 and 17.32(b) accordingly.

11. Permit Conditions

One commenter argued that the Service is under a duty, in imposing reporting requirements as a permit condition, to rely upon existing reporting requirements to the maximum extent practicable. This commenter relied upon legislative history indicating that reporting requirements imposed under section 7(b)(4), to allow monitoring of the impact of incidental taking identified in section 7(a)(2) consultation, should be incorporated into existing reporting requirements where possible. [H.R. Rep. No. 567, 97th Cong., 2nd Sess. 26–27 (1982)]. The Service agrees that this Congressional directive is equally applicable to reporting requirements established for incidental take permits, as reflected in §§ 17.22(b)(3) and 17.32(b)(3) of the final rule.

Another party stated that the reference in proposed §§ 17.22(b)(3) and 17.32(b)(3) to "terms and conditions . . . necessary to carry out the purposes of the permit" might convey the impression that terms and conditions designed to ensure compliance with the species conservation goal of the conservation plan would not be appropriate. In order to make clear that permit conditions relating to conservation of the affected species will be imposed where necessary, the phrase "and the conservation plan" has been added to final §§ 17.22(b)(3) and 17.32(b)(3).

12. Duration of Permits

Congress clearly intended to provide for long-term incidental take permits where needed. [Conf. Rep at 31]. One commenter was concerned, however, that the proposed regulations improperly implied that the only issue involved in deciding on a request for a long-term permit is whether the applicant needs the assurance of a long-term permit in order to obtain financing. The Service did not intend to imply that financing of the project was the only issue involved in setting the duration of the permit.

The Conference Report states:

> Significant development projects often take many years to complete and permit applicants may need long-term permits. In this situation, and in order to provide sufficient incentives for the private sector to participate in the development of such long-term conservation plans, plans which may involve the expenditure of hundreds of thousands if not millions of dollars, adequate assurances must be made to the financial and development communities that a section 10(a) permit can be made available for the life of the project.
>
> The Secretary is vested with broad discretion in carrying out the conservation plan provision to determine the appropriate length of any section 10(a) permit issued pursuant to this provision in light of all of the facts and circumstances of each individual case. Permits of 30 or more years duration may be appropriate in order to provide adequate assurances to the private sector to commit to long-term funding for conservation activities or long-term commitments to restrictions on the use of land. It is recognized that in issuing such permits, the Secretary will, by necessity, consider the possible positive and negative effects associated with permits of such duration.
>
> The Secretary, in determining whether to issue a long-term permit to carry out a conservation plan should consider the extent to which the conservation plan is likely to enhance the habitat of the listed species or increase the long-term survivability of the species or its ecosystem.

[Conf. Rep. at 31]. Final § 17.22(b)(4) and 17.32(b)(4) have been revised to be consistent with the Conference Report.

13. Permits for Activities of Short Duration and/or Limited Scope

A related issue concerns permits for takings of listed species incidental to activities that will be relatively short in duration and/or that will affect a limited area that comprises only a small portion of a listed species' entire range. The term of the San Bruno permit is 30 years and its conservation plan covers over 3000 acres, including the great majority of the habitats of the species. Other incidental take permit applications may, however, involve considerably shorter terms and involve activities that would affect smaller areas and only portions of a species' range. The Service believes that Congress did not intend to exclude projects from the incidental take provisions of section 10(a) merely because the projects were of more limited duration or geographical scope. Final §§ 17.22(b)(2) and 17.32(b)(2) have been revised to make this explicit. In particular, the Director will consider whether the mitigation measures in the conservation plan and the funding for implementing the plan are commensurate with the duration of the project and its geographic scope, including the amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected. Mitigation throughout the entire range of a listed species probably would not be required for a proposed project that would affect only a small portion of that range and have a minor impact on the species as a whole. That a project might be completed within a short time and affect only a portion of a species' habitat would not, however, relieve the Director of his duty under sections 7(a)(2) and 10(a)(2)(B)(iv) of the Act and §§ 17.22(b)(2)(iv) and 17.32(b)(2)(iv) of the regulations to ensure that no jeopardy to the species would ensue from issuance of the permit.

14. Objection to Permit Issuance

Section 17.22 contains explicit provisions for objecting to the issuance of an an endangered species permit and for notification to objectors of the impending issuance of that permit. One commenter suggested that § 17.32 be revised to include an objection provision. The Service has not accepted this suggestion because threatened species are less vulnerable than are endangered species to potential adverse impacts from permitted activities. Advance notice of permit issuance is thus not necessary.

15. Appeals

Several commenters noted the need for provisions for appealing the suspension or revocation of a permit or the terms or conditions of a permit. There should be considerable contact and discussion between an applicant and the Service both prior to and during the Service's review of an application for an incidental take permit. Should a permit nonetheless be issued containing

terms or conditions unacceptable to the permittee, or should a permit be suspended or revoked during its term, the permittee may appeal the action under the provisions of 50 CFR 13.32.

B. Plant Regulations

1. Exemption for Certain Official Duties

An exemption from the § 17.61(c)(1) prohibition on removal and reduction to possession of endangered plants from areas under Federal jurisdiction has been added at § 17.61(c)(2) to allow certain designated officials to care for, dispose of, or salvage specimens without a permit when acting in the course of their official duties. Exemptions from the § 17.61(c)(1) prohibition have been added at §§ 17.61(c)(3) and 17.71(b), which allow qualified employees of State conservation agencies, party to a Cooperative Agreement with the Service in accordance with section 6(c) of the ESA, to conduct the activities specified in that Cooperative Agreement.

2. Describing Location of Removal and Reduction to Possession in Permit Application

Existing §§ 17.62(a)(1)(iii) and 17.72(a)(1)(iii) require applicants for permits to conduct otherwise prohibited activities with respect to listed plants to describe the location from which the plants were or will be taken. The Service proposed to revise these sections to require further information where removal and reduction to possession of a listed plant from an area under Federal jurisdiction would be involved. Comments received on this aspect of the proposed regulations indicate that separate treatment of the latter information requirement is needed. The final regulations therefore include new §§ 17.62(a)(1)(iv) and 17.72(a)(1)(iv) that require separate information with respect to removal and reduction from an area under Federal jurisdiction.

3. Removal and Reduction to Possession of Seeds and Cultivated Plants

A few commenters observed that the proposed regulations did not appear to apply to seeds and cultivated plants, which are treated in §§ 17.62(a)(2) and 17.72(a)(2). This was an inadvertent omission. Final §§ 17.62(a)(2)(v) and 17.72(a)(2)(v) contain the same location information requirements with respect to removal and reduction to possession of seeds and cultivated plants from an area under Federal jurisdiction that are included in §§ 17.62(a)(1)(iv) and 17.72(a)(1)(iv) for listed plants.

4. Explanation of "Remove and Reduce to Possession"

While no commenter raised the issue, the Service believes that an explanation of its interpretation of the phrase "remove and reduce to possession" will be beneficial. Based upon the legislative history of the 1982 amendments, the Service has concluded that section 9(a)(2)(B) was intended to proscribe the removal of an endangered plant when combined with a taking of possession. Accordingly, a person who removes an endangered plant from its location on an area under Federal jurisdiction and holds it as his/her own would violate section 9 of the ESA. Examples of this activity would be plant collectors, persons seeking a transplant to their own property, and those gathering seeds or cuttings. The destruction of a plant on an area under Federal jurisdiction would not, however, be a violation of section 9 of the ESA, since no taking of possession would have occurred.

Removal incident to purposes other than taking of possession is likewise not proscribed. An example of behavior not prohibited would be development activities that physically displace an endangered plant. These activities would not violate section 9 of the ESA.

A second issue is whether a violation of the ESA occurs when a person receives a plant that has been illegally reduce to possession by someone else. Section 9(a)(1) of ESA, which lists prohibited actions in regard to endangered fish or wildlife, makes it unlawful to possess such fish or wildlife after an illegal taking or importation. This prohibition applies whether or not the fish or wildlife possessed are being transported in interstate commerce or were received in intrastate commerce. Section 9(a)(2) of the ESA, which sets forth prohibited acts with regard to listed plants, does not prohibit their possession after an illegal taking or importation. It does prohibit their receipt or shipment in interstate or foreign commerce and in the course of a commercial activity, but does not cover purely intrastate commercial activities or non-commercial interstate shipment and receipt. However, the Lacey Act amendments of 1981 make it unlawful for any person "to import, export, transport, sell, receive, acquire, or purchase any fish or wildlife or plant taken or possessed in violation of any law, treaty, or regulation of the United States . . ." 16 U.S.C. 3372(a)(1). Thus, while receiving an unlawfully taken endangered plant may not violate the ESA, it would violate the Lacey Act, as amended.

III. Miscellaneous

Section 13.12(b) is amended by adding the permit for incidental taking now available at 17.22(b)(1).

Sections 17.22(c) and 17.32(c) are redesignated as 17.22(a)(3) and 17.32(a)(3), respectively, and altered slightly to make them consistent with each other and to make clear that each permit issued pursuant to these sections shall contain a condition requiring reporting of escaped wildlife covered by the permit.

New 50 CFR 17.62(a)(3)(iii) and 17.72(a)(3)(iii) are added in compliance with the Paperwork Reduction Act, 44 U.S.C. 3507.

Required Determinations

The Service has determined that these final regulations are categorically excluded for further National Environmental Policy Act (NEPA) requirements. Part 516 of the Departmental Manual, Chapter 6 Appendix I, section A(3) categorically excludes the issuance of regulatory procedures when the impacts are limited to administrative or technological effects.

The Department of the Interior has determined that this is not a major rule under Executive Order 12291, nor does it have a significant economic effect on a substantial number of small entities under the Regulatory Flexibility Act. The potential applicants are not identified as small business in the Regulatory Flexibility Act. The Service anticipates that fewer than 10 permit applications will be received annually. The Determination of Effects on this proposed rule is available from the individual identified under the section **"FOR FURTHER INFORMATION CONTACT."**

Information Collection

The information collection requirements contained in this Part 17 have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned clearance number 1018–0022.

List of Subjects

50 CFR Part 13

Administrative practice and procedure, Exports, Fish, Imports, Penalties, Reporting and recordkeeping requirements, Wildlife.

50 CFR Part 17

Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture) Regulations promulgation.

For the reasons set out in the preamble, Subchapter B, Chapter 1 of

Title 50, Code of Federal Regulations is amended as follows:

PART 13—GENERAL PERMIT PROCEDURES

The authority citation for Part 13 continues to read as follows:

Authority: 18 U.S.C. 42; sec. 4, Pub. L. 97-79, 95 Stat. 1074 (16 U.S.C. 3373); sec. 7, Pub. L. 97-78, 95 Stat. 1078 (16 U.S.C. 3376); sec. 3, Pub. L. 65-186, 40 Stat. 755 (16 U.S.C. 704); sec. 3(h)(3), Pub. L. 95-616, 92 Stat. 3112 (16 U.S.C. 712); sec. 2, 54 Stat. 251, as amended by sec. 9, Pub. L. 95-616, 92 Stat. 3114 (16 U.S.C. 668a); sec. 102, 76 Stat. 73 (19 U.S.C. 1202), "Schedule 1, Part 15D, Headnote 2(d), Tariff Schedules of the United States"; sec. 9(d), Pub. L. 93-205, 87 Stat. 893 (16 U.S.C. 1538(d)); sec. 6(a)(1), Pub. L. 96-159, 93 Stat. 1228 (16 U.S.C. 1537a); E.O. 11911, 41 FR 15683, 3 CFR, 1976 Comp., p. 112; sec. 10, Pub. L. 93-205, 87 Stat. 896, as amended by secs. 2 and 3, Pub. L. 94-359, 90 Stat. 3760; sec. 7, Pub. L. 96-359, 90 Stat. 911 and 912; sec. 5, Pub. L. 95-632, 92 Stat. 3760; sec. 7, Pub. L. 96-159, 93 Stat. 1230 (16 U.S.C. 1539); sec. 11, Pub. L. 93-205, 87 Stat. 897, as amended by sec. 6(4), Pub. L. 95-632, 92 Stat. 3761 (16 U.S.C. 1504(b)(2)(f)); sec. 13(d), 86 Stat. 905, amending 85 Stat. 480 (16 U.S.C. 742j-1); Title 1, sec. 112, Pub. L. 92-522, 86 Stat. 1042, as amended by Title II, sec. 201(e), Pub. L. 96-470, 94 Stat. 2241 (16 U.S.C. 1382); 65 Stat. 290 (31 U.S.C. 483(a)).

§ 13.12 [Amended]

1. Amend § 13.12(b) by removing the language at the entry for permits under § 17.22 and inserting the following § 13.12 information requirements on permit applications.

* * * * *

(b) * * *

Scientific, enhancement of propagation or survival, incidental taking for wildlife.

* * * * *

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS—[AMENDED]

Accordingly, under the authority of 16 U.S.C. 1538-39, Part 17, Subchapter B of Chapter 1, Title 50 of the Code of Federal Regulations, is amended as set forth below:

1. The authority citation for Part 17 continues to read as follows:

Authority: Pub. L. 93-205, 87 Stat. 884; Pub. L. 94-359; 90 Stat. 911; Pub. L. 95-632, 92 Stat. 3751; Pub. L. 96-159, 93 Stat. 1225; Pub. L. 97-304, 96 Stat. 1411 (16 U.S.C. 1531, *et seq.*), unless otherwise noted.

§ 17.3 [Amended]

2. In § 17.3 add, in alphabetical order, the following definition:

* * * * *

"Incidental taking" means any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

* * * * *

3. Section 17.22 is revised to read as follows:

§ 17.22 Permits for scientific purposes, enhancement of propagation or survival, or for incidental taking.

Upon receipt of a complete application, the Director may issue a permit authorizing any activity otherwise prohibited by § 17.21, in accordance with the issuance criteria of this section, for scientific purposes, for enhancing the propagation or survival, or for the incidental taking of endangered wildlife. Such permits may authorize a single transaction, a series of transactions, or a number of activities over a specific period of time. (See § 17.32 for permits for threatened species.) The Director shall publish notice in the **Federal Register** of each application for a permit that is made under this section. Each notice shall invite the submission from interested parties, within 30 days after the date of the notice, of written data, views, or arguments with respect to the application. The 30-day period may be waived by the Director in an emergency situation where the life or health of an endangered animal is threatened and no reasonable alternative is available to the applicant. Notice of any such waiver shall be published in the **Federal Register** within 10 days following issuance of the permit.

(a)(1) *Application requirements for permits for scientific purposes or for the enhancement of propagation or survival.* Applications for permits under this paragraph must be submitted to the Director, U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, 1000 N. Glebe Road, Room 611, Arlington, Virginia 22201, by the person wishing to engage in the activity prohibited by § 17.21. Each application must be submitted on an official application (Form 3-200) provided by the Service and must include as an attachment, all of the following information:

(i) The common and scientific names of the species sought to the covered by the permit, as well as the number, age, and sex of such species, and the activity sought to be authorized (such as taking, exporting, selling in interstate commerce);

(ii) A statement as to whether, at the time of application, the wildlife sought to be covered by the permit (A) is still in the wild, (B) has already been removed from the wild, or (C) was born in captivity;

(iii) A resume of the applicant's attempts to obtain the wildlife sought to be covered by the permit in a manner which would not cause the death or removal from the wild of such wildlife;

(iv) If the wildlife sought to be covered by the permit has already been removed from the wild, the country and place where such removal occurred; if the wildlife sought to be covered by the permit was born in captivity, the country and place where such wildlife was born;

(v) A complete description and address of the institution or other facility where the wildlife sought to be covered by the permit will be used, displayed, or maintained;

(vi) If the applicant seeks to have live wildlife covered by the permit, a complete description, including photographs or diagrams, of the facilities to house and/or care for the wildlife and a resume of the experience of those person who will be caring for the wildlife;

(vii) A full statement of the reasons why the applicant is justified in obtaining a permit including the details of the activities sought to be authorized by the permit;

(viii) If the application is for the purpose of enhancement of propagation, a statement of the applicant's willingness to participate in a cooperative breeding program and to maintain or contribute data to a studbook;

(ix) The information collection requirements contained in this paragraph have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018-0022. This information is being collected to provide information necessary to evaluate permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations, on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (a)(1) of this section, the Director will decide whether or not a permit should be issued. In making this decision, the Director shall consider, in addition to the general criteria in § 13.21(b) of this subchapter, the following factors:

(i) Whether the purpose for which the permit is required is adequate to justify removing from the wild or otherwise changing the status of the wildlife sought to be covered by the permit;

(ii) The probable direct and indirect effect which issuing the permit would have on the wild populations of the

wildlife sought to be covered by the permit;

(iii) Whether the permit, if issued, would in any way, directly or indirectly, conflict with any known program intended to enhance the survival probabilities of the population from which the wildlife sought to be covered by the permit was or would be removed;

(iv) Whether the purpose for which the permit is required would be likely to reduce the threat of extinction facing the species of wildlife sought to be covered by the permit;

(v) The opinions or views of scientists or other persons or organizations having expertise concerning the wildlife or other matters germane to the application; and

(vi) Whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application.

(3) *Permit conditions.* In addition to the general conditions set forth in Part 13 of this subchapter, every permit issued under this paragraph shall be subject to the special condition that the escape of living wildlife covered by the permit shall be immediately reported to the Service office designated in the permit.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be designated on the face of the permit.

(b)(1) *Application requirements for permits for incidental taking.* Applications for permits under this paragaph must be submitted to the Director, U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, 1000 N. Clebe Road, Room 611, Arlington, Virginia 22201, by the person wishing to engage in the activity prohibited by § 17.21(c). Each application must be submitted on an official application (Form 3–200) provided by the Service and must include as an attachment all of the following information:

(i) A complete description of the activity sought to be authorized;

(ii) The common and scientific names of the species sought to be covered by the permit, as well as the number, age, and sex of such species, if known;

(iii) A conservation plan that specifies: (A) The impact that will likely result from such taking; (B) what steps the applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances; (C) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and (D) such other measures that the Director may require as being necessary or appropriate for purposes of the plan;

(iv) The information collection requirements contained in this paragraph have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018–0022. This information is being collected to provide information necessary to evaluate permit applications. This information will be used to review permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations, on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (b)(1) of this section, the Director will decide whether or not a permit should be issued. The Director shall consider the general criteria in § 13.21(b) of this subchapter and shall issue the permit if he finds that: (i) The taking will be incidental; (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (iii) the applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; (iv) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; (v) the measures, if any, required under subparagraph (b)(1)(iii)(D) of this section will be met; and (vi) he has received such other assurances as he may require that the plan will be implemented. In making his decision, the Director shall also consider the anticipated duration and geographic scope of the applicant's planned activities, including the amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected.

(3) *Permit conditions.* In addition to the general conditions set forth in Part 13 of this subchapter, every permit issued under this paragraph shall contain such terms and conditions as the Director deems necessary or appropriate to carry out the purposes of the permit and the conservation plan including, but not limited to, monitoring and reporting requirements deemed necessary for determining whether such terms and conditions are being complied with. The Director shall rely upon existing reporting requirements to the maximum extent practicable.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be sufficient to provide adequate assurances to the permittee to commit funding necessary for the activities authorized by the permit, including conservation activities and land use restrictions. In determining the duration of a permit, the Director shall consider the duration of the planned activities, as well as the possible positive and negative effects associated with permits of the proposed duration on listed species, including the extent to which the conservation plan will enhance the habitat of listed species and increase the long-term survivability of such species.

(c) *Objection to permit issuance.* (1) In regard to any notice of a permit application published in the **Federal Register**, any interested party that objects to the issuance of a permit, in whole or in part, may, during the comment period specified in the notice, request notification of the final action to be taken on the application. A separate written request shall be made for each permit application. Such a request shall specify the Service's permit application number and state the reasons why that party believes the applicant does not meet the issuance criteria contained in §§ 13.21 and 17.22 of this subchapter or other reasons why the permit should not be issued.

(2) If the Service decides to issue a permit contrary to objections received pursuant to paragraph (c)(1) of this section, then the Service shall, at least ten days prior to issuance of the permit, make reasonable efforts to contact by telephone or other expedient means, any party who has made a request pursuant to paragraph (c)(1) of this section and inform that party of the issuance of the permit. However, the Service may reduce the time period or dispense with such notice if it determines that time is of the essence and that delay in issuance of the permit would: (i) Harm the specimen or population involved; or (ii) unduly hinder the actions authorized under the permit.

(3) The Service will notify any party filing an objection and request for notice under paragraph (c)(1) of this section of the final action taken on the application, in writing. If the Service has reduced or dispensed with the notice period referred to in paragraph (c)(2) of this section, it will include its reasons therefore in such written notice.

§ 17.23 [Amended]

4. The introductory paragraph of § 17.23 is revised to read as follows:

Upon receipt of a complete application, the Director may issue a permit authorizing any activity otherwise prohibited by § 17.21, in

accordance with the issuance criteria of this section in order to prevent undue economic hardship. The Director shall publish notice in the **Federal Register** of each application for a permit that is made under this section. Each notice shall invite the submission from interested parties, within 30 days after the date of the notice, of written data, views, or arguments with respect to the application. The 30-day period may be waived by the Director in an emergency situation where the life or health of an endangered animal is threatened and no reasonable alternative is available to the applicant. Notice of any such waiver shall be published in the **Federal Register** within 10 days following issuance of the permit.

* * * * *

5. § 17.32 is revised to read as follows:

§ 17.32 Permits—general.

Upon receipt of a complete application the Director may issue a permit for any activity otherwise prohibited with regard to threatened wildlife. Such permit shall be governed by the provisions of this section unless a special rule applicable to the wildlife, appearing in § 17.40 to 17.48, of this part provides otherwise. Permits issued under this section must be for one of the following purposes: Scientific purposes, or the enhancement of propagation or survival, or economic hardship, or zoological exhibition, or educational purposes, or incidental taking, or special purposes consistent with the purposes of the Act. Such permits may authorize a single transaction, a series of transactions, or a number of activities over a specific period of time.

(a)(1) *Application requirements for scientific purposes, or the enhancement of propagation or survival, or economic hardship, or zoological exhibition, or educational purposes, or special purposes consistent with the purposes of the Act.* Applications for permits under this paragraph must be submitted to the Director, U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, 1000 N. Glebe Road, Room 611, Arlington, Virginia 22201, by the person wishing to engage in the prohibited activity. Each application must be submitted on an official application (Form 3–200) provided by the Service, and must include, as an attachment, as much of the following information which relates to the purpose for which the applicant is requesting a permit:

(i) The Common and scientific names of the species sought to be covered by the permit, as well as the number, age, and sex of such species, and the activity sought to be authorized (such as taking, exporting, selling in interstate commerce);

(ii) A statement as to whether, at the time of application, the wildlife sought to be covered by the permit (A) is still in the wild, (B) has already been removed from the wild, or (C) was born in captivity;

(iii) A resume of the applicant's attempts to obtain the wildlife sought to be covered by the permit in a manner which would not cause the death or removal from the wild of such wildlife;

(iv) If the wildlife sought to be covered by the permit has already been removed from the wild, the country and place where such removal occurred; if the wildlife sought to be covered by permit was born in captivity, the country and place where such wildlife was born;

(v) A complete description and address of the institution or other facility where the wildlife sought to be covered by the permit will be used, displayed, or maintained;

(vi) If the applicant seeks to have live wildlife covered by the permit, a complete description, including photographs or diagrams, of the facilities to house and/or care for the wildlife and a resume of the experience of those persons who will be caring for the wildlife;

(vii) A full statement of the reasons why the applicant is justified in obtaining a permit including the details of the activities sought to be authorized by the permit;

(viii) If the application is for the purpose of enhancement of propagation, a statement of the applicant's willingness to participate in a cooperative breeding program and to maintain or contribute data to a studbook;

(ix) The information collection requirements contained in this paragraph have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018–0022. This information is being collected to provide information necessary to evaluate permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations, on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (a)(1) of this section, the Director will decide whether or not a permit should be issued. In making this decision, the Director shall consider, in addition to the general criteria in § 13.21(b) of this subchapter, the following factors:

(i) Whether the purpose for which the permit is required is adequate to justify removing from the wild or otherwise changing the status of the wildlife sought to be covered by the permit;

(ii) The probable direct and indirect effect which issuing the permit would have on the wild populations of the wildlife sought to be covered by the permit;

(iii) Whether the permit, if issued, would in any way, directly or indirectly, conflict with any known program intended to enhance the survival probabilities of the population from which the wildlife sought to be covered by the permit was or would be removed;

(iv) Whether the purpose for which the permit is required would be likely to reduce the threat of extinction facing the species of wildlife sought to be covered by the permit;

(v) The opinions or views of scientists or other persons or organizations having expertise concerning the wildlife or other matters germane to the application; and

(vi) Whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application.

(3) *Permit conditions.* In addition to the general conditions set forth in Part 13 of this subchapter, every permit issued under this paragraph shall be subject to the special condition that the escape of living wildlife covered by the permit shall be immediately reported to the Service office designated in the permit.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be designated on the face of the permit.

(b)(1) *Application requirements for permits for incidental taking.* (i) Applications for permits under this paragraph must be submitted to the Director, U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, 1000 N. Glebe Road, Room 611, Arlington, Virginia 22201, by the person wishing to engage in the activity prohibited by § 17.31.

(ii) The director shall publish notice in the **Federal Register** of each application for a permit that is made under this section. Each notice shall invite the submission from interested parties, within 30 days after the date of the notice, of written data, views, or arguments with respect to the application.

(iii) Each application must be submitted on an official application

(Form 3–200) provided by the Service, and must include as an attachment, all of the following information:

(A) A complete description of the activity sought to be authorized;

(B) The common and scientific names of the species sought to be covered by the permit, as well as the number, age, and sex of such species, if known;

(C) A conservation plan that specifies: (*1*) The impact that will likely result from such taking; (*2*) what steps the applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances; (*3*) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and (*4*) such other measures that the Director may require as being necessary or appropriate for purposes of the plan.

(1) The information collection requirements contained in this paragraph have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018–0022. This information is being collected to provide information necessary to evaluate permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (b)(1) of this section, the Director will decide whether or not a permit should be issued. The Director shall consider the general criteria in § 13.21(b) of this subchapter and shall issue the permit if he finds that: (i) The taking will be incidental; (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (iii) the applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; (iv) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; (v) the measures, if any, required under subparagraph (b)(1)(iii)(D) will be met; and (vi) he has received such other assurances as he may require that the plan will be implemented. In making his decision, the Director shall also consider the anticipated duration and geographic scope of the applicant's planned activities, including the amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected.

(3) *Permit conditions.* In addition to the general conditions set forth in Part 13 of this subchapter, every permit issued under this paragraph shall contain such terms and conditions as the Director deems necessary or appropriate to carry out the purposes of the permit and the conservation plan including, but not limited to, monitoring and reporting requirements deemed necessary for determining whether such terms and conditions are being complied with. The Director shall rely upon existing reporting requirements to the maximum extent practicable.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be sufficient to provide adequate assurances to the permittee to commit funding necessary for the activities authorized by the permit, including conservation activities and land use restrictions. In determining the duration of a permit, the Director shall consider the duration of the planned activities, as well as the possible positive and negative effects associated with permits of the proposed duration on listed species, including the extent to which the conservation plan will enhance the habitat of listed species and increase the long-term survivability of such species.

§ 17.61 [Amended]

6. In § 17.61, paragraph (a) is amended by replacing the phrase "paragraphs (b) through (d)" with the phrase "paragraphs (b) through (e)."

7. Section 17.61 is amended by redesignating paragraphs (c) and (d) as (d) and (e), respectively, and by adding the following new paragraph (c):

§ 17.61 Prohibitions.

* * * * *

(c) *Remove and reduce to possession.* (1) It is unlawful to remove and reduce to possession any endangered plant from an area under Federal jurisdiction.

(2) Notwithstanding paragraph (c)(1) of this section, any employee or agent of the Service, any other Federal land management agency, or a State conservation agency, who is designated by that agency for such purposes, may, when acting in the course of official duties, remove and reduce to possession endangered plants from areas under Federal jurisdiction without a permit if such action is necessary to: (i) Care for a damaged or diseased specimen; (ii) dispose of a dead specimen; or (iii) salvage a dead specimen which may be useful for scientific study.

(3) Any removal and reduction to possession pursuant to paragraph (c)(2) of this section must be reported in writing to the U.S. Fish and Wildlife Service, Division of Law Enforcement, P.O. Box 28006, Washington, D.C. 20005, within 5 days. The specimen may only be retained, disposed of, or salvaged in accordance with written directions from the Service.

(4) Notwithstanding paragraph (c)(1) of this section, any qualified employee or agent of a State conservation agency which is a party to a Cooperative Agreement with the Service in accordance with section 6(c) of the Act, who is designated by that agency for such purposes, may, when acting in the course of official duties, remove and reduce to possession from areas under Federal jurisdiction those endangered plants which are covered by an approved cooperative agreement for conservation programs in accordance with the Cooperative Agreement, provided that such removal is not reasonably anticipated to result in: (i) The death or permanent damage of the specimens; (ii) the removal of the specimen from the State where the removal occurred; or (iii) the introduction of the specimen so removed, or of any propagules derived from such a specimen, into an area beyond the historical range of the species.

* * * * *

8. In § 17.62, is amended by redesignating paragraphs (a)(1)(iv) through (a)(1)(vii) as paragraphs (a)(1)(v) through (a)(1)(viii) and by adding new paragraphs (a)(1)(iv), (a)(2)(v), and (a)(3)(iii) to read as follows:

§ 17.62 Permits for scientific purposes or for the enhancement of propagation or survival.

* * * * *

(a) * * *

(1) * * *

(iv) If the activities would involve removal and reduction to possession of a plant from an area under Federal jurisdiction, the year, State, county, or any other description such as place name, township, and range designation that will precisely place the location where the proposed removal and reduction to possession will occur, the name of the Federal entity having jurisdiction over the area, and the name, title, address, and phone number of the person in charge of the area.

* * * * *

(2) * * *

(v) If the activities would involve removal and reduction to possession of seeds from an area under Federal jurisdiction, the year, State, county or

any other description such as place name, township, and range designation that will precisely place the location where the proposed removal and reduction to possession will occur, the name of the Federal entity having jurisdiction over the area and the name, title, address, and phone number of the person in charge of the area.

(3) * * *

(iii) The information collection requirements contained in this section have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018–0022. This information is being collected to provide information necessary to evaluate permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations, on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

* * * * *

9. Section 17.71 is amended by redesignating paragraph (b) as (c) and adding the following new paragraph (b):

§ 17.71 Prohibitions.

* * * * *

(b) In addition to any provisions of this Part 17, any employee or agent of the Service or of a State Conservation Agency which is operating a conservation program pursuant to the terms of a Cooperative Agreement with the Service in accordance with section 6(c) of the Act, who is designated by that agency for such purposes, may, when acting in the course of official duties, remove and reduce to possession from areas under Federal jurisdiction those threatened species of plants which are covered by an approved Cooperative Agreement to carry out conservation programs.

* * * * *

10. In section 17.72, is amended by redesignating paragraphs (a)(1)(iv) through (a)(1)(vi) as paragraphs (a)(1)(v) through (a)(1)(vii) and by adding new paragraphs (a)(1)(iv), (a)(2)(iv), and (a)(3)(iii) to read as follows:

§ 17.72 Permits—general.

* * * * *

(a) * * *

(1) * * *

(iv) If the activities would involve removal and reduction to possession of a plant from an area under Federal jurisdiction, the year, State, county or any other description such as place name, township, and range designation that will precisely place the location where the proposed removal and reduction to possession will occur, the name of the Federal entity having jurisdiction over the area and the name, title, address, and phone number of the person in charge of the area.

* * * * *

(2) * * *

(iv) If the activities would involve removal and reduction to possession of seeds from an area under Federal jurisdiction, the year, State, county, or any other description such as place name, township, and range designation that will precisely place the location where the proposed removal and reduction to possession will occur, the name of the Federal entity having jurisdiction over the area and the name, title, address, and phone number of the person in charge of the area.

(3) * * *

(iii) The information collection requirements contained in this section have been approved by the Office of Management and Budget under 44 U.S.C. 3507 and assigned Clearance Number 1018–0022. This information is being collected to provide information necessary to evaluate permit applications and make decisions, according to criteria established in various Federal wildlife and plant conservation statutes and regulations, on the issuance or denial of permits. The obligation to respond is required to obtain or retain a permit.

* * * * *

Dated: August 22, 1985.

P. Daniel Smith,

Acting Deputy Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 85–23104 Filed 9–27–85; 8:45 am]

BILLING CODE 4310–55–M

APPENDIX 2:

Reference List of Publications On

HCPs and Conservation Biology

Reference List of Publications Concerning HCPs and Conservation Biology

Bean, M.J., S.G. Fitzgerald, and M.A. O'Connell. 1991. Reconciling conflicts under the Endangered Species Act: The habitat conservation planning experience. World Wildlife Fund. Harper's Graphics/St. Mary's Press, Waldorf, Maryland. (Order from WWF Publications, P.O. Box 4866, Hampden Post Office, Baltimore, MD 21211.)

Beatley, T. 1990. Balancing urban development and endangered species: The Coachella Valley habitat conservation plan. Environmental Management. Vol. 16, No. 1, pp. 7-20.

Beatley, T. 1994. Habitat conservation planning: Endangered species and urban growth. University of Texas Press, Austin.

Budd, W.W., and P.L. Cohen. 1987. Stream corridor management in the Pacific Northwest: l. Determination of stream-corridor widths. Environmental Management, Vol. 11, No. 5.

Butler, K.S., and J. Crumley. The Balcones Canyonlands habitat conservation plan. Preserving biodiversity and endangered species in an urban area. Environmental Planning Quarterly, Winter 1991-1992, Vol. 9, No. 1.

Carter, C.H. 1991. A dual track for incidental takings: Reexamining sections 7 and 10 of the Endangered Species Act. Boston College Environmental Affairs Law Review, Vol. 19, No. 1, pp. 135-171.

Cohen, P.L., P.R. Saunders, and W.W. Budd. 1987. Stream corridor management in the Pacific Northwest: II. Management strategies. Environmental Management, Vol. 11, No. 5.

Conner, R.N. 1988. Wildlife populations: Minimally viable or ecologically functional? Wildl. Soc. Bull., Vol. 16, No. 1:80-84.

Harris, L.D. 1985. Conservation corridors - a highway system for wildlife. ENFO.

Harris, L.D. 1984. The fragmented forest: Island biogeography theory and the preservation of biotic diversity. University of Chicago Press, Chicago, Ill.

Harris, R.B., L.A. Maguire, and M.L. Shaffer. 1987. Sample sizes for minimum viable population estimation. Conservation Biology, Vol. 1, No. 1.

Heinen, J., and G.H. Cross. 1983. An approach to measure interspersion, juxtaposition, and spatial diversity from cover-type maps. Wildl. Soc. Bull, Vol. 11, No. 3.

Hemingson, T.K. 1992. A nationwide survey of habitat conservation plans. M.S. Thesis, University of Texas, Austin.

Houck, O.A. 1993. The Endangered Species Act and its implementation by the U.S. Departments of Interior and Commerce. University of Colorado Law Review. 64:277-370.

Irvin, W.R. 1993. The Endangered Species Act: Keeping every cog and wheel. Natural Resources and Environment, Vol. 8, No. 1.

Lehmkuhl, J.F. 1984. Determining size and dispersion of minimum viable populations for land management planning and species conservation. Environmental Management, Vol. 8, No. 2.

Mager, A. 1990. National Marine Fisheries Service habitat conservation efforts in the southeastern United States for 1988. Marine Fisheries Review (J. Alt. Name: Commercial Fisheries Review). Vol. 52, No. 1.

Marsh, L.L., and R.D. Thornton. 1987. San Bruno Mountain habitat conservation plan. In: Managing land use conflicts; case studies in special area management (D.J. Brower and D.S. Carol, Eds.). Duke University Press, Durham, North Carolina.

Murphy, D.D., and B. Noon. 1992. Integrating scientific methods with habitat conservation planning: Reserve design for northern spotted owls. Ecological Applications, a Publication of the Ecological Society of America, Vol. 2, No. 1, pp. 3-17.

Noss, R.F. 1987. Corridors in real landscapes: A reply to Simberloff and Cox. Conservation Biology, Vol. 1, No. 2.

Reed, J.M., P.D. Doerr, and J.R. Walters. 1986. Determining minimum population sizes for birds and mammals. Wildl. Soc. Bull., Vol. 14, No. 3:255-261.

Rohlf, D.J. 1989. The Endangered Species Act: A guide to its protections and implementation. Stanford Environmental Law Society, Stanford, California.

Ruhl, J.B. 1990. Regional habitat conservation planning under the Endangered Species Act: Pushing the legal and practical limits of species protection. Southwestern Law Journal, Vol. 44, No. 1, pp. 1393-1425.

Samples, K.C., J.A. Dixon, and M.M. Gowen. 1986. Information disclosure and endangered species valuation. Land Economics, Vol. 62, No. 3.

Samson, F.B., F. Perez-Trejo, H. Salwasser, L.F. Ruggiero, and M.L. Shaffer. 1985. On determining and managing minimum population size. Wildl. Soc. Bull., Vol. 13, No. 4:425-433.

Scott, J. Michael, et al. [no date]. Beyond endangered species: An integrated conservation strategy for the preservation of biological diversity. Endangered Species Update 5(10).

Severinghaus, W.D. 1981. Guild theory development as a mechanism for assessing environmental impact. Environmental Management, Vol. 5, No. 3.

Simberloff, D., and J. Cox. 1987. Consequences and costs of conservation corridors. Conservation Biology, Vol. 1, No. 1.

Shaw, D.M. 1989. Remote sensing and GIS for the Austin region habitat conservation plan. University of North Texas, Denton, Texas.

Soule, M.E., and B. Wilcox (eds). 1980. Conservation biology. Sinaver Associates, Inc. ISBN 087893800.

Stangel, P.W. 1987. Conservation genetics of endangered species. In: Proceedings of the 3rd nongame and endangered wildlife symposium [Odum Riddleberger, and J.C. Ozier (eds)]. August 8-10, 1987, Athens, Georgia. Georgia Department of Natural Resources, Game and Fish Division, Atlanta, Georgia.

Thornton, R.D. 1990. Takings under the Endangered Species Act section 9. Natural Resources and Environment. Vo. 4.

Thornton, R.D. 1991. Searching for consensus and predictability: Habitat conservation planning under the Endangered Species Act of 1973. Environmental Law 21 :603-55.

Thornton, R.D. 1993. The search for a conservation planning paradigm: Section 10 of the ESA. Natural Resources & Environment. 8:21-23.

Webster, R.W. 1987. Habitat conservation plans under the Endangered Species Act. San Diego Law Review 24:243-71.

Wood, T. 1992. A comparison of habitat conservation plans prepared under the Endangered Species Act of 1973, as amended. M.S. Thesis, University of San Francisco, San Francisco, California.

APPENDIX 3:

Example of an HCP Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

BY AND BETWEEN

U.S. FISH AND WILDLIFE SERVICE

U.S. BUREAU OF LAND MANAGEMENT,

CALIFORNIA DEPARTMENT OF FISH AND GAME,

CALIFORNIA ENERGY COMMISSION,

CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS,

and the

COUNTY OF KERN

TO ESTABLISH A PROGRAM FOR THE CONSERVATION OF SPECIES OF CONCERN IN KERN COUNTY.

This Memorandum of Understanding ("Memorandum") is made and entered into this *17th day of April, 1989*, by and between U.S. Fish and Wildlife Service, hereinafter called the Service, U.S. Bureau of Land Management, hereinafter called the Bureau, California Department of Fish and Game, hereinafter called the Department, California Energy Commission, hereinafter called the Commission, California Department of Conservation, Division of Oil and Gas, hereinafter called the Division, and the County of Kern represented by the Kern County Department of Planning and Development Services, hereinafter called Kern County (collectively, "Public Agencies").

WITNESSETH:

WHEREAS, the Public Agencies are among the Federal, State, and local agencies that have regulatory authority or responsibility under certain Federal and State statutes, including the Endangered Species Act of 1973, as amended ("ESA"), the California Endangered Species Act of 1984 ("CESA"), the National Environmental Policy Act ("NEPA"), the California Environmental Quality Act ("CEQA"), and State Planning and Zoning Law, to protect "Species

of Concern" and their habitats from adverse effects resulting from public and private development actions, and

WHEREAS, the multiple sources of authority under which the Public Agencies operate do not provide any individual agency with the authority to implement a comprehensive program, enlisting the efforts of all levels of government, to provide for the long-term survival of the Species of Concern in Kern County, and

WHEREAS, because of the overlap and concurrent jurisdiction of the Public Agencies, the private sector lacks assurances that compliance with requirements imposed by any one Public Agency will be timely and will satisfy requirements that may be imposed by any other agency, and

WHEREAS, the Public Agencies desire that their respective concerns and responsibilities with regard to the conservation of Species of Concern be integrated and coordinated in such a manner as to ensure effective, timely, and mutually beneficial resolution of such issues within Kern County, and

WHEREAS, the Public Agencies together with representatives from private conservation groups, and oil and gas, agriculture, and urban development, have voluntarily and mutually established a multi-agency work group, known as the Kern County Threatened and Endangered Species Work Group ("Work Group"), for the purpose of developing a program to conserve the Species of Concern in Kern County, with emphasis on the valley floor portion of the county, and

WHEREAS, Kern County is desirous that their local land use regulations and development decisions comply with State and Federal environmental and endangered species statutes and regulations, and, along with local industry, that planning within the County provides for continued economic growth and development and ensures a healthy economic environment for its citizens and industries,

THEREFORE, it is mutually agreed and understood that:

1.0 PURPOSE OF MEMORANDUM

The Public Agencies have entered into this Memorandum to define relationships and agencies with permit or regulatory authority over Species of Concern and to develop a cooperative program called the Kern County Endangered Species Program, which will ensure that the activities of private parties will comply with applicable laws and regulations concerning the Species of Concern in Kern County, and which will provide long-term protection of such species.

2.0 PURPOSES OF THE PROGRAM

The purposes of the Kern County Endangered Species Program, hereinafter called the Program, are as follows:

2.1 Protection of Species of Concern. To conserve and protect Species of Concerns and their habitats within Kern County.

2.2 Assurances to Private Sector. To provide a means to standardize and integrate militation/compensation measures for Species of Concern so that public and private development actions together with mitigation/compensation measures established by the Program for such action(s) will satisfy concurrently without duplication or unnecessary delay applicable provisions of Federal and State laws and applicable local ordinances and regulations.

2.3 Cumulative Effects. To specify mitigation measures needed to lessen or avoid the cumulative effects of development activities on Species of Concern and eliminate, where possible, the requirement of case-by-case review of all such effects that will be mitigated by the specific measures.

The foregoing shall be accomplished through certain procedural components of the Program, as described below, including, but not limited to, (a) an Endangered Species Element to be adopted by the Board of Supervisors of Kern County that addresses the conservation of Species of Concern, (b) a conservation plan(s) for such species in the valley floor portion and perhaps other parts of Kern County which may affect adjoining counties (e.g., San Luis Obispo - Carrizo Plain), (c) an implementing agreement between the public and private sector participants to ensure execution of the conservation plan(s), and (d) Section 10(a) permit(s) pursuant to the ESA to authorize incidental taking of federally listed species.

2.4 Equitable Distribution of Mitigation/Compensation Obligations. To ensure that the costs of mitigation/compensation measures apply equitably to all agencies and private sector groups conducting activities affecting Species of Concern.

3.0 COMPONENTS OF THE PROGRAM

The program will include the following components:

3.1 Endangered Species Element: The Element will establish county-wide goals, policies, and implementation programs for addressing issues affecting Species of Concern and their habitats. The Element will provide a comprehensive policy framework that links State and Federal species conservation programs with local land use planning to ensure coordinated, effective, and timely resolution of conflicts between development and the conservation of Species of Concern, especially listed species.

3.1.1 The Element will provide broad based policy, foundation, and direction for the preparation of conservation plan(s) and other related programs in the county. The Element will be broader in scope and more comprehensive than the area-specific conservation plan(s).

3.1.2 The Element will address the full range of land use issues, including urban, oil and gas, mineral and agricultural development. The State requirement for consistency between general plan elements will afford the opportunity to conform land use planning programs, including the land use, conservation, and open space elements of the general plan, with the Endangered Species Element, and to provide for the necessary linkage with local permit, zoning, and subdivision ordinances.

3.1.3 The Element will be prepared concurrent with and independent of the preparation of any conservation plans to be prepared pursuant to Section 3.2, below.

3.2 Conservation Plan: A conservation plan will be prepared by Kern County for Species of Concern within the valley floor portion of Kern County (shown on Exhibit A) concurrent with the preparation of the Element described in Section 3.1, above. Other portions of the county may be similarly addressed later. Kern County will submit the plan to (1) the U.S. Fish and Wildlife Service as part of County's application for a Federal permit authorizing incidental taking of federally listed endangered and threatened species pursuant to Section 10(a) of the ESA and to (2) the other Federal and State agencies party to this Memorandum for their respective review and approval. The plan will identify the mitigation/compensation measures that will satisfy the requirements of Federal, State, and local law, including but not limited to ESA, CEQA, and CESA, regarding the protection of the Species of Concern and their habitats. Development of the conservation plan must comply with requirements described in 50 CFR Part 17. (For additional details, see Federal Register 50:39681-39691, 1985.) The Section 10(a) permit will authorize Kern County, and private parties operating under the authority of the permit, to carry out activities that result in the incidental take of Species of Concern that are federally listed.

3.2.1 It is intended that the review and approval of the conservation plan by the participating Federal, State, and local agencies will satisfy the requirements of applicable Federal and State environmental law. It is the intent of the parties to eliminate project-by-project review of the effect of development activities on the Species of Concern, to the full extent authorized by law, and to ensure that mitigation/compensation measures are not imposed beyond those detailed in the conservation plan(s) for such development activities provided conditions under which the conservation plan was formulated have not significantly changed. Such a conservation plan will satisfy the participating Federal and State agencies with respect to the protection of the Species of Concern by, among other possible mechanisms, providing uniform and biologically viable mitigation/compensation measures for application to development activities. Such mitigation measures will be developed subject to the approval of participating Federal and State agencies.

3.2.2 Individual landowners, groups of landowners, or development interests may choose to comply with the terms and conditions of an applicable and approved conservation plan affecting their proposed activities. Alternately, they may choose to prepare and submit their own conservation plan and Section 10(a) permit application when their activities may result in incidental take of federally listed species and, if State or local agency approval is required, they may choose to submit their proposal outside the existing conservation plan umbrella.

3.3.3 The conservation plan for the valley floor will be prepared concurrent with and independent of the preparation of the Element prepared pursuant to Section 3.1, above.

3.3 Implementing Agreement. The conservation plan shall be implemented through an enforceable agreement. The agreement shall specify the operating parameters of the conservation plan for the valley floor and any other area in the county. The Agreement specifies the obligations, authorities, responsibilities, liabilities, benefits, rights, and privileges of all parties or signatories to the subject conservation plan to be prepared and submitted with the Section 10(a) permit application. It is intended that the agreement will be entered into by Kern County, the other Public Agencies approving the conservation plan, and any private party having an obligation or role in implementing the conservation plan. The agreement will provide specific mitigation commitments for private parties and Public Agencies conducting development activities, and assurances by the Public Agencies to prevent the imposition of inconsistent or overlapping mitigation/compensation requirements under any Federal, State, or local law.

4.0 STEERING COMMITTEE

Kern County will appoint steering committee(s), consisting of representatives of the parties of this Memorandum, insofar as each may agree to so serve, and other members as may be determined by the County, including, but not limited to, the private sector members of the Work Group, to oversee preparation of the Element, conservation plan(s), and associated environmental documents. Actual preparation of these documents will be undertaken by the County and/or their consultant.

5.0 ENVIRONMENTAL REVIEW

5.1 CEQA Compliance - Conservation Plan. Adoption of an Endangered Species Element by Kern County and approval of a conservation plan(s) and implementation agreements(s) by the State agencies are actions subject to CEQA Review. It is understood the County will act as the lead agency and prepare an Environmental Impact Report ("EIR") or EIR's for the Element and the valley floor conservation plan. In the preparation of the environmental documents for the conservation plans, the participating State agencies shall act as responsible agencies in accordance with Section 15096 of the CEQA Guidelines. The EIR of the Element and

the valley floor conservation plan shall operate ad Program EIR(s) pursuant to Section 15168 of the CEQA Guidelines. The preparation of the Program EIR(s) will provide for the certification of appropriate environmental documents (e.g., negative declarations), if necessary, by Kern County and other agencies for projects within the conservation plan area that comply with the measures described in the plan that avoid or mitigate significant impacts to Species of Concern, as defined under Section 15065 of the CEQA Guidelines. The preparation of a Program EIR(s) will avoid duplicative reconsideration of basic policy considerations and ensure consideration of cumulative effects of individual project impacts. Upon certification of the Program EIR(s), all subsequent projects, as defined in the PRC 21065 and Section 15378 of the CEQA Guidelines, shall continue to be processed by the lead agency through preparation of an initial study and circulation of that study for comment by trustee agencies.

5.1.1 CEQA Compliance - Project. It is not the intent of this Memorandum to create new discretionary permit requirements or to increase unnecessary land use regulation. The lead agency will comply with CEQA requirements to mitigate adverse impacts to Species of Concern by implementing the mitigation requirements established by the Program EIR. All permits and other entitlement shall be issues as early in the process as is feasible for project development. Nothing in this Memorandum is intended to modify or alter the requirements of CEQA with regard to review of projects by lead, trustee, or responsible agencies. Further this Memorandum shall not have the effect of transforming discretionary approvals into ministerial acts or ministerial acts into discretionary approvals.

5.2 NEPA Compliance. Issuance of a Section 19(a) permit by the Service is an action subject to NEPA review. It is understood that the Service will act as the lead agency under NEPA and will prepare either an Environmental Assessment ("EA") or an Environmental Impacts Statement ("EIS"), as appropriate with regard to the Section 19(a) permit and accompanying conservation plan. The EA and EIR may be prepared and circulated concurrently with the Program EIR.

6.0 FUNDING

The Work Group will attempt to secure funding for preparation of these documents and the associated environmental reports. The group will explore all potential sources, including but not limited to Federal and State agencies, conservation organizations, and private industry. Work will continue on Program development so long as sufficient funding is available to Kern County to offset all costs.

7.0 SPECIES OF CONCERN

Species to be specifically addressed in the Endangered Species Element and any area-specific conservation plan will be determined by Kern County based upon recommendations to be provided by the Steering Committee, following opportunity for public input.

8.0 Public Involvement

It is the intent of the parties to this agreement that the public will be afforded sufficient opportunity to provide input to the Element and the conservation plan for the valley floor, not only during the required CEQA and NEPA review process, but during the scoping and planning process, as well.

9.0 RELATIONSHIP OF PROGRAM TO THE ESA AND CESA

9.1 Section 4 of the ESA. Because of the requirements of Section 4(f) of ESA, as amended in 1988, the preparation or revision by the Service of recovery plans for any Species of Concern must be closely coordinated and consistent with the terms of any conservation plan or other program affecting such species. In addition, the Service will, to the maximum extent practicable, incorporate in each recovery plan objective, measurable criteria that when met would result in the delisting of such species.

9.2 Section 7 of the ESA. Section 7 of the ESA requires all Federal agencies to initiate formal consultation if their action may affect federally listed species (50 CFR § 402.14). Though a conservation plan may address in some fashion Federal lands, the issuance of a Section 10(a) permit does not eliminate the need for Federal agencies to comply with Section 7. Nonetheless, the appropriate use by a Federal agency, regardless whether that agency is a signatory to this Memorandum or any conservation plan, of mitigation/compensation measures established by an approved conservation plan will satisfy the requirements of Section 7. Moreover, in the case of jeopardy biological opinion, the Service intends to use, where appropriate, such measures as reasonable and prudent alternatives.

9.3 CESA. Section 2053 of the Fish and Game Code establishes State policy that State agencies should not approve projects that would jeopardize the continued existence of any endangered or threatened species or result in the adverse modification of habitat essential to the continued existence of those species. Further Section 2080 of the Fish and Game Code prohibits the import or export from California, or take, possession or sale within California of any threatened or endangered species. It is the intent of this Memorandum to implement the identified provision of CESA by establishing a planning process that will avoid the adverse modification of habitat essential to the species, and ensure the continued existence of such species.

IN WITNESS WHEREOF, THE PARTIES HERETO have executed this Memorandum, on the date(s) set forth below, as of the day and year first above written.

By _____ Date _____
Regional Director,
U.S. Fish and Wildlife Service,
Portland, Oregon

By _____ Date _____
State Director,
U.S. Bureau of Land Management,
Sacramento, California

By _____ Date _____
Director
California Department of Fish and Game
Sacramento, California

By _____ Date _____
Executive Director,
California Energy Commission,
Sacramento, California

By _____ Date _____
Director,
California Department of Conservation,
Division of Oil and Gas,
Sacramento, California

By _____ Date _____
Chairman,
Kern County Board of Supervisors
Bakersfield, California

APPENDIX 4:

"Template" Implementing Agreement

"Template" Implementing Agreement

This template has been designed primarily for use with simple HCPs, but may also be used in other cases.

Important Notice:

U.S. Fish and Wildlife Service. The template may be used to develop Implementing Agreements by filling in project-specific information where indicated. When used in this manner, no Solicitor's Office review is necessary. However, when provisions in addition to those provided in the template are included, or if any provisions are deleted or the template is otherwise significantly modified, such agreements should be reviewed by the Solicitor's Office prior to approval by the appropriate FWS Regional Director. Attachments 1, if used to address habitat compensation measures in Implementing Agreements, should be reviewed by the Solicitor's Office prior to approval.

National Marine Fisheries Service. The template may also be used to develop Implementing Agreements for HCPs for marine species, anadromous species, and hatchery operations. However, it is NMFS policy that all Implementing Agreements will be reviewed by the National Oceanic and Atmospheric Administration's General Counsel's Office.

IMPLEMENTING AGREEMENT

by and between

[APPLICANT]

U.S. FISH AND WILDLIFE SERVICE and/or
NATIONAL MARINE FISHERIES SERVICE

and the

[STATE] DEPARTMENT OF FISH AND GAME [if applicable]

TO ESTABLISH A MITIGATION PROGRAM FOR ENDANGERED [THREATENED] SPECIES AT THE PROPOSED [APPLICANT] [PROJECT OR ACTIVITY SITE NAME] [SITE LOCATION, INCLUDING LEGAL DESCRIPTION, COUNTY, AND STATE].

This Implementing Agreement ("Agreement"), made and entered into as of the ___ day of _____, 199_, by and among [APPLICANT], the UNITED STATES FISH AND WILDLIFE SERVICE (FWS) and/or NATIONAL MARINE FISHERIES SERVICE (NMFS) (collectively, the Services), and the (STATE) DEPARTMENT OF FISH AND GAME (SDFG) [if applicable], hereinafter collectively called the "Parties," defines the Parties' roles and responsibilities and provides a common understanding of action that will be undertaken to minimize and mitigate the effects on the subject listed and unlisted species and their habitats of the proposed [project or activity site name and location].

1.0 RECITALS

This Agreement is entered into with regard to the following facts:

WHEREAS, the proposed [project or activity name] site selected after environmental review has been determined to be habitat for the federally listed [species]; and,

WHEREAS, the proposed [project name] site also has been determined to be habitat for the [species], a Federal proposed or candidate species [if applicable], and the [species], a State listed species [if applicable] and the [species], a rare or declining species [if applicable]; and,

WHEREAS, [applicant], with technical assistance from the Service[s] and the SDFG, has developed a series of measures, described in the Habitat Conservation Plan, to minimize and mitigate the effects of the proposed [project or activity] upon the subject listed and unlisted species and their associated habitats; and,

THEREFORE, the Parties hereto do hereby understand and agree as follows:

2.0 DEFINITIONS

The following terms as used in this Agreement shall have the meanings set forth below:

2.1 The term "Permit" shall mean an incidental take permit issued by the Service[s] to [applicant] pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA).

2.2 The term "Permit Area" shall mean the [project or activity name] area consisting of approximately [x] acres in the [legal description] in [County and State] as depicted in Figure [x] of the [project or activity] Habitat Conservation Plan.

2.3 The term "Permittee" shall mean [applicant].

2.4 The term "Conservation Plan" shall mean the Habitat Conservation Plan prepared for the proposed [project or activity].

2.5 The term "Plan Species" shall mean species adequately covered in the HCP and identified in Section 1.0 of this Agreement.

2.6 [if applicable] The term "Compensation Lands" shall mean (a.) the [x] acres of land acquired by [applicant] and transferred to the Service[s] [if applicable], the SDFG [if applicable] or an approved third party for management pursuant to the terms of the Conservation Plan as habitat for the Plan Species pursuant to Section [x] of this Agreement [if applicable] or (b.) the [x] acres of land owned or controlled by [applicant] and reserved or set aside as habitat for the conservation of the Plan Species and to be managed pursuant to Section [x] of this Agreement and the terms of the Conservation Plan.

2.7 The term "unforeseen circumstances" means any significant, unanticipated adverse change in the status of species addressed under the HCP or in their habitats; or any significant unanticipated adverse change in impacts of the project or in other factors upon which the HCP is based. The term "unforeseen circumstances" as defined in this Agreement is intended to have the same meaning as "extraordinary circumstances" as used in the No Surprises policy.

3.0 HABITAT CONSERVATION PLAN

Pursuant to the provisions of Section 10(a)(1)(B) of the ESA and Section [x] of the [State] Endangered Species Act [if applicable], [applicant, hereinafter referred to as Permittee] has prepared a Habitat Conservation Plan (HCP) and submitted it to the Service[s] with a request that the Service[s] issue a Permit (Permit) to allow subject Plan species to be incidentally taken within the Permit Area as depicted and described in Figure [x] of the HCP. The HCP proposes a mitigation program for the subject Plan Species and their habitats.

4.0 INCORPORATION OF HCP

The HCP and each of its provisions are intended to be, and by this reference are, incorporated herein. In the event of any direct contradiction between the terms of this Agreement and the HCP, the terms of this Agreement shall control. In all other cases, the terms of this Agreement and the terms of the HCP shall be interpreted to be supplementary to each other.

5.0 LEGAL REQUIREMENTS

In order to fulfill the requirements that will allow the Service[s] to issue the Permit, the HCP sets forth measures that are intended to ensure that any take occurring within the Permit Area will be incidental; that the impacts of the take will, to the maximum extent practicable, be minimized and mitigated; that procedures to deal with unforeseen circumstances will be provided; that adequate funding for the HCP will be provided; and that the take will not appreciably reduce the likelihood of the survival and recovery of the Plan Species in the wild. It also includes measures that have been suggested by the Service[s] as being necessary or appropriate for purposes of the HCP.

6.0 COOPERATIVE EFFORT [This may not be applicable to all HCPs.]

In order that each of the legal requirements as set forth in Paragraph 5.0 hereof are fulfilled, each of the Parties to this Agreement must perform certain specific tasks as more particularly set forth in the HCP. The HCP thus describes a cooperative program by Federal and State agencies and private interests to mitigate the effects of the proposed [project or activity name] on the Plan Species.

7.0 TERMS USED

Terms defined and utilized in the HCP and the ESA shall have the same meaning when utilized in this Agreement, except as specifically noted.

8.0 PURPOSES

The purposes of this Agreement are:

8.1 To ensure implementation of each of the terms of the HCP;

8.2 To describe remedies and recourse should any Party fail to perform its obligations, responsibilities, and tasks as set forth in this Agreement; and,

8.3 As stated in paragraph 12.3.a hereof, to provide assurances to the Permittee(s) and other non-Federal landowner(s) participating in the HCP [if applicable] that as long as the terms of the HCP and the Permit issued pursuant to the HCP and this Agreement are fully and faithfully performed, no additional mitigation will be required except as provided for in this Agreement or required by law.

9.0 TERM

9.1 Stated Term. This Agreement shall become effective on the date that the Service[s] issue(s) the Permit requested in the HCP and shall remain in full force and effect for a period of [x] years or until termination of the Permit, whichever occurs sooner.

9.2 [For development HCPs with permanent habitat set-asides]: Notwithstanding the stated term as herein set forth, the Parties agree and recognize that once the Plan Species have been incidentally taken and their habitat modified pursuant to the HCP, the take and habitat modification will be permanent. It is therefore the intention of the Parties that the provisions

of the HCP and of this Agreement regarding the establishment and maintenance of habitat for the Plan Species shall likewise, to the extent permitted by law, be permanent and extend beyond the terms of this Agreement.

10.0 FUNDING

10.1 [Permittee] will provide such funds as may be necessary to carry out its obligations under the HCP. The Permittee should notify the Services, if the Permittee's funding resources have materially changed, including a discussion of the nature of the change, from the information provided in section [x] of the HCP.

10.2 [For long term Permits] The Permittee shall further ensure that funding is available to meet its obligations under this Agreement, the Permit and the HCP through an account solely designated for this purpose. The account may be a trust account, irrevocable letter of credit, insurance or surety bond. The account, letter of credit, surety or insurance must not be disapproved by the Service, shall be in the amount of no less that $____, and shall be maintained for the life of the Permit. Funds from the account, insurance letter, or surety shall only be used if the Permittee is otherwise unable to meet its obligations under this Agreement, the Permit, or the HCP.

10.3 [if applicable] Prior to site disturbing activities, the Permittee will acquire and transfer to SDFG or the Service(s) [if applicable] or a third party approved by SDFG [if applicable] and the Service[s] offsite habitat compensation lands and associated enhancement and endowment funds [if applicable] as described in the HCP, or will guarantee performance of those duties through an irrevocable Letter of Credit, a trust account, insurance, or surety bond [if applicable] in favor of the Service[s], SDFG, or other third party approved by SDFG and the Service[s] and secured against [Permittee]. Such Letter of Credit, proof of trust account, insurance policy, or surety bond shall be delivered to the Service[s] [if applicable], SDFG or approved third party within [x] days of issuance of the Permit and prior to site disturbing activities [if applicable].

11.0 RESPONSIBILITIES OF THE PARTIES IN MITIGATION PROGRAM IMPLEMENTATION AND MONITORING RESPONSIBILITIES OF THE PERMITTEE

11.1 Responsibilities of the Permittee.

a. The HCP will be properly functioning if the terms of the Agreement have been or are being fully implemented.

b. The Permittee shall undertake all activities set forth in the HCP in order to meet the terms of the HCP and comply with the Permit, including adaptive management procedures described in subparagraph (c) below, if applicable.

c. Describe the adaptive management process agreed to by the parties to ensure the terms of the HCP are fully implemented, if applicable.

d. [if applicable] The Permittee shall submit an annual [or specify other reporting period] report describing its activities and an analysis of whether the terms of the

HCP were met for the reporting period. The report shall provide all reasonably available data regarding the incidental take, and where requested by the Service(s), changes to the overall population of Plan Species that occurred in the Permit area during the reporting period. In the case of a corporate Permittee, the report shall also include the following certification from a responsible company official who supervised or directed the preparation of the report: Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

11.2 Responsibilities of the Service(s).

a. The Service[s] shall cooperate and provide, to the extent funding is available, technical assistance to the Permittee as detailed in Section [x] of the HCP and [optionally] summarized below. Nothing in this Agreement shall require the Service(s) to act in a manner contrary to the requirements of the Anti-Deficiency Act.

b. After issuance of the Permit, the Service[s] shall monitor the implementation thereof, including each of the terms of this Agreement and the HCP in order to ensure compliance with the Permit, the HCP and this Agreement.

11.3 Responsibilities of the SDFG (if applicable). The SDFG shall cooperate and provide, to the extent that adequate funding is available, technical assistance to the Permittee as detailed in Section [x] of the HCP and [optionally] summarized below.

12.0 REMEDIES AND ENFORCEMENT

12.1 REMEDIES IN GENERAL

Except as set forth below, each Party shall have all remedies otherwise available to enforce the terms of this Agreement, the Permit, and the HCP, and to seek remedies for any breach hereof, subject to the following:

a. NO MONETARY DAMAGES

No Party shall be liable in damages to the any other Party or other person for any breach of this Agreement, any performance or failure to perform a mandatory or discretionary obligation imposed by this Agreement or any other cause of action arising from this Agreement. Notwithstanding the foregoing:

(1) Retain Liability

All Parties shall retain whatever liability they would possess for their present and future acts or failure to act without existence of this Agreement.

(2) Land Owner Liability

All Parties shall retain whatever liability they possess as an owner of interests in land.

(3) Responsibility of the United States

Nothing contained in this Agreement is intended to limit the authority of the United States government to seek civil or criminal penalties or otherwise fulfill its enforcement responsibilities under the ESA.

b. INJUNCTIVE AND TEMPORARY RELIEF

The Parties acknowledge that the Plan Species are unique and that their loss as species would result in irreparable damage to the environment and that therefore injunctive and temporary relief may be appropriate to ensure compliance with the terms of this Agreement.

12.2 THE PERMIT

a. SEVERABILITY

[For use in HCPs involving multiple Permittees]: The violation of the Permit by any Permittee with respect to any one or more particular parcels of land or portions thereof owned or controlled or within the jurisdiction of any such Permittee shall not adversely affect or be attributed to, nor shall it result in a loss or diminution of any right, privilege, or benefit hereunder, of any other Permittee.

b. PERMIT SUSPENSION OR REVOCATION

Except as otherwise provided for under the terms of the Agreement, the Permit shall be suspended or revoked in conformance with the provisions of 50 CFR 13.27 through 13.29 (1994), as the same exists as of the date hereof.

[**NOTE**: On September 5, 1995, the FWS published a proposed rule in the Federal Register amending the general regulations for its permit program (50 CFR Part 13 and Part 17). The FWS is currently drafting additional language to clarify and resolve the differences between the Part 13 and 17 and a proposed rule will be published in the near future. Consequently, some information contained in this template may be outdated upon publication of a final rule. Users of this template should check the revised permit procedures when available.]

12.3 LIMITATIONS AND EXTENT OF ENFORCEABILITY

a. NO SURPRISES POLICY

Subject to the availability of appropriated funds as provided in Paragraph 14.6 hereof, and except as otherwise required by law, no further mitigation for the effects of the proposed [project or activity] upon the Plan Species may be required from a

Permittee who has otherwise abided by the terms of the HCP, except in the event of unforeseen circumstances; provided that any such additional mitigation may not require additional land use restrictions or financial compensation from the Permittee without his/her written consent.

b. PRIVATE PROPERTY RIGHTS AND LEGAL AUTHORITIES UNAFFECTED

Except as otherwise specifically provided herein, nothing in this Agreement shall be deemed to restrict the rights of the Permittee to the use or development of those lands, or interests in lands, constituting the Permit Area; provided, that nothing in this Agreement shall absolve the Permittee from such other limitations as may apply to such lands, or interests in lands, under other laws of the United States and the State of [ ].

13.0 AMENDMENTS

Except as otherwise set forth herein, this Agreement may be amended consistent with the ESA and with the written consent of each of the Parties hereto.

14.0 MISCELLANEOUS PROVISIONS

14.1 NO PARTNERSHIP

Except as otherwise expressly set forth herein, neither this Agreement nor the HCP shall make or be deemed to make any Party to this Agreement the agent for or the partner of any other Party.

14.2 SUCCESSORS AND ASSIGNS

This Agreement and each of its covenants and conditions shall be binding on and shall inure to the benefit of the Parties hereto and their respective successors and assigns.

[**NOTE**: On September 5, 1995, the FWS published a proposed rule in the Federal Register amending the general regulations for its permit program (50 CFR Part 13 and Part 17). The FWS is currently drafting additional language to clarify and resolve the differences between the Part 13 and 17 and a proposed rule will be published in the near future.

Consequently, some information contained in this template may be outdated upon publication of a final rule. Users of this template should check the revised permit procedures when available.]

14.3 NOTICE

Any notice permitted or required by this Agreement shall be delivered personally to the persons set forth below or shall be deemed given five (5) days after deposit in the United States mail, certified and postage prepaid, return receipt requested and addressed as follows or at such other address as any Party may from time to time specify to the other Parties in writing:

Assistant Regional Director
United States Fish and Wildlife Service
[Street Address]
[City, State, Zip Code]

Assistant Regional Director [if applicable]
National Marine Fisheries Service
[Street Address]
[City, State, Zip Code]

Director [if applicable]
[State] Department of Fish and Game
[Street Address]
[City, State, Zip Code]

[Permittee's Name or Representative]
[Company or Agency Name]
[Street Address or Post Office Box]
[City, State, Zip Code]

14.4 ENTIRE AGREEMENT

This Agreement, together with the HCP and the Permit, constitutes the entire Agreement between the Parties. It supersedes any and all other Agreements, either oral or in writing among the Parties with respect to the subject matter hereof and contains all of the covenants and Agreements among them with respect to said matters, and each Party acknowledges that no representation, inducement, promise or Agreement, oral or otherwise, has been made by any other Party or anyone acting on behalf of any other Party that is not embodied herein.

14.5 ELECTED OFFICIALS NOT TO BENEFIT

No member of or delegate to Congress shall be entitled to any share or part of this Agreement, or to any benefit that may arise from it.

14.6 AVAILABILITY OF FUNDS

Implementation of this Agreement and the HCP by the Services is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Agreement will be construed by the parties to require the obligation, appropriation, orexpenditure of any money from the U.S. treasury. The parties acknowledge that the Services will not be required under this Agreement to expend any Federal agency's appropriated funds unless and until an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

14.7 DUPLICATE ORIGINALS

This Agreement may be executed in any number of duplicate originals. A complete original of this Agreement shall be maintained in the official records of each of the Parties hereto.

14.8 THIRD PARTY BENEFICIARIES

Without limiting the applicability of the rights granted to the public pursuant to the provisions of 16 U.S.C. § 1540(g), this Agreement shall not create any right or interest in the public, or any member thereof, as a third party beneficiary hereof, nor shall it authorize anyone not a Party to this Agreement to maintain a suit for personal injuries or property damages pursuant to the provisions of this Agreement. The duties, obligations, and responsibilities of the Parties to this Agreement with respect to third parties shall remain as imposed under existing Federal or State law.

14.9 RELATIONSHIP TO THE ESA AND OTHER AUTHORITIES

The terms of this Agreement shall be governed by and construed in accordance with the ESA and other applicable laws. In particular, nothing in this Agreement is intended to limit the authority of the Service to seek penalties or otherwise fulfill its responsibilities under the ESA. Moreover, nothing in this Agreement is intended to limit or diminish the legal obligations and responsibilities of the Service as an agency of the Federal government.

14.10 REFERENCES TO REGULATIONS

Any reference in this Agreement, the HCP, or the Permit to any regulation or rule of the Service shall be deemed to be a reference to such regulation or rule in existence at the time an action is taken.

14.11 APPLICABLE LAWS

All activities undertaken pursuant to this Agreement, the HCP, or the Permit must be in compliance with all applicable State and Federal laws and regulations.

IN WITNESS WHEREOF, THE PARTIES HERETO have executed this Implementing Agreement to be in effect as of the date last signed below.

BY _____ Date _____

Regional Director
United States Fish and Wildlife Service
[City, State]

BY _____ Date _____

Regional Director [if applicable]
National Marine Fisheries Service
[City, State]

BY _____ Date _____

Director [if applicable]
[State] Department of Fish and Game
[City, State]
(With reference to Part [x] of this Agreement only [as applicable])

BY _____ Date _____

[Name], President [Director, etc.]
[Company, Organization, Agency]

ATTACHMENT 1:
Optional Provisions to be Used When the HCP Includes
Habitat "Compensation Credit" Requirements

Note: The material below is provided to aid Service staffs to develop suitable provisions when an HCP includes habitat "compensation credit" requirements. However, it should not be used in an Implementing Agreement without review by the Solicitor's Office (FWS) or General Counsel's Office (NMFS).

11.4 HABITAT COMPENSATION CREDITS

a. As mutually agreed between the Service[s], SDFG [if applicable] and [Permittee], habitat compensation credits shall be established for a maximum of [x] acres of the habitat compensation lands acquired by [Permittee] pursuant to Part 11.1(a) of this Agreement. [Permittee] may sell habitat compensation credits to other project applicants whose projects require acquisition of habitat compensation lands, subject to the following conditions.

(1) A habitat compensation credit is defined as the equivalent of one acre of any parcel of habitat compensation lands which the Service[s] and SDFG [if applicable] have designated in writing to be available for sale to other project applicants. Other project applicants may purchase such compensation credits in lieu of acquiring habitat to satisfy habitat compensation requirements for certain projects as described in Paragraph 11.4(a)(2).

(2) [If applicable] The project of any applicant or other project proponent to which habitat compensation credits may be sold by [Permittee] shall be located outside the [acquisition area], as depicted in Attachment 1 of this Agreement, or any other reserve area designated by the Service[s] and/or SDFG [if applicable].

(3) Compensation lands utilized as habitat compensation credits by [Permittee] shall be acquired and deeded to the Service[s] [if applicable], SDFG [if applicable] or an approved third party [if applicable] prior to any compensation credit transaction, unless otherwise authorized in writing by the Service[s] and SDFG.

(4) All compensation credit transactions shall be approved in advance and in writing by the Service[s] and SDFG [if applicable].

(5) [Permittee] shall retain the right to determine the sales price of habitat compensation credits. [Permittee] is under no

obligation to sell habitat compensation credits and may choose to retain these credits indefinitely. [Permittee] shall bear all costs associated with mitigation credit transactions.

b. [If applicable] [Permittee] may defer payment of habitat enhancement and endowment fees for the [x] acres of compensation lands designated as compensation credits until either the time of sale of such credits or 12 months from the date that compensation lands totaling [x] acres are transferred to the Service[s] [if applicable], SDFG [if applicable] or the approved third party [if applicable] in accordance with Section 11.1(a) of this Agreement. At the time of each sale of compensation credits, either [Permittee] or the purchaser of such credits shall be required to contribute habitat enhancement and endowment fees in the amount of [$__] cash for each acre of habitat deeded to the Service[s] [if applicable], SDFG [if applicable] or the approved third party. If [Permittee] does not sell all or a portion of the designated habitat compensation credits within 12 months of the transfer of habitat compensation lands totaling [x] acres to the Service[s] [if applicable], SDFG [if applicable] or the approved third party, [Permittee] shall immediately pay in cash to the Service[s] [if applicable], SDFG [if applicable] or the approved third party all remaining habitat enhancement and endowment fees allocated to the unsold credits.

c. Upon documentary evidence of sale of habitat compensation credits and deposit of cash fees for habitat enhancement and endowment, [Permittee] may request that the Service[s] [if applicable] and/or SDFG [if applicable], as the beneficiary of the Letter of Credit, join with [Permittee] to request from the issuer an equitable reduction of the Principal Sum of the Letter of Credit. However, the Principal Sum of the Letter of Credit shall not be reduced below an amount determined by the Service[s] [if applicable] and/or SDFG [if applicable] to be reasonably necessary to cure any potential future default by [Permittee].

APPENDIX 5:

FWS Guidance on Addressing Migratory Birds and Eagles (FWS Only)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington, D.C. 20240

In Reply Refer To:
FWS/TE

FEB - 9 1996

Memorandum

To: Regional Directors, Regions 1, 2, 3, 4, 5, 6, and 7

From: Director

Subject: Incidental Take of Migratory Birds and Bald Eagles

Under the Endangered Species Act, the Fish and Wildlife Service may grant a permit (section 10) or issue a statement (section 7) that allows the incidental take of endangered species. Some migratory birds, including the bald eagle, are ESA-listed species. The Migratory Bird Treaty Act prohibits the take of migratory birds, including any species also listed under the ESA. None of the regulations promulgated under the MBTA expressly provide for permits for incidental take.

Likewise, the Bald and Golden Eagle Protection Act prohibits the taking of bald eagles. The regulations promulgated under the BGEPA do not allow for permits to be issued for incidental take of eagles.

In many instances, Service biologists have concluded that incidental take of certain ESA-listed migratory birds (including bald eagles) could be allowed without harm to the species and their inclusion in a particular ESA section 7 statement or section 10 permit would be appropriate. However, the apparent inability to grant incidental take under the MBTA or BGEPA has caused confusion both within the Service and among permit applicants.

A means to allow incidental take of ESA-listed migratory birds, including the bald eagle, when such incidental take has been judged permissible under the ESA, and to remove the threat of prosecution under the MBTA and BGEPA (when warranted), has been needed. The Solicitor's Office has provided the attached opinion on this issue. We have determined to adopt the approach suggested by the Solicitor’s Office as a matter of policy in the following manner:

1. In the ESA section 7 context, the following language should be included when appropriate in any incidental take statement concluding that take of ESA-listed migratory birds (including bald eagles) will result from the actions under consultation:

> To the extent that this statement concludes that take of any threatened or endangered species of migratory bird will result from the agency action for which consultation is being made, the Service will not refer the incidental take of any such migratory bird for prosecution under the MBTA of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

2. In the ESA section 10 context, the Service will insert, when appropriate, the following language into any permit concerning the incidental take of ESA-listed migratory birds (including the bald eagle):

> *[For species other than the bald eagle]* This permit also constitutes a Special Purpose Permit under 50 C.F.R. § 21.27 for the take of *[provide species' common and scientific names; species must be ESA-listed, and may not include the bald eagle]* in the amount and/or number and subject to the terms and conditions specified herein. Any such take will not be in violation of Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-12).
>
> *[For the bald eagle*] The Service will not refer the incidental take of any bald eagle, *Haliaeetus leucocephalus*, for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 68-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

This memorandum will serve to transmit these recommendations to the Regions as working interim guidance, and when appropriate, section 7(a)(2) incidental take statements and section 10(a)(1)(B) permits should incorporate this language regarding the incidental take of ESA-listed migratory birds. The Service will incorporate final guidance in the final versions of the section 7 and the Habitat Conservation Planning [section 10(a)(1)(B)] handbooks. However, until the section 7 and section 10(a)(1)(B) handbooks have been modified to ensure that their procedures guarantee consistency with the standards of the MBTA and BGEPA, and the procedural requirements of 50 C.F.R. § 21.27, if applicable, any section 7 statement or section 10 permit including the above language should be reviewed by the regional Migratory Bird Coordinator.

Comments on this interim guidance are welcomed and to the extent possible, will be used in the final guidance. Comments should be sent to the Chief, Division of Endangered Species, within 30 days of receiving this memorandum.

Attachment

United States Department of the Interior

OFFICE OF THE SOLICITOR
Washington, D.C. 20240

FEB - 5 1996

Memorandum

To: John Rogers, Deputy Director, U.S. Fish and Wildlife Service

From: Pete Raynor, Assistant Solicitor, Fish and Wildlife Branch

Subject: Permitted Incidental Take of Migratory Birds Listed Under the Endangered Species Act

You have asked whether an incidental take statement, under § 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1536, or an incidental take permit, under § 10 of the ESA, 16 U.S.C. § 1539, (collectively, incidental take documents) can be used to provide an applicant or permittee with some assurance that the applicant or permittee will not be prosecuted under either r the Migratory Bird Treaty Act (MBTA) or the Bald and Golden Eagle Protection Act (BGEPA) for that take expressly allowed under the ESA document. We conclude that the Service currently has the authority to do so, using a combination of permitting provisions under the Service's discretion in the enforcement of these statutes.

I. BACKGROUND

Under the ESA, the Service may grant a permit allowing the take of an endangered species incidental to an otherwise lawful activity. Section 10(a)(l). Similarly, pursuant to a consultation under § 7, the Service may issue a statement that incidental take resulting from a federal action will not jeopardize the continued existence of a listed species. Section 7(b)(4). Take of a listed species consistent with an incidental take statement, by the acting agency or an applicant before that agency, does not constitute a violation of the ESA. Section 7(o)(2).

The MBTA prohibits the take of migratory birds, 16 U.S.C. § 703, including migratory birds listed under the ESA. The MBTA authorizes the Secretary of the Interior to permit take consistent with the underlying treaties pursuant to regulation. None of the regulations promulgated under the MBTA expressly allows a permit to be issued for incidental take. See generally 50 C.F.R. part 21. However, 50 C.F.R. § 21.27 provides for the availability of "special purpose permits" for activities outside the scope of the standard permits. The general MBTA permits are not available for eagles; permits for eagles are controlled by the BGEPA regulations, found in 50 C.F.R. part 22. 50 C.F.R. § 21.4(b).

Like the MBTA, the BGEPA prohibits the taking of bald eagles and golden eagles, 16 U.S.C. § 668, except as otherwise permitted pursuant to regulation, id. § 668a. The regulations under the BGEPA allow for the issuance of permits for scientific or exhibition purposes, 50 C.F.R. § 22.21, for Indian religious purposes, id. § 22.22, to take depredating eagles, id. § 22.23, for falconry purposes, id. § 22.24, and to take golden eagle nests, id. § 22.25. The BGEPA regulations do not contain a provision equivalent to the special purpose permit under § 21.27.

Currently, ESA incidental take documents do not provide any relief from the prohibitions of the MBTA and BGEPA; indeed, some of those documents specifically state that they do not provide any such relief. Therefore, an applicant that wants complete protection from prosecution for the take of an ESA-listed migratory bird pursuant to an ESA incidental take document must also seek a permit under the MBTA, or if that bird is a bald eagle, the BGEPA. However, no such permit is currently available under the BGEPA, and § 21.27 under the MBTA has not traditionally been used to provide permits for unintentional take. Thus, applicants in the past have not been provided with assurance that they would not be prosecuted under the MBTA or BGEPA.

II. ALTERNATIVES

There are a number of theories on which ESA incidental take documents could be used to provide relief from liability under the MBTA and BGEPA. The first alternative is that the ESA documents could be expanded to act as permits under the other acts and their existing regulations as well. However, care would have to be taken to ensure that the ESA permit process was consistent with the legal requirements of the other applicable acts and their regulations. Some of the significant legal hurdles are:

- ESA § 7 incidental take statements are not considered to be permits. The process in which these statement are generated is one of scientific analysis. Adapting this process to conform to the procedural requirements of a permit-granting process would be difficult. Among other things, a permitting process may require NEPA analysis, currently not part of the § 7 process.

- An ESA permit could apply to the BGEPA only to the extent which the activity to be permitted falls within the existing permit structure of the BGEPA regulations. This will rarely, if ever, be the case.

- The application of § 21.27 of the MBTA is limited to the "activities related to migratory birds." However, we can argue that activity otherwise unrelated to birds can be considered an "activity related to migratory birds" by virtue of the fact that the activity causes bird mortality.

- An applicant for a permit under § 21.27 must demonstrate " a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justifications." Thus, most applications for a permit for

take under the MBTA to be used in conjunction with an ESA incidental take document would require either a compelling justification or perhaps sufficient mitigation to show a positive benefit to the migratory bird resource.

We note that although § 21.27 appears to be broad enough to encompass the permitting of unintentional take for the purposes of the MBTA, that section is not narrowly focused on incidental take. A regulatory permitting program specifically geared to the problems of incidental take may be advisable. Indeed, such a program would be necessary in order to issue permits for incidental take with respect to the BGEPA, under which regulatory permitting authority for incidental take is essentially lacking. In the meantime, the use of § 21.27 to permit take in conjunction with an ESA § 10 permit is an acceptable approach.

A second alternative, in situations where 50 C.F. R. § 21.27 is not available, would be to include in ESA incidental take documents a statement of enforcement policy to the effect that the Service would not refer the beneficiary of the document for prosecution under the MBTA or BGEPA for the take of the ESA-listed migratory birds covered by the document, provided that such take was consistent with the terms and conditions of the document. The main advantage of this solution is its simplicity; the complications inherent in the permit alternative, discussed above, are avoided. In addition, there is authority to support the argument that such an announcement of enforcement policy under the MBTA is not subject to judicial review. See Alaska Fish & Wildlife Fed'n & Outdoor Council. Inc. v. Dunkle, 829 F.2d 933, 938 (9th Cir. 1987) ("The discretion granted to the Fish and Wildlife Service precludes our review of the Service's failure to enforce the MBTA"), cert. denied, 485 U.S. 988 (1988), on remand, No. J84-013CIVIL, slip op. at 15-16 (June 29, 1988) (distinguishing between reviewable agreement not to enforce and non-reviewable statement of enforcement priorities); see also 53 Fed. Reg. 16877 (May 12, 1988) (statement referred to by district court on remand). An announcement of enforcement policy may not be as satisfactory as an applicable permit to those seeking a safe haven from prosecution under the MBTA and BGEPA, but it will certainly provide a short-term solution pending development of a regulatory approach.

A third alternative would be to argue that the ESA, a comprehensive and more recent statute; trumps those areas in which it overlaps with the MBTA and the BGEPA. Under this theory, there would be no violation of the other statutes for ESA-listed birds if the ESA was complied with. There is no direct support for such a position; indeed it would be contrary, at a minimum, to a Memorandum from the Assistant Solicitor, Fish and Wildlife, dated Aug. 27, 1980, which stated that the BGEPA, as the more specific statute, governed any situation in which it and the ESA conflict. Arguing, that the ESA trumps the other statutes could have significant, unforseen consequences, and thus seems an unwise course to pursue, particularly given the other options available.

III. RECOMMENDATION

In order for the Service to give, consistent with the current regulatory authority, the maximum assurance of freedom from prosecution under the MBTA and BGEPA for the take of ESA-listed species consistent with ESA incidental take documents, we recommend the following.

1. In the ESA § 10 context, the § 10 handbook should be revised to require that the standards and procedures of 50 C.F.R. § 21.27 be included in the § 10 process if the permit will cover any non-eagle migratory bird. In addition, the Service should insert the following language into any permit allowing the incidental take of migratory birds:

> *[For species other than the bald eagle]* This permit also constitutes a Special Purpose Permit under 50 C.F.R. § 21.27 for the take of *[provide species' common and scientific names; species must be ESA-listed, and may not include the bald eagle]* in the amount and/or number and subject to the terms and conditions specified herein. Any such take will not be in violation of Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-12).
>
> *[For the bald eagle*] The Service will not refer the incidental take of any bald eagle, *Haliaeetus leucocephalus*, for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 68-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

2. In the ESA § 7 context, the Service should include the following language in any incidental take statement concluding that take of ESA-listed migratory birds will result from the subject of the consultation:

> To the extent that this statement concludes that take of any threatened or endangered species of migratory bird will result from the agency action for which consultation is being made, the Service will not refer the incidental take of any such migratory bird for prosecution under the MBTA of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

3. The Division of Endangered Species and the Office of Migratory Bird Management should meet to discuss whether any additions to the ESA § 7 and § 10 processes are necessary in order to reflect the goals of the MBTA and BGEPA.

4. Consistent with the standard in Dunkle, under no circumstances should the Service bargain or extract concessions in return for the inclusion in an ESA incidental take document of the above language stating that the Service will not refer take for prosecution.

Should the Service decide to use ESA incidental take documents to provide assurances with regard to the MBTA and BGEPA, we would appreciate an opportunity to review the vehicle by which the Service implements any policy change. Please note that the above analysis and recommendations apply only to migratory birds that are also listed as threatened or endangered under the ESA. The Service should take steps to address the question of how to handle the incidental take of non-ESA-listed migratory birds. If you have any questions concerning the above, please contact me or Ben Jesup at (202) 208-6172.

cc: Jamie Clark
John Doggett
Paul Schmidt

APPENDIX 6:

FWS Guidance on Integrating HCPs With National Wildlife Refuges

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington,

D.C. 20240

In Reply Refer To:
FWS/AES/TE

APR 5 1996

Memorandum

To: Regional Directors, Regions 1, 2, 3, 4, 5, 6,
Assistant Director - Ecological Services
Assistant Director - Fisheries
Assistant Director - Refuges and Wildlife
Assistant Solicitor - Fish and Wildlife

From: Deputy Director

Subject: Relationship of National Wildlife Refuges and Habitat Conservation Planning Efforts

In recent years, the Habitat Conservation Plan program under section 10(a)(1)(B) of the Endangered Species Act has grown rapidly. When Congress enacted the HCP provisions into law in 1982, it stressed the need for developing “creative partnerships” between the public and private sector in resolving endangered species issues, especially on private lands.

One of the ways the Fish and Wildlife Service is developing these “creative partnerships" is through the integration of the National Wildlife Refuge System with HCPs in many areas. These partnerships, although very effective, raise several important questions regarding the relationship between Federal habitat acquisition and HCP efforts.

Some have questioned government land acquisition programs in HCP planning areas, claiming that such programs, in effect, absolve private land developers of their obligations to mitigate the impacts of their activities on listed species. This misconception can be clarified by ensuring that the Federal activity of establishing a NWR, in conjunction with a HCP, does not obviate the habitat mitigation requirements for the incidental take permittee. Under section 10 of the Act, an incidental take permittee is required to "minimize and mitigate” the effects of his/her taking of listed species and the permittee has specific conservation responsibilities within any HCP program. The incidental take permittee **must** mitigate regardless of what is required of or carried

out by other entities within the HCP, to the extent deemed appropriate, as defined in an approved HCP.

The Service believes that HCPs and NWRs each have their respective roles in habitat conservation efforts and also believes that, in many cases, the two can work together to achieve greater results. However, because HCP efforts sometimes require a public agency funding component in establishing a preserve system, it is critically important to define the relationship between NWR and HCP efforts occurring in the same geographic area early in the planning process. Through proper planning and design a NWR and an HCP can be integrated so that greater benefits to the species can be achieved while, at the same time, the incidental take permittee fulfills their mitigation requirements under the HCP. In other cases, physical separation of the NWR and HCP can result in greater benefits to the species than would integration.

The following simple guidelines are provided for determining appropriate courses of action in cases involving establishment and management of NWRs and HCPs occurring in the same geographical area.

(1) The primary objective in deciding whether it is desirable to integrate any NWR within any HCP program is to maximize benefits to the species and the ecosystem upon which they depend.

(2) A NWR must not be established or managed to substitute for the mitigation required of an incidental take permittee, although the NWR may complement an HCP by helping to meet comprehensive conservation and recovery goals for the species or the ecosystem.

Additional guidance and examples can be found in the Service's Habitat Conservation Planning and Incidental Take Permit Processing Handbook.

Additional Guidance and Examples Detailing the Relationship of National Wildlife Refuges and Habitat Conservation Planning Efforts

In recent years, the Habitat Conservation Plan (HCP) program under section 10(a)(1)(B) of the Endangered Species Act has grown rapidly. At the same time, Congress and the Service have begun to play a larger role in helping to fund and support HCP efforts. For example, Congress appropriated funds to the Service to assist in development of the Brevard County HCP in Florida; these funds were subsequently distributed through a Service grant to the HCP applicant. In other cases, Congress has appropriated funds under the Land and Water Conservation Fund (LWCF) for habitat acquisition in areas where HCP efforts are also underway to maximize cooperative Federal, State, and local land protection efforts (e.g., in the Washington County HCP in Utah and Balcones Canyonlands HCP in Texas). By law, lands acquired by the Service with LWCF or Migratory Bird Funds, must be managed as part of the National Wildlife Refuge System (NWR).

These trends raise several important questions concerning the relationship between the two programs (i.e., habitat acquisition under privately funded HCP efforts and publicly funded NWRs) and how such programs should be jointly managed. Some have criticized government land acquisition programs in HCP planning areas, claiming that such programs, in effect, absolve private land developers of their obligations to mitigate the impacts of their activities on listed species.

The Service believes that HCPs and NWRs each have their respective roles in habitat conservation efforts and that the two can actually work together to achieve mutual goals. It is critically important to clearly define the relationship between a NWR and HCP efforts occurring in the same vicinity and establish to what extent and how the efforts may be complementary. However, the Federal activity of establishing a NWR should never be considered a substitute for the habitat mitigation requirements for the incidental take permittee that are established by the HCP.

This memorandum provides guidance that will help define the relationship between NWRs and HCPs occurring in the same geographic area, as well as to help determine how the programs should be managed. The guidance is provided to help determine the appropriate courses of action in cases involving joint establishment and management of NWRs and HCPs.

(1) The primary objective in integrating any NWR with any HCP program is to increase benefits to the species and the ecosystem upon which it depends. The option that most benefits the species is preferable.

(2) A NWR should not be established or managed to substitute for the mitigation required by an HCP, but may complement an HCP in meeting comprehensive conservation and recovery goals for the species or the ecosystem. Endangered species habitat acquisition under NWR and HCP programs that occurs in the same are generally is regarded as independent, but complimentary.

To the extent that establishment of a NWR helps a community initiate, complete, or maintain an HCP program by sharing the burden of habitat protection, it has contributed to species conservation and recovery. However, the Federal activity of establishing a NWR should never be considered a substitute for the habitat mitigation requirements for the incidental take permittee that are established by the HCP. Under section 10 of the Act, an incidental take permittee is required to "minimize and mitigate" the effects of its taking of listed species and the permittee has specific conservation responsibilities within any HCP program. It must be stressed that the incidental take permittee **must** mitigate regardless of what is required of or carried out by other entities in terms of habitat management and protection, to the extent deemed appropriate, as defined in an approved HCP.

When developing a NWR in conjunction with an HCP, the lands available to the incidental take permittee for mitigation purposes must be clearly identified in the HCP. The area targeted by the HCP for acquisition by the Service for the refuge is separate from the targeted for acquisition by the incidental take permittee to fulfill mitigation requirements. The lands acquired for mitigation purposes by the permittee could subsequently become part of the refuge and managed as such. Mitigation required by an HCP should compensate for lost habitat, whereas the establishment of the NWR in conjunction with an HCP should be complementary to the HCP, but should not be compensation for habitat lost through the HCP.

With respect to this guidance, the Service's first responsibility is to promote the conservation and recovery of endangered and threatened species, whereas the responsibility of the incidental take permittee is to meet the habitat mitigation requirements of the HCP. NWRs can clearly contribute to listed species recovery where they protect large or important listed species habitat areas. Large-scale regional HCPs, such as those in the Balcones Canyonlands, TX and Washington County, UT areas, also contribute to endangered species recovery by establishing predictable, enforceable conservation programs across large areas. If one program in an area helps listed species, two different, but complementary programs working together synergistically can support species recovery needs even more.

Through proper planning and design a NWR and an HCP can be integrated so that the species is conserved or recovered while, at the same time, the incident take permittee meets the mitigation requirements of the HCP. The integration of a NWR into an HCP can be accomplished, if the two are established through a coordinated effort and incorporated into the initial planning processes for the HCP. However, this is true only if the NWR and HCP are managed in a coordinated manner so the benefits so the benefits of both programs exceed the benefits of either program working alone. Maximum benefit for the species can be derived by cooperatively establishing a NWR that would help support a regional HCP initiative. The Federal activity of establishing a NWR, in conjunction with a HCP, does not replace the habitat mitigation requirements for the incidental take permittee. However, as part of the mitigation requirements and conditions of an HCP, permittees may purchase land specifically designated in the HCP, that eventually could become part of the NWR and be managed as such, if the plan is properly coordinated and planned.

Many factors can affect how Federal and private habitat protection efforts should be coordinated, and what is appropriate in one situation may not be appropriate in another. We believe the principles outlined above--adherence to the provisions of the HCP (particularly the mitigation requirement), adherence to the NWR's purpose, and cooperative efforts to increase the benefits to the species--should provide the basis for any future decisions of this type. The following two examples (i.e., independent project and complementary project) represent different relationships between NWRs and HCPs and illustrate why these relationships need to be defined on a case-by-case basis.

Independent Project: An HCP for the Balcones Canyonlands in Travis County, TX was initiated in 1988 to address the conservation needs of the golden-cheeked warbler, black-capped vireo, and several cave invertebrates. The draft Balcones HCP calls for acquisition by the permittee of approximately 30,500 acres of warbler and vireo habitat. Of this area, 22,000 acres has already been acquired. Meanwhile, in 1991, the Service decided to establish the Balcones Canyonlands NWR in the same vicinity as the Balcones HCP. The environmental assessment for the project, completed in December 1991, projected a 41,000-acre Refuge (an additional 5,000 acres was later authorized). The area targeted for refuge acquisition was separate from the area targeted by the HCP acquisition.

A potential conflict arose when a developer proposed to purchase private lands inside the Balcones NWR acquisition boundary for use as mitigation lands for development activities in the Balcones HCP area. The issue was whether the Service should accept private lands purchased inside the Refuge boundary as mitigation lands for purposes of the HCP.

Planners for both the HCP and NWR envisioned that the two programs would be independent with respect to land acquisition (i.e., Refuge acquisition would not occur in targeted HCP reserves and vice versa). The Golden-cheeked Warbler Recovery Plan, approved September 1992, divides the warbler's range into eight "recovery regions" and requires protection of sufficient breeding habitat to maintain a viable warbler population in each of these regions. Habitat areas targeted for acquisition under the Balcones HCP and NWR are in the same recovery plan region and both are necessary for fulfillment of the recovery goal for that region. This means that acquiring habitat independently under the two programs will best achieve golden-cheeked warbler recovery. Allowing “cross over,” or purchase inside the Refuge boundary by private developers, may ultimately slow or decrease progress toward recovery.

Based on these considerations, the Service did not allow land procurement for HCP mitigation purposes inside the boundary of the Balcones NWR and maintained the independence of the two programs. This does not mean that land purchases inside the Refuge boundary by private entities cannot occur, only that such purchases would not count toward the mitigation goals under the HCP.

Complementary Project: A complementary agreement is currently being developed between the Service and the private sector through the establishment of a NWR and an HCP in southern California. The goal of this specific HCP is to conserve 87 listed and non-listed species within a 164,000 acre preserve in southern San Diego County. To accomplish this goal, the Service has

entered into the preserve process both in its Federal capacity and as a partner. The Service has committed funds, land, and personnel to the planning and implementation process of the preserve.

The Federal government's contribution to the San Diego habitat protection effort will include a variety of activities. In addition to participation with the local communities on developing a Multiple Species Conservation Planning (MSCP) effort, the Federal government will also be a land manager. Lands currently administered by the Bureau of Land Management (BLM) will become a part of the overall habitat preserve. The Service is planning to establish the San Diego National Wildlife Refuge, and lands that would be acquired with LWCF or other sources within the San Diego NWR boundary, which partially overlays the proposed preserve, will become part of the NWR. The Federal activities associated with establishment, acquisition and management of the NWR, in conjunction with San Diego's HCP, will not replace the mitigation requirements of incidental take permittees in the HCP.

The expectation is that the overall preserve will consist of a mosaic of ownerships, including land acquired by the HCP incidental take permittees, local governments, State resource agencies, and the Federal government, including the Service. The approved refuge boundary would also likely consist of a mosaic of ownerships. BLM lands within the boundary may have management responsibilities transferred to the Service; State and local government agencies may enter into cooperative management agreements with the Service for management of their properties; and lands acquired by other entities to meet mitigation requirements of the HCP for off-site development may also be included. Entities may enter into mitigation banking agreements with the Service by purchasing lands within the refuge boundary, transferring title to the Service for management and credit for future mitigation needs, under an approved HCP or other agreements. The area will also contain inholdings of privately-owned lands, some of which may be contributed to the preserve as mitigation for on-site land disturbances. The Service will prioritize the private land holdings within the refuge boundary and seek to purchase lands or conservation easements from willing sellers as funding is available. The NWR will also focus on providing connecting links between habitats protected through the overall HCP/refuge preserve. These links are essential for the MSCP and for the conservation of the whole ecosystem upon which the threatened and endangered species depend.

When Congress enacted the HCP provisions into law in 1982, it stressed the need for developing "creative partnerships" between the public and private sector in resolving endangered species issues, especially on private lands. We believe that establishing and managing NWRs within the vicinity of HCP planning areas based on the principles outlined above is consistent with the intent of the HCP process and the Service's mission to protect and recover federally listed species.

APPENDIX 7:

Safe Harbor Policy

Federal Register

Thursday
June 12, 1997

Part III

Department of the Interior

Fish and Wildlife Service

Department of Commerce

National Oceanic and Atmospheric Administration

50 CFR Parts 13 and 17

Announcements: Draft Safe Harbor Policy and Candidate Conservation Agreements Draft Policy, Notices; and Safe Harbor and Candidate Conservation Agreements; Proposed Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

Announcement of Draft Safe Harbor Policy

AGENCY: Fish and Wildlife Service, Interior; National Marine Fisheries Service, NOAA, Commerce.

ACTION: Announcement of draft policy; request for public comments.

SUMMARY: The Fish and Wildlife Service and the National Marine Fisheries Service (Services) announce a joint Draft Safe Harbor Policy under the Endangered Species Act of 1973, as amended (Act). Many endangered and threatened species occur exclusively or to a large extent upon privately owned property; the involvement of the private sector in the conservation and recovery of species is critical to the eventual success of these efforts. This policy would provide incentives for private and other non-Federal property owners to restore, enhance or maintain habitats for listed species. Either Service, or the Services jointly, will closely coordinate with the appropriate State agencies and any affected Native American Tribal governments before entering into Safe Harbor Agreements (Agreements). Under the policy, either Service, or the Services, jointly, would provide participating property owners with technical assistance in the development of Agreements and would provide assurances that additional land-use or resource-use restrictions as a result of their voluntary conservation actions to benefit covered species would not be imposed. If the Agreement provides a net conservation benefit to the covered species and the property owner meets all the terms of the Agreement, the Services would authorize the incidental taking of the covered species to enable the property owner to ultimately return the enrolled property back to agreed upon baseline conditions. The Services seek public comment on the draft policy. Additionally, the Fish and Wildlife Service (FWS) has published in today's **Federal Register** a proposed rule that contains the necessary regulatory changes to implement this policy. The Services also seek public comment on the appropriateness of allowing a property owner to enter into a Safe Harbor Agreement in conjunction with a Habitat Conservation Plan (HCP) under section 10(a)(1)(B) of the Act.

DATES: Comments on the draft policy must be received by August 11, 1997.

ADDRESSES: Send any comments or materials concerning the Draft Safe Harbor Policy to the Chief, Division of Endangered Species, U.S. Fish and Wildlife Service, 452 ARLSQ, Washington, D.C. 20240 (Telephone 703/358–2171, Facsimile 703/358–1735) You may examine comments and materials received during normal business hours in room 452, Arlington Square Building, 4401 North Fairfax Drive, Arlington, Virginia. You must make an appointment to examine these materials.

FOR FURTHER INFORMATION CONTACT: E. LaVerne Smith, Chief, Fish and Wildlife Service, Division of Endangered Species (Telephone (703)358–2171) or Nancy Chu, National Marine Fisheries Service, Chief, Endangered Species Division (Telephone (301) 713–1401).

SUPPLEMENTARY INFORMATION:

Background

Much of the nation's current and potential fish and wildlife habitat is on non-Federal property, owned by private citizens, States, municipalities, Native American Tribal governments, and other non-Federal entities. Conservation efforts on non-Federal property are critical to the survival and recovery of many endangered and threatened species. The Services strongly believe that a collaborative stewardship approach to the proactive management of listed species involving government agencies (Federal, State, and local) and the private sector is critical to achieving the ultimate goal of the Endangered Species Act (Act). The long-term recovery of certain species can benefit from short-term and mid-term enhancement, restoration, or maintenance of terrestrial and aquatic habitats on non-Federal property.

Many property owners are willing to voluntarily manage their property to benefit listed fish and wildlife, provided that such actions do not result in new restrictions being placed on the future use of their property. Beneficial management could include actions to enhance, restore, or maintain habitat (e.g., restoring fire by prescribed burning, restoring hydrological conditions), so that it is suitable for listed species. Such proactive management actions cannot be mandated or required by the Act. Thus, failure to conduct habitat enhancement or restoration activities would not violate any of the Act's provisions. Although property owners recognize the benefits of proactive habitat conservation activities to help listed species, some are still concerned about additional land-use or resource-use restrictions that may result if listed species colonize their property or increase in numbers or distribution because of their conservation efforts. Concern centers on the applicability of the Act's section 9 ''take'' prohibitions if listed species occupy their property and on future property-use restrictions that may result from their conservation-oriented property management actions. The potential for future land- or resource-use restrictions has led property owners to avoid or limit property management practices that could enhance or maintain habitat and benefit or attract fish and wildlife that are currently Federally listed as endangered or threatened.

A fundamental purpose of section 2 of the Act, is to conserve the ecosystems upon which endangered and threatened species depend and to conserve listed species. Section 9 of the Act prohibits the ''take'' of listed fish and wildlife species, which is defined in section 3(18) to include, among other things, killing, harming or harassing. The Act's implementing regulations (50 CFR 17.3), as promulgated by the FWS, define ''harm'' to include ''significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding and sheltering.'' Regulations in 50 CFR 17.31 extend the prohibition against take to threatened fish and wildlife species. Consequently, property owners whose properties support endangered or threatened species could violate section 9 of the Act if the property owners significantly develop, modify, or manage those properties in a way that causes harm to listed species.

The Services' draft Safe Harbor Policy encourages property owners to voluntarily conserve threatened and endangered species without the risk of further restrictions pursuant to section 9. Previously the FWS has provided safe harbor type assurances to non-Federal property owners based on various authorities under the Act, including incidental take statements under section 7(a)(2) and incidental take permits under section 10(a)(1)(B). After further consideration of such alternatives and other provisions of the Act, the Services have determined that the section 10(a)(1)(A) ''enhancement of survival'' permit provisions of the Act provide the best mechanism to carry out the Safe Harbor Policy and provide the necessary assurances for participating property owners while also providing conservation benefits to the covered species. Assurances already provided by

the FWS under sections 7 or 10(a)(1)(B) would still be valid, and revision of those proactive Agreements is unnecessary. The Services are developing this policy to provide national consistency in the development of Safe Harbor Agreements and link the policy to an expanded enhancement of survival permit program through section 10(a)(1)(A) of the Act.

The FWS's proposed regulatory changes necessary to implement this draft policy were published in today's **Federal Register**. The proposed rule provides the FWS's procedures to implement the Safe Harbor Policy as well as other changes to Parts 13 and 17. The National Marine Fisheries Service will develop and propose regulatory changes to implement this policy at a later date.

Draft Safe Harbor Policy

Part 1. Purpose

Because many endangered and threatened species occur exclusively, or to a large extent, upon privately owned property, the involvement of the private sector in the conservation and recovery of species is critical to the eventual success of these efforts. Private property owners are willing to be partners in the conservation and recovery of fish, wildlife, and plant species and their habitats. However, property owners often are reluctant to undertake proactive activities that increase the likelihood or extent of use of their properties by endangered and threatened species, due to fear of future additional property-use restrictions. Safe Harbor Agreements are a means of providing an incentive to property owners to restore, enhance, or maintain habitats resulting in a net conservation benefit to endangered and threatened species. Although such Agreements may not permanently conserve such habitats, they nevertheless offer important short-term and mid-term conservation benefits. These net conservation benefits may result from reduction of fragmentation and increasing the connectivity of habitats, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, and creating areas for testing and implementing new conservation strategies.

The purpose of the Safe Harbor Policy is to ensure consistency in the development of Safe Harbor Agreements. Safe Harbor Agreements encourage proactive species conservation efforts by private and other non-Federal property owners while providing certainty relative to future property-use restrictions, if these efforts attract listed species onto their properties, or areas affected by actions undertaken on their property, or increase the numbers or distribution of listed species already present on their properties. These voluntary Agreements will be developed between, either Service, or the Services jointly, and private and other non-Federal property owners. The Services will closely coordinate development of these Agreements with the appropriate State fish and wildlife or other agencies and any affected Native American Tribal governments. Collaborative stewardship with State fish and wildlife agencies is particularly important given the partnerships that exist between the States and the Services in recovering listed species. Under a Safe Harbor Agreement, participating property owners would voluntarily undertake management activities on their property to enhance, restore, or maintain habitat to benefit Federally-listed species.

Safe Harbor Agreements may be initiated by property owners, or, either Service or the Services jointly, may take the initiative on their own or in concert with other Federal or State agencies to encourage property owners to voluntarily enter Safe Harbor Agreements for a given area, particularly when many non-Federal parcels of property are involved. Either Service or the Services jointly, will work with the participating landowner in the development of their permit application and the Safe Harbor Agreement. The Services will provide the necessary technical assistance to the landowner in developing mutually agreeable management actions that the landowner is willing to voluntarily undertake or forgo that will provide a net conservation benefit and help the landowner describe how these activities will benefit covered species. Development of an acceptable permit application and an adequate Safe Harbor agreement is intricately linked. Either Service or the Services jointly will process the participating landowner's permit application following the Safe Harbor permitting process as described in Title 50 of the Code of Federal Regulations Part 17. During this process all parties to the Agreement will work in close coordination in the development of the Agreement to ensure that measures included in the agreement are consistent with the terms and conditions of the permit. Once the permit is issued the parties to the Agreement can finalize and sign the Agreement.

The Services recognize that Safe Harbor Agreements are not appropriate under all circumstances. In particular, in situations when property owners are seeking immediate take authorization, development of a Habitat Conservation Plan (HCP) and issuance of an incidental take permit under section 10(a)(1)(B) would be more appropriate. Safe Harbor Agreements are also not appropriate in situations that do not meet the net conservation benefit standards of this policy. For example, where either Service or the Services jointly, reasonably anticipate that a proposed Agreement would only redistribute the existing population of a listed species or attract a species away from a habitat that enjoys long-term protection to a habitat without such protection, the Services would not enter into the Agreement. As another example, where a species is so depleted or its habitat so degraded that some improvement over baseline conditions is necessary to result in a net conservation benefit, a Safe Harbor Agreement may not be appropriate. For instance, certain aquatic, riverine, and/or riparian species may present a challenge in reaching a net conservation benefit since returning to the baseline conditions could have serious negative effects and would negate or outweigh the benefits achieved through the Agreement. In these cases, if a net conservation benefit cannot be achieved after taking into consideration the return to the baseline conditions, the Services will not enter into a Safe Harbor Agreement unless the Services and the property owner agree to appropriate conditions that provide such a benefit.

Availability of resources will also be a governing factor for the Services. The Services expect the interest in Safe Harbor Agreements to rise and the demand for technical assistance to property owners to increase. Safe Harbor Agreements are developed using limited funds appropriated for recovery activities. Priority will, therefore, be given to Agreements that provide the greatest contribution to the recovery of multiple listed species. Another governing factor will be whether there is sufficient information to develop sound conservation measures. The Services will work with State, Tribal, and other interested parties to fill information gaps for species requirements that have not been adequately documented in the scientific literature.

Part 2. Definitions

The following definitions apply for the purposes of this policy.

''Baseline conditions'' for covered species means population estimates and distribution (if available or determinable) and/or habitat

characteristics of enrolled property that sustain seasonal or permanent use, at the time the Safe Harbor Agreement is executed between either Service or the Services jointly and the property owner.

''*Covered species*'' means a species that is the intended subject of a Safe Harbor Agreement. Covered species are limited to species that are Federally listed as endangered or threatened.

''*Enhancement of Survival Permit*'' means a permit issued under the authority of section 10(a)(1)(A) of the Act.

''*Enrolled property*'' means all private or non-Federal property or waters covered by a Safe Harbor Agreement to which safe harbor assurances apply and on which incidental taking is authorized under the enhancement of survival permit.

''*Management activities*'' are voluntary conservation actions to be undertaken by a property owner that either Service or the Services jointly believe will benefit the status of the covered species.

''*Net conservation benefit*'' means the cumulative results of the management activities identified in an Agreement that provide for an increase in a species' population and/or the enhancement, restoration or maintenance of covered species' suitable habitat within the enrolled property, taking into account the length of the Agreement and the incidental taking allowed by the permit. Net conservation benefits must be sufficient to contribute to the recovery of the covered species if undertaken by other property owners similarly situated within the range of the covered species.

''*Property owner*'' includes, but is not limited to, private individuals, organizations, businesses, Native American Tribal governments, State and local governments, and other non-Federal entities.

''*Safe Harbor Agreement*'' means an Agreement signed by either Service, or both Services jointly and a property owner and any other cooperator, if appropriate, that: (a) Sets forth specific management activities that the private or non-Federal property owner will voluntarily undertake or forgo that will provide a net conservation benefit to covered species; and (b) provides the property owner with the Safe Harbor assurances described within the Agreement and authorized in the enhancement of survival permit.

''*Safe Harbor Assurances*'' are assurances provided in the Agreement and authorized in the enhancement of survival permit for covered species, by either Service, or both jointly, to a non-Federal property owner. These assurances would allow the property owner to alter or modify enrolled property, even if such alteration or modification will result in the incidental take of a listed species that would return the species back to the originally agreed upon baseline conditions. Such assurances may apply to whole parcels, or portions thereof, of the property owner's property as designated in the Agreement. These assurances are dependent upon compliance with the property owners' obligations in the Agreement and in the enhancement of survival permit.

Part 3. Cooperation and Coordination With the States and Tribes

Coordination with the appropriate State agencies and any affected Tribal governments is critical for the success of the Services' collaborative stewardship approach to recovery through these Safe Harbor Agreements, which is the underlying principle of the Safe Harbor Policy. Coordination among the State fish and wildlife agencies, Tribal governments, the Services, and the property owners are key to effectively implementing a successful Safe Harbor Agreement. This coordination allows the special local knowledge of all appropriately affected entities to be considered in the Agreements. The Services will work in close partnership with State agencies on matters involving the distribution of materials describing the Safe Harbor Agreement policies and programs, the determination of acceptable baseline conditions and development of appropriate monitoring efforts. Because of the Services' trust responsibilities, the Services will also closely coordinate and consult with any affected Tribal government which has a treaty right to any fish or wildlife resources covered by a Safe Harbor Agreement.

Part 4. Species Net Benefit From Safe Harbor Agreements

Before entering into any Safe Harbor Agreement, either Service, or the Services jointly, must make a written finding that all covered species would receive a net conservation benefit from management actions undertaken pursuant to the Agreement. Net conservation benefits must contribute to the recovery of the covered species. Although a Safe Harbor Agreement does not have to provide permanent conservation for enrolled property, Agreements must nevertheless be of sufficient design and duration to provide a net conservation benefit to all covered listed species.

Conservation benefits from Safe Harbor Agreements may include reduction of habitat fragmentation rates; the maintenance, restoration or enhancement of habitats; increase in habitat connectivity; maintenance or increase of population numbers or distribution; reduction of the effects of catastrophic events; establishment of buffers for protected areas; and establishment of areas to test and develop new and innovative conservation strategies. The Services believe a ''net conservation benefit'' test is necessary to justify the issuance of an enhancement of survival permit under section 10(a)(1)(A) of the Act. The contribution to the recovery of listed species by Safe Harbor Agreements must be evaluated carefully, since realized benefits from these agreements will be affected by the duration of the Agreement.

The Services believe that there are many listed species that will benefit from management actions carried out for the duration of Safe Harbor Agreements even if there is a return to baseline conditions. Returning the habitat or population numbers to the baseline conditions must be possible without negating the net conservation benefit provided by the Agreement. If this net conservation benefit standard cannot be met, then the Services will not enter into the Agreement. For example, where the Services reasonably anticipate that a proposed Agreement would only redistribute the existing population of a listed species or attract a species away from a habitat that enjoys long-term protection to a habitat without such protection, the Services would not enter into the Agreement. Aquatic, riverine, and/or riparian species may present an additional challenge in reaching a net conservation benefit since returning to the baseline conditions could have a serious negative effect and would negate or outweigh the benefits achieved through the Agreement. In these cases, if a net conservation benefit cannot be achieved, and still allow for the return to the baseline conditions, the Services will not enter into a Safe Harbor Agreement.

Part 5. Standards for and Development of a Safe Harbor Agreement and Permit Issuance Under Section 10(a)(1)(A) of the Act

A property owner may obtain a permit to incidentally take a listed species of fish and wildlife above the agreed upon baseline conditions of the Safe Harbor Agreement, if the Agreement satisfies the following requirements:

The Agreement must—

(1) Specify the species and/or habitats and identify the enrolled property covered by the Agreement;

(2) Describe the agreed upon baseline conditions for each of the covered species within the enrolled property;

(3) Identify management actions that would accomplish the expected net conservation benefits to the species and the agreed upon timeframes for these management actions to remain in effect in order to achieve the anticipated net conservation benefits;

(4) Describe the anticipated results of the management actions and any incidental take associated with the management actions;

(5) Incorporate a notification requirement, where appropriate and feasible, to provide either Service, or Services jointly, or appropriate State agencies with a reasonable opportunity to rescue individual specimens of a covered species before any authorized incidental taking occurs;

(6) Describe the nature of the expected incidental take upon termination of the Agreement (i.e., back to baseline conditions);

(7) Satisfy other requirements of section 10 of the Act; and

(8) Identify the responsible parties that will monitor maintenance of baseline conditions, implementation of terms and conditions of the Agreement, and any incidental take as authorized in the permit.

Issuance of a Safe Harbor permit by the Services is subject to consultation under the intra-Service consultation provisions of section 7 of the Act.

Part 6. Baseline Conditions

Either Service, or the Services jointly, the property owner, and any other cooperator(s) must accurately describe the baseline conditions for the property and species covered by the Safe Harbor Agreement to ensure that the Agreement will not reduce current protection for covered species that presently may use the enrolled property, or result in additional restrictions for such species beyond the baseline conditions. The baseline conditions must reflect the known biological and habitat characteristics that are necessary to support existing levels of use of the property by species covered in the Agreement. However, in light of circumstances beyond the control of the property owner (e.g., loss of nest trees due to storm damage), the parties to the Agreement may revise the baseline conditions to reflect the new circumstances and may develop a new baseline upon which all parties agree.

(A) Determining the Baseline Conditions

This Policy requires a full description of baseline conditions for any species covered in an Agreement (see Part 5 above). Either Service or the Services jointly, or appropriate State or Tribal agencies, with the concurrence of the participating property owner, will describe the baseline conditions for the enrolled property in terms appropriate for the covered species such as: number and location of individual animals, if available or determinable; necessary habitat characteristics that support the species covered by the Agreement; and other appropriate attributes. On-site inspections, maps, aerial photographs, remote sensing, or other similar means can help determine baseline conditions. To the extent determinable, the parties to the Agreement must identify and agree on the level of occupation (permanent or seasonal) by covered species on the enrolled property. For species that are extremely difficult to survey and quantify, an estimate or an indirect measure (e.g., number of suitable acres of habitat needed to sustain a member of the species) is acceptable. Either Service or the Services jointly, will develop the estimate following a protocol agreed upon by all parties to the Agreement. Baseline conditions are then set, based upon the agreed upon measurements or estimates. Either Service or the Services jointly, the property owner or the property owner and any other appropriate agency or government acting in cooperation with either Service or the Services jointly, may determine the baseline conditions. When either Service does not directly determine the baseline conditions, they must review and concur with the determination before entering into an Agreement. Formulation of baseline conditions can incorporate information provided by the property owner, any other appropriate agency, or species experts, as appropriate.

(B) Plants

The Act's ''take'' prohibitions generally do not apply to listed plant species on private property. Therefore, the incidental take assurances provided in this policy are usually not necessary for listed plant species. However, the Services strongly encourage and often enter into Agreements with non-Federal property owners to restore and enhance habitats for listed plants.

Either Service or the Services jointly, must review the effects of their own actions (e.g., issuance of a permit) on listed plants, even when those plants are found on private property under section 7 of the Act. In approving an enhancement of survival permit and entering into a Safe Harbor Agreement, either Service or the Services jointly, must also confirm under section 7 that the Agreement will not ''jeopardize the continued existence'' of listed plants. In the interest of conserving listed plants and complying with their responsibilities under section 7, either Service or the Services jointly, may negotiate with the property owner to voluntarily assist the Services in restoring or enhancing listed plant habitats present within the enrolled property.

(C) Future Section 7 Considerations and Assurances

Before entering into a Safe Harbor Agreement, the either Service or the Services jointly, must conduct an intra-Service section 7 review. During that process, either Service or the Services jointly, must determine that future property use changes within the enrolled property and incidental take consistent with the established baseline conditions will neither jeopardize listed species of fish and wildlife or plants, nor destroy or adversely modify critical habitat at the time of signing the Agreement. If a future Federal nexus to the enrolled property prompts the need for a section 7 review and take of the listed species above the baseline conditions is likely, either Service or the Services jointly, will issue a non-jeopardy biological opinion and incidental take statement to the Federal action agency. As required by section 7 and its implementing regulations, either Service or the Services jointly, will also provide the Federal agency with reasonable and prudent measures that are necessary or appropriate to minimize the effects of the action. Those measures will only require implementation of the same terms and conditions provided to the participating landowner in his/her Safe Harbor Agreement and associated 10(a)(1)(a) permit. This approach is warranted and consistent with section 7 consultation procedures because the effects of any incidental take consistent with the established baseline conditions would have been previously considered during the Services' intra-agency section 7 review for the proposed Agreement.

Part 7. Assurances to Property Owners

A property owner who enters an Agreement and wishes to return enrolled property to the baseline conditions would need to show that the agreed upon baseline conditions were maintained and that activities identified in the Agreement as necessary to achieve the net conservation benefit were carried out for the duration of the agreement. If the property owner carried out the management actions and complied with the permit and the

Agreement conditions, the property owner would be authorized to utilize his/her property in a manner which returns the enrolled property to baseline conditions.

Part 8. Occupation by Non-Covered or Newly Listed Species

After an Agreement is signed and an enhancement of survival permit is issued, a species not addressed in the Agreement may occupy enrolled property. If either Service or the Services jointly, conclude that the species is present as a direct result of the property owner's conservation actions taken under the Agreement, either Service or the Services, will:

(1) At the request of the property owner, amend the Agreement to reflect the changed circumstances and revise the baseline condition description, as appropriate; and

(2) Review and revise the permit, as applicable, to address the presence of additional listed species on enrolled property.

Assurances in the permit may not necessarily be extended to a non-covered species if the species was specifically excluded from the original Agreement as a result of the participating property owner's request, or its presence is a result of activities not directly attributable to the property owner. In these cases, enhancement or maintenance actions that are specific to the non-covered species under consideration must be developed, and baseline conditions determined that will provide a net conservation benefit to that species.

Any substantial change to a Safe Harbor Agreement or a revision to an enhancement of survival permit because of non-covered species would be subject to the same review process (i.e., section 7 of the Act or public review) as the original Safe Harbor agreement and enhancement of survival permit.

Part 9. National Environmental Policy Act Compliance

The National Environmental Policy Act of 1969 (NEPA), as amended, and the regulations of the Council on Environmental Quality (CEQ) require all Federal agencies to examine the environmental impact of their actions, to analyze a full range of alternatives, and to utilize public participation in the planning and implementation of their actions. The purpose of the NEPA process is to help Federal agencies make better decisions and to ensure that those decisions are based on an understanding of environmental consequences. Federal agencies can satisfy NEPA requirements by either a Categorical Exclusion, Environmental Assessment (EA), or Environmental Impact Statement (EIS), depending on the effects of their proposed action.

Either Service or the Services jointly, will review each permit action for other significant environmental, economic, social, historical or cultural impact, or for significant controversy (516 DM 2, Appendix 2 for FWS and NOAA's Environmental Review Procedures and NOAA Administrative Order Series 216–6). If either Service or the Services jointly, expect that significant impact could occur, the issuance of a permit would require preparation of an EA or EIS. General guidance on when the Services exclude an action categorically and when and how to prepare an EA or EIS is found in the FWS's Administrative Manual (30 AM 3) and NOAA Administrative Order Series 216–6. If a Safe Harbor Agreement/permit is not expected to individually or cumulatively have a significant impact on the quality of the human environment, then the Agreement/permit may be categorically excluded.

Part 10. Transfer of Ownership

If a property owner who is party to a Safe Harbor Agreement transfers ownership of the enrolled property, either Service or the Services, will regard the new owner as having the same rights and obligations with respect to the enrolled property as the original property owner if the new property owner agrees to become a party to the original Agreement. Actions taken by the new participating property owner that result in the incidental take of species covered by the Agreement would be authorized if the new property owner maintains the baseline conditions. The new property owner, however, would neither incur responsibilities under the Agreement nor receive any assurances relative to section 9 restrictions from the Agreement unless the new property owner becomes a party to the Agreement.

A Safe Harbor Agreement must commit the participating property owner to notify the Services of any transfer of ownership at the time of the transfer of any property subject to the Agreement. This will allow the Services to contact the new property owner to explain the prior Safe Harbor Agreement and to determine whether the new property owner would like to continue the original Agreement or enter a new Agreement. When a new property owner continues an existing Safe Harbor Agreement, either Service or the Services jointly, will honor the baseline conditions for the enrolled property under consideration.

Part 11. Property Owner Discretion

Nothing in this policy prevents a participating property owner from implementing management actions not described in the Agreement, so long as such actions maintain the baseline conditions. Either Service or the Services jointly, will provide technical advice, to the maximum extent practicable, to the property owner when requested.

Part 12. Discretion of All Parties

Nothing in this policy compels any party to enter a Safe Harbor Agreement at any time. Entering a Safe Harbor Agreement is voluntary and presumes that the Agreement will serve the interests of all affected parties. Unless specifically noted, an Agreement does not otherwise create or waive any legal rights of any party to the Agreement.

Part 13. Scope of Policy

This policy applies to all federally-listed species of fish and wildlife administered by either Service or the Services jointly, as provided in the Act and its implementing regulations.

Required Determinations

A major purpose of this proposed policy is the facilitation of voluntary cooperative programs for the proactive management of non-Federal lands and waters for the benefit of listed species. From the Federal Government's perspective, implementation of this policy would result in minor expenditures (e.g., providing technical assistance in the development of site-specific management plans). The benefits derived from such management actions on non-Federal lands and waters would significantly advance the recovery of listed species. Non-Federal program participants would be provided regulatory certainty as a result of their voluntary management actions. In some cases, such participants may incur minor expenditures to carry out some management actions on their lands or involving their water. The Services have determined that the proposed policy would not result in significant costs of implementation to the Federal Government or to non-Federal program participants.

The Director of the Fish and Wildlife Service certified to the Chief Counsel for Advocacy of the Small Business Administration that a review under the Regulatory Flexibility Act of 1980 (5 U.S.C. 601 et seq.) has revealed that this policy would not have a significant effect on a substantial number of small

entities, which includes businesses, organizations, or governmental jurisdictions. Because of the completely voluntary nature of the Safe Harbor program, no significant effects are expected on non-Federal cooperators exercising their option to enter into a Safe Harbor Agreement. Therefore, this policy would have minimal effect on such entities.

This policy has been determined to be not significant for purposes of Executive Order 12866. Therefore, it was not subject to review by the Office of Management and Budget.

The Services have determined and certify pursuant to the Unfunded Mandates Act, 2 U.S.C. 1502 *et seq.*, that this proposed policy will not impose a cost of $100 million or more in any given year on local or State governments or private entities. The Departments have determined that these proposed policy meets the applicable standards provided in sections 3(a) and 3(b)(2) of Executive Order 12988.

The Services have examined this proposed policy under the Paperwork Reduction Act of 1995 and found it to contain no requests for additional information or increase in the collection requirement other than those already approved under the Paperwork Reduction Act of 1995 for incidental take permits with OMB approval #1018–0022 which expires July 31, 1997. The Service requested renewal of the OMB approval and in accordance with 5 CFR 1320 will not continue to collect the information, if the approval has expired, until OMB approval has been obtained.

The Department has determined that the issuance of the proposed policy is categorically excluded under the Department of Interior's NEPA procedures in 516 DM 2, Appendix 1.10. NMFS concurs with the Department of Interior's determination that the issuance of the proposed policy qualifies for a categorical exclusion and falls within the categorical exclusion criteria in NOAA 216–3 Administrative Order, Environmental Review Procedure.

Public Comments Solicited

The Services request comments on their Draft Safe Harbor Policy. Particularly sought are comments on the procedures or methods for enhancing the utility of the Safe Harbor Policy in carrying out the purposes of the Act.

The Services also are interested in the views of interested parties on the appropriateness of linking ''Safe Harbor'' Agreements to incidental take permits issued under section 10(a)(1)(B) of the Act. In certain situations, HCP permittees might be willing to conduct activities that would enhance listed species populations above their mitigation obligations under an incidental take permit or HCP. The Services are interested in ideas, comments, and suggestions on this concept. The Services also are requesting ideas, comments or suggestions on how to delineate the baseline conditions for a Safe Harbor Agreement that is linked to an HCP incidental take permit. After consideration of all comments received on this question, the Services will decide whether it is appropriate to utilize Safe Harbor Agreements in connection with HCPs.

If the Services decide that it is appropriate to provide these assurances to incidental take permittees, the Services will publish a proposed policy on how best to provide such assurances.

In addition, situations may arise where a property owner may want to recover or conserve numerous species, both listed and unlisted on their property, and may want to enter into both a Safe Harbor Agreement and a Candidate Conservation Agreement. The Services are also seeking comments, and are interested in ideas and suggestions on the ways to streamline and combine these processes when developing these two types of agreements with the same property owner.

The Services will take into consideration the comments and any additional information received by the Services by August 11, 1997. To ease review and consideration of submitted comments, the Services prefer that reviewers organize their comments by part (e.g., Part 1. Purpose, Part 2. Definitions, and linking Safe Harbor Agreements with HCP permits).

Dated: May 27, 1997.

John G. Rogers,

Acting Director, Fish and Wildlife Service.

Dated: June 2, 1997.

Rolland A. Schmitten,

Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration.

[FR Doc. 97–15250 Filed 6–9–97; 1:26 pm]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

Announcement of Draft Policy for Candidate Conservation Agreements

AGENCY: Fish and Wildlife Service, Interior; National Marine Fisheries Service, NOAA, Commerce.

ACTION: Announcement of draft policy; request for public comments.

SUMMARY: The Fish and Wildlife Service and the National Marine Fisheries Service (Services) announce a joint Draft Policy for Candidate Conservation Agreements (Agreements) under the Endangered Species Act of 1973, as amended (Act). This policy would provide incentives for private and other non-Federal property owners, and State and local land managing agencies, to restore, enhance, or maintain habitats for proposed, candidate and certain other unlisted species. Candidate Conservation Agreements would be developed by participating property owners or State or local land managing agencies to remove the need to list the covered species as threatened or endangered under the Act. The Services will coordinate closely with the appropriate State agencies and any affected Native American Tribal governments before entering into Candidate Conservation Agreements with property owners to conserve covered species.

Under this policy, either Service, or the Services jointly, would provide participating property owners and State and local land managing agencies with technical assistance in the development of Candidate Conservation Agreements and would provide assurances that, if covered species are eventually listed, the property owners or agencies would not be required to do more than those actions agreed to in the Candidate Conservation Agreement. If a species is listed, incidental take authorization would be provided to allow the property owner or agency to implement management activities that may result in take of individuals or modification of habitat consistent with those levels agreed upon and specified in the Agreement.

Published concurrently in this **Federal Register** are the Fish and Wildlife Service's (FWS) proposed regulations necessary to implement this policy. The Services seek public comment on this proposed draft policy.

APPENDIX 8:

Example of an Integrated HCP/EA

Environmental Assessment/
Habitat Conservation Plan for
Issuance of an Endangered Species Section
10(a)(1)(B) Permit for the Incidental Take of the
Golden-cheeked Warbler (*Dendroica chrysoparia*)
for Construction of a Single Family Residence on
_ acres on (LOCATION), Austin, Travis County, Texas

U.S. Fish and Wildlife Service
Ecological Services
10711 Burnet Road, Suite 200
Austin, Texas 78758

(DATE)

COVER SHEET

Title for Proposed Action: Issuance of Endangered Species Act section 10(a)(1)(B) permit allowing incidental take of the endangered golden-cheeked warbler (*Dendroica chrysoparia*) during construction of a single family residence on ___ acres on **(LOCATION)**, Austin, Travis County, Texas.

Unit of Fish and Wildlife Service Proposing Action: Permits Branch, U.S. Fish and Wildlife Service, P.O. Box 329, Albuquerque, New Mexico 87103

Legal Mandate for Proposed Action: Endangered Species Act of 1973, as amended, section 10(a)(1)(B), as implemented by 50 CFR 17.22 for endangered species.

Document Author: **(BIOLOGIST NAME)**, Ecological Services, U.S. Fish and Wildlife Service, 10711 Burnet Road, Suite 200, Austin, Texas 78758.

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1.0 INTRODUCTION

(APPLICANT'S NAME) (Applicant) proposes to construct a single family residence on __ acres on **(LOCATION)**, Austin, Travis County, Texas, (Figure 1).

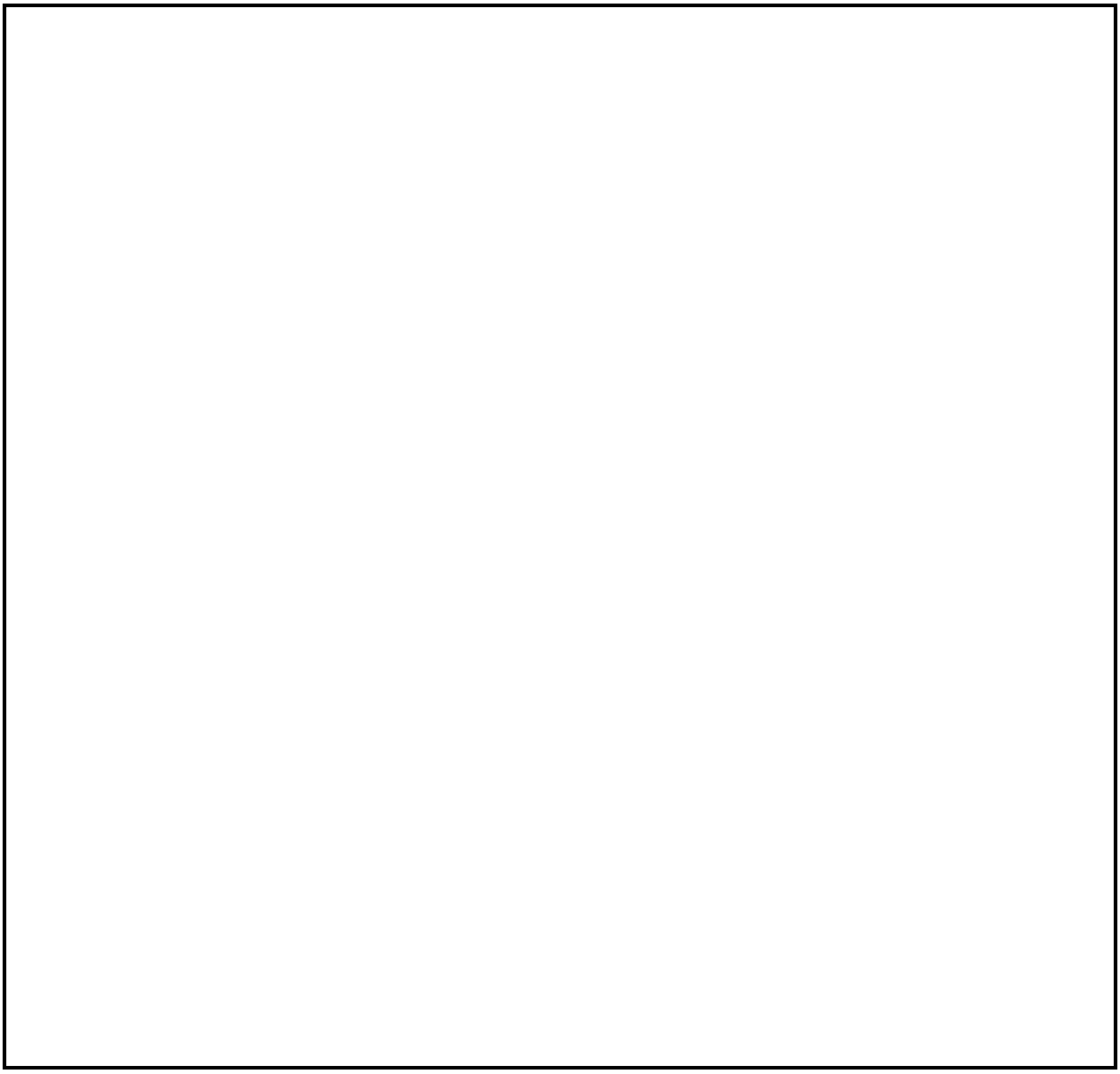


Figure 1. General location of property in Austin, Travis County, Texas.

The golden-cheeked warbler (warbler) (*Dendroica chrysoparia*), a listed endangered song bird, has been documented to use portions of, or the immediate vicinity of the subject tract. Upon review of biological information submitted by the Applicant and other sources, the U.S. Fish and Wildlife Service (Service) has determined that the proposed development would result in an incidental take of the warbler and the Applicant has submitted the necessary 3-200 form for a permit under section 10(a)(1)(B) of the Endangered Species Act (Act) for incidental taking.

This document provides the required National Environmental Policy Act (NEPA) documentation for a Federal action (section 10(a)(1)(B) permit issuance) and the components of a Habitat Conservation Plan (HCP) as mandated by section 10 of the Act.

The duration of this section 10(a)(1)(B) permit **(PRT-)** is for __ years from the date is issuance. This allows the Applicant or their successors to take the golden-cheeked warbler within the geographic boundaries identified in the HCP over that time period. After the expiration of this permit, any "take" within the said geographic boundaries requires reauthorization. However, the term and conditions contained in the HCP do not expire and would be covered by the enforcement authority of section 11(b) of the Endangered Species Act.

2.0 PURPOSE AND NEED FOR ACTION

The purpose of this Environmental Assessment/Habitat Conservation Plan (EA/HCP) is to evaluate the environmental impacts of the proposed action and alternatives of the project. The assessment is required because of the proposed issuance of a section 10(a)(1)(B) incidental take permit by the Service pursuant to the Endangered Species Act (Act) of 1973, as amended.

The Applicant has submitted an application for a permit to allow the incidental take of the federally listed golden-cheeked warbler which has been documented on portions of the subject tract. The implementing regulations for section 10(a)(1)(B) of the Act, as provided by 50 CFR 17.22, specify the criteria by which a permit allowing the incidental take of listed species pursuant to otherwise lawful activities may be obtained. The purpose and need for the section 10(a)(1)(B) permit is to ensure that incidental taking resulting from the proposed development will be minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of the survival and recovery of this listed species in the wild.

The submission of the 10(a)(1)(B) permit application requires the development of an HCP which is designed to ensure the continued existence and aid in the recovery of the listed species while allowing for the limited, incidental take of the species during the construction and operation of the proposed project.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 VEGETATION

The woodlands in Travis County are generally dominated by Ashe juniper (*Juniperus ashei*), plateau live oak (*Quercus fusiformis*), Texas oak (*Quercus buckleyi*), cedar elm (*Ulmus crassifolia*), and hackberry (*Celtis laevigata*). Other frequent to occasional species include bumelia (*Bumelia lanuginosa*), Texas persimmon (*Diospyros texana*), elbowbush (*Forestiera pubescens*), yaupon (*Ilex vomitoria*), redbud (*Cercis canadensis*), rough-leaf dogwood (*Cornus drummondii*), and Texas mountain laurel (*Sophora secundiflora*).

At least one of three general woodland communities (plateaus, canyons, and ecotonal areas) exist in the project area. The plateau areas, which comprise a majority of the site, tend to be generally xeric in nature due to various geologic and surface drainage characteristics. The plateau community is typically dominated by Ashe juniper with occasional plateau live oak and shin oak (*Quercus sinuata* var. *breviloba*).

The canyon areas, conversely, tend to be mesic and support a greater diversity and stature of woodland species. Ashe juniper is again usually dominant canopy species. Texas oak with mixtures of live oak, cedar elm, hackberry, Arizona walnut (*Juglans major*) and escarpment black cherry (*Prunus serotina* var. *eximia*).

The ecotonal zone between the upper plateaus and the canyon contain a mixture of the plateau and canyon communities with Ashe juniper being dominant and occasional live oak, Texas oak, and shin oak.

Grasslands in the area are vegetated predominantly with silver bluestem (*Bothriochloa saccharoides*), little bluestem (*Schizachyrium scoparium*), threeawn (*Aristida* sp.), buffalograss (*Buchloe dactyloides*), and miscellaneous herbs and forbs.

3.2 WILDLIFE

Wildlife of the generally wooded areas is typified by the common woodland species of central Texas. Common bird species include northern mockingbird (*Mimus polyglottos*), northern cardinal (*Cardinalis cardinalis*), Carolina chickadee (*Parus carolinensis*), hermit thrush (*Hylocichla guttata*), tufted titmouse (*Parus bicolor*), black and white warbler (*Mniotilta varia*), and other common woodland bird species. Common mammals include the white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphus virginiana*), fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), and nine-banded armadillo (*Dasypus novemcinctus*). Herpetofauna include aquatic and terrestrial reptile and amphibian species. Common reptiles include the Texas rat snake (*Elaphe obsoleta*), patch-nosed snake (*Salvadora grahamiae*), northern fence lizard (*Sceloperus undulatus*), and ground skink (*Scincella lateralis*).

3.3 THREATENED OR ENDANGERED SPECIES

Within Travis County, eight vertebrate and invertebrate species are currently listed as endangered by the Service. Two bird species, the golden-cheeked warbler and the black-capped vireo (vireo) (*Vireo atricapillus*); and six cave-dwelling invertebrates, the Tooth Cave ground beetle (*Rhadine persephone*), Bee Creek Cave harvestman (*Texella reddelli*), Tooth Cave spider (*Neoleptoneta myopica*), Tooth Cave pseudoscorpion (*Tartarocreagris texensis*), Kretschmarr Cave mold beetle (*Texamaurops reddelli*), and the Bone Cave harvestman (*Texella reyesi*) have been placed on the federal endangered species list.

The six species of endangered cave invertebrates occur within a karsted geologic region known generally as the Edwards geologic formation in Travis and Williamson Counties. The subject site has been evaluated for the presence of surface karst features (caves, sinks, fissures) that might indicate the presence of subsurface voids that could support the listed karst invertebrates. No surface karst features have been located. The absence of surface karst features is generally held to indicate a low probability for the occurrence of the listed karst species.

Spring breeding surveys for the black-capped vireo and the golden-cheeked warbler did not locate any black-capped vireos in the project area. However, warblers were found during surveys conducted between 1989 and 1993 in the project area. During those surveys, four warblers were observed in the canyon north of the property.

The following species are Species of Concern, those for which listing under the Act may be warranted, but for which biological information is lacking. The Jollyville Plateau salamander (*Eurycea spp.*) has been documented in various spring outlets throughout the Jollyville Plateau region. This species has not been documented on this development site. The bracted twist-flower (*Streptanthus bracteatus*) and the canyon mock-orange (*Philadelphus ernestii*) occur in the general area of the subdivision but are not known to occur on the project site.

3.4 WETLANDS

Areas subject to jurisdiction under section 404 of the Clean Water Act include those areas that fall at or below the "plane of ordinary high water" of these waterways as defined by 33 CFR 323.2. No areas of the subject tract defined as wetlands by the criteria established in the 1987 Corps of Engineers Wetland Delineation Manual have been identified on the subject tract.

3.5 GEOLOGY/SOILS

The project site is underlain by the Glen Rose geologic formations of the Lower Cretaceous age. The Glen Rose formation is composed of alternating marl, dolomite, and limestone strata which frequently results in a stair-step topography due to differential erosion rates of various strata. The Glen Rose is very slowly permeable and horizontal movement of water along the hard limestone strata often results in seepages where the strata becomes exposed on hillsides.

Soils on the project site are of the Tarrant Series according to the Soil Conservation Service (SCS) Soil Survey of Travis County, Texas, issued June 1974. These soils consist of shallow to very shallow, well-drained, stoney, clayey soils overlaying limestone. There are random outcrops of limestone and loose stones that cover up to 50 percent of the surface. These soils occupy the upper plateau area of the subject site, with rock outcrops not uncommon in the hilly breaks.

3.6 LAND USE

The subject property is in an established residential subdivision bordered on the east and west by a residential development. A mature oak/juniper forested canyon lies to the north and south.

The proposed project site is located in southwest Travis County, but within an area that has been experiencing urban development for the past 15 to 20 years. Past land uses have included livestock grazing, agriculture, deer hunting, and open space. In recent years, intensive urban development has encroached around much of the site.

3.7 AIR QUALITY

Travis County and the Austin metropolitan area are currently full attainment areas for all air quality criteria pollutants of the Environmental Protection Agency (EPA) and Texas Natural Resource Conservation Commission (TNRCC). However, potential degradation of air quality, particularly from automobile exhaust, in the Austin metropolitan area has been a topic of discussion over the past decade.

3.8 WATER RESOURCES AND WATER QUALITY

Water quality on the proposed development site is presently estimated to be good because it is an undeveloped lot with no current commercial or residential use.

All streams in the vicinity are listed as compliance streams suitable for contact recreation by the TNRCC.

3.9 CULTURAL RESOURCES

There are no properties or archeological sites listed on the National Register of Historic Places on this site.

4.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section presents details of the proposed action and the reasonably practicable alternatives that have been considered. The alternatives include: 1) proposed (preferred) action, 2) selection of an alternate site, 3) modification of site design and layout, 4) waiting on approval of a regional section 10(a)(1)(B) permit, and 5) no action. The environmental consequences of these various alternatives are presented in section 5.0.

4.1 ALTERNATIVE 1 - PROPOSED (PREFERRED) ACTION

The proposed action is the issuance of a permit under section 10(a)(1)(B) of the Act to authorize the incidental take of the endangered golden-cheeked warbler during the development of a single

family residence on __ acres on **(LOCATION)**, Austin, Travis County, Texas. The anticipated onsite and offsite impacts of the proposed action are addressed in section 5.1.

An HCP has been developed as part of the preferred alternative as mitigation for the incidental taking of the warbler. The conservation plan indicates that $1,500 will be placed in a fund held by the City of Austin Balcones Canyonlands Conservation Fund for use in land acquisition/management within golden-cheeked warbler Recovery Unit 5 for the conservation of the golden-cheeked warbler (Figure 2). The HCP is detailed more fully in section 6.0.

This alternative was selected as the preferred action as it will allow development of the property and the conservation plan minimizes and offsets the potential impact to the warbler by providing for offsite conservation measures which will be utilized to better manage the recovery of the species.

4.2 ALTERNATIVE 2 - ALTERNATE SITE LOCATION

This alternative assumes that the Applicant could equitably divest the subject property and construct a single family residence elsewhere that would not result in the take of the warbler.

4.3 ALTERNATIVE 3 - ALTERNATE SITE DESIGN

This alternative assumes that alteration of site layout is possible and that relocation of the residence would eliminate take of the warbler.

4.4 ALTERNATIVE 4 - WAIT ON A REGIONAL 10(a)(1)(B) PERMIT

This alternative assumes that the Applicant could wait on the completion and implementation of a regional section 10(a)(1)(B) permit for continuation of development plans.

4.5 ALTERNATIVE 5 - NO ACTION ALTERNATIVE

This alternative assumes that all proposed development does not occur and that no application for incidental take is processed.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 ALTERNATIVE 1- PROPOSED (PREFERRED) ALTERNATIVE

5.1.1 Onsite Impacts

5.1.1.1 Vegetation

The proposed action of permit issuance will result in the surface and/or vegetational alteration of less than one (1) acre (Figure 3). Most of the vegetative resources associated with construction of a single family residence will be altered. Vegetation within the steep canyon area will not be altered by the proposed development.

5.1.1.2 Wildlife

Wildlife over the area planned for development would largely be displaced to adjacent areas, which could result in increased competition for nesting, foraging, breeding, and feeding areas. Landscape vegetation will provide habitat for those species of wildlife suited for coexistence with urban development. The undevelopable portions of the canyon system are expected to remain in their natural vegetational state and would continue to provide habitat for the wildlife species that currently utilize this area. Undetermined negative or positive effects associated with the promotion of urban wildlife species and human activities associated with the planned development may result in negative impacts to certain species while others may be unaffected or positively affected from this development.

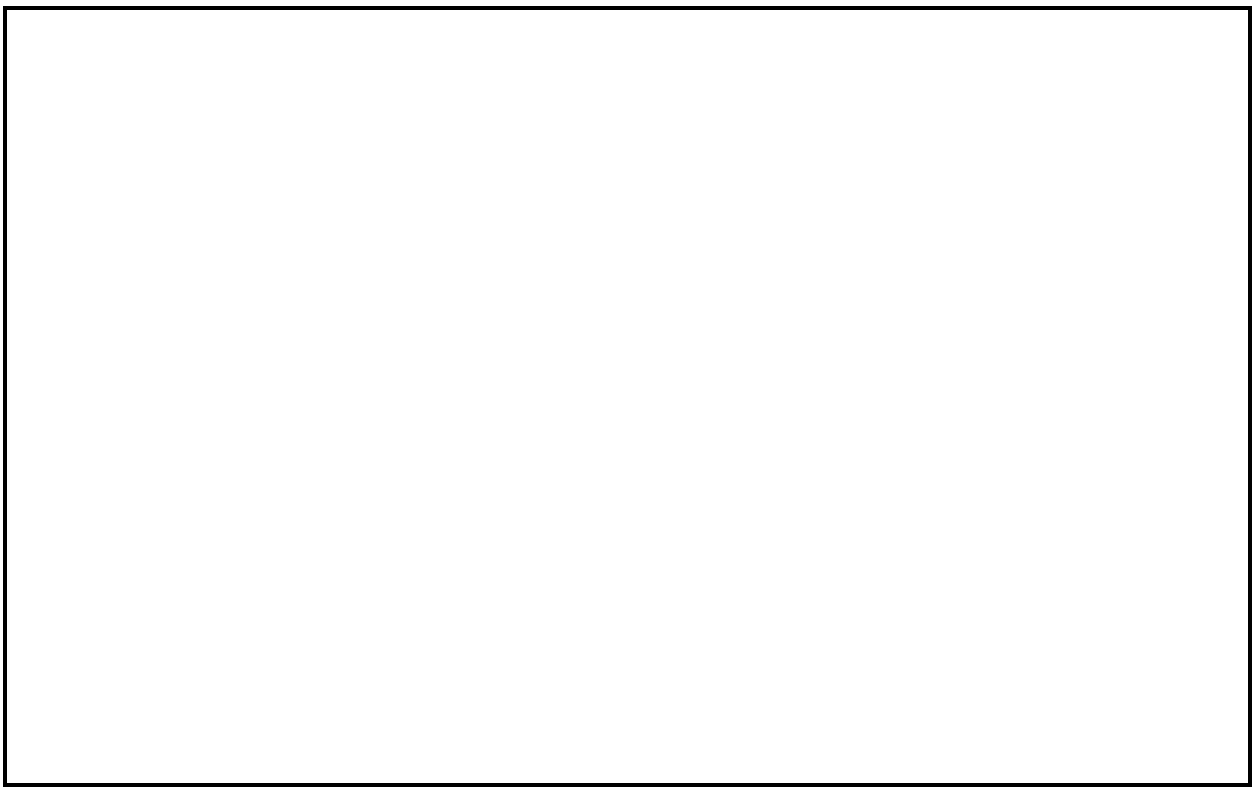


Figure 3. **(APPLICANT'S NAME)** lot and approximate location of proposed construction.

5.1.1.3 Endangered Species

The black-capped vireo and the six species of cave-adapted invertebrates have not been documented to occur on the subject site nor has suitable habitat been identified for these species.

Spring surveys for the warbler were conducted between 1989 and 1993 in the project area. During those surveys,__ **(#)** warblers were observed in the canyon north of the property. Based on the Service's definition of warbler habitat, the forested community found on the subject property would be considered warbler habitat. Much of the forested canyon and ecotonal areas are, to some degree, utilized by the warbler. Forested areas on the plateaus which contribute to the overall habitat continuity on this site have not been found to be directly utilized by warblers.

5.1.1.4 Assessment of Take

Development of _ acres on **(LOCATION)**, Austin, Travis County, Texas is subject to the City of Austin and Travis County Land Development Code which limits development on slopes of greater than 25 percent. This precludes the use of those portions of the lot that include the canyon area. Direct alteration of habitat areas known to be utilized by the warbler will be limited to intrusions within the ecotonal transition zones between the upper plateau and the canyon habitat. The Service currently believes that development activities in general will cause indirect impacts to the warbler due to habitat fragmentation, and an overall decrease of the contiguous habitat patch size. Encroachment of noise and activity within close proximity to nesting pairs, and introduction or increase of predator species (i.e., cowbirds, jays, house cats, fire ants) into otherwise low-predator-density areas are also potential indirect impacts of adjacent development.

Based on the results of previous warbler surveys, the Service has concluded that up to 1 pair of warblers occur in the project area during the nesting season and that this project will result in the direct and/or indirect destruction of approximately 1 acre of warbler habitat, which contributes to the support of one warbler pair.

No take is anticipated for any other federally listed or proposed species. No populations of the candidate plant species or the Barton Springs salamander have been identified on the subject site, and are, therefore, not anticipated to be impacted.

5.1.1.5 Wetlands

Areas subject to section 404 of the Clean Water Act jurisdiction are limited to the existing surface creek channel and is not proposed for development. Runoff into this area is to be treated according to local regulations and EPA standards for nonpoint-source pollution and sedimentation prevention. No impacts are expected.

5.1.1.6 Geology/Soils

No significant geologic alterations are anticipated from the proposed project.

Some surface soil alterations will result from the proposed development.

5.1.1.7 Land Use

Current and past land use trends in the vicinity are toward single-family residential use.

5.1.1.8 Water Resources

Surface water resources will be directed to appropriate filtration and sedimentation facilities. Subsurface groundwater resources will be slightly altered by the construction of impervious cover in the form of roadways and building foundations. Water that would have seeped into the geologic strata will become surface runoff and channeled to the appropriate facility. There could be slight increases in sediment loading and other pollutants in surface water runoff, however, these increases are not believed to be significant given the sedimentation facilities' ability to capture these pollutants and the small size of the project.

5.1.1.9 Air and Water Quality Impacts

The proposed development may contribute to increased local traffic noise and exhaust emissions by increasing the number of gasoline-powered vehicles in the immediate vicinity. The addition of one residence with fireplaces would be expected to contribute to carbon dioxide, particulate and other emissions in the local area.

The removal of trees associated with the proposed development will slightly reduce the local air filtering capabilities.

A temporary increase of fugitive dust emissions and noise will be expected during construction activities.

No significant impacts are expected to occur from runoff of the developed areas. All City of Austin and Travis County Land Development Codes are expected to be complied with during all aspects of the development. All impervious cover runoff will be directed to the filtration and sedimentation facilities, as required by the applicable City ordinances.

5.1.1.10 Cultural Resources

According to Texas Historic Commission files, no registered archaeological sites exist for the subject tract. No impacts are expected to occur to any significant sites of historical value.

5.1.2 Offsite Impacts

5.1.2.1 Vegetation

No offsite impacts to vegetation are expected to occur.

5.1.2.2 Wildlife

Displacement of certain wildlife species is expected to occur from the developed lot into the undeveloped canyon as well as adjacent, undeveloped properties. Wildlife over the subject lot would largely be displaced to adjacent areas, which could result in increased competition for nesting, foraging, breeding, and feeding areas.

5.1.2.3 Endangered Species

Offsite impacts pertaining to endangered species may ultimately include the displacement of warblers that have been documented to utilize the areas adjacent to the subject sites.

Implementation of the conservation measures described in section 6.0 illustrate the method to be utilized to minimize and mitigate potential onsite impacts. The actions described for the conservation/mitigation measures would address any offsite impacts that may result due to the proposed development.

5.1.2.4 Wetlands

As previously discussed, the onsite sedimentation and nonpoint-source pollution controls will minimize the amount of sediment and other pollutants introduced into downstream jurisdictional areas. No offsite impacts to jurisdictional areas are expected to occur.

5.1.2.5 Geology/Soils

No offsite impacts to geologic or soil resources are expected to occur.

5.1.2.6 Land Use

No significant alterations to existing or proposed land uses are expected to occur as a result of the proposed action.

5.1.2.7 Air and Water Quality

As previously discussed in the onsite impacts section, vehicle emissions and noise levels, as well as emissions from fireplaces, are expected to increase locally due to an increase in the number of

vehicles and residences in the area. This local increase may have minor effects on the regional air quality conditions.

The proposed water quality control devices are discussed in the onsite impacts section. Existing offsite water quality conditions are expected to be maintained by these control devices.

Potential offsite, indirect water quality impacts would relate to roadway surface runoff pollution as a result of the increase in vehicle traffic in the area. This increase will be insignificant because the action is construction of one single family residence.

5.1.2.8 Water Resources

Offsite surface and groundwater resources are not expected to be impacted by this activity. Natural water volumes exiting from the site are expected to remain consistent with normal weather patterns, with slight increases in surface water runoff due to the increase in impervious cover due to development.

5.1.2.9 Cultural Resources

No offsite impacts to cultural resources are expected.

5.1.3 Cumulative Impacts Analysis - This section considers the past, present, and future projects, authorized or under review, that are considered to contribute to the cumulative loss of species of concern.

5.1.3.1 Vegetation - As the proposed action would result in disturbance of less than 1 acre of vegetation, primarily juniper-live oak woodland, it would cumulatively contribute to disturbance of this vegetation type in Travis County resulting from development, road construction, and other land use projects.

5.1.3.2 Wildlife - The proposed action will contribute to a cumulative reduction of habitat for some wildlife species when added to impacts resulting from other development, road construction, and other land use projects in Travis County. Wildlife species associated with urban and suburban settings would likely increase while species intolerant of development would locally decrease. No significant cumulative impacts to wildlife species currently occurring in Travis County or the region would be expected.

5.1.3.3 Threatened or Endangered Species - The proposed action will contribute to "take" of golden-cheeked warblers and/or their habitat in the region when added to section 10(a)(1)(B) incidental take permits that have been or will be issued by the Service for other projects. To date, 70 incidental take permits have been issued in the Austin area. These permits cover approximately 5,417 acres a portion of which included warbler habitat. There are currently 19 active incidental take permit applications, 8 of which are single family residence applications,

being considered by the Service in the Austin area. These permits cover in excess of 4,229 acres, of which a portion is suitable warbler habitat. The level of impacts resulting from projects for which permits are currently being considered is dependent on the amount of take resulting from the actual number of these permits issued by the Service. Cumulatively, the known activities would not result in a significant impact to the warbler because each activity is being evaluated with respect to its impact on the warbler's recovery unit number 5.

5.1.3.4 Wetlands - There are not impacts to wetlands as a result of this project. Therefore, no cumulative impacts are anticipated.

5.1.3.5 Geology and Soils - No significant cumulative impacts to geology and soils would occur as a result of the proposed action.

5.1.3.6 Land Use - The proposed action contributes to the conversion of undeveloped land to developed land in the Austin area. Past, present, and future developments must comply with all development codes and cumulative impacts will be the same for all alternatives.

5.1.3.7 Air and Water Quality - The proposed action will contribute to limited degradation of air quality in the Austin area, primarily through a slight increase in automobile exhaust emissions. The significance of the impact will depend upon air quality requirements for construction activities and automobiles. The continued development of the area could result in a significant cumulative impact on air quality.

The proposed action, complying with local water quality codes, will cause some change in existing water quality. However, this change will not result in a significant cumulative impact from the single family residential lots that are anticipated to undergo this process. However, uncontrolled development in areas that do not have adequate water quality standards will result in a significant cumulative impact on the water quality.

5.1.3.8 Cultural Resources - This project, because of its limited scope, will not result in cumulative impacts to sites eligible for the National Register of Historic Places.

5.2 ALTERNATIVE 2 - ALTERNATE SITE LOCATION

With the steady encroachment of urbanization around the property during the past decade, and commensurate increases in property taxes and expenses, the previous uses of the land have either become impractical or uneconomical in terms of providing adequate return against expenses. The property location is situated within a rapidly urbanizing area within the Austin community.

While it is possible to construct a single family residence on property other than the subject site and not within suitable warbler habitat, it is not economically practicable for the Applicant to divest the subject parcel at a non-development market price and then purchase another site at or above development market price. Therefore, this alternative was considered non-practicable.

5.3 ALTERNATIVE 3 - ALTERNATIVE SITE LAYOUT

An alternative site layout design would not eliminate the incidental take of the golden-cheeked warbler. Therefore, this alternative was considered non-practicable.

5.4 ALTERNATIVE 4 - WAIT ON THE REGIONAL 10(a)(1)(B) PERMIT

Following discovery of the warbler near the site and the potential for take from construction of a single family residence, the Service recommended that the Applicant should apply for an individual section 10(a)(1)(B) permit or wait on completion of the regional section 10(a)(1)(B) permit.

From 1990 to present, a proposed regional HCP has met with numerous delays. In November 1993, Travis County voters denied a bond proposition to provide major funding for that HCP. Due to uncertainties as to when a regional plan might be available, this alternative was considered non-practicable.

5.5 ALTERNATIVE 5 - NO ACTION

This scenario would not result in the near-term disturbance of portions of the site proposed for development, nor the attendant potential take of the warbler. Since the site is privately owned, there is constant economic maintenance of the property, particularly in taxes and upkeep. The sale of the property for purposes other than development is not economically feasible. The Applicant no longer can afford to hold the property without reasonable economic return. Therefore, this alternative was considered non-practicable under current and foreseeable circumstances.

6.0 HABITAT CONSERVATION PLAN

As part of the proposed action, an HCP has been proposed to minimize the potential take described in section 5.1.1.4 above and assure that this action does not reduce the potential for survival and recovery of the warbler in the wild, as mandated by requirements of 50 CFR Part 17.22(b)(1)(iii). The HCP includes the following features:

- The donation of $1,500 to the City of Austin Balcones Canyonlands Conservation Fund for the specific purpose of land acquisition/management within golden-cheeked warbler Recovery Unit 5 for the conservation of the golden-cheeked warbler. The lands acquired/managed through this fund are to be approved by the Fish and Wildlife Service. These funds are not required at the time of permit application but must be provided prior to any clearing activities or house construction.

- Minimization or avoidance of clearing within the canyon habitats on the development site;

- The use of herbicides and pesticides will be kept to a minimum and will fully comply with the label guidelines for application; and

- Clearing and construction within the proposed development area shall be consistent with the current practices recommended by the Texas Forest Service to prevent the spread of oak wilt.

The following conservation recommendations will be followed where possible:

- Clearing within the development area will be limited to what is necessary for residential construction and revegetation of non-impervious disturbances will be with native vegetation; and

- New construction onsite will not be initiated during the warbler breeding/nesting period between 1 March and 1 August within 300 feet of the edge of a documented warbler territory, if possible.

This conservation plan is intended to minimize the potential impact to the warbler and provide for its continued existence.

One of the four conservation planning requirements is a requirement that sufficient funding be made available to implement the HCP. **(APPLICANT'S NAME)** is committed to provide the necessary funding to support the mitigation as outlined above.

6.1 AMENDMENT PROCEDURE

It is necessary to establish a procedure whereby the section 10(a)(1)(B) permit can be amended. However, it is extremely important that the cumulative effect of amendments will not jeopardize any endangered species or other species of concern. Amendments must be evaluated based on their effect on the habitat as a whole. The Service must be consulted on all proposed amendments. The types of proposed amendments and the applicable amendment procedures are as follows:

6.2 AMENDMENTS TO THE DEVELOPMENT PLANS

It is acknowledged that upon the written request of **(APPLICANT'S NAME)**, the local agency having land use regulatory jurisdiction, is authorized in accordance with applicable law to approve amendments to development plans for the subject property which do not encroach on any endangered species habitat that is not presently contemplated to be taken as a consequence of the development, and which do not alter the conditions set forth in this HCP.

6.3 MINOR AMENDMENTS TO THE HCP

Minor amendments involve routine administrative revisions or changes to the operation and management program and which do not diminish the level or means of mitigation. Such minor amendments do not alter the terms of the section 10(a)(1)(B) permit.

Upon the written request of **(APPLICANT'S NAME)**, the Service is authorized to approve minor amendments to this HCP, if the amendment does not conflict with the primary purpose of this HCP as stated in section 2.0.

6.4 ALL OTHER AMENDMENTS

All other amendments will be considered an amendment to the section 10(a)(1)(B) permit, subject to any other procedural requirements of federal law or regulation which may be applicable to amendment of such a permit.

7.0 REFERENCES

Balcones Canyonlands Conservation Plan (BCCP), 1988. Prepared for The BCCP Executive Committee by The Butler/EHA team. February, 1992. Final Draft.

Garner, L.E. and Young, K.P. 1976. Environmental Geology of the Austin Area: An Aid to Urban Planning. Bureau of Economic Geology, Report of Investigation No. 86, University of Texas at Austin.

Soil Conservation Service (SCS). 1974. Soil Survey of Travis County, Texas. U.S. Department of Agriculture.

U.S. Fish and Wildlife Service. 1992. Golden-cheeked Warbler (*Dendroica chrysoparia*) Recovery Plan. Albuquerque, New Mexico. 88 pp.

Wahl, C.R., D.D. Diamond and D. Shaw. 1989. The Golden-cheeked Warbler: A Status Review, Texas Parks and Wildlife Department, Austin, Texas.

APPENDIX 9:

FWS Fish and Wildlife Permit Application Form (Form 3-200)

With Endangered/Threatened Species Attachment, Privacy Act Notices, FOIA Notice, Application Fee Notice, and Instructions

and

NMFS Incidental Take Application Instructions

Department of the Interior
U.S. Fish and Wildlife Service

Expires (2/28/01)
OMB No. 1018-0094

FEDERAL FISH AND WILDLIFE LICENSE/PERMIT APPLICATION FORM

RETURN TO:

Type of Activity:

3-200-56 NATIVE ENDANGERED AND THREATENED SPECIES - INCIDENTAL TAKE

A.	**COMPLETE IF APPLYING AS AN INDIVIDUAL**		
1. Name:			
2. Street address:			3. County:
4. City, State, Zip code:			
5. Date of birth:	6. Social Security No.:	7. Occupation:	
8. List any business, agency, organizational, or institutional affiliation associated with the wildlife to be covered by this license or permit:			
9. Home telephone number:	10. Work telephone number:	11. Fax number:	12. E:mail address:

B.	**COMPLETE IF APPLYING AS A BUSINESS, CORPORATION, PUBLIC AGENCY OR INSTITUTION**		
1. Name of business, agency or institution:			2. Tax identification no.:
3. Street address:			4. County:
5. City, State, Zip code:			
6. Describe the type of business, agency, or institution:			
7. Name and title of person responsible for permit (president, principal officer, director, etc.):			
8. Home telephone number:	9. Work telephone number:	10. Fax number:	11. E:mail address:

C.	**ALL APPLICANTS COMPLETE**		
1. Do you currently have or have you had any Federal Fish and Wildlife License or Permit? Yes ☐ No ☐ If yes, list license or permit numbers:			
2. Have you obtained any required state or foreign government approval to conduct the activity you propose? Yes ☐ No ☐ Not required ☐ If yes, provide a copy of the license or permit.			
3. Enclose check or money order payable to the U.S. FISH AND WILDLIFE SERVICE in the amount of $25. Institutions which qualify under 50 CFR 13.11(d)(3) may be exempt from fees.			
4. ATTACHMENTS: Complete the additional pages of this application. Application will not be considered complete without these pages. Incomplete applications may be returned.			
5. **CERTIFICATION:** I hereby certify that I have read and am familiar with the regulations contained in Title 50, Part 13, of the Code of Federal Regulations and the other applicable parts in subchapter B of Chapter I of Title 50, and I further certify that the information submitted in this application for a license or permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.			
6. Signature (in ink) of applicant or person responsible for permit in Block A or B			7. Date:

Endangered Species Incidental Take Permits

For Incidental Take Permit applications, the following specific information must be provided in addition to the general information on page one of this application:

1. Physical address or location of activities: Section/Township/Range, County tax parcel number, or other formal legal description.

2. A complete description of activity(ies) to be authorized.

3. The common and scientific names of the species sought to be covered by the permit, as well as, the number, age, and sex of such species, if known.

4. A conservation plan that specifies:

    a. The impact that will likely result from the incidental taking.

    b. What steps will be taken to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to deal with unforseen circumstances.

    c. What alternative actions to such incidental taking have been considered and the reasons why these alternatives are not proposed for use.

5. A certification notice that states: By submitting this application and receiving an incidental take permit pursuant to Section 10(a)(1)(B) of the Endangered Species Act, the landowner/permittee agrees that he/she owns the lands indicated in this application, or has sufficient authority or rights over these lands to implement the measures of the Habitat Conservation Plan. Further, upon receipt of the incidental take permit, the permittee signing Form 3-200 will conduct the activities as specified in the Habitat Conservation Plan and implementation agreement according to the terms and conditions, of the permit and supporting documents.

The public reporting burden for these reporting requirements is estimated to be 2.5 hours, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Comments regarding the burden estimate or any other aspect of the reporting requirement(s) should be directed to the Service Information Collection Clearance Officer, MS 224 ARLSQ, Fish and Wildlife Service, Washington, DC 20240, or the Office of Management and Budget, Attention: Desk Officer for the Department of the Interior; Washington, DC 20503.

An agency may not conduct and a person is not required to respond to a collection of information unless a currently valid OMB control number is displayed.

NOTICE TO:
APPLICANTS FOR FEDERAL FISH AND WILDLIFE LICENCES/PERMITS

PRIVACY ACT- NOTICE

In accordance with the Privacy Act of 1974 (S U.S.C. 552a), please be advised that:

1. The gathering of information on fish and wildlife is authorized by: (a) Bald Eagle Protection Act (16 U.S.C. 663a); (b) Endangered Species Act of 1973 (16 U.S.C. 1539); (c) Migratory Bird Treaty Act (16 U.S.C. 703-711); (d) Marine Mammal Protection Act of 1972 (16 U.S.C. 1371-1383); (e) Lacey Act (18 U.S.C. 42 & 4 4); and (f) Title 50, Part 13, Code of the Code of Federal Regulations.

2. Submission of requested information is required in order to process applications for licenses or permits authorized under the above acts. With the exception of your social security number, failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny a permit.

3. Applications for licenses or permits authorized under the Endangered Species Act of 1973 (16 U.S.C. 1539) and the Marine Mammal Protection Act of 1972 (16 U.S.C. 1371-1383) may be published in the *Federal Register* as required by the two acts.

4. In the event a violation of a statute, regulations, rule, order, or license, whether civil, criminal, or regulatory in nature is discovered during the application review process, the requested information may be transferred to the appropriate Federal, State, local, or foreign agency charged with investigating or prosecuting such violations.

5. In the event of litigation involving the records or the subject matter of the records, the requested information may be transferred to the U.S. Department of Justice or appropriate law enforcement authorities.

6. Information provided in the application may be disclosed to subject matter experts, and State and other Federal agencies, for the sole purpose of obtaining advise relevant to issuance of the permit.

7. For individuals, personal information such as home address and telephone number, financial data, and personal identifiers (social security number, birth date, etc.) will be removed prior to any release of the application.

FREEDOM OF INFORMATION ACT- NOTICE

8. For organizations, businesses, or individuals operating as a business (i.e., permittees not covered by the Privacy Act), we request that you identify any information that should be

considered privileged and confidential business information to allow the Service to meet its responsibilities under FOIA. Confidential business information must be clearly marked "Business Confidential" at the top of the letter or page and each succeeding page, and must be accompanied by a nonconfidential summary of the confident information. The nonconfidential summary and remaining documents may be made available to the public under FOIA [43 CFR 2.13(c)(4), 43 CFR 2.15(d)(1)(i)].

NOTICE TO:
APPLICANTS FOR FEDERAL FISH AND WILDLIFE LICENSES/PERMITS (CONT.)

APPLICATION FEE- NOTICE

There is a $25.00 processing fee for incidental take permit applications under the Endangered Species Act [50 CFR 17.22(b) and 50 CFR 17.32(b)]. The fee applies to permit applications, renewals, and amendments.

A check (it does not need to be certified) or money order should be made payable to the **"U.S. Fish and Wildlife Service"**. The processing fee will not be refunded if the permit application is abandoned or the permit is issued or denied. The fee may be refunded if the permit application is withdrawn in writing before significant processing has occurred.

Fee Exemption: State or local government agencies or individuals or institutions under contract to such agencies for proposed activities are exempt from paying this fee. Until further notice, the fee will be waived for public institutions. As defined in 50 CFR 10.12, the term "public" as used in reference to museums, zoological parks, and scientific institutions, refers to such as are open to the general public and are privately owned and organized but are not operated for profit.

APPENDIX 10:

Genral Permit Conditions

50 CFR Part 13 (FWS)

50 CFR Part 217, 220, 222 (NMFS)

(g) If the Solicitor decides that relief should not be granted, the Solicitor shall so notify the petitioner in writing, stating in the notification the reasons for denying relief. The petitioner may then file a supplemental petition, but no supplemental petition shall be considered unless it is received within 60 days from the date of the Solicitor's notification denying the original petition.

[45 FR 17864, Mar. 19, 1980, as amended at 47 FR 56861, Dec. 21, 1982]

§ 12.42 Recovery of certain storage costs.

If any wildlife, plant, or evidentiary item is seized and forfeited under the Endangered Species Act, 16 U.S.C. 1531 *et seq.*, any person whose act or omission was the basis for the seizure may be charged a reasonable fee for expenses to the United States connected with the transfer, board, handling, or storage of such property. If any fish, wildlife or plant is seized in connection with a violation of the Lacey Act Amendments of 1981, 16 U.S.C. 3371, *et seq.*, any person convicted thereof, or assessed a civil penalty therefor, may be assessed a reasonable fee for expenses of the United States connected with the storage, care and maintenance of such property. Within a reasonable time after forfeiture, the Service shall send to such person by registered or certified mail, return receipt requested, a bill for such fee. The bill shall contain an itemized statement of the applicable costs, together with instructions on the time and manner of payment. Payment shall be made in accordance with the bill. The recipient of any assessment of costs under this section who has an objection to the reasonableness of the costs described in the bill may, within 30 days of the date on which he received the bill, file written objections with the Regional Director of the Fish and Wildlife Service for the Region in which the seizure occurred. Upon receipt of the written objections, the appropriate Regional Director will promptly review them and within 30 days mail his final decision to the party who filed objections. In all cases, the Regional Director's decision shall constitute final administrative action on the matter.

[47 FR 56861, Dec. 21, 1982]

Subpart F—Return of Property

§ 12.51 Return procedure.

If, at the conclusion of the appropriate proceedings, seized property is to be returned to the owner or consignee, the Solicitor or Service shall issue a letter or other document authorizing its return. This letter or other document shall be delivered personally or sent by registered or certified mail, return receipt requested, and shall identify the owner or consignee, the seized property, and, if appropriate, the bailee of the seized property. It shall also provide that upon presentation of the letter or other document and proper identification, and the signing of a receipt provided by the Service, the seized property is authorized to be released, provided it is properly marked in accordance with applicable State or Federal requirements.

PART 13—GENERAL PERMIT PROCEDURES

Subpart A—Introduction

Subpart B—Application for Permits

Subpart C—Permit Administration

Subpart D—Conditions

AUTHORITY: 16 U.S.C. 668a, 704, 712, 742j–1, 1382, 1538(d), 1539, 1540(f), 3374, 4901–4916; 18 U.S.C. 42; 19 U.S.C. 1202; E.O. 11911, 41 FR 15683; 31 U.S.C. 9701.

SOURCE: 39 FR 1161, Jan. 4, 1974, unless otherwise noted.

Subpart A—Introduction

§ 13.1 General.

Each person intending to engage in an activity for which a permit is required by this subchapter B shall, before commencing such activity, obtain a valid permit authorizing such activity. Each person who desires to obtain the permit privileges authorized by this subchapter must make application for such permit in accordance with the requirements of this part 13 and the other regulations in this subchapter which set forth the additional requirements for the specific permits desired. If the activity for which permission is sought is covered by the requirements of more than one part of this subchapter, the requirements of each part must be met. If the information required for each specific permitted activity is included, one application will be accepted for all permits required, and a single permit will be issued.

§ 13.2 Purpose of regulations.

The regulations contained in this part provide uniform rules, conditions, and procedures for the application for and the issuance, denial, suspension, revocation, and general administration of all permits issued pursuant to this subchapter B.

[54 FR 38147, Sept. 14, 1989]

§ 13.3 Scope of regulations.

The provisions in this part are in addition to, and are not in lieu of, other permit regulations of this subchapter and apply to all permits issued thereunder, including ''Import and Marking'' (part 14), ''Feather Imports'' (part 15), ''Injurious Wildlife'' (part 16), ''Endangered Wildlife and Plants'' (part 17), ''Marine Mammals'' (part 18), ''Migratory Birds'' (part 21), ''Eagles'' (part 22) and ''Endangered Species Convention'' (part 23). As used in this part 13, the term ''permit'' shall refer to either a license, permit, or certificate as the context may require.

[42 FR 10465, Feb. 22, 1977, as amended at 42 FR 32377, June 24, 1977; 45 FR 56673, Aug. 25, 1980]

§ 13.4 Emergency variation from requirements.

The Director may approve variations from the requirements of this part when he finds that an emergency exists and that the proposed variations will not hinder effective administration of this subchapter B, and will not be unlawful.

§ 13.5 Information collection requirements.

(a) The Office of Management and Budget approved the information collection requirements contained in this part 13 under 44 U.S.C. and assigned OMB Control Number 1018–0092. The Service may not conduct or sponsor, and you are not required to respond, to a collection of information unless it displays a currently valid OMB control number. We are collecting this information to provide information necessary to evaluate permit applications. We will use this information to review permit applications and make decisions, according to criteria established in various Federal wildlife conservation statutes and regulations, on the issuance, suspension, revocation, or denial permits. You must respond to obtain or retain a permit.

(b) We estimate the public reporting burden for these reporting requirements to vary from 15 minutes to 4 hours per response, with an average of 0.803 hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding the burden estimate or any other aspect of these reporting requirements to the Service Information Collection Control Officer, MS–222 ARLSQ, U.S. Fish and Wildlife Service, Washington, DC 20240, or the Office of Management and Budget, Paperwork

Reduction Project (1018–0092), Washington, DC 20603.

[63 FR 52634, Oct. 1, 1998]

Subpart B—Application for Permits

§ 13.11 Application procedures.

The Service may not issue a permit for any activity authorized by this subchapter B unless the applicant has filed an application in accordance with the following procedures. Applicants do not have to submit a separate application for each permit unless otherwise required by this subchapter.

(a) *Forms.* Applications must be submitted in writing on a Federal Fish and Wildlife License/Permit Application (Form 3–200) or as otherwise specifically directed by the Service.

(b) *Forwarding instructions.* Applications for permits in the following categories should be forwarded to the issuing office indicated below.

(1) Migratory bird banding permits (50 CFR 21.22)—Bird Banding Laboratory, Office of Migratory Bird Management, U.S. Fish and Wildlife Service, Laurel, Maryland 20708. (Special application forms must be used for bird banding permits. They may be obtained by writing to the Bird Banding Laboratory).

(2) Exception to designated port (50 CFR part 14), import/export license (50 CFR 14.93), migratory bird permit, other than banding (50 CFR part 21) and Bald or Golden eagle permits (50 CFR part 22)—Assistant Regional Director for Law Enforcement of District in which the applicant resides (see 50 CFR 10.22 for addresses and boundaries of the Law Enforcement Districts).

(3) Feather quota (50 CFR part 15), injurious wildlife (50 CFR part 16), endangered and threatened species (50 CFR part 17), marine mammal (50 CFR part 18) and permits and certificates for the Convention on International Trade in Endangered Species (CITES) (50 CFR part 23)—U.S. Fish and Wildlife Service, Federal Wildlife Permit Office, P.O. Box 3654, Arlington, Virginia 22203.

(c) *Time notice.* The Service will process all applications as quickly as possible. However, it cannot guarantee final action within the time limits the applicant requests. Applicants for endangered species and marine mammal permits should submit applications to the Office of Management Authority which are postmarked at least 90 calendar days prior to the requested effective date. Applicants for all other permits should submit applications to the issuing office which are postmarked at least 60 days prior to the requested effective date.

(d) *Fees.* (1) Unless otherwise exempted by this paragraph, applicants for issuance or renewal of permits must pay the required permit processing fee at the time of application. Applicants should pay fees by check or money order made payable to ''U.S. Fish and Wildlife Service.'' The Service will not refund any application fee under any circumstances if the Service has processed the application. However, the Service may return the application fee if the applicant withdraws the application before the Service has significantly processed it.

(2) Except as provided in paragraph (d)(4) of this section the fee for processing any application is $25.00. If regulations in this subchapter require more than one type of permit for an activity, and the permits are issued by the same office, the issuing office may issue one consolidated permit authorizing the activity. The issuing office may charge only the highest single fee for the activity permitted.

(3) A fee shall not be charged to any Federal, State or local government agency, nor to any individual or institution under contract to such agency for the proposed activities. The fee may be waived or reduced for public institutions (see 50 CFR 10.12). Proof of such status must accompany the application.

(4) *Nonstandard fees.*

Type of permit	Fee
Import/Export License (Section 14.93)	$50.
Marine Mammal (Section 18.31)	$100.
Migratory Bird-Banding or Marking (21.22)	None.
Bald or Golden Eagles (Part 22)	None.

(e) *Abandoned or incomplete applications.* Upon receipt of an incomplete or improperly executed application, or if the applicant does not submit the proper fees, the issuing office will notify the applicant of the deficiency. If the

applicant fails to supply the correct information to complete the application or to pay the required fees within 45 calendar days of the date of notification, the Service will consider the application abandoned. The Service will not refund any fees for an abandoned application.

[47 FR 30785, July 15, 1982, as amended at 50 FR 52889, Dec. 26, 1985; 54 FR 4031, Jan. 27, 1989; 54 FR 38147, Sept. 14, 1989; 61 FR 31868, June 21, 1996]

§ 13.12 General information requirements on applications for permits.

(a) General information required for all applications. All applications must contain the following information:

(1) Applicant's full name, mailing address, telephone number(s), and,

(i) If the applicant is an individual, the date of birth, height, weight, hair color, eye color, sex, and any business or institutional affiliation of the applicant related to the requested permitted activity; or

(ii) If the applicant is a corporation, firm, partnership, association, institution, or public or private agency, the name and address of the president or principal officer and of the registered agent for the service of process;

(2) Location where the requested permitted activity is to occur or be conducted;

(3) Reference to the part(s) and section(s) of this subchapter B as listed in paragraph (b) of this section under which the application is made for a permit or permits, together with any additional justification, including supporting documentation as required by the referenced part(s) and section(s);

(4) If the requested permitted activity involves the import or re-export of wildlife or plants from or to any foreign country, and the country of origin, or the country of export or re-export restricts the taking, possession, transportation, exportation, or sale of wildlife or plants, documentation as indicated in §14.52(c) of this subchapter B;

(5) Certification in the following language:

> I hereby certify that I have read and am familiar with the regulations contained in title 50, part 13, of the Code of Federal Regulations and the other applicable parts in subchapter B of chapter I of title 50, Code of Federal Regulations, and I further certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to the criminal penalties of 18 U.S.C. 1001.

(6) Desired effective date of permit except where issuance date is fixed by the part under which the permit is issued;

(7) Date;

(8) Signature of the applicant; and

(9) Such other information as the Director determines relevant to the processing of the application.

(b) *Additional information required on permit applications.* As stated in paragraph (a)(3) of this section certain additional information is required on all applications. These additional requirements may be found by referring to the section of this subchapter B cited after the type of permit for which application is being made:

Type of permit	Section
Importation at nondesignated ports:	
Scientific	14.31
Deterioration prevention	14.32
Economic hardship	14.33
Marking of package or container:	
Symbol marking	14.83
Import/export license	14.93
Feather import quota: Importation or entry	15.21
Injurious wildlife: Importation or shipment	16.22
Endangered wildlife and plant permits:	
Similarity of appearance	17.52
Scientific, enhancement of propagation or survival, incidental taking for wildlife	17.22
Scientific, propagation, or survival for plants	17.62
Economic hardship for wildlife	17.23
Economic hardship for plants	17.63
Threatened wildlife and plant permits:	
Similarity of appearance	17.52
General for wildlife	17.32
American alligator–buyer or tanner	17.42(a)
General for plants	17.72
Marine mammals permits:	
Scientific research	18.31
Public display	18.31
Migratory bird permits:	
Banding or marking	21.22
Scientific collecting	21.23
Taxidermist	21.24
Waterfowl sale and disposal	21.25
Special aviculturist	21.26
Special purpose	21.27
Falconry	21.28
Raptor propagation permit	21.30
Depredation control	21.41
Eagle permits:	
Scientific or exhibition	22.21
Indian religious use	22.22
Depredation control	22.23
Falconry purposes	22.24

Type of permit	Section
Take of golden eagle nests	22.25
Endangered Species Convention permits	23.15

[39 FR 1161, Jan. 4, 1974, as amended at 42 FR 10465, Feb. 22, 1977; 42 FR 32377, June 24, 1977; 44 FR 54006, Sept. 17, 1979; 44 FR 59083, Oct. 12, 1979; 45 FR 56673, Aug. 25, 1980; 45 FR 78154, Nov. 25, 1980; 46 FR 42680, Aug. 24, 1981; 48 FR 31607, July 8, 1983; 48 FR 57300, Dec. 29, 1983; 50 FR 39687, Sept. 30, 1985; 50 FR 45408, Oct. 31, 1985; 54 FR 38147, Sept. 14, 1989]

Subpart C—Permit Administration

§ 13.21 Issuance of permits.

(a) No permit may be issued prior to the receipt of a written application therefor, unless a written variation from the requirements, as authorized by § 13.4, is inserted into the official file of the Bureau. An oral or written representation of an employee or agent of the United States Government, or an action of such employee or agent, shall not be construed as a permit unless it meets the requirements of a permit as defined in 50 CFR 10.12.

(b) Upon receipt of a properly executed application for a permit, the Director shall issue the appropriate permit unless:

(1) The applicant has been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed, if such assessment or conviction evidences a lack of responsibility.

(2) The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his application;

(3) The applicant has failed to demonstrate a valid justification for the permit and a showing of responsibility;

(4) The authorization requested potentially threatens a wildlife or plant population, or

(5) The Director finds through further inquiry or investigation, or otherwise, that the applicant is not qualified.

(c) *Disqualifying factors.* Any one of the following will disqualify a person from receiving permits issued under this part.

(1) A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Director in response to a written petition.

(2) The revocation of a permit for reasons found in § 13.28 (a)(1) or (a)(2) disqualifies any such person from receiving or exercising the privileges of a similar permit for a period of five years from the date of the final agency decision on such revocation.

(3) The failure to pay any required fees or assessed costs and penalties, whether or not reduced to judgement disqualifies such person from receiving or exercising the privileges of a permit as long as such moneys are owed to the United States. This requirement shall not apply to any civil penalty presently subject to administrative or judicial appeal; provided that the pendency of a collection action brought by the United States or its assignees shall not constitute an appeal within the meaning of this subsection.

(4) The failure to submit timely, accurate, or valid reports as required may disqualify such person from receiving or exercising the privileges of a permit as long as the deficiency exists.

(d) *Use of supplemental information.* The issuing officer, in making a determination under this subsection, may use any information available that is relevant to the issue. This may include any prior conviction, or entry of a plea of guilty or nolo contendere, or assessment of civil or criminal penalty for a violation of any Federal or State law or regulation governing the permitted activity. It may also include any prior permit revocations or suspensions, or any reports of State or local officials. The issuing officer shall consider all relevant facts or information available, and may make independent inquiry or investigation to verify information or substantiate qualifications asserted by the applicant.

(e) *Conditions of issuance and acceptance.* (1) Any permit automatically incorporates within its terms the conditions and requirements of subpart D of

this part and of any part(s) or section(s) specifically authorizing or governing the activity for which the permit is issued.

(2) Any person accepting and holding a permit under this subchapter B acknowledges the necessity for close regulation and monitoring of the permitted activity by the Government. By accepting such permit, the permittee consents to and shall allow entry by agents or employees of the Service upon premises where the permitted activity is conducted at any reasonable hour. Service agents or employees may enter such premises to inspect the location; any books, records, or permits required to be kept by this subchapter B; and any wildlife or plants kept under authority of the permit.

(f) *Term of permit.* Unless otherwise modified, a permit is valid during the period specified on the face of the permit. Such period shall include the effective date and the date of expiration.

(g) *Denial.* The issuing officer may deny a permit to any applicant who fails to meet the issuance criteria set forth in this section or in the part(s) or section(s) specifically governing the activity for which the permit is requested.

[39 FR 1161, Jan. 4, 1974, as amended at 42 FR 32377, June 24, 1977; 47 FR 30785, July 15, 1982; 54 FR 38148, Sept. 14, 1989]

§ 13.22 Renewal of permits.

(a) *Application for renewal.* Applicants for renewal of a permit must submit a written application at least 30 days prior to the expiration date of the permit. Applicants must certify in the form required by § 13.12(a)(5) that all statements and information in the original application remain current and correct, unless previously changed or corrected. If such information is no longer current or correct, the applicant must provide corrected information.

(b) *Renewal criteria.* The Service shall issue a renewal of a permit if the applicant meets the criteria for issuance in § 13.21(b) and is not disqualified under § 13.21(c).

(c) *Continuation of permitted activity.* Any person holding a valid, renewable permit, who has complied with this section, may continue the activities authorized by the expired permit until the Service has acted on such person's application for renewal.

(d) *Denial.* The issuing officer may deny renewal of a permit to any applicant who fails to meet the issuance criteria set forth in § 13.21 of this part, or in the part(s) or section(s) specifically governing the activity for which the renewal is requested.

[54 FR 38148, Sept. 14, 1989]

§ 13.23 Amendment of permits.

(a) *Permittee's request.* Where circumstances have changed so that a permittee desires to have any condition of his permit modified, such permittee must submit a full written justification and supporting information in conformity with this part and the part under which the permit was issued.

(b) *Service reservation.* The Service reserves the right to amend any permit for just cause at any time during its term, upon written finding of necessity.

(c) *Change of name or address.* A permittee is not required to obtain a new permit if there is a change in the legal individual or business name, or in the mailing address of the permittee. A permittee is required to notify the issuing office within 10 calendar days of such change. This provision does not authorize any change in location of the conduct of the permitted activity when approval of the location is a qualifying condition of the permit.

[54 FR 38148, Sept. 14, 1989]

§ 13.24 Right of succession by certain persons.

(a) Certain persons, other than the permittee are granted the right to carry on a permitted activity for the remainder of the term of a current permit provided they comply with the provisions of paragraph (b) of this section. Such persons are the following:

(1) The surviving spouse, child, executor, administrator, or other legal representative of a deceased permittee; and

(2) A receiver or trustee in bankruptcy or a court designated assignee for the benefit of creditors.

(b) In order to secure the right provided in this section the person or persons desiring to continue the activity

shall furnish the permit to the issuing officer for endorsement within 90 days from the date the successor begins to carry on the activity.

[54 FR 38149, Sept. 14, 1989]

§ 13.25 Permits not transferable; agents.

(a) Permits issued under this part are not transferable or assignable. Some permits authorize certain activities in connection with a business or commercial enterprise and in the event of any lease, sale, or transfer of such business entity, the successor must obtain a permit prior to continuing the permitted activity. However, certain limited rights of succession are provided in § 13.24.

(b) Except as otherwise stated on the face of the permit, any person who is under the direct control of the permittee, or who is employed by or under contract to the permittee for purposes authorized by the permit, may carry out the activity authorized by the permit, as an agent for the permittee.

[54 FR 38149, Sept. 14, 1989]

§ 13.26 Discontinuance of permit activity.

When a permittee, or any successor to a permittee as provided for by § 13.24, discontinues activities authorized by a permit, the permittee shall within 30 calendar days of the discontinuance return the permit to the issuing office together with a written statement surrendering the permit for cancellation. The permit shall be deemed void and cancelled upon its receipt by the issuing office. No refund of any fees paid for issuance of the permit or for any other fees or costs associated with a permitted activity shall be made when a permit is surrendered for cancellation for any reason prior to the expiration date stated on the face of the permit.

[54 FR 38149, Sept. 14, 1989]

§ 13.27 Permit suspension.

(a) *Criteria for suspension.* The privileges of exercising some or all of the permit authority may be suspended at any time if the permittee is not in compliance with the conditions of the permit, or with any applicable laws or regulations governing the conduct of the permitted activity. The issuing officer may also suspend all or part of the privileges authorized by a permit if the permittee fails to pay any fees, penalties or costs owed to the Government. Such suspension shall remain in effect until the issuing officer determines that the permittee has corrected the deficiencies.

(b) *Procedure for suspension.* (1) When the issuing officer believes there are valid grounds for suspending a permit the permittee shall be notified in writing of the proposed suspension by certified or registered mail. This notice shall identify the permit to be suspended, the reason(s) for such suspension, the actions necessary to correct the deficiencies, and inform the permittee of the right to object to the proposed suspension. The issuing officer may amend any notice of suspension at any time.

(2) Upon receipt of a notice of proposed suspension the permittee may file a written objection to the proposed action. Such objection must be in writing, must be filed within 45 calendar days of the date of the notice of proposal, must state the reasons why the permittee objects to the proposed suspension, and may include supporting documentation.

(3) A decision on the suspension shall be made within 45 days after the end of the objection period. The issuing officer shall notify the permittee in writing of the Service's decision and the reasons therefore. The issuing officer shall also provide the applicant with the information concerning the right to request reconsideration of the decision under § 13.29 of this part and the procedures for requesting reconsideration.

[54 FR 38149, Sept. 14, 1989]

§ 13.28 Permit revocation.

(a) *Criteria for revocation.* A permit may be revoked for any of the following reasons:

(1) The permittee willfully violates any Federal or State statute or regulation, or any Indian tribal law or regulation, or any law or regulation of any foreign country, which involves a violation of the conditions of the permit

or of the laws or regulations governing the permitted activity; or

(2) The permittee fails within 60 days to correct deficiencies that were the cause of a permit suspension; or

(3) The permittee becomes disqualified under § 13.21(c) of this part; or

(4) A change occurs in the statute or regulation authorizing the permit that prohibits the continuation of a permit issued by the Service; or

(5) The population(s) of the wildlife or plant that is subject of the permit declines to the extent that continuation of the permitted activity would be detrimental to maintenance or recovery of the affected population.

(b) *Procedure for revocation.* (1) When the issuing officer believes there are valid grounds for revoking a permit, the permittee shall be notified in writing of the proposed revocation by certified or registered mail. This notice shall identify the permit to be revoked, the reason(s) for such revocation, the proposed disposition of the wildlife, if any, and inform the permittee of the right to object to the proposed revocation. The issuing officer may amend any notice of revocation at any time.

(2) Upon receipt of a notice of proposed revocation the permittee may file a written objection to the proposed action. Such objection must be in writing, must be filed within 45 calendar days of the date of the notice of proposal, must state the reasons why the permittee objects to the proposed revocation, and may include supporting documentation.

(3) A decision on the revocation shall be made within 45 days after the end of the objection period. The issuing officer shall notify the permittee in writing of the Service's decision and the reasons therefore, together with the information concerning the right to request and the procedures for requesting reconsideration.

(4) Unless a permittee files a timely request for reconsideration, any wildlife held under authority of a permit that is revoked must be disposed of in accordance with instructions of the issuing officer. If a permittee files a timely request for reconsideration of a proposed revocation, such permittee may retain possession of any wildlife held under authority of the permit until final disposition of the appeal process.

[54 FR 38149, Sept. 14, 1989]

§ 13.29 Review procedures.

(a) *Request for reconsideration.* Any person may request reconsideration of an action under this part if that person is one of the following:

(1) An applicant for a permit who has received written notice of denial;

(2) An applicant for renewal who has received written notice that a renewal is denied;

(3) A permittee who has a permit amended, suspended, or revoked, except for those actions which are required by changes in statutes or regulations, or are emergency changes of limited applicability for which an expiration date is set within 90 days of the permit change; or

(4) A permittee who has a permit issued or renewed but has not been granted authority by the permit to perform all activities requested in the application, except when the activity requested is one for which there is no lawful authority to issue a permit.

(b) *Method of requesting reconsideration.* Any person requesting reconsideration of an action under this part must comply with the following criteria:

(1) Any request for reconsideration must be in writing, signed by the person requesting reconsideration or by the legal representative of that person, and must be submitted to the issuing officer.

(2) The request for reconsideration must be received by the issuing officer within 45 calendar days of the date of notification of the decision for which reconsideration is being requested.

(3) The request for reconsideration shall state the decision for which reconsideration is being requested and shall state the reason(s) for the reconsideration, including presenting any new information or facts pertinent to the issue(s) raised by the request for reconsideration.

(4) The request for reconsideration shall contain a certification in substantially the same form as that provided by § 13.12(a)(5). If a request for reconsideration does not contain such certification, but is otherwise timely

and appropriate, it shall be held and the person submitting the request shall be given written notice of the need to submit the certification within 15 calendar days. Failure to submit certification shall result in the request being rejected as insufficient in form and content.

(c) *Inquiry by the Service.* The Service may institute a separate inquiry into the matter under consideration.

(d) *Determination of grant or denial of a request for reconsideration.* The issuing officer shall notify the permittee of the Service's decision within 45 days of the receipt of the request for reconsideration. This notification shall be in writing, shall state the reasons for the decision, and shall contain a description of the evidence which was relied upon by the issuing officer. The notification shall also provide information concerning the right to appeal, the official to whom an appeal may be addressed, and the procedures for making an appeal.

(e) *Appeal.* A person who has received an adverse decision following submission of a request for reconsideration may submit a written appeal to the Regional Director for the region in which the issuing office is located, or to the Director for offices which report directly to the Director. An appeal must be submitted within 45 days of the date of the notification of the decision on the request for reconsideration. The appeal shall state the reason(s) and issue(s) upon which the appeal is based and may contain any additional evidence or arguments to support the appeal.

(f) *Decision on appeal.* (1) Before a decision is made concerning the appeal the appellant may present oral arguments before the Regional Director or the Director, as appropriate, if such official judges oral arguments are necessary to clarify issues raised in the written record.

(2) The Service shall notify the appellant in writing of its decision within 45 calendar days of receipt of the appeal, unless extended for good cause and the appellant notified of the extension.

(3) The decision of the Regional Director or the Director shall constitute the final administrative decision of the Department of the Interior.

[54 FR 38149, Sept. 14, 1989]

Subpart D—Conditions

§ 13.41 Humane conditions.

Any live wildlife possessed under a permit must be maintained under humane and healthful conditions.

[54 FR 38150, Sept. 14, 1989]

§ 13.42 Permits are specific.

The authorizations on the face of a permit which set forth specific times, dates, places, methods of taking, numbers and kinds of wildlife or plants, location of activity, authorize certain circumscribed transactions, or otherwise permit a specifically limited matter, are to be strictly construed and shall not be interpreted to permit similar or related matters outside the scope of strict construction.

[39 FR 1161, Jan. 4, 1974, as amended at 42 FR 32377, June 24, 1977]

§ 13.43 Alteration of permits.

Permits shall not be altered, erased, or mutilated, and any permit which has been altered, erased, or mutilated shall immediately become invalid. Unless specifically permitted on the face thereof, no permit shall be copied, nor shall any copy of a permit issued pursuant to this subchapter B be displayed, offered for inspection, or otherwise used for any official purpose for which the permit was issued.

§ 13.44 Display of permit.

Any permit issued under this part shall be displayed for inspection upon request to the Director or his agent, or to any other person relying upon its existence.

§ 13.45 Filing of reports.

Permittees may be required to file reports of the activities conducted under the permit. Any such reports shall be filed not later than March 31 for the preceding calendar year ending December 31, or any portion thereof, during which a permit was in force, unless the regulations of this subchapter

B or the provisions of the permit set forth other reporting requirements.

§ 13.46 Maintenance of records.

From the date of issuance of the permit, the permittee shall maintain complete and accurate records of any taking, possession, transportation, sale, purchase, barter, exportation, or importation of plants obtained from the wild (excluding seeds) or wildlife pursuant to such permit. Such records shall be kept current and shall include names and addresses of persons with whom any plant obtained from the wild (excluding seeds) or wildlife has been purchased, sold, bartered, or otherwise transferred, and the date of such transaction, and such other information as may be required or appropriate. Such records shall be legibly written or reproducible in English and shall be maintained for five years from the date of expiration of the permit.

[39 FR 1161, Jan. 4, 1974, as amended at 42 FR 32377, June 24, 1977; 54 FR 38150, Sept. 14, 1989]

§ 13.47 Inspection requirement.

Any person holding a permit under this subchapter B shall allow the Director's agent to enter his premises at any reasonable hour to inspect any wildlife or plant held or to inspect, audit, or copy any permits, books, or records required to be kept by regulations of this subchapter B.

[39 FR 1161, Jan. 4, 1974, as amended at 42 FR 32377, June 24, 1977]

§ 13.48 Compliance with conditions of permit.

Any person holding a permit under subchapter B and any person acting under authority of such permit must comply with all conditions of the permit and with all appllicable laws and regulations governing the permitted activity.

[54 FR 38150, Sept. 14, 1989]

§ 13.49 Surrender of permit.

Any person holding a permit under subchapter B shall surrender such permit to the issuing officer upon notification that the permit has been suspended or revoked by the Service, and all appeal procedures have been exhausted.

[54 FR 38150, Sept. 14, 1989]

§ 13.50 Acceptance of liability.

Any person holding a permit under subchapter B assumes all liability and responsibility for the conduct of any activity conducted under the authority of such permit.

[54 FR 38150, Sept. 14, 1989]

PART 14—IMPORTATION, EXPORTATION, AND TRANSPORTATION OF WILDLIFE

Subpart A—Introduction

Sec.
14.1 Purpose of regulations.
14.2 Scope of regulations.
14.3 Information collection requirements.
14.4 Definitions.

Subpart B—Importation and Exportation at Designated Ports

14.11 General restrictions.
14.12 Designated ports.
14.13 Emergency diversion.
14.14 In-transit shipments.
14.15 Personal baggage and household effects.
14.16 Border ports.
14.17 Personally owned pet birds.
14.18 Marine mammals.
14.19 Special ports.
14.20 Exceptions by permit.
14.21 Shellfish and fishery products.
14.22 Certain antique articles.
14.23 Live farm-raised fish and farm-raised fish eggs.
14.24 Scientific specimens.

Subpart C—Designated Port Exception Permits

14.31 Permits to import or export wildlife at nondesignated port for scientific purposes.
14.32 Permits to import or export wildlife at nondesignated port to minimize deterioration or loss.
14.33 Permits to import or export wildlife at nondesignated port to alleviate undue economic hardship.

Subpart D [Reserved]

Subpart E—Inspection and Clearance of Wildlife

14.51 Inspection of wildlife.
14.52 Clearance of imported wildlife.

taking and a description of any measures that will be taken in the following year to prevent exceeding the authorized incidental take level.

(5) Results of any population assessment studies made on marine mammals in the Outer Sea Test Range during the previous year.

§216.156 Renewal of Letter of Authorization.

(a) A Letter of Authorization issued under §216.106 for the activity identified in §216.151(a) will be renewed annually upon:

(1) Timely receipt of the reports required under §216.155(f) and (g), which have been reviewed by the Assistant Administrator for Fisheries, NOAA, and determined to be acceptable;

(2) A determination that the maximum incidental take authorizations in §216.151(b) will not be exceeded; and

(3) A determination that the mitigation measures required under §216.153(b) and the Letter of Authorization have been undertaken.

(b) If a species' annual authorization is exceeded, the National Marine Fisheries Service will review the documentation submitted with the annual report required under §216.155(g), to determine that the taking is not having more than a negligible impact on the species or stock involved.

(c) Notice of issuance of a renewal of the Letter of Authorization will be published in the FEDERAL REGISTER.

[59 FR 5126, Feb. 3, 1994. Redesignated and amended at 61 FR 15887, 15890–15891, Apr. 10, 1996]

§216.157 Modifications to Letter of Authorization.

(a) In addition to complying with the provisions of §216.106, except as provided in paragraph (b) of this section, no substantive modification, including withdrawal or suspension, to the Letter of Authorization issued pursuant to §216.106 and subject to the provisions of this subpart shall be made until after notice and an opportunity for public comment. For purposes of this paragraph, renewal of a Letter of Authorization under §216.146, without modification, is not considered a substantive modification.

(b) If the National Marine Fisheries Service determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in §216.151, or that significantly and detrimentally alters the scheduling of explosives detonation within the area specified in §216.151, the Letter of Authorization issued pursuant to §216.106, or renewed pursuant to this section may be substantively modified without prior notice and an opportunity for public comment. A notice will be published in the FEDERAL REGISTER subsequent to the action.

[59 FR 5126, Feb. 3, 1994. Redesignated and amended at 61 FR 15887, 15891, Apr. 10, 1996]

Subparts O–Q [Reserved]

PART 217—GENERAL PROVISIONS

Subpart A—Introduction

Sec.

Subpart B—Definitions

Subpart C—Addresses

AUTHORITY: 16 U.S.C. 742a *et seq.,* 1361 *et seq.,* and 1531–1544, unless otherwise noted.

Subpart A—Introduction

§217.1 Purpose of regulations.

The regulations of parts 216 through 227 are promulgated to implement the following statutes enforced by the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce, which regulate the taking, possession, transportation, sale, purchase,

barter, exportation, and importation of wildlife.

(Endangered Species Act of 1973, section 11(f), 87 Stat. 884, Pub. L. 93–205; Fish and Wildlife Act of 1956, 16 U.S.C. 742a–1)

[39 FR 41370, Nov. 27, 1974, as amended at 52 FR 24250, June 29, 1987]

§ 217.2 Scope of regulations.

The various provisions of parts 216 through 227 of this chapter are interrelated, and particular note should be taken that the parts must be construed with reference to each other. The regulations in parts 216 through 227 apply only for fish or wildlife under the jurisdictional responsibilities of the Secretary of Commerce for the purpose of carrying out the Endangered Species Act of 1973 (see part 222, § 222.23(a)). Endangered species of fish or wildlife other than those covered by these regulations are under the jurisdiction of the Secretary of the Interior. For rules and procedures relating to such species, see 50 CFR parts 10 through 17.

[39 FR 41370, Nov. 27, 1974, as amended at 52 FR 24250, June 29, 1987]

§ 217.3 Other applicable laws.

No statute or regulation of any State shall be construed to relieve a person from the restrictions, conditions, and requirements contained in parts 216 through 227 of this chapter. In addition, nothing in parts 216 through 227 of this chapter, nor any permit issued under parts 217 through 228 of this chapter, shall be construed to relieve a person from any other requirements imposed by a statute or regulation of any State or of the United States, including any applicable health, quarantine, agricultural, or customs laws or regulations, or other National Marine Fisheries Service enforced statutes or regulations.

[39 FR 41370, Nov. 27, 1974, as amended at 52 FR 24250, June 29, 1987]

§ 217.4 When regulations apply.

The regulations of parts 216 through 227 of this chapter shall apply to all matters, including the processing of permits, arising after the effective date of such regulations, with the following exception:

(a) *Civil penalty proceedings.* Except as otherwise provided in § 218.25, the civil penalty assessment procedures contained in parts 216 through 227 of this chapter shall apply only to any proceeding instituted by notice of violation dated subsequent to the effective date of these regulations, regardless of when the act or omission which is the basis of a civil penalty proceeding occurred.

(b) [Reserved]

[39 FR 41370, Nov. 27, 1974, as amended at 52 FR 24250, June 29, 1987]

Subpart B—Definitions

§ 217.12 Definitions.

Accelerator funnel means a device used to accelerate the flow of water through a shrimp trawl net.

Act means the Endangered Species Act of 1973, as amended (Pub. L. 93–205).

Approved TED means:

(1) A hard TED that complies with the generic design criteria set forth in 50 CFR 227.72(e)(4)(i). (A hard TED may be modified as specifically authorized by 50 CFR 227.72(e)(4)(iv)); or

(2) A soft TED that complies with the provisions of 50 CFR 227.72(e)(4)(iii); or

(3) A special hard TED which complies with the provisions of 50 CFR 227.72(e)(4)(ii).

Assistant Administrator means the Assistant Administrator for Fisheries of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce, or his authorized representative.

Atlantic Area means all waters of the Atlantic Ocean south of 36°33′00.8″ N. latitude (the line of the North Carolina/Virginia border) and adjacent seas, other than waters of the Gulf Area, and all waters shoreward thereof (including ports).

Atlantic Shrimp Fishery-Sea Turtle Conservation Area (Atlantic SFSTCA) means the inshore and offshore waters extending to 10 nautical miles (18.5 km) offshore along the coast of the States of Georgia and South Carolina from the Georgia-Florida border (defined as the line along 30°42′45.6″ N. lat.) to the North Carolina-South Carolina border

(defined as the line extending in a direction of 135°34′55″ from true north from the North Carolina-South Carolina land boundary, as marked by the border station on Bird Island at 33° 51′07.9″ N. lat., 078°32′32.6″ W. long.).

Authorized officer means:

(1) Any commissioned, warrant, or petty officer of the U.S. Coast Guard;

(2) Any special agent or enforcement officer of the National Marine Fisheries Service;

(3) Any officer designated by the head of a Federal or state agency that has entered into an agreement with the Secretary or the Commandant of the Coast Guard to enforce the provisions of the Act; or

(4) Any Coast Guard personnel accompanying and acting under the direction of any person described in paragraph (1) of this definition.

Bait shrimper means a shrimp trawler that fishes for and retains its shrimp catch alive for the purpose of selling it for use as bait.

Commercial activity means all activities of industry and trade, including, but not limited to, the buying or selling of commodities and activities conducted for the purpose of facilitating such buying and selling: *Provided, however,* That it does not include the exhibition of commodities by museums or similar cultural or historical organizations.

Country of exportation means the last country from which the animal was exported before importation into the United States.

Country of origin means the country where the animal was taken from the wild, or the country of natal origin of the animal.

Fish or wildlife means any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.

Fishing, or to fish, means:

(1) The catching taking or harvesting of fish or wildlife;

(2) The attempted catching, taking, or harvesting of fish or wildlife;

(3) Any other activity that can reasonably be expected to result in the catching, taking, or harvesting of fish or wildlife; or

(4) Any operations on any waters in support of, or in preparation for, any activity described in paragraphs (1) through (3) of this definition.

Footrope means a weighted rope or cable attached to the lower lip (bottom edge) of the mouth of a trawl net along the forwardmost webbing.

Footrope length means the distance between the points at which the ends of the footrope are attached to the trawl net, measured along the forwardmost webbing.

Foreign commerce includes, among other things, any transaction (1) between persons within one foreign country, or (2) between persons in two or more foreign countries, or (3) between a person within the United States and a person in one or more foreign countries, or (4) between persons within the United States, where the fish or wildlife in question are moving in any country or countries outside the United States.

Four-seam, straight-wing trawl means a design of shrimp trawl in which the main body of the trawl is formed from a top panel, a bottom panel, and two side panels of webbing. The upper and lower edges of the side panels of webbing are parallel over the entire length.

Four-seam, tapered-wing trawl means a design of shrimp trawl in which the main body of the trawl is formed from a top panel, a bottom panel, and two side panels of webbing. The upper and lower edges of the side panels of webbing converge toward the rear of the trawl.

Gulf Area means all waters of the Gulf of Mexico west of 81° W. longitude (the line at which the Gulf Area meets the Atlantic Area) and all waters shoreward thereof (including ports).

Gulf Shrimp Fishery-Sea Turtle Conservation Area (Gulf SFSTCA) means the offshore waters extending to 10 nautical miles (18.5 km) offshore along the coast of the States of Texas and Louisiana from the South Pass of the Mississippi River (west of 89°08.5′ W. long.) to the U.S.-Mexican border.

Hard TED means a rigid deflector grid and associated hardware designed to be installed in a trawl net forward of the codend for the purpose of excluding sea turtles from the net.

Headrope means a rope that is attached to the upper lip (top edge) of the mouth of a trawl net along the forewardmost webbing.

Headrope length means the distance between the points at which the ends of the headrope are attached to the trawl net, measured along the forewardmost webbing.

Import means to land on, bring into, or introduce into, or attempt to land on, bring into, or introduce into any place subject to the jurisdiction of the United States, whether or not such landing, bringing, or introduction constitutes an importation within the meaning of the tariff laws of the United States.

Inshore means marine and tidal waters landward of the 72 COLREGS demarcation line (International Regulations for Preventing Collisions at Sea, 1972), as depicted or noted on nautical charts published by the National Oceanic and Atmospheric Administration (Coast Charts, 1:80,000 scale) and as described in 33 CFR part 80.

Leatherback conservation zone means all inshore and offshore waters bounded on the south by a line along 28°24.6′ N. lat. (Cape Canaveral, FL), and bounded on the north by a line along 36°30.5′ N. lat. (North Carolina-Virginia border).

Length in reference to a shrimp trawler, means the distance from the tip of the vessel's bow to the tip of its stern.

North Carolina restricted area means that portion of the offshore waters bounded on the north by a line along 34°17.6′ N. latitude (Rich Inlet, North Carolina) and 34°35.7′ N. latitude (Browns Inlet, North Carolina) to a distance of 1 nautical mile seaward of the 72 COLREGS demarcation line (International Regulations for Preventing Collisions at Sea, 1972).

Offshore means marine and tidal waters seaward of the 72 COLREGS demarcation line (International Regulations for Preventing Collisions at Sea, 1972), as depicted or noted on nautical charts published by the National Oceanic and Atmospheric Administration (Coast Charts, 1:80,000 scale) and as described in 33 CFR part 80.

Permit or *''Certificate of exemption''* means any document so designated by the National Marine Fisheries Service and signed by an authorized official of the National Marine Fisheries Service, including any document which modifies, amends, extends or renews any permit or certificate of exemption.

Person means an individual, corporation, partnership, trust, association, or any other private entity, or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State or political subdivision thereof, or of any foreign government.

Possession means the detention and control, or the manual or ideal custody of anything which may be the subject of property, for one's use and enjoyment, either as owner or as the proprietor of a qualified right in it, and either held personally or by another who exercises it in one's place and name. Possession includes the act or state of possessing and that condition of facts under which one can exercise his power over a corporeal thing at his pleasure to the exclusion of all other persons. Possession includes constructive possession which means not actual but assumed to exist, where one claims to hold by virtue of some title, without having actual custody.

Pre-Act endangered species part means any sperm whale oil, including derivatives and products thereof, which was lawfully held within the United States on December 28, 1973 in the course of a commercial activity; or any finished scrimshaw product, if such product or the raw material for such product was lawfully held within the United States on December 28, 1973, in the course of a commercial activity.

Pusher-head trawl (chopsticks) means a trawl that is spread by poles suspended in a ''V'' configuration from the bow of the trawler.

Right whale, as used in subpart D of this part, means any whale that is a member of the western North Atlantic population of the northern right whale species (*Eubalaena glacialis*).

Scrimshaw product means any art form which involves the substantial etching or engraving of designs upon,

or the substantial carving of figures, patterns, or designs from any bone or tooth of any marine mammal of the order Cetacea. For purposes of this part, polishing or the adding of minor superficial markings does not constitute substantial etching, engraving or carving.

Secretary means the Secretary of Commerce or his authorized representative.

Shrimp means any species of marine shrimp (Order Crustacea) found in the Atlantic Area or the Gulf Area, including, but not limited to:

(1) Brown shrimp (*Penaeus aztecus*);

(2) White shrimp (*P. setiferus*);

(3) Pink shrimp (*P. duorarum*);

(4) Rock shrimp (*Sicyonia brevirostris*);

(5) Royal red shrimp (*Hymenopenaeus robustus*); and

(6) Seabob shrimp (*Xiphopenaeus kroyeri*).

Shrimp trawler means any vessel that is equipped with one or more trawl nets and that is capable of, or used for, fishing for shrimp, or whose on-board or landed catch of shrimp is more than 1 percent, by weight, of all fish comprising its on-board or landed catch.

Skimmer trawl means a trawl that extends from the outrigger of a vessel with a cable and a lead weight holding the trawl mouth open.

Soft TED means a panel of polypropylene or polyethylene netting designed to be installed in a trawl net forward of the codend for the purpose of excluding sea turtles from the net.

State means any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam, and the Trust Territory of the Pacific Islands.

Stretched mesh size means the distance between the centers of the two opposite knots in the same mesh when pulled taut.

Summer flounder means the species *Paralichthys dentatus.*

Summer flounder fishery-sea turtle protection area means:

(1) All offshore waters, bounded on the north by a line along 37°05′ N. latitude (Cape Charles, VA) and bounded on the south by a line along 33°35′ N. latitude (North Carolina-South Carolina border), except as provided in paragraph (2) of this definition.

(2) [Reserved]

Summer flounder trawler means any vessel that is equipped with one or more bottom trawl nets, and that is capable of, or used for, fishing for flounder, or whose on-board or landed catch of flounder is more than 100 pounds (45.4 kg).

Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect.

Taper, in reference to the webbing used in trawls, means the angle of a cut used to shape the webbing, expressed as the ratio between the cuts that reduce the width of the webbing by cutting into the panel of webbing through one row of twine (bar cuts) and the cuts that extend the length of the panel of webbing by cutting straight aft through two adjoining rows of twine (point cuts). For example, sequentially cutting through the lengths of twine on opposite sides of a mesh, leaving an uncut edge of twines all lying in the same line, produces a relatively strong taper called ''all-bars''; making a sequence of 4-bar cuts followed by 1-point cut produces a more gradual taper called ''4 bars to 1 point'' or ''4b1p''; similarly, making a sequence of 2-bar cuts followed by 1-point cut produces a still more gradual taper called ''2b1p''; and making a sequence of cuts straight aft does not reduce the width of the panel and is called a ''straight'' or ''all-points'' cut.

Taut means a condition in which there is no slack in the net webbing.

TED (turtle excluder device) means a device designed to be installed in a trawl net forward of the codend for the purpose of excluding sea turtles from the net.

Test net, or try net, means a net pulled for brief periods of time just before, or during, deployment of the primary net(s) in order to test for shrimp concentrations or determine fishing conditions (e.g., presence or absence of bottom debris, jellyfish, bycatch, seagrasses, etc.).

Tongue means any piece of webbing along the top, center, leading edge of a trawl, whether lying behind or ahead of

the headrope, to which a towing bridle can be attached for purposes of pulling the trawl net and/or adjusting the shape of the trawl.

Transportation means to ship, convey, carry or transport by any means whatever, and deliver or receive for such shipment, conveyance, carriage, or transportation.

Triple-wing trawl means a trawl with a tongue on the top, center, leading edge of the trawl and an additional tongue along the bottom, center, leading edge of the trawl.

Two-seam trawl means a design of shrimp trawl in which the main body of the trawl is formed from a top panel and a bottom panel of webbing that are directly attached to each other down the sides of the trawl.

Underway, with respect to a vessel, means that the vessel is not at anchor, or made fast to the shore, or aground.

United States means the several States of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam, and the Trust Territory of the Pacific Islands.

Vessel includes every description of watercraft, including nondisplacement craft and seaplanes, used or capable of being used as a means of transportation on water.

Vessel restricted in her ability to maneuver has the meaning specified for this term at 33 U.S.C. 2003(g).

Whoever means the same as person.

Wildlife means the same as fish or wildlife.

Wing net (butterfly trawl) means a trawl with a rigid frame, rather than trawl door, holding the trawl mouth open.

(Sec. 3(d), Fish and Wildlife Act of 1956, as amended, 88 Stat. 92 (16 U.S.C. 742b); sec. 11(f), Endangered Species Act of 1973, Pub. L. 93–205, 87 Stat. 884 (16 U.S.C. 1540))

[45 FR 57132, Aug. 27, 1980]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §217.12, see the List of CFR Sections Affected in the Finding Aids section of this volume.

Subpart C—Addresses

AUTHORITY: Sec. 3(d), Fish and Wildlife Act of 1956, as amended, 88 Stat. 92 (16 U.S.C. 742b); sec. 11(f), Endangered Species Act of 1973, Pub. L. 93–205, 87 Stat. 884 (16 U.S.C. 1540).

SOURCE: 45 FR 57133, Aug. 27, 1980, unless otherwise noted.

§ 217.21 Assistant Administrator.

Mail forwarded to the Assistant Administrator for Fisheries should be addressed:

Assistant Administrator for Fisheries, F
National Marine Fisheries Service
Washington, DC 20235.

§ 217.22 Office of Marine Mammals and Endangered Species.

Mail in regard to permits should be addressed to:

Office of Marine Mammals and Endangered Species, F/MM
National Marine Fisheries Service
Washington, DC 20235.

§ 217.23 Enforcement Division.

Mail in regard to enforcement and certificates of exemption should be addressed to:

Enforcement Division, F/CM5
National Marine Fisheries Service
Washington, DC 20235.

PART 220—GENERAL PERMIT PROCEDURES

Subpart A—Introduction

Subpart B—Application for Permits

Subpart C—Permit Administration

Subpart D—Conditions

Subpart E—Permits Involving Endangered or Threatened Sea Turtles

AUTHORITY: Endangered Species Act of 1973, sec. 11(f), 87 Stat. 884, Pub. L. 93–205; act of August 31, 1951, Ch. 376. Title 5, sec. 501, 65 Stat. 290 (31 U.S.C. 483a).

SOURCE: 39 FR 41373, Nov. 27, 1974, unless otherwise noted.

Subpart A—Introduction

§ 220.1 General.

Each person intending to engage in an activity for which a permit is required by parts 217 through 222 of this chapter or the Endangered Species Act of 1973 shall, before commencing such activity, obtain a valid permit authorizing such activity. Each person who desires to obtain the permit privileges authorized by parts 217 through 222 of this chapter must make application for such permit in accordance with the requirements of this part 220 of this chapter and the other regulations in parts 217 through 222 of this chapter which set forth the additional requirements for the specific permits desired. If the activity for which permission is sought is covered by the requirements of more than one part of parts 217 through 222 of this chapter, the requirements of each part must be met. If the information required for each specific permitted activity is included, one application may be accepted for all permits required, and a single permit may be issued.

§ 220.2 Purpose of regulations.

The regulations contained in this part will provide uniform rules and procedures for application, issuance, renewal, conditions, and general administration of permits issuable pursuant to parts 217 through 222 of this chapter.

§ 220.3 Scope of regulations.

The provisions in this part are in addition to, and are not in lieu of, other permit regulations of parts 217 through 222 of this chapter and apply to all permits issued thereunder, including ''Endangered Fish or Wildlife'' (part 222).

§ 220.4 Emergency variation from requirements.

The Director may approve variations from the requirements of this part when he finds that an emergency exists and that the proposed variations will not hinder effective administration of parts 217 through 222 of this chapter, and will not be unlawful.

Subpart B—Application for Permits

§ 220.11 Procedure for obtaining a permit.

The following general procedures apply to applications for permits:

(a) *Forms.* Applications must be submitted by letter containing all necessary information, attachments, certification, and signature. In no case will oral or telephone applications be accepted.

(b) *Forwarding instructions.* Applications must be submitted to the Director, National Marine Fisheries Service. The address is listed in §217.21.

(c) *Time requirement.* Applications must be received by the appropriate official of the National Marine Fisheries Service at least 90 calendar days prior to the date on which the applicant desires to have the permit made effective. The National Marine Fisheries Service will, in all cases, attempt to process applications deemed sufficient in the shortest possible time. The National Marine Fisheries Service does not, however, guarantee 90 days issuance after publication in the FEDERAL REGISTER of receipt of a permit application and some permits cannot be issued within that time period.

§ 220.12 [Reserved]

§ 220.13 Abandoned application.

Upon receipt of an insufficiently or improperly executed application, the

applicant shall be notified of the deficiency in the application. If the applicant fails to supply the deficient information or otherwise fails to correct the deficiency within 60 days following the date of notification, the application shall be considered abandoned.

Subpart C—Permit Administration

§ 220.21 Issuance of permits.

(a) No permit may be issued prior to the receipt of a written application therefor, unless a written variation from the requirements, as authorized by § 220.4 is inserted into the official file of the National Marine Fisheries Service. Any representation of an employee or agent of the United States Government shall not be construed as a permit unless it meets the requirements of a permit as defined in 50 CFR 217.12.

(b) The Director shall issue the appropriate permit unless—

(1) Denial of a permit has been made pursuant to subpart D of 15 CFR part 904;

(2) The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his application;

(3) The applicant has failed to demonstrate a valid justification for the permit or a showing of responsibility;

(4) The authorization requested potentially threatens a wildlife population, or

(5) The Director finds through further inquiry or investigation, or otherwise, that the applicant is not qualified.

(c) Each permit shall bear a serial number. Such number may be reassigned to the permittee to whom issued so long as he maintains continuity of renewal.

(d) The applicant shall be notified in writing of the denial of any permit request, and the reasons therefor. If authorized in the notice of denial, the applicant may submit further information, or reasons why the permit should not be denied. Such further submissions shall not be considered a new application. The final action by the Director shall be considered the final administrative decision of the Department.

[39 FR 41373, Nov. 27, 1974, as amended at 49 FR 1042, Jan. 6, 1984]

§ 220.22 Duration of permit.

Permits shall entitle the person to whom issued to engage in the activity specified in the permit, within the limitations of the applicable statute and regulations contained in parts 217 through 222 of this chapter for the period stated on the permit, unless sooner modified, suspended, or revoked pursuant to subpart D of 15 CFR part 904.

[49 FR 1042, Jan. 6, 1984]

§ 220.23 [Reserved]

§ 220.24 Renewal of permit.

Where the permit is renewable and a permittee intends to continue the activity described in the permit during any portion of the year ensuing its expiration, he shall, unless otherwise notified in writing by the Director, file a request for permit renewal, together with a certified statement that the information in his original application is still currently correct, or a statement of all changes in the original application, accompanied by any required fee at least 30 days prior to the expiration of his permit. Any person holding a valid renewable permit, who has complied with the foregoing provision of this section, may continue such activities as were authorized by his expired permit until his renewal application is acted upon.

§ 220.25 Permits not transferable; agents.

(a) Permits issued under parts 220 through 222 are not transferable or assignable. Some permits authorize certain activities in connection with a business or commercial enterprise and in the event of any lease, sale, or transfer of such business entity, the successor must obtain a permit prior to continuing the permitted activity. However, certain limited rights of succession are provided in § 220.26.

(b) Except as otherwise stated on the face of a permit, any person who is under the direct control of the permittee, or who is employed by or under

contract to the permittee for the purposes authorized by the permit, may carry out the activity authorized by the permit.

§ 220.26 Right of succession by certain persons.

(a) Certain persons, other than the permittee, are granted the right to carry on a permitted activity for the remainder of the term of a current permit provided they comply with the provisions of paragraph (b) of this section. Such persons are the following:

(1) The surviving spouse, child, executor, administrator, or other legal representative of a deceased permittee; and

(2) A receiver or trustee in bankruptcy or a court designated assignee for the benefit of creditors.

(b) In order to secure the right provided in this section, the person or persons desiring to continue the activity shall furnish the permit to the issuing officer for endorsement within 90 days from the date the successor begins to carry on the activity.

§ 220.27 Change of mailing address.

During the term of his permit, a permittee may change his mailing address without procuring a new permit. However, in every case notification of the new mailing address must be forwarded to the issuing official within 30 days after such change. This section does not authorize the change of location of the permitted activity for which an amendment must be obtained.

§ 220.28 Change in name.

A permittee continuing to conduct a permitted activity is not required to obtain a new permit by reason of a mere change in trade name under which a business is conducted or a change of name by reason of marriage or legal decree: *Provided*, That such permittee must furnish his permit to the issuing official for endorsement within 30 days from the date the permittee begins conducting the permitted activity under the new name.

§§ 220.29–220.30 [Reserved]

§ 220.31 Discontinuance of activity.

When any permittee discontinues his activity, he shall, within 30 days thereof, mail his permit and a request for cancellation to the issuing officer, and said permit shall be deemed void upon receipt. No refund of any part of an amount paid as a permit fee shall be made where the operations of the permittee are, for any reason, discontinued during the tenure of an issued permit.

Subpart D—Conditions

§ 220.42 Permits are specific.

The authorizations on the face of a permit which set forth specific times, dates, places, methods of taking, numbers and kinds of fish or wildlife, location of activity, authorize certain circumscribed transactions, or otherwise permit a specifically limited matter, are to be strictly construed and shall not be interpreted to permit similar or related matters outside the scope of strict construction.

§ 220.43 Alteration of permits.

Permits shall not be altered, erased, or mutilated, and any permit which has been altered, erased, or mutilated shall immediately become invalid.

§ 220.44 Display of permit.

Any permit issued under parts 220 through 222 shall be displayed for inspection upon request to the Director or his agent, or to any other person relying upon its existence.

§ 220.45 Filing of reports.

Permittees may be required to file reports of the activities conducted under the permit. Any such reports shall be filed not later than March 31 for the preceding calendar year ending December 31, or any portion thereof, during which a permit was in force, unless the regulations of parts 217 through 222 of this chapter or the provisions of the permit set forth other reporting requirements.

§ 220.46 Maintenance of records.

From the date of issuance of the permit, the permittee shall maintain complete and accurate records of any taking, possession, transportation, sale, purchase, barter, exportation, or importation of fish or wildlife pursuant to such permit. Such records shall be kept current and shall include names and addresses of persons with whom any fish or wildlife has been purchased, sold, bartered, or otherwise transferred, and the date of such transaction, and such other information as may be required or appropriate. Such records, unless otherwise specified, shall be entered in books, legibly written in the English language. Such records shall be retained for 5 years from the date of issuance of the permit.

§ 220.47 Inspection requirement.

Any person holding a permit under parts 217 through 222 of this chapter shall allow the Director's agent to enter his premises at any reasonable hour to inspect any fish or wildlife held or to inspect, audit, or copy any permits, books, or records required to be kept by regulations of parts 217 through 222 of this chapter or by the Endangered Species Act of 1973.

Subpart E—Permits Involving Endangered or Threatened Sea Turtles

SOURCE: 43 FR 32809, July 28, 1978, unless otherwise noted.

§ 220.50 Purpose.

This subpart establishes procedures for issuance of permits for scientific purposes or to enhance the propagation or survival of ''endangered'' or ''threatened'' sea turtles and zoological exhibition or educational purposes for ''threatened'' sea turtles.

§ 220.51 Permit applications.

Applications for permits to take, import, export or engage in any other prohibited activity involving any species of sea turtle listed in 50 CFR 17.11 shall be submitted to the Wildlife Permit Office (WPO) of the U.S. Fish and Wildlife Service in accordance with either, 50 CFR 17.22(a) (Endangered Species) or 50 CFR 17.32(a) (Threatened Species) as appropriate. Applications involving activities under the jurisdiction of the National Marine Fisheries Service (NMFS) as defined in 50 CFR 222.23(a) and 50 CFR 227.4 shall be forwarded by the WPO to NMFS.

§ 220.52 Issuance of permits.

(a) Applications under the jurisdiction of the WPO shall be reviewed and acted upon in accordance with 50 CFR 17.22 or 50 CFR 17.32 as appropriate.

(b) NMFS shall make a complete review of applications forwarded to it by the WPO in accordance with § 220.51 and determine the appropriate action to be taken in accordance with 50 CFR 220.21(b) and 222.23(c). In instances where the application involves activities solely within NMFS jurisdiction, NMFS shall issue permits or letters of denial and provide WPO with copies of its actions.

(c) Where a permit application involves activities under both NMFS and FWS jurisdiction, each agency will process the application for activities under its jurisdiction. WPO will issue either a permit or a letter of denial.

(d) Where a permit application for activities under NMFS jurisdiction also requires a permit under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (TIAS 8249, July 1, 1975) (CITES) (50 CFR part 23), NMFS will process the application for activities under its jurisdiction. WPO will issue the final document by means of a combination ESA/CITES permit or a letter of denial.

§ 220.53 Other requirements.

Permits issued by NMFS under this subpart shall be administered and comply with the provisions of 50 CFR parts 217 through 227 as appropriate.

PART 221—DESIGNATED PORTS

AUTHORITY: Endangered Species Act of 1973, sec. 11(f), 87 Stat. 884, Pub. L. 93–205.

§ 221.1 Importation and exportation at designated ports.

Any fish or wildlife (other than shellfish and fishery products which (a) are

not endangered or not threatened species, and (b) are imported for purposes of human or animal consumption or taken in waters under the jurisdiction of the United States or on the high seas for recreational purposes) which is subject to the jurisdiction of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce and is intended for importation into or exportation from the United States, shall not be imported or exported except at a port or ports designated by the Secretary of the Interior. The Secretary of the Interior may permit the importation or exportation at nondesignated ports in the interest of the health or safety of the fish or wildlife or for other reasons if he deems it appropriate and consistent with the purpose of facilitating enforcement of the Endangered Species Act and reducing the costs thereof. Importers and exporters are advised to see 50 CFR part 14 for importation and exportation requirements and information.

[39 FR 41375, Nov. 27, 1974]

PART 222—ENDANGERED FISH OR WILDLIFE

Subpart A—Introduction

Sec.

Subpart B—Certificates of Exemption for Pre-Act Endangered Species Parts

Subpart C—Endangered Fish or Wildlife Permits

Subpart D—Special Prohibitions

Subpart E—Incidental Capture of Endangered Sea Turtles

AUTHORITY: 16 U.S.C. 1531–1543 and 16 U.S.C. 1361 *et seq.*

Subpart A—Introduction

§ 222.1 Purpose of regulations.

The regulations contained in this part identify the species or subspecies of fish or wildlife determined to be endangered under either the Endangered Species Conservation Act of 1969 or the Endangered Species Act of 1973, and presently deemed endangered species under the Endangered Species Act of 1973, which are under the jurisdiction of the Secretary of Commerce, and establish procedures and criteria for

issuance of permits for the taking, importation, exportation, or otherwise prohibited acts, involving endangered fish or wildlife. The regulations of this part implement, in part, the Endangered Species Act of 1973, 87 Stat. 884, Pub. L. 93–205, as amended.

[45 FR 57133, Aug. 27, 1980]

§ 222.2 Scope of regulations.

(a) The regulations of this part apply only to endangered fish or wildlife.

(b) The provisions in this part are in addition to, and are not in lieu of, other regulations of parts 217 through 222 of this chapter which may require a permit or prescribe additional restrictions or conditions for the taking, importation, exportation, and interstate transportation of fish or wildlife. (See also parts 220 and 221 of this chapter.)

[45 FR 57133, Aug. 27, 1980]

§ 222.3 Definitions.

These definitions apply only to § 222.22:

Adequately covered means, with respect to species listed pursuant to section 4 of the ESA, that a proposed conservation plan has satisfied the permit issuance criteria under section 10(a)(2)(B) of the ESA for the species covered by the plan and, with respect to unlisted species, that a proposed conservation plan has satisfied the permit issuance criteria under section 10(a)(2)(B) of the ESA that would otherwise apply if the unlisted species covered by the plan were actually listed. For the Services to cover a species under a conservation plan, it must be listed on the section 10(a)(1)(B) permit.

Changed circumstances means changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and NMFS and that can be planned for (*e.g.,* the listing of new species, or a fire or other natural catastrophic event in areas prone to such events).

Conserved habitat areas means areas explicitly designated for habitat restoration, acquisition, protection, or other conservation purposes under a conservation plan.

Conservation plan means the plan required by section 10(a)(2)(A) of the ESA that an applicant must submit when applying for an incidental take permit. Conservation plans also are known as ''habitat conservation plans'' or ''HCPs.''

Operating conservation program means those conservation management activities which are expressly agreed upon and described in a conservation plan or its Implementing Agreement, if any, and which are to be undertaken for the affected species when implementing an approved conservation plan, including measures to respond to changed circumstances.

Properly implemented conservation plan means any conservation plan, Implementing Agreement and permit whose commitments and provisions have been or are being fully implemented by the permittee.

Unforeseen circumstances means changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and NMFS at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the covered species.

[63 FR 8872, Feb. 23, 1998]

Subpart B—Certificates of Exemption for Pre-Act Endangered Species Parts

SOURCE: 45 FR 57134, Aug. 27, 1980, unless otherwise noted.

§ 222.11–1 General certificate of exemption requirements.

(a) The Assistant Administrator, pursuant to the provisions of the Endangered Species Act, and pursuant to the provisions of this paragraph, may exempt any pre-Act endangered species part from one or more of the following:

(1) The prohibition, as set forth in section 9(a)(1)(A) of the Act, to export any such species part from the United States;

(2) The prohibitions, as set forth in section 9(a)(1)(E) of the Act, to deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of

a commercial activity any such species part;

(3) The prohibitions, as set forth in section 9(a)(1)(F) of the Act, to sell or offer for sale in interstate or foreign commerce any such species part.

(b) No person shall engage in any of the above activities involving any pre-Act endangered species part without a valid certificate of exemption, or evidence of a right thereunder, issued pursuant to this subpart B.

(c) After January 31, 1984, no person may export; deliver, receive, carry, transport or ship in interstate or foreign commerce in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce any pre-Act finished scrimshaw product unless that person has been issued a valid certificate of exemption and the product or the raw material for such product was held by such certificate holder on October 13, 1982.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12808, Apr. 1, 1985]

§ 222.11–2 Application renewal procedure.

(a) Any person to whom a certificate of exemption has been issued by the National Marine Fisheries Service and who desires to obtain a renewal of such certificate of exemption may make application therefor to the Assistant Administrator. The sufficiency of the application shall be determined by the Assistant Administrator in accordance with the requirements of this part and, in that connection, he may waive any requirement for information, or require any elaboration for further information deemed necessary.

(b) One copy of a completed application for renewal shall be submitted to the Assistant Administrator for Fisheries, National Marine Fisheries Service, Washington, DC 20235.

(c) The outside of the envelope should be marked, ATTENTION: Enforcement Division, ''Certificate of Exemption Request.'' Assistance may be obtained by writing or calling the Enforcement Division, NMFS, in Washington, DC (AC 202, 634–7265). At least 15 days should be allowed for processing. An application for a certificate of exemption shall provide the information contained in § 222.11–3 (when the information requested is not applicable, put ''N.A.'') and such other information that the Assistant Administrator may require.

[45 FR 57134, Aug. 27, 1980]

§ 222.11–3 Application renewal requirements.

(a) The following information will be used as the basis for determining whether an application for renewal of a certificate of exemption is complete:

(1) Title: Application for Renewal of Certificate of Exemption Under Pub. L. 97–304.

(2) The date of application.

(3) The identity of the applicant including complete name, original certificate of exemption number, current address, and telephone number, including zip and area codes. If the applicant is a corporation, partnership, or association set forth the details.

(4) The period of time for which a renewal of the certificate of exemption is requested; however, no renewal of certificate of exemption, or right claimed thereunder, shall be effective after the close of the three-year period beginning on the date of the expiration of the previous renewal of the certificate of exemption.

(5)(i) A complete and detailed updated inventory of all pre-Act endangered species parts for which the applicant seeks exemption. Each item on the inventory must be identified by the following information: a unique serial number; the weight of the item in grams, to the nearest whole gram; and a description in detail sufficient to permit ready identification of the item. Small lots, not exceeding five pounds (2,270 grams), of scraps or raw material, which may include or consist of one or more whole raw whale teeth, may be identified by a single serial number and total weight. All finished scrimshaw items subsequently made from a given lot of scrap may be identified by the lot serial number plus additional digits to signify the piece number of the individual finished item. Identification numbers will be in the following format: 00–000000–0000. The first two digits will be the last two digits of the appropriate certificate of exemption number; the next six digits, the serial number of the individual piece or lot of scrap or

raw material; and the last four digits, where applicable, the piece number of an item made from a lot of scrap or raw material. The serial numbers for each certificate holder's inventory must begin with 000001, and piece numbers, where applicable, must begin with 0001 for each separate lot.

(ii) Identification numbers may be affixed to inventory items by any means, including, but not limited to, etching the number into the item, attaching a label or tag bearing the number to the item, or sealing the item in a plastic bag, wrapper or other container bearing the number. Provided that, the number must remain affixed to the item until it is sold to an ultimate user, as defined in §222.11–8(b) of this part.

(iii) No renewals will be issued for scrimshaw products in excess of any quantities declared in the original application for a certificate of exemption.

(6) A certification in the following language:

I hereby certify that the foregoing information is complete, true, and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a renewal of my certificate of exemption under the Endangered Species Act of 1973, as amended by Pub. L. 94–359, 90 Stat. 911, Pub. L. 96–159, 93 Stat. 1225, Pub. L. 97–304, 95 Stat. 715, and the Department of Commerce regulations issued thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to the penalties under the Endangered Species Act of 1973.

(7) Signature of the applicant.

(b) Upon receipt of an incomplete or improperly executed application for renewal, the applicant shall be notified by Certified Mail of the deficiency in the application for renewal. If the application for renewal is not corrected and received by the Assistant Administrator within 30 days following the date of receipt of notification, the application for renewal shall be considered as having been abandoned.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12808, Apr. 1, 1985]

§222.11–4 Procedures for issuance of renewals of certificates of exemption.

Whenever application for a renewal of a certificate of exemption is received by the Assistant Administrator which the Assistant Administrator deems sufficient, he shall, as soon as practicable, issue a certificate of renewal to the applicant.

§222.11–5 Application for modification of certificate of exemption by holder.

Where circumstances have changed so that an applicant or certificate of exemption holder desires to have any material term or condition of his application or certificate modified, he must submit in writing full justification and supporting information in conformance with the provisions of this part.

§222.11–6 Amendment of certificates of exemption.

All certificates are issued subject to the condition that the Assistant Administrator reserves the right to amend the provisions of a certificate of exemption for just cause at any time. Such amendments take effect on the date of notification, unless otherwise specified.

§222.11–7 Procedures for suspension, revocation, or modification of certificates of exemption.

Any violation of the applicable provisions of parts 217 through 222 of this chapter, or of the Act, or of a condition of the certificate of exemption may subject the certificate holder to the following:

(a) The penalties provided in the Act; and

(b) Suspension, revocation, or modification of the certificate of exemption, as provided in subpart D of 15 CFR part 904.

[49 FR 1042, Jan. 6, 1984]

§222.11–8 Purchaser provisions.

(a) Any person granted a certificate of exemption, including a renewal, under this subpart, upon a sale of any exempted pre-Act endangered species part, must provide the purchaser in writing with a description (including full identification number) of the part sold, and must inform the purchaser in writing of the purchaser's obligation

under paragraph (b) of this section, including the address given in the certificate to which the purchaser's report is to be sent.

(b) Any purchaser of pre-Act endangered species parts included in a valid certificate of exemption, unless an ultimate user, must within 30 days after the receipt of such parts submit a written report to the address given in the certificate specifying the quantity of such parts or products received, the name and address of the seller, a copy of the invoice or other document showing the serial numbers, weight, and descriptions of the parts or products received, the date on which such parts or products were received, and the intended use of such parts by the purchaser. An ultimate user, for purposes of this paragraph, means any person who acquired such endangered species part or product for his own consumption or personal use (including as gifts), and not for resale.

(c) After January 31, 1984, no purchaser may export; deliver, receive, carry or transport in interstate or foreign commerce in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce any endangered species part or product even though such part or product was acquired under a certificate of exemption either prior to or subsequent to that date.

[50 FR 12808, Apr. 1, 1985]

§ 222.11–9 Duration of certificate of exemption.

A certificate of exemption is valid only if renewed in accordance with the procedures set forth in § 222.11–3 of this part. All certificates so renewed will be valid for a period beginning April 1, 1985, and ending no later than March 31, 1988. A renewed certificate of exemption entitles the holder to engage in the business or activity specified in the certificate of exemption, within the limitations of the Act and the regulations contained in this subpart, for the period stated in the certificate of exemption, unless sooner terminated.

[50 FR 12808, Apr. 1, 1985, as amended at 50 FR 25713, June 21, 1985]

§ 222.12 Locations covered by certificate of exemption.

The certificate of exemption covers the business or activity specified in the certificate of exemption at the address described therein. No certificate of exemption is required to cover a separate warehouse facility used by the certificate of exemption holder solely for storage of pre-Act endangered species parts, if the records required by this subpart are maintained at the address specified in the certificate of exemption which is served by the warehouse or storage facility.

[50 FR 12809, Apr. 1, 1985]

§ 222.12–1 Certificate of exemption not transferable; exception.

Certificates of exemption issued under this subpart are not transferable: *Provided,* That in the event of the lease, sale or other transfer of the operations or activity authorized by the certificate of exemption the successor is not required by this subpart to obtain a new certificate of exemption prior to commencing such operations or activity. In such case, the successor will be treated as a purchaser and must comply with the record and reporting requirements set forth in § 222.11–8.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12809, Apr. 1, 1985]

§ 222.12–2 Change of address.

A certificate of exemption holder may during the term of the certificate of exemption move his business or activity to a new location at which he intends regularly to carry on such business or activity, without obtaining a new certificate of exemption. However, in every case, notification of the new location of the business or activity must be given in writing within 10 days of such move to the Assistant Administrator. In each instance, the certificate of exemption must be endorsed by the Assistant Administrator. After endorsement of the certificate of exemption the Assistant Administrator will provide an amended certificate of exemption to the person to whom issued.

§ 222.12–3 Certain continuance of business.

A certificate of exemption holder who requests that his certificate of exemption be amended by the Assistant Administrator for corrections or endorsement in compliance with the provisions contained in this subpart, may continue his operations while awaiting action by the Assistant Administrator.

§ 222.12–4 Change in trade name.

A certificate holder continuing to conduct business at the location shown on his certificate of exemption is not required to obtain a new certificate of exemption by reason of a change in trade name under which he conducts his business: *Provided,* That such certificate of exemption holder requests in writing that his certificate of exemption be endorsed to reflect such change of name to the Assistant Administrator within 30 days from the date the certificate of exemption holder begins his business under the new name.

§ 222.12–5 State or other law.

A certificate of exemption issued under this subpart confers no right or privilege to conduct a business or an activity contrary to State or other law. Similarly, compliance with the provisions of any State or other law affords no immunity under any Federal laws or regulations of any other Federal Agency.

§ 222.12–6 Right of entry and examination.

Any person authorized to enforce the Act may enter during business hours the premises, including places of storage, of any holder of a certificate of exemption or of any purchaser for the purpose of inspecting or examining any records or documents required to be kept by such certificate of exemption holder or successor under this subpart, and any endangered species parts at such premises of location.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12809, Apr. 1, 1985]

§ 222.12–7 Records.

The records pertaining to pre-Act endangered species parts prescribed by this subpart shall be in permanent form, and shall be retained at the address shown on the certificate of exemption, or at the principal address of a purchaser in the manner prescribed by this subpart.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12809, Apr. 1, 1985]

§ 222.12–8 Record of receipt and disposition.

(a) Holders of certificates of exemption must maintain records of all pre-Act endangered species parts they receive, sell, transfer, distribute or dispose of otherwise. Purchasers of pre-Act endangered species parts, unless ultimate users, must similarly maintain records of all such parts or products they receive.

(b) Such records as referred to in paragraph (a) of this section may consist of invoices or other commercial records which must be filed in an orderly manner separate from other commercial records maintained, and be readily available for inspection. Such records must (1) show the name and address of the purchaser, seller, or other transferor; (2) show the type, quantity, and identity of the part or product; (3) show the date of such sale or transfer; and (4) be retained, in accordance with the requirements of this subpart, for a period of not less than three years following the date of sale or transfer. Each pre-Act endangered species part will be identified by its number on the updated inventory required to renew a certificate of exemption.

(c)(1) Each certificate of exemption holder must submit a quarterly report (to the address given in the certificate) containing all record information required by paragraph (b) on all transfers of pre-Act endangered species parts made in the previous calendar quarter, or such other record information the Assistant Administrator may specify from time to time.

(2) Quarterly reports are due on January 15, April 15, July 15, and October 15. The first report is due on October 15, 1985.

(d) The Assistant Administrator may authorize the record information to be submitted in a manner other than that prescribed in paragraph (b) of this section when it is shown by the record

holder that an alternate method of reporting is reasonably necessary and will not hinder the effective administration or enforcement of this subpart.

[45 FR 57134, Aug. 27, 1980, as amended at 50 FR 12809, Apr. 1, 1985]

§ 222.12–9 Importation.

No pre-Act endangered species part shall be imported into the United States, and a certificate of exemption issued in accordance with the provisions of this subpart confers no right or privilege to import into the United States any such part.

§ 222.13 Exportation.

(a) Any person desiring to export from the United States any pre-Act endangered species part or scrimshaw product, must possess a valid certificate of exemption issued in accordance with the provisions of this subpart.

(b) In addition to other information, which may be required by this subpart, the exporter will notify the Assistant Administrator by letter which shall show the name and address of the foreign consignee, the intended port of exportation, and a complete description of the parts to be exported. Such information should reach the Assistant Administrator not less than 10 days prior to shipment.

(c) No pre-Act endangered species part or scrimshaw product which is to be exported from the United States under a certificate of exemption issued therefor, shall be exported except at a port or ports designated by the Secretary of the Interior. The Secretary of the Interior may permit the exportation at non-designated ports for any reason if he deems it appropriate and consistent with the purposes of the Endangered Species Act, as amended, or it will facilitate the administration or enforcement of the Act and reducing the costs thereof. Exporters are advised to see 50 CFR part 14 for a listing of the designated ports.

§ 222.13–1 Procedure by exporter.

Shipment may not be made until the requirements of § 222.13 are met by the exporter. A copy of the certificate of exemption, and any endorsements thereto, must be sent by the exporter to the District Director of Customs at the port of exportation, and must precede or accompany the shipment in order to permit appropriate inspection prior to lading.

§ 222.13–2 Action by Customs.

Upon receipt of a certificate of exemption authorizing the exportation of pre-Act endangered species parts or scrimshaw products, the District Director of Customs may order such inspection as deemed necessary prior to lading of the merchandise. If satisfied that the shipment is proper and agrees with the information contained in the certificate, and any endorsement thereto, the District Director of Customs will clear the merchandise for export. The certificate, and any endorsements, will be forwarded to the Chief, Enforcement Division, F/CM5 National Marine Fisheries Service, Washington, DC 20235.

§ 222.13–3 Transportation to effect exportation.

Notwithstanding any provision of this subpart, it shall not be required that authorization be obtained from the Assistant Administrator for the transportation in interstate or foreign commerce of pre-Act endangered species parts to effect an exportation of such parts authorized under the provisions of this subpart.

§ 222.13–4 Burden of proof; presumption.

Any person claiming the benefit of any exemption or certificate of exemption under the Act or regulations, shall have the burden of proving that the exemption or certificate is applicable, has been granted, and was valid and in force at the time of the alleged violation.

Subpart C—Endangered Fish or Wildlife Permits

SOURCE: 39 FR 41375, Nov. 27, 1974, unless otherwise noted.

§ 222.21 General permit requirement.

No person shall take, import, export, or engage in any other prohibited activity involving, any species or subspecies of fish or wildlife which the Secretary has determined to be endangered under the Endangered Species

Act of 1973, as evidenced by its inclusion on the list of endangered fish or wildlife (see 50 CFR chapter I, part 17) or which the Secretary of the Interior determined to be endangered under the Endangered Species Conservation Act of 1969 and which are now under the jurisdictional responsibilities of the Secretary of Commerce, without a valid permit issued pursuant to this part.

(Pub. L. 94–359)

[41 FR 36028, Aug. 26, 1976]

§ 222.22 Permits for the incidental taking of endangered species.

(a) *Scope.* (1) The Assistant Administrator may issue permits to take endangered marine species incidentally to an otherwise lawful activity under section 10(a)(1)(B) of the Endangered Species Act of 1973. The regulations in this section apply only to those endangered species under the jurisdiction of the Secretary of Commerce identified in § 222.23(a).

(2) If the applicant represents an individual or a single entity, such as a corporation, the Assistant Administrator will issue an individual incidental take permit. If the applicant represents a group or organization whose members conduct the same or a similar activity in the same geographical area with similar impacts on endangered marine species, the Assistant Administrator will issue a general incidental take permit. To be covered by a general incidental take permit, each individual conducting the activity must have a certificate of inclusion issued under paragraph (f) of this section.

(b) *Permit application procedures.* Applications should be sent to the Assistant Administrator for Fisheries, National Marine Fisheries Service, 1335 East West Highway, Silver Spring, MD 20910. The sufficiency of the application will be determined by the Assistant Administrator in accordance with the requirements of this section. At least 120 days should be allowed for processing. Each application must be signed and dated and include the following:

(1) The type of application, either:

(i) Application for an Individual Incidental Take Permit under the Endangered Species Act of 1973, or

(ii) Application for a General Incidental Take Permit under the Endangered Species Act of 1973.

(2) The name, address and telephone number of the applicant. If the applicant is a partnership, corporate entity or is representing a group or organization, the applicable details.

(3) The species or stocks, by common and scientific name, and a description of the status, distribution, seasonal distribution, habitat needs, feeding habits and other biological requirements of the affected species or stocks.

(4) A detailed description of the proposed activity, including the anticipated dates, duration and specific location. If the request is for a general incidental take permit, an estimate of the total level of activity expected to be conducted.

(5) A conservation plan, based on the best scientific and commercial data available, which specifies

(i) The anticipated impact (*i.e.*, amount, extent and type of anticipated taking) of the proposed activity on the species or stocks;

(ii) The anticipated impact of the proposed activity on the habitat of the species or stocks and the likelihood of restoration of the affected habitat;

(iii) The steps (specialized equipment, methods of conducting activities, or other means) that will be taken to monitor, minimize and mitigate such impacts, and the funding available to implement such measures; and

(iv) The alternative actions to such taking that were considered and the reasons why those alternatives are not being used.

(v) A list of all sources of data used in preparation of the plan, including reference reports, environmental assessments and impact statements, and personal communications with recognized experts on the species or activity who may have access to data not published in current literature.

(c) *Issuance criteria.* (1) In determining whether to issue a permit, the Assistant Administrator will consider the following:

(i) The status of the affected species or stocks;

(ii) The potential severity of direct, indirect and cumulative impacts on the

APPENDIX 11:

Endangered and Threatened Species Permit Conditions

50 CFR Part 17 Excerpts (FWS)
50 CFR 222.22 (NMFS)

AUTHORITY: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

SOURCE: 40 FR 44415, Sept. 26, 1975, unless otherwise noted.

Subpart A—Introduction and General Provisions

§ 17.1 Purpose of regulations.

(a) The regulations in this part implement the Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531–1543, except for those provisions in the Act concerning the Convention on International Trade in Endangered Species of Wild Fauna and Flora, for which regulations are provided in part 23 of this subchapter.

(b) The regulations identify those species of wildlife and plants determined by the Director to be endangered or threatened with extinction under section 4(a) of the Act and also carry over the species and subspecies of wildlife designated as endangered under the Endangered Species Conservation Act of 1969 (83 Stat. 275, 16 U.S.C. 668cc–1 to 6) which are deemed endangered species under section 4(c)(3) of the Act.

[40 FR 44415, Sept. 26, 1975, as amended at 42 FR 10465, Feb. 22, 1977]

§ 17.2 Scope of regulations.

(a) The regulations of this part apply only to endangered and threatened wildlife and plants.

(b) By agreement between the Service and the National Marine Fisheries Service, the jurisdiction of the Department of Commerce has been specifically defined to include certain species, while jurisdiction is shared in regard to certain other species. Such species are footnoted in subpart B of this part, and reference is given to special rules of the National Marine Fisheries Service for those species.

(c) The provisions in this part are in addition to, and are not in lieu of, other regulations of this subchapter B which may require a permit or prescribe additional restrictions or conditions for the importation, exportation, and interstate transportation of wildlife.

(d) The examples used in this part are provided solely for the convenience of the public, and to explain the intent and meaning of the regulation to which they refer. They have no legal significance.

(e) Certain of the wildlife and plants listed in §§ 17.11 and 17.12 as endangered or threatened are included in Appendix I, II or III to the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The importation, exportation and reexportation of such species are subject to additional regulations provided in part 23 of this subchapter.

[40 FR 44415, Sept. 26, 1975, as amended at 42 FR 10465, Feb. 22, 1977]

§ 17.3 Definitions.

In addition to the definitions contained in part 10 of this subchapter, and unless the context otherwise requires, in this part 17:

Act means the Endangered Species Act of 1973 (16 U.S.C. 1531–1543; 87 Stat. 884);

Adequately covered means, with respect to species listed pursuant to section 4 of the ESA, that a proposed conservation plan has satisfied the permit issuance criteria under section 10(a)(2)(B) of the ESA for the species covered by the plan, and, with respect to unlisted species, that a proposed conservation plan has satisfied the permit issuance criteria under section 10(a)(2)(B) of the ESA that would otherwise apply if the unlisted species covered by the plan were actually listed. For the Services to cover a species under a conservation plan, it must be listed on the section 10(a)(1)(B) permit.

Alaskan Native means a person defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1603(b) (85 Stat. 588)) as a citizen of the United States who is of one-fourth degree or more Alaska Indian (including Tsimshian Indians enrolled or not enrolled in the Metlaktla Indian Community), Eskimo, or Aleut blood, or combination thereof. The term includes any Native, as so defined, either or both of whose adoptive parents are not Natives. It also includes, in the absence of proof of a minimum blood quantum, any citizen of the United States who is regarded as an Alaska Native by the Native village or town of which he claims to be a member and whose father or mother is (or, if deceased, was) regarded as Native by any Native village or Native town. Any citizen enrolled by the Secretary pursuant to section 5 of the Alaska Native Claims Settlement Act shall be conclusively presumed to be an Alaskan Native for purposes of this part;

Authentic native articles of handicrafts and clothing means items made by an Indian, Aleut, or Eskimo which (a) were commonly produced on or before December 28, 1973, and (b) are composed wholly or in some significant respect of natural materials, and (c) are significantly altered from their natural form and which are produced, decorated, or fashioned in the exercise of traditional native handicrafts without the use of pantographs, multiple carvers, or similar mass copying devices. Improved methods of production utilizing modern implements such as sewing machines or modern techniques at a tannery registered pursuant to § 18.23(c) of this subchapter (in the case of marine mammals) may be used so long as no large scale mass production industry results. Traditional native handicrafts include, but are not limited to, weaving, carving, stitching, sewing, lacing, beading, drawing, and painting. The formation of traditional native groups such as cooperatives, is permitted so long as no large scale mass production results;

Bred in captivity or *captive-bred* refers to wildlife, including eggs, born or otherwise produced in captivity from parents that mated or otherwise transferred gametes in captivity, if reproduction is sexual, or from parents that were in captivity when development of the progeny began, if development is asexual.

Captivity means that living wildlife is held in a controlled environment that is intensively manipulated by man for the purpose of producing wildlife of the selected species, and that has boundaries designed to prevent animal, eggs or gametes of the selected species from entering or leaving the controlled environment. General characteristics of captivity may include but are not limited to artificial housing, waste removal, health care, protection from predators, and artificially supplied food.

Changed circumstances means changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the Service and that can be planned for (*e.g.*, the listing of new species, or a fire or other natural catastrophic event in areas prone to such events).

Conservation plan means the plan required by section 10(a)(2)(A) of the ESA that an applicant must submit when applying for an incidental take permit. Conservation plans also are known as ''habitat conservation plans'' or ''HCPs.''

Conserved habitat areas means areas explicitly designated for habitat restoration, acquisition, protection, or other conservation purposes under a conservation plan.

Convention means the Convention on International Trade in Endangered Species of Wild Fauna and Flora, TIAS 8249.

Enhance the propagation or survival, when used in reference to wildlife in captivity, includes but is not limited to the following activities when it can be shown that such activities would not be detrimental to the survival of wild or captive populations of the affected species:

(a) Provision of health care, management of populations by culling, contraception, euthanasia, grouping or handling of wildlife to control survivorship and reproduction, and similar normal practices of animal husbandry needed to maintain captive populations that are self-sustaining and that possess as much genetic vitality as possible;

(b) Accumulation and holding of living wildlife that is not immediately needed or suitable for propagative or scientific purposes, and the transfer of such wildlife between persons in order to relieve crowding or other problems hindering the propagation or survival of the captive population at the location from which the wildlife would be removed; and

(c) Exhibition of living wildlife in a manner designed to educate the public about the ecological role and conservation needs of the affected species.

Endangered means a species of wildlife listed in §17.11 or a species of plant listed in §17.12 and designated as endangered.

Harass in the definition of ''take'' in the Act means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. This definition, when applied to captive wildlife, does not include generally accepted:

(1) Animal husbandry practices that meet or exceed the minimum standards for facilities and care under the Animal Welfare Act,

(2) Breeding procedures, or

(3) Provisions of veterinary care for confining, tranquilizing, or anesthetizing, when such practices, procedures, or provisions are not likely to to result in injury to the wildlife.

Harm in the definition of ''take'' in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

Incidental taking means any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Industry or trade in the definition of ''commercial activity'' in the Act means the actual or intended transfer of wildlife or plants from one person to another person in the pursuit of gain or profit;

Native village or town means any community, association, tribe, clan or group;

Operating conservation program means those conservation management activities which are expressly agreed upon and described in a conservation plan or its Implementing Agreement, if any, and which are to be undertaken for the affected species when implementing an approved conservation plan, including measures to respond to changed circumstances.

Population means a group of fish or wildlife in the same taxon below the subspecific level, in common spatial arrangement that interbreed when mature;

Properly implemented conservation plan means any conservation plan, Implementing Agreement and permit whose commitments and provisions have been or are being fully implemented by the permittee.

Specimen means any animal or plant, or any part, product, egg, seed or root of any animal or plant;

Subsistence means the use of endangered or threatened wildlife for food, clothing, shelter, heating, transportation and other uses necessary to maintain the life of the taker of the wildlife, or those who depend upon the taker to provide them with such subsistence, and includes selling any edible portions of such wildlife in native villages and towns in Alaska for native

consumption within native villages and towns;

Threatened means a species of wildlife listed in §17.11 or plant listed in §17.12 and designated as threatened.

Unforeseen circumstances means changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the covered species.

Wasteful manner means any taking or method of taking which is likely to result in the killing or injury of endangered or threatened wildlife beyond those needed for subsistence purposes, or which results in the waste of a substantial portion of the wildlife, and includes without limitation the employment of a method of taking which is not likely to assure the capture or killing of the wildlife, or which is not immediately followed by a reasonable effort to retrieve the wildlife.

[40 FR 44415, Sept. 26, 1975, as amended at 42 FR 28056, June 1, 1977; 44 FR 54006, Sept. 17, 1979; 46 FR 54750, Nov. 4, 1981; 47 FR 31387, July 20, 1982; 50 FR 39687, Sept. 30, 1985; 63 FR 8870, Feb. 23, 1998; 63 FR 48639, Sept. 11, 1998]

EFFECTIVE DATE NOTE: At 63 FR 48639, Sept. 11, 1998, §17.3 was amended by revising the definition of ''Harass'', effective Oct. 13, 1998. For the convenience of the user, the superseded text is set forth as follows:

§17.3 Definitions.

* * * * *

Harass in the definition of ''take'' in the Act means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

* * * * *

§17.4 Pre-Act wildlife.

(a) The prohibitions defined in subparts C and D of this part 17 shall not apply to any activity involving endangered or threatened wildlife which was held in captivity or in a controlled environment on December 28, 1973: *Provided,*

(1) That the purposes of such holding were not contrary to the purposes of the Act; and

(2) That the wildlife was not held in the course of a commercial activity.

Example 1. On January 25, 1974, a tourist buys a stuffed hawksbill turtle (an endangered species listed since June, 1970), in a foreign country. On December 28, 1973, the stuffed turtle had been on display for sale. The tourist imports the stuffed turtle into the United States on January 26, 1974. This is a violation of the Act since the stuffed turtle was held for commercial purposes on December 28, 1973.

Example 2. On December 27, 1973 (or earlier), a tourist buys a leopard skin coat (the leopard has been listed as endangered since March 1972) for his wife in a foreign country. On January 5, he imports it into the United States. He has not committed a violation since on December 28, 1973, he was the owner of the coat, for personal purposes, and the chain of commerce had ended with the sale on the 27th. Even if he did not finish paying for the coat for another year, as long as he had possession of it, and he was not going to resell it, but was using it for personal purposes, the Act does not apply to that coat.

Example 3. On or before December 28, 1973, a hunter kills a leopard legally in Africa. He has the leopard mounted and imports it into the United States in March 1974. The importation is not subject to the Act. The hunter has not engaged in a commercial activity, even though he bought the services of a guide, outfitters, and a taxidermist to help him take, preserve, and import the leopard. This applies even if the trophy was in the possession of the taxidermist on December 28, 1973.

Example 4. On January 15, 1974, a hunter kills a leopard legally in Africa. He has the leopard mounted and imports it into the United States in June 1974. This importation is a violation of the Act since the leopard was not in captivity or a controlled environment on December 28, 1973.

(b) Service officers or Customs officers may refuse to clear endangered or threatened wildlife for importation into or exportation from the United States, pursuant to §14.53 of this subchapter, until the importer or exporter can demonstrate that the exemption referred to in this section applies. Exempt status may be established by any sufficient evidence, including an affidavit containing the following:

(1) The affiant's name and address;

(2) Identification of the affiant;

(3) Identification of the endangered or threatened wildlife which is the subject of the affidavit;

(4) A statement by the affiant that to the best of his knowledge and belief, the endangered or threatened wildlife which is the subject of the affidavit was in captivity or in a controlled environment on December 28, 1973, and was not being held for purposes contrary to the Act or in the course of a commercial activity;

(5) A statement by the affiant in the following language:

The foregoing is principally based on the attached exhibits which, to the best of my knowledge and belief, are complete, true and correct. I understand that this affidavit is being submitted for the purpose of inducing the Federal Government to recognize an exempt status regarding (*insert description of wildlife*), under the Endangered Species Act of 1973 (16 U.S.C. 1531–1543), and regulations promulgated thereunder, and that any false statements may subject me to the criminal penalties of 18 U.S.C. 1001.

(6) As an attachment, records or other available evidence to show:

(i) That the wildlife in question was being held in captivity or in a controlled environment on December 28, 1973;

(ii) The purpose for which the wildlife was being held; and

(iii) The nature of such holding (to establish that no commercial activity was involved).

(c) This section applies only to wildlife born on or prior to December 28, 1973. It does not apply to the progeny of any such wildlife born after December 28, 1973.

§ 17.5 Alaska natives.

(a) The provisions of subpart C of this part relating to the importation or the taking of endangered wildlife, and any provision of subpart D of this part relating to the importation or the taking of threatened wildlife, shall not apply to:

(1) Any Indian, Aleut, or Eskimo who is an Alaskan native and who resides in Alaska; or

(2) Any non-native permanent resident of an Alaskan native village who is primarily dependent upon the taking of wildlife for consumption or for the creation and sale of authentic native articles of handicrafts and clothing:

If the taking is primarily for subsistence purposes, and is not accomplished in a wasteful manner.

(b) Edible portions of endangered or threatened wildlife taken or imported pursuant to paragraph (a) of this section may be sold in native villages or towns in Alaska for native consumption within native villages and towns in Alaska.

(c) Non-edible by-products of endangered or threatened wildlife taken or imported pursuant to paragraph (a) of this section may be sold in interstate commerce when made into authentic native articles of handicrafts and clothing.

§ 17.6 State cooperative agreements. [Reserved]

§ 17.7 Raptor exemption.

(a) The prohibitions found in §§ 17.21 and 17.31 do not apply to any raptor [a live migratory bird of the Order *Falconiformes* or the Order *Strigiformes*, other than a bald eagle (*Haliaeetus leucocephalus*) or a golden eagle (*Aquila chrysaetos*)] legally held in captivity or in a controlled environment on November 10, 1978, or to any of its progeny, which is:

(1) Possessed and banded in compliance with the terms of a valid permit issued under part 21 of this chapter; and

(2) Identified in the earliest applicable annual report required to be filed by a permittee under part 21 of this chapter as in a permittee's possession on November 10, 1978, or as the progeny of such a raptor.

(b) This section does not apply to any raptor intentionally returned to the wild.

[48 FR 31607, July 8, 1983]

§ 17.8 Permit applications and information collection requirements.

(a) Address permit applications for activities affecting species listed under the Endangered Species Act, as amended, as follows:

(1) Address activities affecting endangered and threatened species that are native to the United States to the Regional Director for the Region in which the activity is to take place. You can find addresses for the Regional

Directors in 50 CFR 2.2. Send applications for interstate commerce in native endangered and threatened species to the Regional Director with lead responsibility for the species. To determine the appropriate region, call the nearest Regional Office:

Region 1 (Portland, OR): 503–231–6241
Region 2 (Albuquerque, NM): 505–248–6920
Region 3 (Twin Cities, MN): 612–713–5343
Region 4 (Atlanta, GA): 404–679–7313
Region 5 (Hadley, MA): 413–253–8628
Region 6 (Denver, CO): 303–236–8155, ext 263
Region 7 (Anchorage, AK): 907–786–3620
Headquarters (Washington, DC): 703–358–2106

(2) Submit permit applications for activities affecting native endangered and threatened species in international movement or commerce, and all activities affecting nonnative endangered and threatened species to the Director, U.S. Fish and Wildlife Service, (Attention Office of Management Authority), 4401 N. Fairfax Drive, Room 700, Arlington, VA 22203.

(b) The Office of Management and Budget approved the information collection requirements contained in this part 17 under 44 U.S.C. 3507 and assigned OMB Control Numbers 1018–0093 and 1018–0094. The Service may not conduct or sponsor, and you are not required to respond to, a collection of information unless it displays a currently valid OMB control number. We are collecting this information to provide information necessary to evaluate permit applications. We will use this information to review permit applications and make decisions, according to criteria established in various Federal wildlife conservation statutes and regulations, on the issuance, suspension, revocation, or denial of permits. You must respond to obtain or retain a permit. We estimate the public reporting burden for these reporting requirements to vary from 2 to 2½ hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding the burden estimate or any other aspect of these reporting requirements to the Service Information Collection Control Officer, MS–222 ARLSQ, U.S. Fish and Wildlife Service, Washington, DC 20240, or the Office of Management and Budget, Paperwork Reduction Project (1018–0093/0094), Washington, DC 20603.

[63 FR 52635, Oct. 1, 1998]

Subpart B—Lists

§ 17.11 Endangered and threatened wildlife.

(a) The list in this section contains the names of all species of wildlife which have been determined by the Services to be Endangered or Threatened. It also contains the names of species of wildlife treated as Endangered or Threatened because they are sufficiently similar in appearance to Endangered or Threatened species (see § 17.50 *et seq.*).

(b) The columns entitled ''Common Name,'' ''Scientific Name,'' and ''Vertebrate Population Where Endangered or Threatened'' define the species of wildlife within the meaning of the Act. Thus, differently classified geographic populations of the same vertebrate subspecies or species shall be identified by their differing geographic boundaries, even though the other two columns are identical. The term ''Entire'' means that all populations throughout the present range of a vertebrate species are listed. Although common names are included, they cannot be relied upon for identification of any specimen, since they may vary greatly in local usage. The Services shall use the most recently accepted scientific name. In cases in which confusion might arise, a synonym(s) will be provided in parentheses. The Services shall rely to the extent practicable on the *International Code of Zoological Nomenclature.*

(c) In the ''Status'' column the following symbols are used: ''E'' for Endangered, ''T'' for Threatened, and ''E [or T] (S/A)'' for similarity of appearance species.

(d) The other data in the list are nonregulatory in nature and are provided for the information of the reader. In the annual revision and compilation of this title, the following information may be amended without public notice: the spelling of species' names, historical range, footnotes, references to certain other applicable portions of this title, synonyms, and more current names. In any of these revised entries,

606—62 FR 4182; January 29, 1997.
609—62 FR 5551; February 6, 1997.
611—62 FR 14351; March 26, 1997.
613—62 FR 27978; May 22, 1997.
615—62 FR 31748; June 11, 1997.
619—62 FR 33037; June 18, 1997.
620—62 FR 33373; June 19, 1997.
623—62 FR 40973; July 31, 1997.
624—62 FR 42702; August 8, 1997.
625—62 FR 54807; October 22, 1997.
627—62 FR 61925; November 20, 1997.
635—63 FR 19849; April 22, 1998.
640—63 FR 43115; August 12, 1998.
641—63 FR 44594; August 20, 1998.
643—63 FR 49034; September 14, 1998.
644—63 FR 49021; September 14, 1998.

EDITORIAL NOTE 1: For FEDERAL REGISTER citations affecting the table in §17.12(h), see the listing above.

EDITORIAL NOTE 2: For FEDERAL REGISTER citations affecting §17.12, see the List of CFR Sections Affected in the Finding Aids section of this volume.

Subpart C—Endangered Wildlife

§17.21 Prohibitions.

(a) Except as provided in subpart A of this part, or under permits issued pursuant to §17.22 or §17.23, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit or to cause to be committed, any of the acts described in paragraphs (b) through (f) of this section in regard to any endangered wildlife.

(b) *Import or export.* It is unlawful to import or to export any endangered wildlife. Any shipment in transit through the United States is an importation and an exportation, whether or not it has entered the country for customs purposes.

(c) *Take.* (1) It is unlawful to take endangered wildlife within the United States, within the territorial sea of the United States, or upon the high seas. The high seas shall be all waters seaward of the territorial sea of the United States, except waters officially recognized by the United States as the territorial sea of another country, under international law.

(2) Notwithstanding paragraph (c)(1) of this section, any person may take endangered wildlife in defense of his own life or the lives of others.

(3) Notwithstanding paragraph (c)(1) of this section, any employee or agent of the Service, any other Federal land management agency, the National Marine Fisheries Service, or a State conservation agency, who is designated by his agency for such purposes, may, when acting in the course of his official duties, take endangered wildlife without a permit if such action is necessary to:

(i) Aid a sick, injured or orphaned specimen; or

(ii) Dispose of a dead specimen; or

(iii) Salvage a dead specimen which may be useful for scientific study; or

(iv) Remove specimens which constitute a demonstrable but nonimmediate threat to human safety, provided that the taking is done in a humane manner; the taking may involve killing or injuring only if it has not been reasonably possible to eliminate such threat by live-capturing and releasing the specimen unharmed, in a remote area.

(4) Any taking pursuant to paragraphs (c) (2) and (3) of this section must be reported in writing to the U.S. Fish and Wildlife Service, Division of Law Enforcement, P.O. Box 19183, Washington, DC 20036, within 5 days. The specimen may only be retained, disposed of, or salvaged in accordance with directions from Service.

(5) Notwithstanding paragraph (c)(1) of this section, any qualified employee or agent of a State Conservation Agency which is a party to a Cooperative Agreement with the Service in accordance with section 6(c) of the Act, who is designated by his agency for such purposes, may, when acting in the course of his official duties take those endangered species which are covered by an approved cooperative agreement for conservation programs in accordance with the Cooperative Agreement, provided that such taking is not reasonably anticipated to result in:

(i) The death or permanent disabling of the specimen;

(ii) The removal of the specimen from the State where the taking occurred;

(iii) The introduction of the specimen so taken, or of any progeny derived

from such a specimen, into an area beyond the historical range of the species; or

(iv) The holding of the specimen in captivity for a period of more than 45 consecutive days.

(d) *Possession and other acts with unlawfully taken wildlife.* (1) It is unlawful to possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any endangered wildlife which was taken in violation of paragraph (c) of this section.

Example A person captures a whooping crane in Texas and gives it to a second person, who puts it in a closed van and drives thirty miles, to another location in Texas. The second person then gives the whooping crane to a third person, who is apprehended with the bird in his possession. All three have violated the law—the first by illegally taking the whooping crane; the second by transporting an illegally taken whooping crane; and the third by possessing an illegally taken whooping crane.

(2) Notwithstanding paragraph (d)(1) of this section, Federal and State law enforcement officers may possess, deliver, carry, transport or ship any endangered wildlife taken in violation of the Act as necessary in performing their official duties.

(e) *Interstate or foreign commerce.* It is unlawful to deliver, receive, carry transport, or ship in interstate or foreign commerce, by any means whatsoever, and in the course of a commercial activity, any endangered wildlife.

(f) *Sale or offer for sale.* (1) It is unlawful to sell or to offer for sale in interstate or foreign commerce any endangered wildlife.

(2) An advertisement for the sale of endangered wildlife which carries a warning to the effect that no sale may be consummated until a permit has been obtained from the U.S. Fish and Wildlife Service shall not be considered an offer for sale within the meaning of this section.

(g) *Captive-bred wildlife.* (1) Notwithstanding paragraphs (b), (c), (e) and (f) of this section, any person may take; export or re-import; deliver, receive, carry, transport or ship in interstate or foreign commerce, in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce any endangered wildlife that is bred in captivity in the United States provided either that the wildlife is of a taxon listed in paragraph (g)(6) of this section, or that the following conditions are met:

(i) The wildlife is of a species having a natural geographic distribution not including any part of the United States, or the wildlife is of a species that the Director has determined to be eligible in accordance with paragraph (g)(5) of this section;

(ii) The purpose of such activity is to enhance the propagation or survival of the affected species;

(iii) Such activity does not involve interstate or foreign commerce, in the course of a commercial activity, with respect to non-living wildlife;

(iv) Each specimen of wildlife to be re-imported is uniquely identified by a band, tattoo or other means that was reported in writing to an official of the Service at a port of export prior to export from the United States; and

(v) Any person subject to the jurisdiction of the United States who engages in any of the activities authorized by this paragraph does so in accordance with paragraphs (g) (2), (3) and (4) of this section, and with all other applicable regulations in this Subchapter B.

(2) Any person subject to the jurisdiction of the United States seeking to engage in any of the activities authorized by this paragraph must first register with the Service (Office of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Arlington, Virginia 22203). Requests for registration must be submitted on an official application form (Form 3–200-41) provided by the Service, and must include the following information:

(i) The types of wildlife sought to be covered by the registration, identified by common and scientific name to the taxonomic level of family, genus or species;

(ii) A description of the applicant's experience in maintaining and propagating the types of wildlife sought to be covered by the registration, and when appropriate, in conducting research directly related to maintaining and propagating such wildlife;

(iii) Photograph(s) or other evidence clearly depicting the facilities where such wildlife will be maintained; and

(iv) a copy of the applicant's license or registration, if any, under the animal welfare regulations of the U.S. Department of Agriculture (9 CFR part 2).

(3) Upon receiving a complete application, the Director will decide whether or not the registration will be approved. In making this decision, the Director will consider, in addition to the general criteria in §13.21(b) of this subchapter, whether the expertise, facilities or other resources available to the applicant appear adequate to enhance the propagation or survival of the affected wildlife. Public education activities may not be the sole basis to justify issuance of a registration or to otherwise establish eligibility for the exception granted in paragraph (g)(1) of this section. Each person so registered must maintain accurate written records of activities conducted under the registration, and allow reasonable access to Service agents for inspection purposes as set forth in §§13.46 and 13.47. Each person registered must submit to the Director an individual written annual report of activities, including all births, deaths and transfers of any type.

(4) Any person subject to the jurisdiction of the United States seeking to export or conduct foreign commerce in captive-bred endangered wildlife that will not remain under the care of that person must first obtain approval by providing written evidence to satisfy the Director that the proposed recipient of the wildlife has expertise, facilities or other resources adequate to enhance the propagation or survival of such wildlife and that the proposed recipient will use such wildlife for purposes of enhancing the propagation or survival of the affected species.

(5)(i) The Director will use the following criteria to determine if wildlife of any species having a natural geographic distribution that includes any part of the United States is eligible for the provisions of this paragraph:

(A) Whether there is a low demand for taking of the species from wild populations, either because of the success of captive breeding or because of other reasons, and

(B) Whether the wild populations of the species are effectively protected from unauthorized taking as a result of the inaccessibility of their habitat to humans or as a result of the effectiveness of law enforcement.

(ii) The Director will follow the procedures set forth in the Act and in the regulations thereunder with respect to petitions and notification of the public and governors of affected States when determining the eligibility of species for purposes of this paragraph.

(iii) In accordance with the criteria in paragraph (g)(5)(i) of this section, the Director has determined the following species to be eligible for the provisions of this paragraph:

Laysan duck (*Anas laysanensis*).

(6) Any person subject to the jurisdiction of the United States seeking to engage in any of the activities authorized by paragraph (g)(1) of this section may do so without first registering with the Service with respect to the bar-tailed pheasant (*Syrmaticus humiae*), Elliot's pheasant (*S. ellioti*), Mikado pheasant (*S. mikado*), brown eared pheasant (*Crossoptilon mantchuricum*), white eared pheasant (*C. crossoptilon*), cheer pheasant (*Catreus wallichii*), Edward's pheasant (*Lophura edwardsi*), Swinhoe's pheasant (*L. swinhoii*), Chinese monal (*Lophophorus lhuysii*), and Palawan peacock pheasant (*Polyplectron emphanum*); parakeets of the species *Neophema pulchella* and *N. splendida;* the Laysan duck (*Anas laysanensis*); the white-winged wood duck (*Cairina scutulata*); and the inter-subspecific crossed or ''generic'' tiger (*Panthera tigris*) (*i e.*, specimens not identified or identifiable as members of the Bengal, Sumatran, Siberian or Indochinese subspecies (*Panthera tigris tigris, P.t. sumatrae, P.t. altaica* and *P.t. corbetti*, respectively) provided:

(i) The purpose of such activity is to enhance the propagation or survival of the affected exempted species;

(ii) Such activity does not involve interstate or foreign commerce, in the course of a commercial activity, with respect to non-living wildlife;

(iii) Each specimen to be re-imported is uniquely identified by a band, tattoo or other means that was reported in writing to an official of the Service at a port of export prior to export of the specimen from the United States;

(iv) No specimens of the taxa in this paragraph (g)(6) of this section that were taken from the wild may be imported for breeding purposes absent a definitive showing that the need for new bloodlines can only be met by wild specimens, that suitable foreign-bred, captive individuals are unavailable, and that wild populations can sustain limited taking, and an import permit is issued under § 17.22;

(v) Any permanent exports of such specimens meet the requirements of paragraph (g)(4) of this section; and

(vi) Each person claiming the benefit of the exception in paragraph (g)(1) of this section must maintain accurate written records of activities, including births, deaths and transfers of specimens, and make those records accessible to Service agents for inspection at reasonable hours as set forth in §§ 13.46 and 13.47.

[40 FR 44415, Sept. 26, 1975, as amended at 40 FR 53400, Nov. 18, 1975; 41 FR 19226, May 11, 1976; 44 FR 31580, May 31, 1979; 44 FR 54007, Sept. 17, 1979; 58 FR 68325, Dec. 27, 1993; 63 FR 48640, Sept. 11, 1998]

EFFECTIVE DATE NOTE: At 63 FR 48640, Sept. 11, 1998, § 17.21 was amended by revising paragraph (g), effective Oct. 13, 1998. For the convenience of the user the superseded text is set forth as follows:

§ 17.21 Prohibitions.

* * * * *

(g) *Captive-bred wildlife.* (1) Notwithstanding paragraphs (b), (c), (e) and (f) of this section, any person may take; import or export; deliver, receive, carry, transport or ship in interstate or foreign commerce, in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce any endangered wildlife that is bred is captivity in the United States, provided the principal purpose of these activities is to facilitate captive breeding, and provided the following conditions are met:

(i) The wildlife is a species having a natural geographic distribution not including any part of the United States, or the wildlife is a species that the Director has determined to be eligible in accordance with paragraph (g)(5) of this section;

(ii) The purpose of such activity is to enhance the propagation or survival of the affected species;

(iii) Such activity does not involve interstate or foreign commerce, in the course of a commercial activity, with respect to non-living wildlife;

(iv) Each specimen of wildlife to be imported is uniquely identified by a band, tattoo or other means that was reported in writing to an official of the Service at a port of export prior to export from the United States, and

(v) Any person subject to the jurisdiction of the United States who engages in any of the activities authorized by this paragraph does so in accordance with paragraphs (g) (2), (3) and (4) of this section.

(2) Any person subject to the jurisdiction of the United States seeking to engage in any of the activities authorized by this paragraph must first register with the Service (Federal Wildlife Permit Office, U.S. Fish and Wildlife Service, Washington, DC 20240). Requests for registration must be submitted on an official application form (Form 3–200) provided by the Service, and must include the following information:

(i) The types of wildlife sought to be covered by the registration, identified by common and scientific name to the taxonomic level of family, genus or species;

(ii) A description of the applicant's experience in maintaining and propagating the types of wildlife sought to be covered by the registration, or in conducting research directly related to maintaining and propagating such wildlife;

(iii) A description, if appropriate, of the means by which the applicant intends to educate the public about the ecological role and conservation needs of the affected species;

(iv) Photograph(s) or other evidence clearly depicting the facilities where such wildlife will be maintained; and

(v) A copy of the applicant's license or registration, if any, under the animal welfare regulations of the U.S. Department of Agriculture (9 CFR part 2).

(3) Upon receiving a complete application, the Director will decide whether or not the registration will be approved. In making his decision, the Director will consider, in addition to the general criteria in § 13.2(b) of this subchapter, whether the expertise, facilities or other resources available to the applicant appear adequate to enhance the propagation or survival of the affected wildlife. Each person so registered must maintain accurate written records of activities conducted under the registration and must submit to the Director a written annual report of such activities.

(4) Any person subject to the jurisdiction of the United States seeking to export or conduct foreign commerce in captive-bred endangered wildlife which will not remain under the care of that person must first obtain approval by providing written evidence to satisfy the Director that the proposed recipient of the wildlife has expertise, facilities or other resources adequate to enhance the propagation or survival of such wildlife

and that the proposed recipient will use such wildlife for purposes of enhancing the propagation or survival of the affected species.

(5)(i) The Director shall use the following criteria to determine if wildlife of any species having a natural geographic distribution that includes any part of the United States is eligible for the provisions of this paragraph:

(A) Whether there is a low demand for taking of the species from wild populations, either because of the success of captive breeding or because of other reasons, and

(B) Whether the wild populations of the species are effectively protected from unauthorized taking as a result of the inaccessibility of their habitat to man or as a result of the effectiveness of law enforcement.

(ii) The Director shall follow the procedures set forth in section 4(b) and section 4(f)(2)(A) of the Act and in the regulations promulgated thereunder with respect to petitions and notification of the public and governors of affected States when determining the eligibility of species for purposes of this paragraph.

(iii) In accordance with the criteria in paragraph (g)(5)(i) of this section, the Director has determined the following species to be eligible for the provisions of this paragraph:

Laysan teal (*Anas laysanensis*).

§17.22 Permits for scientific purposes, enhancement of propagation or survival, or for incidental taking.

Upon receipt of a complete application, the Director may issue a permit authorizing any activity otherwise prohibited by §17.21, in accordance with the issuance criteria of this section, for scientific purposes, for enhancing the propagation or survival, or for the incidental taking of endangered wildlife. Such permits may authorize a single transaction, a series of transactions, or a number of activities over a specific period of time. (See §17.32 for permits for threatened species.) The Director shall publish notice in the FEDERAL REGISTER of each application for a permit that is made under this section. Each notice shall invite the submission from interested parties, within 30 days after the date of the notice, of written data, views, or arguments with respect to the application. The 30-day period may be waived by the Director in an emergency situation where the life or health of an endangered animal is threatened and no reasonable alternative is available to the applicant. Notice of any such waiver shall be published in the FEDERAL REGISTER within 10 days following issuance of the permit.

(a)(1) *Application requirements for permits for scientific purposes or for the enhancement of propagation or survival.* A person wishing to get a permit for an activity prohibited by §17.21 submits an application for activities under this paragraph. The Service provides Form 3–200 for the application to which all of the following must be attained:

(i) The common and scientific names of the species sought to the covered by the permit, as well as the number, age, and sex of such species, and the activity sought to be authorized (such as taking, exporting, selling in interstate commerce);

(ii) A statement as to whether, at the time of application, the wildlife sought to be covered by the permit (A) is still in the wild, (B) has already been removed from the wild, or (C) was born in captivity;

(iii) A resume of the applicant's attempts to obtain the wildlife sought to be covered by the permit in a manner which would not cause the death or removal from the wild of such wildlife;

(iv) If the wildlife sought to be covered by the permit has already been removed from the wild, the country and place where such removal occurred; if the wildlife sought to be covered by the permit was born in captivity, the country and place where such wildlife was born;

(v) A complete description and address of the institution or other facility where the wildlife sought to be covered by the permit will be used, displayed, or maintained;

(vi) If the applicant seeks to have live wildlife covered by the permit, a complete description, including photographs or diagrams, of the facilities to house and/or care for the wildlife and a resume of the experience of those person who will be caring for the wildlife;

(vii) A full statement of the reasons why the applicant is justified in obtaining a permit including the details of the activities sought to be authorized by the permit;

(viii) If the application is for the purpose of enhancement of propagation, a

statement of the applicant's willingness to participate in a cooperative breeding program and to maintain or contribute data to a studbook;

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (a)(1) of this section, the Director will decide whether or not a permit should be issued. In making this decision, the Director shall consider, in addition to the general criteria in § 13.21(b) of this subchapter, the following factors:

(i) Whether the purpose for which the permit is required is adequate to justify removing from the wild or otherwise changing the status of the wildlife sought to be covered by the permit;

(ii) The probable direct and indirect effect which issuing the permit would have on the wild populations of the wildlife sought to be covered by the permit;

(iii) Whether the permit, if issued, would in any way, directly or indirectly, conflict with any known program intended to enhance the survival probabilities of the population from which the wildlife sought to be covered by the permit was or would be removed;

(iv) Whether the purpose for which the permit is required would be likely to reduce the threat of extinction facing the species of wildlife sought to be covered by the permit;

(v) The opinions or views of scientists or other persons or organizations having expertise concerning the wildlife or other matters germane to the application; and

(vi) Whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application.

(3) *Permit conditions.* In addition to the general conditions set forth in part 13 of this subchapter, every permit issued under this paragraph shall be subject to the special condition that the escape of living wildlife covered by the permit shall be immediately reported to the Service office designated in the permit.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be designated on the face of the permit.

(b)(1) *Application requirements for permits for incidental taking.* A person wishing to get a permit for an activity prohibited by § 17.21(c) submits an application for activities under this paragraph. The Service provides Form 3–200 for the application to which all of the following must be attached:

(i) A complete description of the activity sought to be authorized;

(ii) The common and scientific names of the species sought to be covered by the permit, as well as the number, age, and sex of such species, if known;

(iii) A conservation plan that specifies:

(A) The impact that will likely result from such taking;

(B) What steps the applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances;

(C) What alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and

(D) Such other measures that the Director may require as being necessary or appropriate for purposes of the plan;

(2) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (b)(1) of this section, the Director will decide whether or not a permit should be issued. The Director shall consider the general criteria in § 13.21(b) of this subchapter and shall issue the permit if he finds that: (i) The taking will be incidental; (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (iii) the applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided; (iv) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; (v) the measures, if any, required under paragraph (b)(1)(iii)(D) of this section will be met; and (vi) he has received such other assurances as he may require that the plan will be implemented. In making his decision, the Director shall also consider the anticipated duration and geographic scope of the applicant's planned activities, including the

amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected.

(3) *Permit conditions.* In addition to the general conditions set forth in part 13 of this subchapter, every permit issued under this paragraph shall contain such terms and conditions as the Director deems necessary or appropriate to carry out the purposes of the permit and the conservation plan including, but not limited to, monitoring and reporting requirements deemed necessary for determining whether such terms and conditions are being complied with. The Director shall rely upon existing reporting requirements to the maximum extent practicable.

(4) *Duration of permits.* The duration of permits issued under this paragraph shall be sufficient to provide adequate assurances to the permittee to commit funding necessary for the activities authorized by the permit, including conservation activities and land use restrictions. In determining the duration of a permit, the Director shall consider the duration of the planned activities, as well as the possible positive and negative effects associated with permits of the proposed duration on listed species, including the extent to which the conservation plan will enhance the habitat of listed species and increase the long-term survivability of such species.

(5) *Assurances provided to permittee in case of changed or unforeseen circumstances.* The assurances in this paragraph (b)(5) apply only to incidental take permits issued in accordance with paragraph (b)(2) of this section where the conservation plan is being properly implemented, and apply only with respect to species adequately covered by the conservation plan. These assurances cannot be provided to Federal agencies. This rule does not apply to incidental take permits issued prior to March 25, 1998. The assurances provided in incidental take permits issued prior to March 25, 1998 remain in effect, and those permits will not be revised as a result of this rulemaking.

(i) *Changed circumstances provided for in the plan.* If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and were provided for in the plan's operating conservation program, the permittee will implement the measures specified in the plan.

(ii) *Changed circumstances not provided for in the plan.* If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, the Director will not require any conservation and mitigation measures in addition to those provided for in the plan without the consent of the permittee, provided the plan is being properly implemented.

(iii) *Unforeseen circumstances.* (A) In negotiating unforeseen circumstances, the Director will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee.

(B) If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the Director may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan's operating conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.

(C) The Director will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. These findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the affected species. The Director will consider, but not be limited to, the following factors:

(*1*) Size of the current range of the affected species;

(*2*) Percentage of range adversely affected by the conservation plan;

(*3*) Percentage of range conserved by the conservation plan;

(*4*) Ecological significance of that portion of the range affected by the conservation plan;

(*5*) Level of knowledge about the affected species and the degree of specificity of the species' conservation program under the conservation plan; and

(*6*) Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

(6) Nothing in this rule will be construed to limit or constrain the Director, any Federal, State, local, or Tribal government agency, or a private entity, from taking additional actions at its own expense to protect or conserve a species included in a conservation plan.

(c) *Objection to permit issuance.* (1) In regard to any notice of a permit application published in the FEDERAL REGISTER, any interested party that objects to the issuance of a permit, in whole or in part, may, during the comment period specified in the notice, request notification of the final action to be taken on the application. A separate written request shall be made for each permit application. Such a request shall specify the Service's permit application number and state the reasons why that party believes the applicant does not meet the issuance criteria contained in §§13.21 and 17.22 of this subchapter or other reasons why the permit should not be issued.

(2) If the Service decides to issue a permit contrary to objections received pursuant to paragraph (c)(1) of this section, then the Service shall, at least ten days prior to issuance of the permit, make reasonable efforts to contact by telephone or other expedient means, any party who has made a request pursuant to paragraph (c)(1) of this section and inform that party of the issuance of the permit. However, the Service may reduce the time period or dispense with such notice if it determines that time is of the essence and that delay in issuance of the permit would: (i) Harm the specimen or population involved; or (ii) unduly hinder the actions authorized under the permit.

(3) The Service will notify any party filing an objection and request for notice under paragraph (c)(1) of this section of the final action taken on the application, in writing. If the Service has reduced or dispensed with the notice period referred to in paragraph (c)(2) of this section, it will include its reasons therefore in such written notice.

[50 FR 39687, Sept. 30, 1985, as amended at 63 FR 8871, Feb. 23, 1998; 63 FR 52635, Oct. 1, 1998]

§17.23 Economic hardship permits.

Upon receipt of a complete application, the Director may issue a permit authorizing any activity otherwise prohibited by §17.21, in accordance with the issuance criteria of this section in order to prevent undue economic hardship. The Director shall publish notice in the FEDERAL REGISTER of each application for a permit that is made under this section. Each notice shall invite the submission from interested parties, within 30 days after the date of the notice, of written data, views, or arguments with respect to the application. The 30-day period may be waived by the Director in an emergency situation where the life or health of an endangered animal is threatened and no reasonable alternative is available to the applicant. Notice of any such waiver shall be published in the FEDERAL REGISTER within 10 days following issuance of the permit.

(a) *Application requirements.* Applications for permits under this section must be submitted to the Director by the person allegedly suffering undue economic hardship because his desired activity is prohibited by §17.21. Each application must be submitted on an official application form (Form 3–200) provided by the Service, and must include, as an attachment, all of the information required in §17.22 plus the following additional information:

(1) The possible legal, economic or subsistence alternatives to the activity sought to be authorized by the permit;

(2) A full statement, accompanied by copies of all relevant contracts and

correspondence, showing the applicant's involvement with the wildlife sought to be covered by the permit (as well as his involvement with similar wildlife), including, where applicable, that portion of applicant's income derived from the taking of such wildlife, or the subsistence use of such wildlife, during the calendar year immediately preceding either the notice in the FEDERAL REGISTER of review of the status of the species or of the proposal to list such wildlife as endangered, whichever is earliest;

(3) Where applicable, proof of a contract or other binding legal obligation which:

(i) Deals specifically with the wildlife sought to be covered by the permit;

(ii) Became binding prior to the date when the notice of a review of the status of the species or the notice of proposed rulemaking proposing to list such wildlife as endangered was published in the FEDERAL REGISTER, whichever is earlier; and

(iii) Will cause monetary loss of a given dollar amount if the permit sought under this section is not granted.

(b) *Issuance criteria.* Upon receiving an application completed in accordance with paragraph (a) of this section, the Director will decide whether or not a permit should be issued under any of the three categories of economic hardship, as defined in section 10(b)(2) of the Act. In making his decisions, the Director shall consider, in addition to the general criteria in §13.21(b) of this subchapter, the following factors:

(1) Whether the purpose for which the permit is being requested is adequate to justify removing from the wild or otherwise changing the status of the wildlife sought to be covered by the permit;

(2) The probable direct and indirect effect which issuing the permit would have on the wild populations of the wildlife sought to be covered by the permit;

(3) The economic, legal, subsistence, or other alternatives or relief available to the applicant;

(4) The amount of evidence that the applicant was in fact party to a contract or other binding legal obligation which;

(i) Deals specifically with the wildlife sought to be covered by the permit; and

(ii) Became binding prior to the date when the notice of a review of the status of the species or the notice of proposed rulemaking proposing to list such wildlife as endangered was published in the FEDERAL REGISTER, whichever is earlier.

(5) The severity of economic hardship which the contract or other binding legal obligation referred to in paragraph (b)(4) of this section would cause if the permit were denied;

(6) Where applicable, the portion of the applicant's income which would be lost if the permit were denied, and the relationship of that portion to the balance of his income;

(7) Where applicable, the nature and extent of subsistence taking generally by the applicant; and

(8) The likelihood that applicant can reasonably carry out his desired activity within one year from the date a notice is published in the FEDERAL REGISTER to review status of such wildlife, or to list such wildlife as endangered, whichever is earlier.

(c) *Permit conditions.* In addition to the general conditions set forth in part 13 of this subchapter, every permit issued under this section shall be subject to the following special conditions:

(1) In addition to any reporting requirements contained in the permit itself, the permittee shall also submit to the Director a written report of his activities pursuant to the permit. Such report must be postmarked or actually delivered no later than 10 days after completion of the activity.

(2) The death or escape of all living wildlife covered by the permit shall be immediately reported to the Service's office designated in the permit.

(d) Duration of permits issued under this section shall be designated on the face of the permit. No permit issued under this section, however, shall be valid for more than one year from the date a notice is published in the FEDERAL REGISTER to review status of such wildlife, or to list such wildlife as endangered, whichever is earlier.

[40 FR 44415, Sept. 26, 1975, as amended at 40 FR 53400, Nov. 18, 1975; 40 FR 58307, Dec. 16, 1975; 50 FR 39688, Sept. 30, 1985]

Subpart D—Threatened Wildlife

§ 17.31 Prohibitions.

(a) Except as provided in subpart A of this part, or in a permit issued under this subpart, all of the provisions in § 17.21 shall apply to threatened wildlife, except § 17.21(c)(5).

(b) In addition to any other provisions of this part 17, any employee or agent of the Service, of the National Marine Fisheries Service, or of a State conservation agency which is operating a conservation program pursuant to the terms of a Cooperative Agreement with the Service in accordance with section 6(c) of the Act, who is designated by his agency for such purposes, may, when acting in the course of his official duties, take those threatened species of wildlife which are covered by an approved cooperative agreement to carry out conservation programs.

(c) Whenever a special rule in §§ 17.40 to 17.48 applies to a threatened species, none of the provisions of paragraphs (a) and (b) of this section will apply. The special rule will contain all the applicable prohibitions and exceptions.

[43 FR 18181, Apr. 28, 1978, as amended at 44 FR 31580, May 31, 1979]

§ 17.32 Permits—general.

Upon receipt of a complete application the Director may issue a permit for any activity otherwise prohibited with regard to threatened wildlife. Such permit shall be governed by the provisions of this section unless a special rule applicable to the wildlife, appearing in §§ 17.40 to 17.48, of this part provides otherwise. Permits issued under this section must be for one of the following purposes: Scientific purposes, or the enhancement of propagation or survival, or economic hardship, or zoological exhibition, or educational purposes, or incidental taking, or special purposes consistent with the purposes of the Act. Such permits may authorize a single transaction, a series of transactions, or a number of activities over a specific period of time.

(a)(1) *Application requirements for permits for scientific purposes, or the enhancement of propagation or survival, or economic hardship, or zoological exhibition, or educational purposes, or special purposes consistent with the purposes of the Act.* A person wishing to get a permit for an activity prohibited by § 17.31 submits an application for activities under this paragraph. The Service provides Form 3–200 for the application to which as much of the following information relating to the purpose of the permit must be attached:

(i) The Common and scientific names of the species sought to be covered by the permit, as well as the number, age, and sex of such species, and the activity sought to be authorized (such as taking, exporting, selling in interstate commerce);

(ii) A statement as to whether, at the time of application, the wildlife sought to be covered by the permit (A) is still in the wild, (B) has already been removed from the wild, or (C) was born in captivity;

(iii) A resume of the applicant's attempts to obtain the wildlife sought to be covered by the permit in a manner which would not cause the death or removal from the wild of such wildlife;

(iv) If the wildlife sought to be covered by the permit has already been removed from the wild, the country and place where such removal occurred; if the wildlife sought to be covered by permit was born in captivity, the country and place where such wildlife was born;

(v) A complete description and address of the institution or other facility where the wildlife sought to be covered by the permit will be used, displayed, or maintained;

(vi) If the applicant seeks to have live wildlife covered by the permit, a complete description, including photographs or diagrams, of the facilities to house and/or care for the wildlife and a resume of the experience of those persons who will be caring for the wildlife;

(vii) A full statement of the reasons why the applicant is justified in obtaining a permit including the details of the activities sought to be authorized by the permit;

(viii) If the application is for the purpose of enhancement of propagation, a statement of the applicant's willingness to participate in a cooperative breeding program and to maintain or contribute data to a studbook;

this section, all prohibitions of 50 CFR 17.31 and exemptions of 50 CFR 17.32 shall apply to the bull trout Columbia River and Klamath River population segments within the contiguous United States.

(2) *Exceptions.* No person shall take this species, except in accordance with applicable State and Native American Tribal fish and wildlife conservation laws and regulations, as constituted in all respects relevant to protection of bull trout in effect on June 10, 1998.

(3) Any violation of applicable State and Native American Tribal fish and wildlife conservation laws or regulations with respect to the taking of this species is also a violation of the Endangered Species Act.

(4) No person shall possess, sell, deliver, carry, transport, ship, import, or export, any means whatsoever, any such species taken in violation of this section or in violation of applicable State and Native American Tribal fish and game laws and regulations.

(5) It is unlawful for any person to attempt to commit, solicit another to commit, or cause to be committed, any offense defined in paragraphs (v) (2) through (4) of this section.

[40 FR 44415, Sept. 26, 1975]

EDITORIAL NOTE: For FEDERAL REGISTER citations to §17.44, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 17.45 Special rules—snails and clams. [Reserved]

§ 17.46 Special rules—crustaceans.

(a) Madison Cave isopod (*Antrolana lira*). (1) All provisions of §17.31 (a) and (b) apply to this species except that it may be taken for scientific purposes without Federal permits issued pursuant to these regulations: *Provided,* that all other Federal, State, or local laws, regulations, ordinances or other restrictions or limitations have been complied with.

(b) [Reserved]

[47 FR 43701, Oct. 4, 1982]

§ 17.47 [Reserved]

§ 17.48 Special rules—common sponges and other forms. [Reserved]

Subpart E—Similarity of Appearance

SOURCE: 42 FR 32377, June 24, 1977, unless otherwise noted.

§ 17.50 General.

(a) Whenever a species which is not Endangered or Threatened closely resembles an Endangered or Threatened species, such species may be treated as either Endangered or Threatened if the director makes such determination in accordance with section 4(e) of the Act and the criteria of paragraph (b) of this section. After the Director has made such determination in accordance with the notification procedures specified in the Act, such species shall appear in the list in §17.11 (Wildlife) or §17.12 (Plants) with the notation ''(S/A)'' (similarity of appearance) in the ''Status'' column, following either a letter ''E'' or a letter ''T'' to indicate whether the species is being treated as Endangered or Threatened.

(b) In determining whether to treat a species as Endangered or Threatened due to similarity of appearance, the Director shall consider the criteria in section 4(e) of the Act, as indicated below:

(1) The degree of difficulty enforcement personnel would have in distinguishing the species, at the point in question, from an Endangered or Threatened species (including those cases where the criteria for recognition of a species are based on geographical boundaries);

(2) The additional threat posed to the Endangered or Threatened species by the loss of control occasioned because of the similarity of appearance; and

(3) The probability that so designating a similar species will substantially facilitate enforcement and further the purposes and policy of the Act.

Example 1. The ABC sparrow is Endangered wildlife. The ABD sparrow is a subspecies that is so similar to the ABC sparrow that

Act of 1973, as evidenced by its inclusion on the list of endangered fish or wildlife (see 50 CFR chapter I, part 17) or which the Secretary of the Interior determined to be endangered under the Endangered Species Conservation Act of 1969 and which are now under the jurisdictional responsibilities of the Secretary of Commerce, without a valid permit issued pursuant to this part.

(Pub. L. 94–359)

[41 FR 36028, Aug. 26, 1976]

§ 222.22 Permits for the incidental taking of endangered species.

(a) *Scope.* (1) The Assistant Administrator may issue permits to take endangered marine species incidentally to an otherwise lawful activity under section 10(a)(1)(B) of the Endangered Species Act of 1973. The regulations in this section apply only to those endangered species under the jurisdiction of the Secretary of Commerce identified in § 222.23(a).

(2) If the applicant represents an individual or a single entity, such as a corporation, the Assistant Administrator will issue an individual incidental take permit. If the applicant represents a group or organization whose members conduct the same or a similar activity in the same geographical area with similar impacts on endangered marine species, the Assistant Administrator will issue a general incidental take permit. To be covered by a general incidental take permit, each individual conducting the activity must have a certificate of inclusion issued under paragraph (f) of this section.

(b) *Permit application procedures.* Applications should be sent to the Assistant Administrator for Fisheries, National Marine Fisheries Service, 1335 East West Highway, Silver Spring, MD 20910. The sufficiency of the application will be determined by the Assistant Administrator in accordance with the requirements of this section. At least 120 days should be allowed for processing. Each application must be signed and dated and include the following:

(1) The type of application, either:

(i) Application for an Individual Incidental Take Permit under the Endangered Species Act of 1973, or

(ii) Application for a General Incidental Take Permit under the Endangered Species Act of 1973.

(2) The name, address and telephone number of the applicant. If the applicant is a partnership, corporate entity or is representing a group or organization, the applicable details.

(3) The species or stocks, by common and scientific name, and a description of the status, distribution, seasonal distribution, habitat needs, feeding habits and other biological requirements of the affected species or stocks.

(4) A detailed description of the proposed activity, including the anticipated dates, duration and specific location. If the request is for a general incidental take permit, an estimate of the total level of activity expected to be conducted.

(5) A conservation plan, based on the best scientific and commercial data available, which specifies

(i) The anticipated impact (*i.e.*, amount, extent and type of anticipated taking) of the proposed activity on the species or stocks;

(ii) The anticipated impact of the proposed activity on the habitat of the species or stocks and the likelihood of restoration of the affected habitat;

(iii) The steps (specialized equipment, methods of conducting activities, or other means) that will be taken to monitor, minimize and mitigate such impacts, and the funding available to implement such measures; and

(iv) The alternative actions to such taking that were considered and the reasons why those alternatives are not being used.

(v) A list of all sources of data used in preparation of the plan, including reference reports, environmental assessments and impact statements, and personal communications with recognized experts on the species or activity who may have access to data not published in current literature.

(c) *Issuance criteria.* (1) In determining whether to issue a permit, the Assistant Administrator will consider the following:

(i) The status of the affected species or stocks;

(ii) The potential severity of direct, indirect and cumulative impacts on the

species or stocks and habitat as a result of the proposed activity;

(iii) The availability of effective monitoring techniques;

(iv) The use of the best available technology for minimizing or mitigating impacts; and

(v) The views of the public, scientists and other interested parties knowledgeable of the species or stocks or other matters related to the application.

(2) To issue the permit, the Assistant Administrator must find that:

(i) The taking will be incidental;

(ii) The applicant will, to the maximum extent practicable, monitor, minimize and mitigate the impacts of such taking;

(iii) The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;

(iv) The applicant has amended the conservation plan to include any measures (not originally proposed by the applicant) that the Assistant Administrator determines are necessary or appropriate; and

(v) There are adequate assurances that the conservation plan will be funded and implemented, including any measures required by the Assistant Administrator.

(d) *Permit conditions.* In addition to the general conditions set forth in part 220 of this chapter, every permit issued under this section will contain such terms and conditions as the Assistant Administrator deems necessary and appropriate, including, but not limited to the following:

(1) Reporting requirements or rights of inspection for determining whether the terms and conditions are being complied with;

(2) The species and number of animals covered;

(3) The authorized method of taking;

(4) The procedures to be used to handle or dispose of any animals taken; and

(5) The payment of a fee to reimburse the National Marine Fisheries Service the cost of processing the application.

(e) *Duration of permits.* The duration of permits issued under this section will be such as to provide adequate assurances to the permit holder to commit funding necessary for the activities authorized by the permit, including conservation activities. In determining the duration of a permit, the Assistant Administrator will consider the duration of the proposed activities, as well as the possible positive and negative effects associated with issuing a permit of the proposed duration on listed species, including the extent to which the conservation plan is likely to enhance the habitat of the endangered species or increase the long-term survivability of the species.

(f) *Certificates of inclusion.* (1) Any individual who wishes to conduct an activity covered by a general incidental take permit must apply to the Assistant Administrator for a certificate of inclusion. Each application must be signed and dated and include the following:

(i) The general incidental take permit under which the applicant wants coverage.

(ii) The name, address and telephone number of the applicant. If the applicant is a partnership or a corporate entity, the applicable details.

(iii) A description of the activity the applicant seeks to have covered under the general incidental take permit including the anticipated dates, duration, and specific location; and

(iv) A signed certification that the applicant has read and understands the general incidental take permit and the conservation plan, will comply with their terms and conditions, and will fund and implement applicable measures of the conservation plan.

(2) To issue a certificate of inclusion, the Assistant Administrator must find that:

(i) The applicant will be engaged in the activity covered by the general permit and

(ii) The applicant has made adequate assurances that the applicable measures of the conservation plan will be funded and implemented.

(g) *Assurances provided to permittee in case of changed or unforeseen circumstances.* The assurances in this paragraph (g) apply only to incidental take permits issued in accordance with paragraph (c) of this section where the conservation plan is being properly implemented, and apply only with respect to species adequately covered by the

conservation plan. These assurances cannot be provided to Federal agencies. This rule does not apply to incidental take permits issued prior to March 25, 1998. The assurances provided in incidental take permits issued prior to March 25, 1998 remain in effect, and those permits will not be revised as a result of this rulemaking.

(1) *Changed circumstances provided for in the plan.* If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and were provided for in the plan's operating conservation program, the permittee will implement the measures specified in the plan.

(2) *Changed circumstances not provided for in the plan.* If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, NMFS will not require any conservation and mitigation measures in addition to those provided for in the plan without the consent of the permittee, provided the plan is being properly implemented.

(3) *Unforeseen circumstances.* (i) In negotiating unforeseen circumstances, NMFS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee.

(ii) If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, NMFS may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan's operating conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.

(iii) NMFS will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. These findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the affected species. NMFS will consider, but not be limited to, the following factors:

(A) Size of the current range of the affected species;

(B) Percentage of range adversely affected by the conservation plan;

(C) Percentage of range conserved by the conservation plan;

(D) Ecological significance of that portion of the range affected by the conservation plan;

(E) Level of knowledge about the affected species and the degree of specificity of the species' conservation program under the conservation plan; and

(F) Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

(h) Nothing in this rule will be construed to limit or constrain the Assistant Administrator, any Federal, State, local, or tribal government agency, or a private entity, from taking additional actions at its own expense to protect or conserve a species included in a conservation plan.

[55 FR 20606, May 18, 1990, as amended at 63 FR 8872, Feb. 23, 1998]

§ 222.23 Permits for scientific purposes or to enhance the propagation or survival of the affected endangered species.

(a) The Director, National Marine Fisheries Service, may issue permits for scientific purposes or to enhance the propagation or survival of the affected endangered species which authorize, under such terms and conditions as he may prescribe, taking, importation, or certain other acts with respect to endangered species otherwise prohibited by section 9 of the Endangered Species Act of 1973. The

species listed as endangered under either the Endangered Species Conservation Act of 1969 or the Endangered Species Act of 1973 and currently under the jurisdiction of the Secretary of Commerce are: Shortnose sturgeon (*Acipenser brevirostrum*); Totoaba (*Cynoscian macdonaldi*), Snake River sockeye salmon (*Oncorhynchusnerka*), Umpqua River cutthroat trout (*Oncorhynchus clarki clarki*); Southern California steelhead (*Oncorhynchus mykiss*), which includes all naturally spawned populations of steelhead (and their progeny) in streams from the Santa Maria River, San Luis Obispo County, California (inclusive) to Malibu Creek, Los Angeles County, California (inclusive); Upper Columbia River steelhead (*Oncorhynchus mykiss*), which includes the Wells Hatchery stock and all naturally spawned populations of steelhead (and their progeny) in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the United States-Canada Border; Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*); Western North Pacific (*Korean*) gray whale (*Eschrichtius robustus*), Blue whale (*Balaenoptera musculus*), Humpback whale (*Megaptera novaeangliae*), Bowhead whale (*Balaenamysticetus*), Right whales (*Eubalaena spp.*), Fin or finback whale (*Balaenoptera physalus*), Sei whale (*Balaenoptera borealis*), Sperm whale (*Physeter catodon*); Cochito (*Phocoena Sinus*), Chinese river dolphin (*Lipotes vexillifer*); Indus River dolphin (*Platanista minor*); Caribean monk seal (*Monachus tropicalis*) Hawaiian monk seal (*Monachus schauinslandi*); Mediterranean monk seal (*Monachus monachus*); Saimaa seal (*Phoca hispida saimensis*); Steller sea lion (*Eumetopias jubatus*), western population, which consists of Steller sea lions from breeding colonies located west of 144° W. long.; Leatherback sea turtle (*Dermochelys coriacea*), Pacific hawksbill sea turtle (*Eretmochelys imbricata bissa*), Atlantic hawksbill sea turtle (*Eretmochelys imbricata imbricata*), Atlantic ridley sea turtle (*Lepidochelys kempii*). Green sea turtle (*Chelonia mydas*) breeding colony populations in Florida and on the Pacific coast of Mexico, and the olive ridley sea turtle (*Lepidochelys olivacea*) breeding colony population on the Pacific coast of Mexico. Of these, the National Marine Fisheries Service has sole agency jurisdiction for sea turtles while the turtles are in the water and the U.S. Fish and Wildlife Service has jurisdiction for sea turtles while the turtles are on land. Within the jurisdiction of a State, more restrictive State laws or regulations in regard to endangered species shall prevail in regard to taking. Proof of compliance with applicable State laws will be required before a permit will be issued.

(b) *Application procedures.* To obtain such a permit, an application must be made to the Director in accordance with this subpart, except for marine mammal permits which shall be issued in accordance with the provisions of part 216, subpart D of this chapter, and sea turtle permits which shall be issued in accordance with part 220, subpart E of this chapter. The sufficiency of the application shall be determined by the Director in accordance with the requirements of this part and, in that connection, he may waive any requirement for information, or require any elaboration or further information deemed necessary. The following information will be used as the basis for determining whether an application is complete and whether a permit for scientific purposes or to enhance the propagation or survival of the affected endangered species should be issued by the Director. An original and four copies of the completed application shall be submitted to the Director, National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, Washington, DC 20235. Assistance may be obtained by writing the Director or calling the Marine Mammal and Endangered Species Division in Washington, DC (202–343–9445 and effective December 2, 1974, it will become 202–634–7529). At least 45 days should be allowed for processing. An application for a permit shall provide the following information (when the information requested is not applicable put ''N.A.'') and such other information that the Director may require:

(1) Title: As applicable, either:

(i) Application for Permit for Scientific Purposes under the Endangered Species Act of 1973; or

(ii) Application for Permit to Enhance the Propagation or Survival of the Endangered Species Under the Endangered Species Act of 1973.

(2) The date of the application.

(3) The identity of the applicant including complete name, address, and telephone number. If the applicant is a partnership or a corporate entity set forth the details. If the endangered species is to be utilized by a person other than the Applicant, set forth the name of that person and such other information as would be required if such person were an Applicant.

(4) A description of the purpose of the proposed acts, including:

(i) A detailed justification of the need for the endangered species, including a discussion of possible alternatives, whether or not under the control of the applicant; and

(ii) A detailed description of how the species will be used.

(5) A detailed description of the project, or program, in which the endangered species is to be used, including:

(i) The period of time over which the project or program will be conducted;

(ii) A list of the names and addresses of the sponsors or cooperating institutions and the scientists involved;

(iii) A copy of the formal research proposal or contract if one has been prepared;

(iv) A statement of whether the proposed project or program has broader significance than the individual researcher's goals (i.e., does the proposed project or program respond directly or indirectly to recommendation of any national or international scientific body charged with research or management of the endangered species, and, if so, how?); and

(v) A description of the arrangements, if any, for the disposition of any dead specimen or its skeleton or other remains, for the continued benefit to science, in a museum or other institutional collection.

(6) A description of the endangered species which is the subject of the application, including the following:

(i) A list of each species and the number of each, including the common and scientific name; the subspecies (if applicable); population group, and range;

(ii) A physical description of each animal, including the age, size, and sex;

(iii) A list of the probable dates of capture or other taking, importation, exportation, and other acts which require a permit, for each animal, and the location of capture or other taking, importation, exportation, and other acts which require a permit, as specifically as possible;

(iv) A description of the status of the stock of each species related insofar as possible to the location or area of taking;

(v) A description of the manner of taking for each animal, including the gear to be used;

(vi) The name and qualifications of the persons or entity which will capture or otherwise take the animals;

(vii) If the capture or other taking is to be done by a contractor, a statement as to whether a qualified member of your staff (include name(s) and qualifications) will supervise or observe the capture or other taking. Accompany such statement with a copy of the proposed contract or a letter from the contractor indicating agreement to capture or otherwise taken the animals, should a permit be granted;

(7) A description of the manner of transportation of any live animal taken, imported, exported, or shipped in interstate commerce, including:

(i) Mode of transportation;

(ii) Name of transportation company;

(iii) Length of time in transit for the transfer of the animal(s) from the capture site to the holding facility;

(iv) Length of time in transit for any future move or transfer of the animal(s) that is planned;

(v) The qualifications of the common carrier or agent used for transportation of the animals;

(vi) A description of the pen, tank, container, cage, cradle, or other devices used, both to hold the animal at the capture site and during transportation;

(vii) Special care before and during transportation, such as salves, antibiotics, moisture; and

(viii) A statement as to whether the animals will be accompanied by a veterinarian or other similarly qualified person, and the qualifications of such person.

(8) Describe the contemplated care and maintenance of any live animals sought, including a complete description of the facilities where any such animals will be maintained including:

(i) The dimensions of the pools or other holding facilities and the number, sex, and age of animals by species to be held in each;

(ii) The water supply, amount, and quality;

(iii) The diet, amount and type, for all animals;

(iv) Sanitation practices used;

(v) Qualifications and experience of the staff; and

(vi) A written certification from a licensed veterinarian knowledgeable about the species (or related species) or group which is the subject of the application, or from a recognized expert on the species (or related species) or group covered in the application that he has personally reviewed the amendments for transporting and maintaining the animal(s) and that in his opinion they are adequate to provide for the well-being of the animal; and

(vii) The availability in the future of a consulting expert or veterinarian meeting paragraph (b)(8)(vi) requirements of this section;

(9) A statement of willingness to participate in a cooperative breeding program and maintain or contribute data to a stud book.

(10) A statement of how the applicant's proposed project or program will enhance or benefit the wild population.

(11) For the 5 years preceding the date of this application, provide a detailed description of all mortalities involving species which were under the control of or utilized by the applicant and are either presently listed as endangered species or are taxonomically related within the Order to the species which is the subject of this application, including:

(i) A list of all endangered species and species related to the species which is the subject of this application; captured, transported, maintained, or utilized by the applicant for scientific purposes or to enhance the propagation or survival of the affected species, and/or for all such species caused to be captured, transported, maintained, or utilized for scientific purposes or to enhance the propagation or survival of the affected species, by the Applicant;

(ii) The numbers of mortalities among such animals by species, by date, location of capture, i.e., from which population, and location of such mortalities;

(iii) The cause(s) of any such mortalities; and

(iv) The steps which have been taken by Applicant to avoid or decrease any such mortalities.

(12) A certification in the following language:

> I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (87 Stat. 864, Pub. L. 93–205, 16 U.S.C. 1531 et seq.) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the Endangered Species Act of 1973.

(13) The applicant and/or an officer thereof must sign the application.

(c) *Issuance criteria.* The Director shall specifically consider, among other criteria, the following in determining whether to issue a permit for scientific purposes or to enhance the propagation or survival of the affected endangered species:

(1) Whether the permit was applied for in good faith;

(2) Whether the permit if granted and exercised will not operate to the disadvantage of the endangered species;

(3) Whether the permit would be consistent with the purposes and policy set forth in section 2 of the Act;

(4) Whether the permit would further a bona fide and necessary or desirable scientific purpose or enhance the propagation or survival of the endangered species, taking into account the benefits anticipated to be derived on behalf of the endangered species;

(5) The status of the population of the requested species, and the effect of the proposed action on the population, both direct and indirect;

(6) If a live animal is to be taken, transported, or held in captivity—the applicant's qualifications for the proper care and maintenance of the species and the adequacy of his facilities;

(7) Whether alternative non-endangered species or population stocks can and should be used;

(8) Whether the animal was born in captivity or was (or will be) taken from the wild;

(9) Provision for disposition of the species if and when the applicant's project or program terminates;

(10) How the applicant's needs, program, and facilities compare and relate to proposed and ongoing projects and programs;

(11) Whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application;

(12) Opinions or views of scientists or other persons or organizations knowledgeable of the species which is the subject of the application or of other matters germane to the application; and

(d) Permits applied for under this section shall contain terms and conditions as the Director may deem appropriate, including:

(1) The number and kind of species which are covered;

(2) The location and manner of taking;

(3) Port of entry or export;

(4) The methods of transportation, care and maintenance to be used with live species;

(5) Any requirements for reports or rights of inspections with respect to any activities carried out pursuant to the permit;

(6) The transferability or assignability of the permit;

(7) The sale or other disposition of the species, its progeny or the species product;

(8) A reasonable fee covering the costs of issuance of such permit, including reasonable inspections and an appropriate apportionment of overhead and administrative expenses of the Department of Commerce. All such fees will be deposited in the Treasury to the credit of the appropriation which is current and chargeable for the cost of furnishing the service.

[39 FR 41375, Nov. 27, 1974]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §222.23, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§222.24 Procedures for issuance of permits.

(a) Whenever application for a permit is received by the Director which the Director deems sufficient, he shall, as soon as practicable, publish a notice thereof in the FEDERAL REGISTER. Information received by the Director as a part of the application shall be available to the public as a matter of public record at every stage of the proceeding. An interested party may within 30 days after the date of publication of such notice, submit to the Director his written data, views, or arguments with respect to the taking, importation, or other action proposed in the application and may request a hearing in connection with the action to be taken thereon.

(b) If a request for a hearing is made within the 30–day period referred to in paragraph (a) of this section, or if the Director determines that a hearing would otherwise be advisable, the Director may, within 60 days after the date of publication of the notice referred to in paragraph (a) of this section, afford to such requesting party or parties an opportunity for a hearing. Such hearing shall also be open to participation by any interested members of the public. Notice of the date, time, and place of such hearing shall be published in the FEDERAL REGISTER not less than 15 days in advance of such hearing. Any interested person may appear in person or through representatives at the hearing and may submit any relevant material, data, views, comments, arguments, or exhibits. A summary record of the hearing shall be kept.

(c) Except as provided in subpart D of 15 CFR part 904, as soon as practicable but not later than 30 days after the close of the hearing (or if no hearing is held, as soon as practicable after the end of the 30 days succeeding publication of the notice referred to in paragraph (a) of this section) the Director

shall issue or deny issuance of the permit. Notice of the decision of the Director shall be published in the FEDERAL REGISTER within 10 days after the date of the issuance or denial and indicate where copies of the permit, if issued, may be obtained.

(d) If a permit is issued, the Director shall publish notice thereof in the FEDERAL REGISTER, including his finding that (1) such permit was applied for in good faith, (2) if granted and exercised will not operate to the disadvantage of such endangered species, and (3) will be consistent with the purposes and policy set forth in section 2 of the Endangered Species Act of 1973. The requirements of this paragraph pertain solely to the permits issued under §222.23.

(e) The Director may waive the thirty-day period in an emergency situation where the health or life of an endangered animal is threatened and no reasonable alternative is available to the applicant, but notice of any such waiver shall be published by the Director in the FEDERAL REGISTER within ten days following the issuance of the certificate of exemption or permit.

[39 FR 41375, Nov. 27, 1974, as amended at 42 FR 28139, June 2, 1977; 49 FR 1042, Jan. 6, 1984; 55 FR 20607, May 18, 1990]

§222.25 Applications for modification of permit by permittee.

Where circumstances have changed so that an applicant or permittee desires to have any term or condition of his application or permit modified, he must submit in writing full justification and supporting information in conformance with the provisions of this part and the part under which the permit has been issued or requested. Such applications for modification are subject to the same issuance criteria as are original applications, as provided in §§222.22(c) and 222.23(c).

[39 FR 41375, Nov. 27, 1974, as amended at 55 FR 20607, May 18, 1990]

§222.26 Amendment of permits by NMFS.

All permits are issued subject to the condition that the National Marine Fisheries Service reserves the right to amend the provisions of a permit for just cause at any time during its term. Such amendments take effect on the date of notification, unless otherwise specified.

[39 FR 41375, Nov. 27, 1974]

§222.27 Procedures for suspension, revocation, or modification of permits.

Any violation of the applicable provisions of parts 217 through 222 of this chapter, or of the Act, or of a condition of the permit may subject the certificate holder to the following:

(a) The penalties provided in the Act; and

(b) Suspension, revocation, or modification of the permit, as provided in subpart D of 15 CFR part 904.

[49 FR 1043, Jan. 6, 1984, as amended at 55 FR 20607, May 18, 1990]

§222.28 Possession of permits.

(a) Any permit issued under these regulations must be in the possession of the person to whom it is issued (or an agent of such person) during:

(1) The time of the authorized taking, importation, exportation, or other act;

(2) The period of any transit of such person or agent which is incident to such taking, importation, exportation, or other act; and

(3) Any other time while any animal under such permit is in the possession of such person or agent.

(b) A duplicate copy of the issued permit must be physically attached to the tank, container, package, enclosure, or other means of containment, in which the animal is placed for purposes of storage, transit, supervision, or care.

[39 FR 41375, Nov. 27, 1974]

Subpart D—Special Prohibitions

§222.31 Approaching humpback whales in Hawaii.

Except as provided in subpart C (Endangered Fish or Wildlife Permits) of this part it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or to cause to be committed, within 200 nautical miles (370.4 km) of the Islands of Hawaii, any of the following acts with respect to humpback whales (*Megaptera novaeangliae*):

(a) Operate any aircraft within 1,000 ft (300 m) of any humpback whale; or

(b) Approach by any means, within 100 yd (90 m) of any humpback whale; or

(c) Cause a vessel or other object to approach within 100 yd (90 m) of a humpback whale; or

(d) Disrupt the normal behavior or prior activity of a whale by any other act or omission. A disruption of normal behavior may be manifested by, among other actions on the part of the whale, a rapid change in direction or speed; escape tactics such as prolonged diving, underwater course changes, underwater exhalation, or evasive swimming patterns; interruptions of breeding, nursing, or resting activities, attempts by a whale to shield a calf from a vessel or human observer by tail swishing or by other protective movement; or the abandonment of a previously frequented area.

[60 FR 3775, Jan. 19, 1995]

§ 222.32 Approaching North Atlantic right whales.

(a) *Prohibitions.* Except as provided under paragraph (c) of this section, it is unlawful for any person subject to the jurisdiction of the United States to commit, attempt to commit, to solicit another to commit, or cause to be committed any of the following acts:

(1) Approach (including by interception) within 500 yards (460 m) of a right whale by vessel, aircraft, or any other means;

(2) Fail to undertake required right whale avoidance measures specified under paragraph (b) of this section.

(b) *Right whale avoidance measures.* Except as provided under paragraph (c) of this section, the following avoidance measures must be taken if within 500 yards (460 m) of a right whale:

(1) If underway, a vessel must steer a course away from the right whale and immediately leave the area at a slow safe speed;

(2) An aircraft must take a course away from the right whale and immediately leave the area at a constant airspeed.

(c) *Exceptions.* The following exceptions apply to this section, but any person who claims the applicability of an exception has the burden of proving that the exception is applicable:

(1) Paragraphs (a) and (b) of this section do not apply if a right whale approach is authorized by NMFS through a permit issued under subpart C (Endangered Fish or Wildlife Permits) of this part or through a similar authorization.

(2) Paragraphs (a) and (b) of this section do not apply where compliance would create an imminent and serious threat to a person, vessel, or aircraft.

(3) Paragraphs (a) and (b) of this section do not apply when approaching to investigate a right whale entanglement or injury, or to assist in the disentanglement or rescue of a right whale, provided that permission is received from NMFS or a NMFS designee prior to the approach.

(4) Paragraphs (a) and (b) of this section do not apply to an aircraft unless the aircraft is conducting whale watch activities or is being operated for that purpose.

(5) Paragraph (b) of this section does not apply to the extent that a vessel is restricted in her ability to maneuver, and because of the restriction, cannot comply with paragraph (b) of this section.

[62 FR 6738, Feb. 13, 1997]

§ 222.33 Special prohibitions relating to endangered Steller sea lion protection.

General. The regulatory provisions set forth in part 227, which govern threatened Steller sea lions, shall also apply to the western population of Steller sea lions, which consists of all Steller sea lions from breeding colonies located west of 144 °W. long.

[62 FR 24355, May 5, 1997]

Subpart E—Incidental Capture of Endangered Sea Turtles

§ 222.41 Policy regarding incidental capture of sea turtles.

Shrimp fishermen in the southeastern United States and the Gulf of Mexico who comply with rules for threatened sea turtles specified in § 227.72(e) of this subchapter will not be subject

to civil penalties under the Act for incidental captures of endangered sea turtles by shrimp trawl gear.

[52 FR 24251, June 29, 1987]

§222.42 Special prohibitions relating to leatherback sea turtles.

Special prohibitions relating to leatherback sea turtles are provided at §227.72(e)(2)(iv) of this chapter.

[60 FR 25623, May 12, 1995]

PART 225—FEDERAL/STATE COOPERATION IN THE CONSERVATION OF ENDANGERED AND THREATENED SPECIES

Sec.

AUTHORITY: Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531–1543, Pub. L. 93–205.

SOURCE: 41 FR 24354, June 16, 1976, unless otherwise noted.

§225.1 Purpose of regulations.

The regulations in this part implement section 6 of the Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531 through 1543, Pub. L. 93–205 which provides, under certain circumstances, for cooperative agreements with and financial assistance to the States.

§225.2 Scope of regulations.

This part applies to endangered and threatened species under the jurisdiction of the Department of Commerce (see 50 CFR 222.23(a)).

§225.3 Definitions.

In addition to the definitions contained in the Act, and unless the context otherwise requires, in this part 225:

(a) *Act* means the Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531 through 1543, Pub. L. 93–205.

(b) *Agreements* mean signed documented statements of the actions to be taken by the State(s) and the Director in furthering certain purposes of the Act. They include:

(1) A Cooperative Agreement entered into pursuant to section 6(c) of the Act and, where appropriate, containing provisions found in section 6(d)(2) of the Act.

(2) A Grant-In-Aid Award which includes a statement of the actions to be taken in connection with the conservation of endangered or threatened species receiving Federal financial assistance, objectives and costs of such actions, and costs to be borne by the Federal Government and by the State(s).

(c) *Application for Federal Assistance* means a description of work to be accomplished, including objectives and needs, expected results and benefits, approach, cost, location and time required for completion.

(d) *Director* means the Director of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce, or his authorized designee.

(e) *Program* means a State-developed plan for the conservation and management of all resident species which are deemed by the Secretary to be endangered or threatened and those which are deemed by the State to be endangered or threatened, which includes goals, priorities, strategies, actions, and funding necessary to accomplish the objectives on an individual species basis.

(f) *Project* means a substantial undertaking to conserve the various endangered or threatened species.

(g) *Project segment* means an essential part or a division of a project, usually separated as a period of time, occasionally as a unit of work.

(h) *Resident species* means, for purposes of these regulations, with respect to a State, a species which exists in the wild in that State during any part of its life.

(i) *Secretary* means the Secretary of Commerce or his authorized designee.

APPENDIX 12:

List of FWS/NMFS Washington, D.C. and Regional Offices

U.S. FISH & WILDLIFE SERVICE

Washington, D.C. Office:

Mailing Address:

U.S. Department of the Interior
U.S. Fish and Wildlife Service
Division of Endangered Species
1849 C St., N.W. - Mail Stop 420ARLSQ
Washington, D.C. 20240
(202) 208-4646

Express Mail Address:

U.S. Fish and Wildlife Service
Division of Endangered Species
4401 N. Fairfax Drive, Room 420
Arlington, VA 22203
(703) 358-2106

Region 1: (CA, HI, ID, NV, OR, WA, American Samoa, Territories of the Pacific Islands)

Regional Director
U.S. Fish and Wildlife Service
911 NE 11th Avenue
Portland, OR 97232-4181
Telephone: (503) 231-6118
Fax: (503) 231-2122

Region 2: (AZ, NM, OK, TX)

Regional Director
U.S. Fish and Wildlife Service
500 Gold Avenue S.W.
P.O. Box 1306
Albuquerque, NM 87103-1306
Telephone: (505) 248- 6920
Fax: (505) 248- 6922

Region 3: (IA, IL, IN, MI, MN, MO, OH, WI)

Regional Director
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056
Telephone: (612) 713-5350
Fax: (612) 713-5292

Region 4: (AL, AR, FL, GA, KY, LA, MS, NC, PR, SC, TN, U.S. VI)

Regional Director
U.S. Fish and Wildlife Service
1875 Century Blvd.
Atlanta, GA 30345
Telephone: (404) 679-4000
Fax: (404) 679-4006

Region 5: (CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV)

Regional Director
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
Telephone: (413) 253-8200
Fax: (413) 253-8308

Region 6: (CO, KS, MT, NE, ND, SD, UT, WY)

Regional Director
U.S. Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225

Lake Plaza North Building
134 Union Blvd., 4th Floor
Lakewood, CO 80228
Telephone: (303) 236-7920
Fax: (303) 236-6958

Region 7: (AK)

Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503
Telephone: (907) 786-3542
Fax: (907) 786-3350

NATIONAL MARINE FISHERIES SERVICE

Washington, D.C. Office:

Headquarters Office
National Marine Fisheries Service
Endangered Species Division
Office of Protected Resources
1315 East-West Highway, PR 3
Silver Spring, MD 20910
Telephone: (301) 713-1401
Fax: (301) 713-0376

National Marine Fisheries Service
Office of Fisheries Conservation and Management
1315 East-West Highway
Silver Spring, MD 20910
(301) 713-2334

Northeast Region: (CT, DE, DC, IL, IN, ME, MD, MA, MI, MN, NH, NJ, NY, OH, PA, RI, VA, VT, WV, WI)

Regional Director
Northeast Regional Office
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 09130-2298
Telephone: (978) 281-9346
Fax: (978) 281-9394

Southeast Region: (AL, AR, FL, GA, IA, KS, KY, LA, MS, MO, NE, NM, NC, OK, PR, SC, TN, TX, U.S. VI)

Regional Director
Southeast Regional Office
National Marine Fisheries Service
9721 Executive Center Drive
St. Petersburg, FL 33702
Telephone: (727) 570-5312
Fax: (727) 570-5517

Southwest Region: (AZ, CA, GU, HI, NV, American Samoa, Territories of the Pacific Islands)

Regional Director
Southwest Regional Office
National Marine Fisheries Service
501 West Ocean Boulevard, Suite 4200
Long Beach, CA 90802-4213
Telephone: (562) 980-4020
Fax: (562) 980-4027

Northwest Region: (CO, ID, MT, ND, OR, SD, UT, WA, WY)

Regional Director
Northwest Regional Office
National Marine Fisheries Service
7600 Sand Point Way, N.E.
BINC 15700 Building 1
Seattle, WA 98115-0070
Telephone: (206) 526-6150
Fax: (206) 526-6426

Alaska Region: (AK)

Regional Director
Alaska Regional Office
National Marine Fisheries Service
709 W. 9th Street, Federal Bldg. 461
Juneau, AK 99802-1668
Telephone: (907) 586-7235
Fax: (907) 586-7012

APPENDIX 15:

FWS Federal Fish and Wildlife Permit
(Form 3-201)

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201 (10/86)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES

REGULATIONS (ATTACHED)

3. NUMBER

1. PERMITTEE

4. RENEWABLE	**5. MAY COPY**
____ YES	____ YES
_____ NO	_____ NO
6. EFFECTIVE	**7. EXPIRES**

8. NAME AND TITLE OF PRINCIPAL OFFICER (IF # 1 IS A BUSINESS)

9. TYPE OF PERMIT

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR § 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE, AND HIS DESIGNATED AUTHORIZED AGENTS.

□ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS

ISSUED BY	**TITLE**	**DATE**

ORIGINAL

APPENDIX 16:

Examples of Federal Register Notice of Receipt of a Permit Application
and
Notice of Availability of a NEPA Document

The applicant requests amendment of their permit for take (capture and release) of the Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) to include Monterey County, California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–797315

Applicant: Dr. Michael L. Morrison, Tucson, Arizona

The applicant requests a permit to take (capture, mark, and release) the salt marsh harvest mouse (*Reithrodontomys raviventris*) and the Fresno kangaroo rat (*Dipodomys nitratoides exilis*) at the Lemoore Naval Air Station in Fresno, California to conduct population/habitat studies and to determine presence or absence of the species for the purpose of scientific research and for enhancing its survival. These studies were previously authorized under the Regional Director's permit no. PRT–702631.

Permit No. PRT–798017

Applicant: Habitat Restoration Group, Felton, California

The applicant requests a permit to take (capture and release) the Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) in Santa Cruz and Monterey Counties, California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–798025

Applicant: California Desert Studies Consortium, Fullerton, California

The applicant requests a permit to take (capture, mark, and release) the Mohave tui chub (*Gila bicolor mohavensis*) in Lake Tuendae, Desert Studies Center, Baker, California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–798003

Applicant: North State Resources, Inc., Redding, California

The applicant requests a permit to take (harass by survey, collect and sacrifice voucher specimens) the conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), Riverside fairy shrimp (*Streptocephalus wootoni*), and vernal pool tadpole shrimp (*Lepidurus packardi*) in vernal pools throughout the species' range in California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–798015

Applicant: Mr. Michael Skenfield, Murphys, California

The applicant requests a permit to take (harass by survey, collect and sacrifice voucher specimens) the conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), and vernal pool tadpole shrimp (*Lepidurus packardi*) in vernal pools throughout the species' range in northern California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–795931

Applicant: Biota Biological Consulting, Sacramento, California

The applicant requests amendment of their permit to include take (harass by survey, collect and sacrifice) of the conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), and Riverside fairy shrimp (*Streptocephalus wootoni*) in vernal pools throughout the species' range in California to determine presence or absence of the species for the purpose of enhancing its survival.

Permit No. PRT–798018

Applicant: Golden Gate Raptor Observatory, San Francisco, California

The applicant requests a permit to take (capture, band, and release) the peregrine falcon (*Falco peregrinus*) in the Golden Gate National Recreation Area, Marin County, California for the purpose of enhancing its survival.

DATES: Written comments on the permit applications must be received on or before March 2, 1995.

ADDRESSES: Written data or comments should be submitted to the Chief, Division of Consultation and Conservation Planning, Ecological Services, U.S. Fish and Wildlife Service, 911 N.E. 11th Avenue, Portland, Oregon 97232–4181. Please refer to the respective permit number for each application when submitting comments.

FOR FURTHER INFORMATION CONTACT: Documents and other information submitted with these applications are available for review, subject to the requirements of the Privacy Act and Freedom of Information Act, by any party who submits a written request for a copy of such documents, within 30 days of the date of publication of this notice, to the following office: U.S. Fish and Wildlife Service, Ecological Services, Division of Consultation and Conservation Planning, 911 N.E. 11th Avenue, Portland, Oregon 97232–4181. Telephone: 503–231–2063; FAX: 503–231–6243. Please refer to the respective permit number for each application when requesting copies of documents.

[The following applicants have applied for a permit to conduct certain activities with endangered species. This notice is provided pursuant to section 10(c) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531, *et seq.*).]

Dated: January 20, 1995.

Thomas Dwyer,

Deputy Regional Director, Region 1, Portland, Oregon.

[FR Doc. 95–2278 Filed 1–30–95; 8:45 am]

BILLING CODE 4310–55–P

Availability of an Environmental Assessment and Finding of No Significant Impact, and Receipt of an Application for an Incidental Take Permit for La Costa Villages, Carlsbad, CA

AGENCY: Fish and Wildlife Service, Interior Department.

ACTION: Notice.

SUMMARY: Fieldstone/La Costa Associates and the City of Carlsbad, California (applicants) have applied for an incidental take permit from the Fish and Wildlife Service (Service) pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973 (Act), as amended. The proposed permit would authorize take of the threatened coastal California gnatcatcher (*Polioptila californica californica*) in San Diego County, California, for a period of 30 years. The proposed taking is incidental to planned home and road construction on 1,940 acres of land primarily owned by Fieldstone/La Costa Associates.

This notice advises the public that the Service has re-opened the comment period on the permit application and the environmental assessment (EA). The permit application includes a Habitat Conservation Plan (HCP), two HCP addendums, and an Implementing Agreement (IA). The EA package includes an EA, EA addendum, and a draft Finding of No Significant Impact (FONSI) which concludes that issuing the incidental take permit is not a major Federal action significantly affecting the quality of the human environment, within the meaning of section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended.

This notice is provided pursuant to section 10(c) of the Act and NEPA regulations (40 CFR 1506.6). The Service will evaluate the application, associated documents, and comments submitted thereon to determine whether the application meets the requirements of NEPA regulations and section 10(a) of

the Act. If it is determined that the requirements are met, a permit will be issued for the incidental take of the coastal California gnatcatcher. The final NEPA and permit determinations will not be completed until after the end of the 30-day comment period and will fully consider all public comments received during the comment period.

This notice supplements an earlier notice published in the **Federal Register** on October 28, 1994 (59 FR 54207). That notice announced an initial 30-day public comment period on the HCP, first HCP addendum, and draft EA. The draft EA was not available for public review until two weeks into the initial 30-day comment period. Subsequently, an addendum to the draft EA, a second addendum to the HCP, and an IA were completed that include a description of a change in mitigation for a portion of the proposed project. Consequently, the Service has re-opened the period for public comment on the NEPA documents and the complete application package, as revised.

DATES: Written comments on the HCP, HCP addendums, IA, EA, EA addendum, and draft FONSI should be received on or before March 2, 1995.

ADDRESSES: Comments should be addressed to Mr. Gail Kobetich, Field Supervisor, U.S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, California 92008. Comments may be sent by facsimile to telephone (619) 431–9618. Please refer to permit No. PRT–795759 when submitting comments.

FOR FURTHER INFORMATION CONTACT: Gail Kobetich (Field Supervisor) or Ken Corey (Biologist) at the above address, or telephone (619) 431–9440. Individuals wishing copies of the documents should immediately contact Ken Corey. Documents also will be available for public inspection, by appointment, during normal business hours at the above address.

SUPPLEMENTARY INFORMATION: Proposed grading and construction activities would directly impact 30 of 48 pairs of the threatened coastal California gnatcatcher (gnatcatcher) and 550 of 1,064 acres of suitable gnatcatcher habitat on-site (506 of 944 acres of coastal sage scrub and 44 of 120 acres of southern maritime chaparral). In addition, 254 of 307 acres of grassland and 69 of 114 acres of riparian scrub/woodland would be directly impacted on-site. Approximately 18 pairs of gnatcatchers, 438 acres of coastal sage scrub, 76 acres of southern maritime chaparral, and 173 acres of associated habitats will be conserved and managed on-site in perpetuity. In addition, the applicants will provide $1,000,000 for purchase of an off-site mitigation parcel, within the City of Carlsbad, to be approved by the Service.

The applicants have requested the issuance of permits (immediately or when a species is listed) under section 10(a) of the Act that would authorize incidental take, in accordance with the terms of the HCP, for up to 66 sensitive species listed in the HCP. Of these species, the coastal California gnatcatcher is the only federally-listed species observed on-site. Section 10(a) permits are issued only for federally-listed species; however, unlisted species that subsequently become listed, and are adequately conserved by the original HCP, can be added by permit amendment.

A concern has been raised regarding the consistency of the HCP with certain subarea and subregional plans under the statewide Natural Community Conservation Planning program (NCCP) (see 59 FR 54208). All interested agencies, organizations, and individuals are urged to provide comments on the permit application, NEPA documents, and the NCCP consistency issue. All comments received by the closing date will be considered in finalizing NEPA compliance and permit issuance or denial.

The Service will publish a record of its final action in the **Federal Register**.

Dated: January 25, 1995.

Thomas J. Dwyer,

Deputy Regional Director, Region 1, Portland, Oregon.

[FR Doc. 95–2279 Filed 1–30–95; 8:45 am]

BILLING CODE 4310–55–P

National Park Service

Committee for the Preservation of the White House; Meeting

In compliance with the Federal Advisory Committee Act, notice is hereby given of a meeting of the Committee for the Preservation of the White House. The meeting will be held at the Department of Commerce, Washington, DC at 1 p.m., Friday, February 17,1995. It is expected that the agenda will include policies, goals and long range plans. The meeting will be open, but subject to appointment and security clearance requirements, including clearance information by February 10, 1995.

Inquiries may be made by calling the Committee for the Preservation of the White House between 9 a.m. and 4 p.m., weekdays at (202) 619–6344. Written comments may be sent to the Executive Secretary, Committee for the Preservation of the White House, 1100 Ohio Drive, SW., Washington, DC 20242.

Dated: January 18, 1995.

James I. McDaniel,

Executive Secretary, Committee for the Preservation of the White House.

[FR Doc. 95–2256 Filed 1–30–95; 8:45 am]

BILLING CODE 4310–70–M

National Register of Historic Places; Notification of Pending Nominations

Nominations for the following properties being considered for listing in the National Register were received by the National Park Service before January 21, 1995. Pursuant to § 60.13 of 36 CFR part 60 written comments concerning the significance of these properties under the National Register criteria for evaluation may be forwarded to the National Register, National Park Service, P.O. Box 37127, Washington, D.C. 20013–7127. Written comments should be submitted by February 15, 1995.

Carol D. Shull,

Chief of Registration, National Register.

ALABAMA

Jefferson County

Arlington Park, 800–840 First St. W., 815–909 Second St. W. and 100–269 Munger Ave., Birmingham, 95000097

Lauderdale County

Seminary—O'Neal Historic District, Roughly, Seminary St. between Hermitage Dr. and Irvine Ave. and Irvine between Seminary and Wood Ave., Florence, 95000092

DELAWARE

New Castle County

Merestone, 1610–1620 Yeatman's Mill Rd., Mill Creek Hundred (Delaware); Yeatman's Station Rd., New Garden Township (Pennsylvania), Newark vicinity, 95000093

IOWA

Humboldt County

Renwick Generating Plant, 103 N. Field St., Renwick, 95000099

Jackson County

Chicago, Milwaukee & St. Paul Narrow Gauge Depot—LaMotte (Advent & Development of Railroads in Iowa MPS), Market St., LaMotte, 95000105

Polk County

Camp Dodge Pool District, Buildings A22–A24, Camp Dodge, Johnston, 95000098

LOUISIANA

Terrebonne Parish

Cook, Herman Albert, House, 515 W. Main St., Houma, 95000107

Sec. 21;
Sec. 28;
Sec. 29, N½, NE¼SW¼, NE¼NW¼SW¼, S½NW¼SW¼, S½SW¼, and SE¼;
Sec. 30, lots 1, 4, and 6, N½NE¼, E½W½SW¼NE¼, E½SW¼NE¼, W½SE¼NE, NE¼NW¼, S½NE¼SW¼, SE¼SW¼, W½NE¼SE¼, SE¼NE¼SE¼, NW¼SE¼, and S½SE¼;
Sec. 31, lots 1 to 4 inclusive, E½, and E½W½;
Sec. 32;
Sec. 33.

T. 30 S., R. 38 E.,

All of the following land lying north of the northern right-of-way boundary of the highway known as the Redrock Randsburg Road:

Sec. 4, lot 2 of NE¼, and E½ lot 2 of NW¼.
Sec. 6, lot 1 of NE¼, lot 1 of NW¼, lot 2 of NE¼, lot 2 of NW¼, lot 1 of SW¼, lot 2 of SW¼, and SE¼.

The area within the withdrawal contains approximately 16,560 acres.

Congress has mandated all the public lands described above be conveyed to the State of California, subject to valid existing rights, for inclusion in Red Rock Canyon State Park (California Desert Protection Act, 108 Stat. 4471, sec. 701.) The purpose of the proposed withdrawal is to protect the park values of this designated area until the lands can be conveyed to the State of California pursuant to the aforementioned act.

For a period of 90 days from the date of publication of this notice, all persons who wish to submit comments, suggestions, or objections in connection with the proposed withdrawal may present their views in writing to the California State Director of the Bureau of Land Management.

A public meeting is required to be held regarding the proposed withdrawal. Upon determination by the authorized officer of the location and date of the meeting, a notice of time and place will be published in the **Federal Register** and in a local newspaper at least 30 days before the scheduled date of the meeting.

The application will be processed in accordance with the regulations set forth in 43 CFR 2300. Records relating to the application are available for examination in the BLM Public Room, 2800 Cottage Way, Sacramento, CA 95825.

For a period of 2 years from the date of publication of this notice in the **Federal Register**, the lands will be segregated as specified above unless the application is denied or canceled or the withdrawal is approved prior to that date.

The temporary uses which will be permitted during this segregative period are land uses consistent with the California Desert Conservation Area Plan and permitted by the Memorandum of Understanding between the Bureau of Land Management and the California Department of Parks and Recreation. Existing rights are not affected by this action.

David M. McIlnay

Chief, Branch of Lands

[FR Doc. 95–12205 Filed 5–17–95; 8:45 am]

BILLING CODE 4310–40–P

Fish and Wildlife Service

Information Collection Submitted to the Office of Management and Budget for Review Under the Paperwork Reduction Act

The proposal for the collection of information listed below has been submitted to the Office of Management and Budget (OMB) for reinstatement approval under the provisions of the Paperwork Reduction Act (44 U.S.C. Chapter 35). Copies of the proposed information collection requirement and related forms and explanatory material may be obtained by contacting the Service's clearance officer at the phone number listed below. Comments and suggestions on the requirement should be made directly to the Service Clearance Officer and the Office of Management and Budget, Paperwork Reduction Project (1018–0009) Washington, D.C. 20503, telephone 202–395–7340.

Title: Woodcock Wing Collection Envelope

OMB Approval Number: 1018–0009

Abstract: The Migratory Bird Treaty Act authorizes and directs the Secretary of the Interior to determine to what extent migratory game birds may be hunted. For several species of game birds, including the woodcock, this determination is based primarily on biological information gathered through surveys. Survey cooperators provide data on their harvests and hunting activities, and from each bird taken, they submit one wing for certain biological determinations.

Service Form Number: 3–156A.

Frequency: On occasion.

Description of Respondents: Individuals and households.

Completion Time: The overall reporting burden is estimated to average 4 minutes per response with a response rate average of 5 responses per respondent.

Annual Responses: 2,000.

Annual Burden Hours: 670.

Service Clearance Officer: Phyllis H. Cook, 703–358–1943 Mail Stop—224 Arlington Square, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

Dated: April 14, 1995.

John J. Doggett,

Acting Assistant Director—Refuges and Wildlife.

[FR Doc. 95–12224 Filed 5–17–95; 8:45 am]

BILLING CODE 4310–55–M

Endangered and Threatened Species Permit Application

AGENCY: Fish and Wildlife, Interior.

ACTION: Notice of document availability; request for comments.

Availability of an Environmental Assessment and Receipt of an Application for a Permit to Allow Incidental Take of Threatened and Endangered Species by Murray Pacific Corporation on its Mineral Tree Farm in Lewis County, Washington.

SUMMARY: This notice advises the public that Murray Pacific Corporation (Applicant) has applied to the U.S. Fish and Wildlife Service (FWS) for an incidental take permit pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act). The Applicant has requested the permit as an amendment to their existing permit (PRT–777837) authorizing incidental take of the northern spotted owl, which was issued on September 24, 1993, and have amended their existing Habitat Conservation Plan (HCP). The application has been assigned permit number PRT–777837. The Applicant has also requested to enter into a consensual agreement with the U.S. National Marine Fisheries Service (NMFS) to address the needs of anadromous salmonids being considered for listing under the Act, and with the FWS to conserve other fish and wildlife species which may be associated with habitats on their Mineral Tree Farm in Lewis County, Washington (Tree Farm). The requested permit would authorize the incidental take of all species presently listed under the Act, that may occur on the Applicant's Tree Farm. The proposed incidental take would occur as a result of timber harvest activities in the various habitat types that occur now, and will occur on the Tree Farm during the term of the proposed permit. The HCP Amendment includes an agreement for the issuance of additional permits for the incidental take of species not presently listed under the Act, but which may become listed during the term of the proposed permit, and which may occur in habitats on the Tree Farm.

The FWS in conjunction with NMFS announce the availability of an Environmental Assessment (EA) for the proposed issuance of the incidental take permit and signing of the agreement. The FWS is taking administrative responsibility for announcing the availability of the aforementioned documents. This notice is provided pursuant to section 10(c) of the Act and National Environmental Policy Act regulations (40 CFR 1506.6).

DATES: Written comments on the permit application and EA should be received on or before June 19, 1995.

ADDRESSES: Comments regarding the application or EA should be addressed to Mr. Curt Smitch, Assistant Regional Director, U.S. Fish and Wildlife Service, 3773 Martin Way East, Building C—Suite 101, Olympia, Washington 98501. Please refer to permit No. PRT–777837 when submitting comments. Individuals wishing copies of the application or EA for review should immediately contact the above office (360–534–9330).

FOR FURTHER INFORMATION CONTACT: Craig Hansen, U.S. Fish and Wildlife Service, 3773 Martin Way East, Building C- Suite 101, Olympia, WA., 98501; (360) 412–5465. Steve Landino, National Marine Fisheries Service, 3773 Martin Way East, Building C- Suite 101, Olympia, WA., 98501; (360) 412–5469.

SUPPLEMENTARY INFORMATION:

Background

Under section 9 of the Act and its implementing regulations, ''taking'' of a threatened or endangered species, is prohibited. However, the FWS and NMFS, under limited circumstances, may issue permits to take threatened and endangered wildlife species if such taking is incidental to, and not the purpose of, otherwise lawful activities. Regulations governing permits for threatened species are in 50 CFR 17.32 and in 50 CFR 17.22 for endangered species.

The Applicant proposes to implement an amendment to their HCP for the northern spotted owl that will allow timber harvest on portions of approximately 55,000 acres of their Tree Farm. The Applicant's proposed timber harvest may result in the take, as defined in the Act and its implementing regulations, of listed species. The HCP and permit would be in effect through the year 2094. The application includes an amended HCP and Implementation Agreement.

The Applicant proposes to mitigate for the incidental take of all listed species by maintaining at least 10 percent of the Tree Farm in non-harvestable reserves for the term of the permit. Reserves would be established during a Watershed Analysis process which the Applicant would complete by 2004. The expected result of Watershed Analysis would place a majority of the reserves in riparian zones. In addition, the Applicant would be committed to a variety of special measures intended to mitigate and minimize impacts to the habitat types which occur on the Tree Farm, and specific State and Federal species of concern including the grizzly bear, gray wolf, bald and golden eagles, goshawk, Larch Mountain salamander, Townsend's big-eared bat, long-legged myotis (bat), and others. The Applicant also proposes to mitigate for impacts to anadromous salmonids through habitat conservation measures for these species.

The EA considers the environmental consequences of 5 alternatives, including the proposed action and no-action alternatives. The proposed action alternative is the issuance of a permit under section 10(a) of the Act that would authorize incidental take of all listed species, and signing of the agreement for currently unlisted species, that may occur in the habitats on the Applicant's Tree Farm. The proposed action would require the Applicant to implement their amended Habitat Conservation Plan. Under the no-action alternative, the Applicant would continue to implement their existing northern spotted owl HCP, and additional incidental take permits would not be issued. The third alternative is to maintain approximately 29 percent of the Tree Farm in reserves generated according to Watershed Analysis prescriptions. The fourth alternative is to maintain reserves on about 17 percent of the Tree Farm, and would allow the Applicant to harvest timber on a limited basis in the outer half of riparian reserves. The fifth alternative would place about 5 percent of the Tree Farm in riparian reserves with additional protection on steep slopes with wet talus habitat, the Applicant would commit to and complete further Watershed Analysis by the year 2004, and the Applicant would retain all live conifer and conifer snags greater than 40 inches in diameter at breast height.

Dated: May 12, 1995.

Thomas Dwyer,

Deputy Regional Director, Region 1, Fish and Wildlife Service, Portland, Oregon.

[FR Doc. 95–12204 Filed 5–17–95; 8:45 am]

BILLING CODE 4310–55–P

National Park Service

National Capital Memorial Commission; Public Meeting

Notice is hereby given in accordance with the Federal Advisory Committee Act that a meeting of the National Capital Memorial Commission will be held on Tuesday, June 20, 1995, at 1 p.m., at the National Building Museum, Room 312, 5th and F Streets, NW.

The Commission was established by Public Law 99–652, the Commemorative Works Act, for the purpose of preparing and recommending to the Secretary of the Interior, Administrator, General Services Administration, and Members of Congress broad criteria, guidelines, and policies for memorializing persons and events on Federal lands in the National Capital Region (as defined in the National Capital Planning Act of 1952, as amended), through the media of monuments, memorials and statues. It is to examine each memorial proposal for adequacy and appropriateness, make recommendations to the Secretary and Administrator, and to serve as information focal point for those persons seeking to erect memorials on Federal land in the National Capital Region.

The members of the Commission are as follows:

Director, National Park Service
Chairman, National Capital Planning Commission
The Architect of the Capitol
Chairman, American Battle Monuments Commission
Chairman, Commission of Fine Arts
Mayor of the District of Columbia
Administrator, General Services Administration
Secretary of Defense

The purpose of the meeting will be to consider sites for the World War II Memorial. The meeting will be open to the public. Any person may file with the Commission a written statement concerning the matters to be discussed. Persons who wish to file a written statement or testify at the meeting or who want further information concerning the meeting may contact the Commission at 202–619–7097. Minutes of the meeting will be available for public inspection 4 weeks after the meeting at the Office of Land Use Coordination, National Capital Region, 1100 Ohio Drive, SW., Room 201, Washington, D.C., 20242.

Dated: May 11, 1995.

Robert Stanton,

Regional Director, National Capital Region.

[FR Doc. 95–12260 Filed 5–17–95; 8:45 am]

BILLING CODE 4310–70–M

boundary and subdivisional lines, and the survey of the centerline of the May to Patterson Road and Lot 2 in section 32, T. 15 N., R. 22 E., Boise Meridian, Idaho, Group No. 887, was accepted, May 24, 1995.

This survey was executed to meet certain administrative needs of the Bureau of Land Management.

All inquiries concerning the survey of the above described land must be sent to the Chief, Branch of Cadastral Survey, Idaho State Office, Bureau of Land Management, 3380 Americana Terrace, Boise, Idaho, 83706.

Dated: May 31, 1995.

Duane E. Olsen,

Chief Cadastral Surveyor for Idaho.

[FR Doc. 95–14109 Filed 6–8–95; 8:45 am]

BILLING CODE 4310–GG–M

Fish and Wildlife Service

Information Collection Submitted to the Office of Management and Budget for Review Under the Paperwork Reduction Act

The proposal for the collection of information listed below has been submitted to the Office of Management and Budget (OMB) for reinstatement approval under the provisions of the Paperwork Reduction Act (44 U.S.C. Chapter 35). Copies of the proposed information collection requirement and related forms and explanatory material may be obtained by contacting the Service's clearance officer at the phone number listed below. Comments and suggestions on the requirement should be made directly to the Service Clearance Officer and the Office of Management and Budget, Paperwork Reduction Project (1018–0066) Washington, D.C. 20503, telephone 202–395–7340.

Title: Marking, Tagging and Reporting Regulations for Polar Bear, Sea Otter and Walrus.

OMB Approval Number: 1018–0066.

Abstract: The Marine Mammal Protection Act of 1972, (Act) as amended, authorized the Secretary of the Interior to prescribe marking, tagging and reporting regulations in 50 CFR 18.23(f), for Alaska Natives harvesting polar bear, seat otter, and walrus. Under the Act Alaska Natives residing in Alaska and dwelling on the coast of the North Pacific or arctic Oceans may harvest these species for subsistence or handicraft purposes. The marking and tagging program is intended to gather reports of all kills made, and to tag or mark, as appropriate, skins, skulls and tusks of marine mammals killed to reduce illegal trading in walrus ivory, polar pear and sea otter skins. The information collected is used by the Fish and Wildlife Service to improve its decision-making ability by substantially expanding the quality and quantity of harvest and biological data upon which future management decisions can be based. It provides the Service with the ability to make inferences about the condition and general health of the populations and to consider the importance and impact to these populations from such processes as development activities and habitat degradation.

Service Form Number(s): R7–50 (Walrus Certificate); R7–51 (Polar Bear Certificate); R7–52 (Sea Otter Certificate)

Frequency: On occasion.

Description of Respondents: Individuals and household.

Completion Time: The reporting burden is estimated to average 15 minutes per respondent; respondents will average 1.46 responses per year.

Annual Responses: 2,925.

Annual Burden Hours: 732.

Service Clearance Officer: Phyllis H. Cook, 703–358–1943, Mail Stop—224 Arlington Square, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

Dated May 22, 1995.

Rowan W. Gould,

Acting Assistant Director—Fisheries.

[FR Doc. 95–14087 Filed 6–8–95; 8:45 am]

BILLING CODE 4310–55–M

Endangered and Threatened Species Permit Application

AGENCY: Fish and Wildlife, Interior.

ACTION: Notice of availability of the Final Environmental Impact Statement (EIS) on the Proposed Issuance of an Incidental Take Permit for Desert Tortoises in Clark County, Nevada.

SUMMARY: This notice advises the public that the Final Environmental Impact Statement (EIS) on the proposed issuance of an incidental take permit for desert tortoises in Clark County, Nevada is available. The Record of Decision will be published no sooner than 30 days from this notice.

FOR FURTHER INFORMATION CONTACT: Dolores Savignano, U.S. Fish and Wildlife Service, 1500 North Decatur Boulevard, #01, Las Vegas, Nevada 89108 or Carlos Mendoza, U.S. Fish and Wildlife Service, 4600 Kietzke Lane, Building C, Room 125, Reno, Nevada 89502.

Individuals wishing copies of this Final EIS should immediately contact Christine Robinson, Clark County Manager's Office, 225 Bridger Avenue, Las Vegas, Nevada 89155. Copies of the Final EIS have been sent to all agencies and individuals who previously received copies of the Draft EIS and to all others who have already requested copies.

SUPPLEMENTARY INFORMATION:

A. Background

On April 2, 1990, the U.S. Fish and Wildlife Service (Service) issued a final rule (55 FR 12178) that determined the desert tortoise to be a threatened species under the Endangered Species Act of 1973, as amended (Act). That regulation became effective on the date of its publication in the **Federal Register**. Because of its listing as a threatened species, the desert tortoise is protected by the Act's prohibition against ''taking.'' The Act defines ''take'' to mean: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in such conduct. ''Harm'' is further defined by regulation as any act that kills or injures wildlife including significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3).

The Service, however, may issue permits to carry out otherwise lawful activities involving take of endangered and threatened wildlife under certain circumstances. Regulations governing permits are in 50 CFR 17.22, 17.23, and 17.32. For threatened species, such permits are available for scientific purposes, enhancing the propagation or survival of the species, economic hardship, zoological exhibition or educational purposes, incidental taking, or special purposes consistent with the purposes of the Act.

Clark County; the cities of Las Vegas, North Las Vegas, Henderson, Mesquite, and Boulder City; and Nevada Department of Transportation (NDOT) (Applicants) submitted an application to the Service for a permit to incidentally take desert tortoises (*Gopherus agassizii*), pursuant to section 10(a)(1)(B) of the Act, in association with various proposed public and private projects in Clark County, Nevada. The proposed permit would allow incidental take of desert tortoises for a period of 30 years, resulting from development on up to 113,900 acres of private lands within Clark County, Nevada. The permit application was received September 28, 1994, and was accompanied by the *Clark County Desert Conservation Plan* (CCDCP), which serves as the Applicant's habitat

conservation plan and details their proposed measures to minimize, monitor, and mitigate the impacts of the proposed take on the desert tortoise.

The Applicants propose to expend $1.35 million per year, and up to $1.65 million per year for the first 10 years, to minimize and mitigate the potential loss of desert tortoise habitat. It is anticipated that the majority of these funds will be used to implement mitigation measures as described in the CCDCP. In addition, funds will be provided to State and Federal resource managers for implementing desert tortoise recovery measures recommended in the *Desert Tortoise* (Mojave Population) *Recovery Plan*, and for planning and managing lands both within and outside of desert wildlife management areas. The desert tortoise is only part of the desert ecosystem, and unless the various species of plants and animals which co-inhabit that system are likewise preserved, the status of the desert tortoise is likely to decline. Therefore, the needs of other plant and wildlife resources will be addressed, possibly avoiding the need to list these species as threatened or endangered under the Act in the future. The Applicants also propose to purchase a conservation easement that preserves, protects, and assures the management and study of the conservation values, and in particular the habitat of the desert tortoise, of more than 85,000 acres of non-Federal land in Clark County.

To minimize the impacts of take, the Applicants propose to provide a free pick-up and collection service for desert tortoises encountered in harm's way within Clark County. These desert tortoises will be made available for beneficial uses such as translocation studies and programs, research, education, zoos, museums, or other programs approved by the Service and Nevada Division of Wildlife. Sick or injured desert tortoises will be humanely euthanized. NDOT will incorporate specific measures into its operations to avoid or minimize impacts to desert tortoises. Clark County will also implement a public information and education program to benefit the desert tortoise and the desert ecosystem.

Clark County or the cities would approve the issuance of land development permits for otherwise lawful public and private project proponents during the 30-year period in which the proposed Federal permit would be in effect. Clark County or the cities would impose, and NDOT would pay, a fee of $550 per acre of habitat disturbance to fund the measures to minimize and mitigate the impacts of the proposed action on desert tortoises.

The underlying purpose or goal of the proposed action is to develop a program designed to ensure the continued existence of the species, while resolving potential conflicts that may arise from otherwise lawful private and public improvement projects.

B. Development of the Final EIS

This Final EIS has been developed by the U.S. Fish and Wildlife Service. In the development of this Final EIS, the Service initiated action to assure compliance with the purpose and intent of the National Environmental Policy Act of 1969, as amended (NEPA). Scoping activities were undertaken preparatory to developing a Draft EIS with a variety of Federal, State, and local entities. A Notice of Intent to prepare a Draft EIS was published February 4, 1994 (59 FR 5439); a public scoping meeting was held February 14, 1994; and a Notice of Availability of a Draft EIS and Receipt of an Application for an Incidental Take Permit for Desert Tortoises in Clark County, Nevada was published February 10, 1995 (60 FR 8058).

Potential consequences, in terms of adverse impacts and benefits associated with the implementation of each alternative selected for detailed analysis, were described in the Draft EIS. The Service received 13 letters of comment on the Draft EIS which focused on the following subject areas: (1) Survey and removal of desert tortoises; (2) translocation of tortoises to a sanctuary; (3) euthanasia of tortoises; (4) measurable criteria for short-term and long-term conservation goals; (5) tortoise adoption; (6) effects to other species and resources; and (7) financing implementation of the CCDCP.

Appendix A of the Final EIS contains copies of all comments received and responses to all comments received. The Final EIS was revised where appropriate based on public comment and review. Issues and potential consequences have remained identical from the draft to the final EIS.

C. Alternatives Analyzed in the Final EIS

Two alternatives were considered. Issuance of the permit with the mitigating, minimizing, and monitoring measures outlined in the CCDCP is the Service's preferred action and is discussed above. The Draft EIS outlined alternative measures that were considered by the Service prior to issuance of the permit. The other alternative selected for detailed evaluation was a No Action alternative. The No Action alternative would benefit individual desert tortoises on private lands in the short-term, however, it has been determined that viable populations of desert tortoises will not persist in the urban areas over the long-term. The No Action alternative would, therefore, not provide the benefits of the long-term recovery efforts for the desert tortoise identified in the CCDCP. The No Action alternative was not identified as the preferred alternative because it would diffuse existing regional conservation planning efforts for the desert tortoise and possibly concentrate activity on individual project needs, not meet the purpose and needs of the Applicants, and not provide the long-term benefits to the desert tortoise. Additionally, the No Action alternative could result in adverse impacts to the social environment within Clark County due to constraints on land-use activities that would impact the desert tortoise.

Dated: June 1, 1995.

Thomas Dwyer,

Deputy Regional Director.

[FR Doc. 95–13901 Filed 6–8–95; 8:45 am]

BILLING CODE 4310–55–P

Finding of No Significant Impact for Incidental Take Permits for the Construction of Single-Family Residences at the Specific Site Locations Indicated Below in Travis County, Texas

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice.

SUMMARY: The U.S. Fish and Wildlife Service (Service) has prepared an Environmental Assessment for issuance of a Section 10(a)(1)(B) permit for the incidental take of the federally endangered golden-cheeked warbler (*Dendroica chrysoparia*) during the construction and operation of single-family residences in Travis County, Texas.

Proposed Action

The proposed action is the issuance of permits under Section 10(a)(1)(B) of the Endangered Species Act to authorize the incidental take of the golden-cheeked warbler.

The Applicant (Steven G. Madere) plans to construct a single-family residence at the specific site indicated as Lot 22, Block H, Long Canyon Phase IIA, aka 9000 Bell Mountain Drive, Austin, Travis County, Texas (PRT–799859).

The Applicant (Larry Michael Beasley) plans to construct a single-family residence at the specific site

approximate time required to make their comments.

Open committee discussion. The committee will discuss data relevant to the new drug application (NDA) 20–569 ganciclovir intravitreal implant (Vitrasert® Sterile Intravitreal Implant, Chiron Vision Corp.) for treatment of cytomegalovirus retinitis. The committee will also discuss data relevant to NDA 20–597 latanoprost (Xalatan™ Sterile Ophthalmic Solution, Pharmacia, Inc.) a topical ophthalmic drug indicated for the reduction of elevated intraocular pressure in patients with open-angle glaucoma and ocular hypertension.

FDA public advisory committee meetings may have as many as four separable portions: (1) An open public hearing, (2) an open committee discussion, (3) a closed presentation of data, and (4) a closed committee deliberation. Every advisory committee meeting shall have an open public hearing portion. Whether or not it also includes any of the other three portions will depend upon the specific meeting involved. There are no closed portions for the meetings announced in this notice. The dates and times reserved for the open portions of each committee meeting are listed above.

The open public hearing portion of each meeting shall be at least 1 hour long unless public participation does not last that long. It is emphasized, however, that the 1 hour time limit for an open public hearing represents a minimum rather than a maximum time for public participation, and an open public hearing may last for whatever longer period the committee chairperson determines will facilitate the committee's work.

Public hearings are subject to FDA's guideline (subpart C of 21 CFR part 10) concerning the policy and procedures for electronic media coverage of FDA's public administrative proceedings, including hearings before public advisory committees under 21 CFR part 14. Under 21 CFR 10.205, representatives of the electronic media may be permitted, subject to certain limitations, to videotape, film, or otherwise record FDA's public administrative proceedings, including presentations by participants.

Meetings of advisory committees shall be conducted, insofar as is practical, in accordance with the agenda published in this **Federal Register** notice. Changes in the agenda will be announced at the beginning of the open portion of a meeting.

Any interested person who wishes to be assured of the right to make an oral presentation at the open public hearing portion of a meeting shall inform the contact person listed above, either orally or in writing, prior to the meeting. Any person attending the hearing who does not in advance of the meeting request an opportunity to speak will be allowed to make an oral presentation at the hearing's conclusion, if time permits, at the chairperson's discretion.

The agenda, the questions to be addressed by the committee, and a current list of committee members will be available at the meeting location on the day of the meeting.

Transcripts of the open portion of the meeting may be requested in writing from the Freedom of Information Office (HFI–35), Food and Drug Administration, rm. 12A–16, 5600 Fishers Lane, Rockville, MD 20857, approximately 15 working days after the meeting, at a cost of 10 cents per page. The transcript may be viewed at the Dockets Management Branch (HFA–305), Food and Drug Administration, rm. 1–23, 12420 Parklawn Dr., Rockville, MD 20857, approximately 15 working days after the meeting, between the hours of 9 a.m. and 4 p.m., Monday through Friday. Summary minutes of the open portion of the meeting may be requested in writing from the Freedom of Information Office (address above) beginning approximately 90 days after the meeting.

This notice is issued under section 10(a)(1) and (2) of the Federal Advisory Committee Act (5 U.S.C. app. 2), and FDA's regulations (21 CFR part 14) on advisory committees.

Dated: November 13, 1995.

David A. Kessler,

Commissioner of Food and Drugs.

[FR Doc. 95–28366 Filed 11–16–95; 8:45 am]

BILLING CODE 4160–01–F

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of the Assistant Secretary for Community Planning and Development

[Docket No. FR–3778–N–63]

Federal Property Suitable as Facilities To Assist the Homeless

AGENCY: Office of the Assistant Secretary for Community Planning and Development, HUD.

ACTION: Notice.

SUMMARY: This Notice identifies unutilized, underutilized, excess, and surplus Federal property reviewed by HUD for suitability for possible use to assist the homeless.

EFFECTIVE DATE: November 17, 1995.

FOR FURTHER INFORMATION CONTACT: Mark Johnston, Department of Housing and Urban Development, Room 7256, 451 Seventh Street SW., Washington, DC 20410; telephone (202) 708–1226; TDD number for the hearing- and speech-impaired (202) 708-2565, (these telephone numbers are not toll-free), or call the toll-free Title V information line at 1–800–927–7588.

SUPPLEMENTARY INFORMATION: In accordance with the December 12, 1988 court order in *National Coalition for the Homeless* v. *Veterans Administration*, No. 88–2503–OG (D.D.C.), HUD publishes a Notice, on a weekly basis, identifying unutilized, underutilized, excess and surplus Federal buildings and real property that HUD has reviewed for suitability for use to assist the homeless. Today's Notice is for the purpose of announcing that no additional properties have been determined suitable or unsuitable this week.

Dated: November 9, 1995.

Jacquie M. Lawing,

Deputy Assistant Secretary for Economic Development.

[FR Doc. 95–2828 Filed 11–16–95; 8:45 am]

BILLING CODE 4210–29–M

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Availability of a Draft Environmental Impact Statement and Receipt of an Application for the Proposed Issuance of a Permit To Allow Incidental Take of Threatened and Endangered Species on Plum Creek Timber Company, L.P., Lands in the I–90 Corridor, King and Kittitas Counties, WA

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of document availability; request for comments.

SUMMARY: This notice advises the public that Plum Creek Timber Company, L.P. (Applicant) has applied to the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (together Services) for an incidental take permit pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act). The Applicant has also requested unlisted-species and safe-harbor provisions in an Implementation Agreement (Agreement) to cover vertebrate species which may be found in the planning area. The application has been assigned permit number PRT–808398. The requested permit would

authorize incidental take of currently listed threatened or endangered species that may occur within the planning area in King and Kittitas Counties, Washington, as a result of the Applicant's timber management activities. The unlisted-species provision provides for the issuance of further permits for the incidental take of species not presently listed under the Act, but which might become listed during the term of the proposed permit, and which might occur within the planning area.

The Services also announce the availability of a Draft Environmental Impact Statement (DEIS) for the proposed issuance of the incidental take permit and approval of the Agreement. All comments received will become part of the public record and may be released. This notice is provided pursuant to section 10(c) of the Act and National Environmental Policy Act regulations (40 CFR 1506.6).

DATES: Written comments on the permit application and DEIS should be received on or before January 7, 1996.

ADDRESSES: Comments regarding the application or DEIS, or requests for those documents, should be addressed to William Vogel, U.S. Fish and Wildlife Service, Pacific Northwest Habitat Conservation Plan Program, 3773 Martin Way East, Building C—Suite 101, Olympia, Washington 98501; (360) 534–9330. Please refer to permit No. PRT–808398 when submitting comments. Individuals wishing copies of the documents for review should immediately contact the office listed above. Copies of the documents are also available at the following libraries:

Wenatchee Public Library, Attention: Joy, 310 Douglas Street, Wenatchee, Washington 98801

University of Washington Library, Attention: Carolyn Aamot, Government Publications Department, 170 Suzzallo Library, Seattle, Washington 98195–2900

Seattle Public Library, Attention: Jeanette Voiland, Government Publications Department, 1000 Fourth Avenue, Seattle, Washington 98104

Evergreen State College, Attention: Lee Lyttle, Library Campus Parkway—L23100H, Olympia, Washington 98505

Central Washington University, Attention: Dr. Patrick McLaughlin, Library Collection Development, Ellensburg, Washington 98926

King County Library System, Attention: Cheryl Standley, Documents Department, 1111 110th Avenue Northeast, Bellevue, Washington 98004

FOR FURTHER INFORMATION CONTACT: William Vogel, U.S. Fish and Wildlife Service, or Steve Landino, National Marine Fisheries Service, at the office listed above.

SUPPLEMENTARY INFORMATION:

Background

Under section 9 of the Act and its implementing regulations, ''taking'' of threatened and endangered species is prohibited. However, the Service, under limited circumstances, may issue permits to take threatened or endangered wildlife species if such taking is incidental to, and not the purpose of, otherwise lawful activities. Regulations governing permits for threatened and endangered species are in 50 CFR 17.32 and 17.22.

The permit application includes a Habitat Conservation Plan (HCP) and the Agreement. In the HCP, the Applicant has addressed species conservation and ecosystem management on approximately 170,000 acres of its private land in the Cascade Mountains of Washington. The Applicant's ownership occurs in a ''checkerboard'' pattern in an area commonly referred to as the I–90 Corridor. The term ''checkerboard'' refers to alternate sections of public and private land. The ''checkerboard'' HCP planning area is approximately 419,000 acres in size. The term of the proposed permit is 50 years from the date of issuance, with a possible extension of an additional 50 years for safe-harbor provision purposes.

The Applicant is requesting a permit for the incidental take of northern spotted owls (Strix occidentalis caurina) (owls) which may occur as a result of timber harvest and related activities within a portion of the owl sites present on the Applicant's property. There are currently more than 100 owl sites that impact operations within the planning area. The Applicant plans to avoid the take of marbled murrelets (Brachyramphus marmoratus marmoratus), but has included murrelets in the incidental take permit application in case some incidental take occurs. The Applicant has also included grizzly bears (Ursus arctos = U.a. horribilis) and gray wolves (Canis lupus) in the permit application to cover the circumstance where these species may occur on the subject property in the future and may at some point be subject to take. The Applicant has addressed numerous other species in their HCP and is requesting the unlisted-species and safe-harbor provisions in the Agreement for vertebrate species which may be found in habitats within the planning area. At the time of termination for the HCP phase of the permit, the safe-harbor provision would provide the Applicant relief from regulatory restrictions on timber-management activities in habitats provided for listed species which are greater than the habitat amounts required under the HCP.

The HCP is designed to complement the Federal Northwest Forest Plan, and includes various forms of mitigation which are integral parts of the HCP. Mitigation includes a schedule of habitat amounts to be provided for each decade of the 50-year HCP. These habitats include eight stand-structure types (ranging from early-successional stages, such as stand initiation, to late-successional stages, such as old growth) and habitat for owls. Owl-habitat projections include projections for nesting, roosting, and foraging habitat, and for foraging and dispersal habitat. Mitigation for gray wolves and grizzly bears include avoidance of timber harvest and road construction in certain habitats, limits to road densities, provision of visual cover, and other specific management prescriptions. Minimum prescriptions are also provided for riparian and wetland areas, and Watershed Analysis will be completed on an accelerated basis. Specific prescriptions to minimize and mitigate impacts will also be implemented for other species and special habitats.

The DEIS considers four alternatives, including the Proposed Action and the No-action Alternatives. Under the No-action Alternative, the Applicant would avoid the take of all Federally listed species and no permit would be issued. Under the Riparian Alternative, emphasis for conservation of fish and wildlife species would be placed in riparian and wetland areas; other portions of the ownership would be managed for aggressive timber harvest. Under the Dispersal Alternative, riparian areas would be managed for fish and wildlife, but, in addition, upland areas would be managed to provide dispersal habitat for owls. The Proposed Action builds upon the benefits of the previous alternatives. It places emphasis for conservation on riparian and wetland areas, but, also, commits to implementation of the Applicant's Environmental Principles; provides for nesting, roosting, and foraging habitat for owls, and provides for habitat deferrals for owls and goshawks. The Proposed Action includes specific mitigation for other currently listed and unlisted wildlife species such as the gray wolf, grizzly bear, Larch Mountain salamander, and

other vertebrate species and special habitats.

Dated: November 6, 1995.

Thomas J. Dwyer,

Deputy Regional Director, Region 1, Portland, Oregon.

[FR Doc. 95–27962 Filed 11–16–95; 8:45 am]

BILLING CODE 4310–55–P

National Park Service

Fort McHenry National Monument and Historic Shrine, MD; Concession Contract

AGENCY: National Park Service, Interior.

ACTION: Public notice.

SUMMARY: Public notice is hereby given that the National Park Service proposes to issue a concession contract for operations currently conducted by Evelyn Hill Corporation authorizing the continuation of gift and souvenir sales for the public at Fort McHenry National Monument And Historic Shrine, Baltimore, Maryland, for a period of five (5) years from January 1, 1996 through December 31, 2000.

EFFECTIVE DATE: January 16, 1996.

ADDRESS: Interested parties should contact the Superintendent, Fort McHenry National Monument and Historic Shrine, Baltimore, Maryland 21230–5393, for information as to the requirements of the proposed contract.

SUPPLEMENTARY INFORMATION: This contract renewal has been determined to be categorically excluded from the procedural provisions of the National Environmental Policy Act and no environmental document will be prepared.

The foregoing concessioner has performed its obligations to the satisfaction of the Secretary under an existing contract which expired by limitation of time on December 31, 1992, and therefore pursuant to the provisions of Section 5 of the Act of October 9, 1965 (79 Stat. 969; 16 U.S.C. 20), is entitled to be given preference in the renewal of the contract and in the negotiation of a new contract as defined in 36 CFR, Section 51.5.

The Secretary will consider and evaluate all proposals received as a result of this notice. Any proposal, including that of the existing concessioner, must be postmarked or hand delivered on or before the sixtieth (60) day following publication of this notice to be considered and evaluated.

Dated: November 2, 1995.

Warren Beach,

Acting Director, Northeast Field Area.

[FR Doc. 95–28363 Filed 11–16–95; 8:45 am]

BILLING CODE 4310–70–M

General Management Plan/ Development Concept Plan, Draft Environmental Impact Statement, Natural Bridges National Monument, UT

AGENCY: National Park Service, Interior.

ACTION: Availability of draft environmental impact statement and general management plan/development concept plan for Natural Bridges National Monument.

SUMMARY: Pursuant to section 102(2)(c) of the National Environmental Policy Act of 1969, the National Park Service (NPS) announces the availability of a Draft Environmental Impact Statement/ General Management Plan/Development Concept Plan (DEIS/GMP) for Natural Bridges National Monument, Utah.

DATES: The DEIS/GMP will remain available for public review until January 16, 1996. If any public meetings are held concerning the DEIS/GMP, they will be announced at a later date.

ADDRESSES: Comments of the DEIS/GMP should be sent to the Superintendent, Natural Bridges National Monument, Box 1—Natural Bridges, Lake Powell, Utah 84533–0101. Public reading copies of the DEIS/GMP will be available for review at the following locations:

Office of the Superintendent, Natural Bridges National Monument, Box 1—Natural Bridges, Lake Powell, Utah 84533–0101, (801) 692–1234

Office of Public Affairs, National Park Service, Department of the Interior, 18th and C Streets NW., Washington, DC 20240, Telephone: (202) 208–6843.

SUPPLEMENTARY INFORMATION: The DEIS/GMP analyzes two alternatives which are being considered to direct the management and development of Natural Bridges National Monument for a period of about ten years.

The alternatives include: (1) No Action—Under this alternative, existing facilities and management actions would remain unchanged; (2) Proposed Plan—Under the proposal, the administrative/visitor center would be expanded to provide 900–1,400 square feet of office and sales space; removal and rehabilitation of a small picnic area, the addition of a comfort station and benches for visitor comfort along the loop road; the addition of housing for 12 future employees; redesign of the visitor center parking area to improve vehicular circulation; and the addition of a garage and storage building in the maintenance area.

The DEIS/GMP in particular evaluates the environmental consequences of the proposed action and the other alternative on water resources, flood plains, wetlands, geology, soils, vegetation, wildlife, threatened and endangered species, air quality, visual interpretation, socioeconomic data, health and safety, law enforcement, other agencies, management and operations, and cumulative impacts. The environmental consequences of the proposed action and alternative considered are fully disclosed in the DEIS/GMP/DCP.

FOR FURTHER INFORMATION: Contact Superintendent, Natural Bridges National Monument, at the above address and telephone number.

Dated: October 20, 1995.

Roy Everhart,

Intermountain Field Area, National Park Service.

[FR Doc. 95–28379 Filed 11–16–95; 8:45 am]

BILLING CODE 4310–70–P

Advisory Commission for the San Francisco Maritime National Historical Park; Meeting

Agenda for the December 7, 1995 Meeting of the Advisory Commission for the San Francisco Maritime National Historical Park

Public Meeting, Fort Mason, Building C, Room 370, 9:30 am–12:15 pm

9:30 am—At Building C
Welcome—Neil Chaitin, Chairman,
Proclamation Presentation—Neil Chaitin, Chairman,
Opening Remarks—Neil Chaitin, Chairman
William G. Thomas, Superintendent
Old Business
Approval of Minutes
9:45 am—Orientation to Park Departments
Collections, Judy Hitzeman, Supervisory Archivist
Small Craft, William Doll, Curator of Small Craft
10:05 am—Update—Museum Accreditation San Francisco
Maritime National Historical Park, Marc Hayman—Chief, Interpretation and Resource Management
10:15 am—Update—General Management Plan, William G. Thomas, Superintendent
10:30 am—Break.
10:45 am—FY–96 Ships Division Priorities, Acting Ships Manager

Name	Permit No.	Issuance date
Ray Griffiths	800793	6/22/95
Zentner and Zentner, Incorporated	800794	6/22/95
James Deacon	794782	6/27/95
Patricia Ann Hobell	789266	6/27/95
San Marino Environmental Consultants	781377	7/3/95
Louis Courtois	802446	7/20/95
Elaine Harding-Smith	802445	8/4/95
Biosearch Wildlife Surveys	768251	8/9/95
Jepson Prairie Reserve	800777	8/9/95
Donald L. Davis	800797	8/9/95
Carl J. Page	802094	8/11/95
Patricia Baird	802107	8/11/95
Manomet Observatory for Conservation Sciences	800922	8/11/95
John E. Moeur	802092	8/13/95
Stephen J. Myers	804203	8/13/95
A.G. Crook Company	802456	8/18/95
California Department of Water Resources	801821	9/5/95
Regional Environmental Consultants	797665	9/5/95
Lisa Webber	802086	9/5/95
Thomas Roberts	802103	9/5/95
Carolee Caffrey	802104	9/5/95
Robert A. Aramayo	804207	9/20/95
Assistant Regional Director-Ecological Services, Region 1, U.S. Fish and Wildlife Service	702631	10/19/95
Arthur Davenport	802450	10/30/95
Patrice Ashfield	807056	11/3/95
Enterprise Advisory Services, Incorporated	806723	11/10/95
Janet Randall	799486	12/4/95
Becky Yeager	804076	12/6/95

FOR FURTHER INFORMATION CONTACT: Chief, Division of Consultation and Conservation Planning, U.S. Fish and Wildlife Service, Ecological Services, 911 N.E. 11th Avenue, Portland, Oregon 97232–4181 (tel: 503–231–2063; fax: 503–231–6243).

Dated: February 9, 1996.

Thomas Dwyer,

Deputy Regional Director, Region 1, Portland, Oregon.

[FR Doc. 96–3565 Filed 2–15–96; 8:45 am]

BILLING CODE 4310–55–P

Availability of an Environmental Assessment and Receipt of an Application Submitted by Ms. Suzanne Gasque and Ms. Jewel Felkel for an Incidental Take Permit for Red-cockaded Woodpeckers in Association With Timber Harvesting Activities on Their Property in Orangeburg County, South Carolina

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice.

SUMMARY: Ms. Suzanne Gasque and Ms. Jewel Felkel (Applicants) have applied to the U.S. Fish and Wildlife Service for an incidental take permit pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973 (Act), as amended. The proposed permit would authorize the incidental take of a federally endangered species, the red-cockaded woodpecker *Picoides borealis* (RCW) known to occur on property owned by the Applicants in Orangeburg County, South Carolina. The Applicants propose to harvest 106 acres of timber on their 446-acre property located approximately 3.5 miles south of Elloree. The proposed permit would authorize incidental take of RCWs on this property in exchange for mitigation elsewhere as described further in the Supplementary Information Section below.

The Service also announces the availability of an environmental assessment (EA) and habitat conservation plan (HCP) for the incidental take application. Copies of the EA or HCP may be obtained by making a request to the Regional Office address below. Requests must be submitted in writing to be processed. This notice is provided pursuant to Section 10© of the Act and National Environmental Policy Act Regulations (40 CFR 1506.6).

DATES: Written comments on the permit application, EA and HCP should be sent to the Regional Permit Coordinator in Atlanta, Georgia, at the address below and should be received on or before March 18, 1996.

ADDRESSES: Persons wishing to review the application, HCP, and EA may obtain a copy by writing the Service's Southeast Regional Office, Atlanta, Georgia. Documents will also be available for public inspection by appointment during normal business hours at the Regional Office; or the Asheville, North Carolina or Charleston, South Carolina Field Offices. Written data or comments concerning the application, EA, or HCP should be submitted to the Regional Office. Please reference permit under PRT–810934 in such comments.

U.S. Fish and Wildlife Service (AES/TE), 1875 Century Boulevard, Suite 200, Atlanta, Georgia 30345, Telephone: 404/679–7110, Fax: 404/679–7081

Field Supervisor, U.S. Fish and Wildlife Service, 160 Zillicoa Street, Asheville, North Carolina 28801, Telephone: 704/258–3939

Field Supervisor, U.S. Fish and Wildlife Service, 217 Fort Johnson Road, Charleston, South Carolina 29422–2559, Telephone: 803/727–4707.

FOR FURTHER INFORMATION CONTACT: Janice Nicholls at the Asheville, North Carolina Field Office, or Lori Duncan at the Charleston, South Carolina, Field Office, or Rick G. Gooch at the Atlanta, Georgia, Regional Office.

SUPPLEMENTARY INFORMATION: The RCW is a territorial, non-migratory cooperative breeding bird species. RCWs live in social units called groups which generally consist of a breeding pair, the current year's offspring, and one or more helpers (normally adult male offspring of the breeding pair from previous years). Groups maintain year-round territories near their roost and nest trees. The RCW is unique among the North American woodpeckers in

that it is the only woodpecker that excavates its roost and nest cavities in living pine trees. Each group member has its own cavity, although there may be multiple cavities in a single pine tree. The aggregate of cavity trees is called a cluster. RCWs forage almost exclusively on pine trees and they generally prefer pines greater than 10 inches diameter at breast height. Foraging habitat is contiguous with the cluster. The number of acres required to supply adequate foraging habitat depends on the quantity and quality of the pine stems available.

The RCW is endemic to the pine forests of the Southeastern United States and was once widely distributed across 16 States. The species evolved in a mature fire-maintained ecosystem. The RCW has declined primarily due to the conversion of mature pine forests to young pine plantations, agricultural fields, and residential and commercial developments, and to hardwood encroachment in existing pine forests due to fire suppression. The species is still widely distributed (presently occurs in 13 southeastern States), but remaining populations are highly fragmented and isolated. Presently, the largest populations occur on federally owned lands such as military installations and national forests.

In South Carolina, there are an estimated 681 active RCW clusters as of 1994; 67 percent are on Federal lands, 6 percent are on State lands, and 27 percent are on private lands. The populations on public lands are generally stable, and in some cases are increasing. The overall population trend on private lands in South Carolina, on the other hand, is downward. Most RCW populations on private lands are relatively small and isolated.

The Applicant's land in Orangeburg County hosts a small and isolated population of RCWs. As of 1995, there were 2 active RCW clusters; 1 breeding group and 1 solitary adult male. The nearest known RCW group occurs on private lands approximately 2.5 miles to the north of the Gasque/Felkel tract near Elloree. The nearest known RCW concentration (greater than 5 groups) occurs over 10–15 miles away on the Manchester State Forest/Shaw Air Force Base to the north in Sumter County, and on the privately-owned Norfolk Southern property located south of the Gasque/Felkel tract in Dorchester County. The Applicants propose to harvest timber on their property for supplemental income. Timber harvesting activities may result in death of, or harm to, any remaining RCWs through the loss of nesting and foraging habitat.

The EA considers the environmental consequences of three alternatives, including the proposed action. The proposed action alternative is issuance of the incidental take permit and implementation of the HCP as submitted by the Applicants. The HCP will provide for the provisioning of 4 clusters with artificial starts and cavities on suitable habitat on the Sandhills State Forest in Chesterfield County. The Sandhills State Forest is part of a designated recovery population for the RCW in the South Carolina Sandhills Physiographic Province. The State Forest has a total of 46,000 acres of which 40,000 acres are manageable pine lands (predominately longleaf pine). The State Forest currently has 55 active RCW groups with a long-term goal of increasing the population to assist with the recovery of the South Carolina Sandhills population. The HCP will also involve the translocation of any juveniles produced by the breeding pair on the Gasque/Felkel property to the provisioned sites at the Sandhills State Forest. Finally, the HCP will involve monitoring the provisioned sites for a specified time period at the State Forest to determine success of the provisioning efforts. The HCP provides a funding source for the mitigation measures.

Dated: January 9, 1996.

Noreen K. Clough,

Regional Director.

[FR Doc. 96–3566 Filed 2–15–96; 8:45 am]

BILLING CODE 4310–55–P

Migratory Bird Hunting and Conservation Stamp (Duck Stamp) Contest

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice.

SUMMARY: The Service announces the dates and locations of the 1996 Federal Duck Stamp Contest; the public is invited to attend.

DATES: 1. The 1996 contest opens for submission July 1, 1996.

2. The public may view the 1996 Federal Duck Stamp Contest entries on Tuesday, October 15, 1996, from 10:00 a.m. to 2:00 p.m., in the Department of the Interior Auditorium.

3. This year's judging will be held from October 16–17, 1996, beginning at 10:30 a.m. on Wednesday, October 16, and continuing at 9:00 a.m. on Thursday, October 17.

4. Persons wishing to enter this year's contest may submit entries anytime after Monday, July 1, but *all* must be postmarked no later than midnight Sunday, September 15, 1996.

ADDRESSES: Requests for complete copies of the regulations, reproduction rights and the display and participation agreements should be addressed to: Federal Duck Stamp Contest, U.S. Fish and Wildlife Service, Department of the Interior, 1849 C Street NW., Suite 2058, Washington, DC 20240.

Location of Contest: Department of the Interior Building, Auditorium (C Street entrance), 1849 C Street NW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: Mrs. Lita F. Edwards, Telephone (202) 208–4354 or Fax (202) 208–6296.

SUPPLEMENTARY INFORMATION: The following *five* eligible species for the 1996–97 duck stamp contest are as follows:

(1) Canada Goose
(2) Greater Scaup
(3) Green-Winged Teal
(4) Northern Pintail
(5) Black Duck

The primary author of this document is Mrs. Lita F. Edwards, U.S. Fish and Wildlife Service.

Dated: February 6, 1996.

John G. Rogers, Jr.,

Director.

[FR Doc. 96–3562 Filed 2–15–96; 8:45 am]

BILLING CODE 4310–55–M

Bureau of Land Management

[CACA 35919]

California; Classification of Public Lands

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice, CA–35919.

SUMMARY: The following described lands have been examined and found suitable for classification for recreation and public purposes under the provisions of the Recreation and Public Purposes Act (R&PP) of June 14, 1926, as amended (43 U.S.C. 869 et. seq.). The Bureau of Land Management will reclassify 160 acres of public land in San Bernardino County to facilitate the Colorado River Law Enforcement Shooting Range Project.

DATE: Comments must be received by April 1, 1996. Adverse comments will be reviewed by the State Director.

ADDRESS: Bureau of Land Management, Area Manager, Needles Resource Area, 101 W. Spikes Road, Needles, California, 92363.

FOR FURTHER INFORMATION CONTACT: George R. Meckfessel, Planning & Environmental Coordinator, (619) 326–3896.

SUPPLEMENTARY INFORMATION: On February 9, 1996 a decision was made

APPENDIX 17:

Examples of Issued Incidental Take Permits

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201 (10/86)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC1539(a)(1)(B)

REGULATIONS (ATTACHED)
50 CFR §13 & 17, & 21

3. NUMBER
PRT-XXXXX

1. PERMITTEE

NAME
ADDRESS
CITY, STATE, ZIP CODE
PHONE

4. RENEWABLE	5. MAY COPY
XXXX YES	XXXX YES
_____ NO	_____ NO
6. EFFECTIVE	**7. EXPIRES**
09/21/96	12/31/2095

8. NAME AND TITLE OF PRINCIPAL OFFICER (IF # 1 IS A BUSINESS)
N/A

9. TYPE OF PERMIT
INCIDENTAL TAKE - ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

TWO TRACTS OF LAND, ONE ENCOMPASSING 7,200 ACRES. BOTH ARE LOCATED IN NORTH CAROLINA, AS DESCRIBED IN THE PERMITTEE'S HCP.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR § 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE, AND HIS DESIGNATED AUTHORIZED AGENTS.

D. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND HIS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

XX BLOCK 11 OF THIS PERMIT CONSISTS OF ITEMS A-P (5 PAGES TOTAL)

12. REPORTING REQUIREMENTS

REPORTS WILL BE PROVIDED TO THE U.S. FISH AND WILDLIFE SERVICE OFFICES APPEARING IN ITEMS N, O, AND PERMIT. THE FIRST REPORT IS DUE DECEMBER 31, 1996.

ISSUED BY:	TITLE	DATE
	REGIONAL DIRECTOR, FWS, SOUTHEAST REGION	

ORIGINAL

NAME

E. The Permittee owns the lands identified in Block #10, above. Within the 8,000-acres encompassed within the property, surveys indicate that approximately 1,121-acres are occupied by the endangered red-cockaded woodpecker, *Picoides borealis,* and that approximately 3,363 acres is currently unoccupied, but suitable *Picoides borealis* habitat. The Permit authorizes the take of the endangered red-cockaded woodpecker, *Picoides borealis*, incidental to lawful timber harvest and other land management activities (Project). Twelve *Picoides borealis* groups may be incidentally taken under the authority of this Permit, subject to the terms and conditions stipulated herein. Additionally, this Permit provides authorization to incidentally take any "future" *Picoides borealis* that may occupy the Project after the effective date of this Permit and for its duration, subject to the terms and conditions stipulated herein.

F. Permittee is authorized to take all *Picoides borealis* cavity trees, located on the lands identified in Block 10 above, under the authority of this permit, subject to the terms and conditions stipulated herein. This permit also constitutes a Special Purpose Permit under 50 CFR § 21.27 for take of *Picoides borealis* in the amount and/or number and subject to the terms and conditions specified herein. Any such take will not be in violation of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § § 703-12).

G. The Permittee agrees to allow U.S. Fish and Wildlife Service personnel, personnel from the North Carolina Wildlife Resources Commission, or these agencies' designated representatives to enter the property identified in Block 10 of this permit for general purposes as specified in 50 CFR §13.21(d)(2).

H. The following measures will be employed to ensure that *Picoides borealis* take is minimized and successfully mitigated for the current *Picoides borealis* population. For purposes of this Item, success will be accomplished when the Permittee successfully creates twelve new *Picoides borealis* groups on private, State, and Federal lands in North Carolina within 3 years of the effective date of the permit, or December 31, 1999, whichever is sooner. The Permittee may not incidentally take one (1) extant *Picoides borealis* group until the successful creation (as defined in Item H.3) of one (1) *Picoides borealis* group off-site as stipulated herein. As new *Picoides borealis* groups are created successfully, the Permittee has the option to incidentally take an existing *Picoides borealis* group, so long as a 1:1 ratio (created:taken) is maintained.

1. The Permittee will fund the creation of a minimum of four (4) artificial cavities (either drilled or inserts) and two (2) cavity starts (forty-eight (48) cavities and twenty-four (24) starts in all) within a minimum of twelve (12) recipient sites. The recipient sites will be determined in cooperation with the Permittee and the U.S. Fish and Wildlife Service. Ultimate approval of the sites will rest with the U.S. Fish and Wildlife Service. Additionally:

    I. The artificial cavities will be kept screened until all internal sap leakage ceases. If internal sap leakage is severe, the leaking cavity will be replaced with a new starts/cavities.

    ii. Cavities damaged or made unsuitable due to modification by other species, such as pileated woodpeckers, will be repaired with cavity restrictors or replaced during the 3-year monitoring period.

H. (Continued)

2. The Permittee will fund the initial management prescriptions, if necessary, for the twelve (12) recipient sites. The management prescriptions may include hardwood mid-story removal and/or understory removal, with the express purpose of enhancing each site's potential to attract and maintain a *Picoides borealis* breeding group.

3. After cavity provisioning, all provisioned sites must be monitored for subsequent use and/or occupation every four (4) months (April, August, and December) through December 31, 1999, or until success is documented sooner. Success is defined as when each of the twelve (12) provisioned recipient sites is occupied by a *Picoides borealis* breeding group (as evidenced by observations of copulation during the breeding season, and/or eggs or nestlings; or observation of two adults at a site over a 6-month period during the breeding season).

4. The Permittee will provide funding for implementation of Conditions H.1 through H.3, not to exceed $45,000 (Forty-five thousand dollars).

5. The Permittee agrees to provide a 60-day advance notice prior to timber harvesting and incidental taking of a existing *Picoides borealis* group, to allow the U.S. Fish and Wildlife Service, or its authorized agent(s), to capture and translocate juvenile *Picoides borealis* to either candidate sites or other sites selected by the U.S. Fish and Wildlife Service.

I. Approximately 3,363 acres of the Project area is currently suitable but unoccupied *Picoides borealis* habitat. The Permittee agrees to the following mitigation/minimization strategy in the event that, at some point after the effective date of this permit, additional ("future") *Picoides borealis* occupy these lands:

1. Continue to conduct *Picoides borealis*-compatible land management within the currently unoccupied acreage, including (but not limited to) thinning, prescribed burning, and hardwood mid-story control.

2. Avoid any activities that may result in incidental take during the nesting season (generally March through August), within the foraging and nesting area of a "future" *Picoides borealis* group.

3. Provide a 60-day advance notice to the U.S. Fish and Wildlife Service to allow for the capture and translocation of any adult and/or juvenile *Picoides borealis* that may be directly impacted by future timber-harvesting activities within the occupied and utilized habitat of these "future"*Picoides borealis* group.

4. Allow the U.S. Fish and Wildlife Service to enter the unoccupied 3,363 acres to provision suitable sites (at its expense) with the intent of accelerating the chances of *Picoides borealis* occupancy.

5. Allow the U.S. Fish and Wildlife Service to enter the areas of the Project site that are occupied by "future" *Picoides borealis* during the term of the Permit for the express purpose of *Picoides borealis* capture and translocation to sites selected by the U.S. Fish and Wildlife Service.

J. The Permittee must select an experienced contractor to perform the mitigation and minimization and monitoring duties as described in this Permit. The selected contractor must be pre-approved by the contact office of the U.S. Fish and Wildlife Service and must obtain all necessary local, State, and Federal permits prior to initiating the work. The Permittee, upon further consultation and approval from the U.S. Fish and Wildlife Service, will select a contractor and develop an expenditure budget for the funds identified in Item H.4, above.

K. By December 31, of each year this Permit is valid, (starting in 1996) the Permittee will submit an annual report to U.S. Fish and Wildlife Service offices listed in Items N, O, and P of this Permit. The annual reports are due as specified until the successful creation of twelve (12) *Picoides borealis* groups, as described in Item I, above, is achieved, or December 31, 1999, whichever is soon. The annual report shall outline and describe the implementation and success of mitigation and minimization measures as identified below:

1. Progress on compliance with the success criteria outlined in Condition I. Further, the annual report must specify the number of incidental take actions taken upon the existing twelve (12) *Picoides borealis* groups, if applicable.

2. A copy of the executed contract with the qualified contractor, as outlined in Item J, if not previously provided.

3. An accounting of the funding identified in Item H.4.

4. Include any corrective measures or other changes that may be necessary to improve the efficacy of the Permit.

L. Upon locating a dead, injured, or sick *Picoides borealis*, initial notification must be made immediately to the U.S. Fish and Wildlife Service Law Enforcement Office, Strom Thurman Federal Building, 1835 Assembly Street, Room 971-B, Columbia, South Carolina 29201. The phone number is 803/765-5626. Notification should also be made (by the next work day) to the U.S. Fish and Wildlife Service office appearing in Item N, below. Care should be taken in handling sick or injured specimens to ensure effective treatment and care in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

M. The Permittee and the U.S. Fish and Wildlife Service acknowledge that even with the above detailed provisions for mitigating impacts to *Picoides borealis*, circumstances could arise which were not fully anticipated by this Permit and which are considered unforeseen. Such circumstances may become apparent either to the Permittee, his authorized agents, or to personnel of the U.S. Fish and Wildlife Service. For purposes of implementation of this condition, unforeseen circumstances are defined as any significant, unanticipated adverse change in the status of species; any significant, unanticipated adverse change in impacts of the Project or in other factors upon which the HCP and Permit are based; or any other significant new

M. (Continued)

information relevant to the Permit and Project that was unforeseen by the Permittee and the U.S. Fish and Wildlife Service that could give rise to the need to review the Permittee's conservation program. If unforeseen circumstances arise, the Permittee and the contact office of the U.S. Fish and Wildlife Service shall meet within twenty (20) working days following notice of such unforeseen circumstances. The Permittee shall develop appropriate measures and begin their implementation within an additional thirty (30) working days.

N. For purposes of administration of the monitoring and compliance aspects, addressing unforeseen circumstances, and other matters associated with implementation of this Permit, the contact office of the U.S. Fish and Wildlife Service is:

Field Supervisor (HCP Program)
U.S. Fish and Wildlife Service
160 Zillicoa Street
Asheville, North Carolina 28801
Phone: 704/258-3939

O. For purposes of administration of the monitoring and compliance aspects, addressing unforeseen circumstances, and other matters associated with implementation of this Permit, the alternative contact office of the U.S. Fish and Wildlife Service is:

Field Supervisor (HCP Program)
U.S. Fish and Wildlife Service
Department of Forest Resources
261 Lehotsky Hall, Box 341003
Clemson, South Carolina 29634-1003
Phone: 803/656-2432

P. Copies of annual reports will also be provided to the following U.S. Fish and Wildlife Service offices:

Endangered Species Permits (AES/TE/P)
U.S. Fish and Wildlife Service
1875 Century Boulevard, Suite 200
Atlanta, Georgia 30345
Phone: 404/679-7110

END

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201 (10/86)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES

16 USC1539(a)(1)(B)

REGULATIONS (ATTACHED)

50 CFR §13 & 17, & 21

3. NUMBER

PRT-XXXXX

1. PERMITTEE

NAME
ADDRESS
CITY, STATE, ZIP CODE
PHONE

4. RENEWABLE	5. MAY COPY
XXXX YES	XXXX YES
_____ NO	_____ NO
6. EFFECTIVE	**7. EXPIRES**
11/07/96	11/07/2046

8. NAME AND TITLE OF PRINCIPAL OFFICER (IF # 1 IS A BUSINESS)

N/A

9. TYPE OF PERMIT

ENDANGERED/THREATENED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

Orange County, California: on lands specified within the body of the permit.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR § 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE, AND HIS DESIGNATED AUTHORIZED AGENTS.

D. FURTHER CONDITIONS OF AUTHORIZATION ARE CONTAINED IN THE ATTACHED SPECIES TERMS AND CONDITIONS.

12. REPORTING REQUIREMENTS

See permit conditions for reporting.

ISSUED BY:	TITLE	DATE

U.S. FISH AND WILDLIFE SERVICE, PORTLAND, OREGON
PERMIT CONDITIONS FOR PRT-784571

D. Acceptance of this permit serves as evidence that the permittees, and their designated agents, understand and agree to abide by the "General Conditions for Native Endangered and Threatened Wildlife Species Permits" (copy attached).

E. The permittees, and their designated agents, are authorized to incidentally take coastal California gnatcatchers (*Polioptila californica californica*) occupying 27 of the 142 acres of coastal sage scrub and 108 acres of cactus scrub habitat in the course of otherwise lawful development and conservation activities, as described in the permittees' application and supporting documents, and as conditioned herein.

F. The permittees, and their designated agents, are authorized to incidentally take cactus wrens (*Campylorhynchus brunneicappilus cousei*) located in 83 of the 108 acres of cactus scrub and 142 acres of coastal sage scrub, in the course of otherwise lawful development and conservation activities, as described in the permittees' application and supporting documents, and as conditioned herein. Provided that this permit has become effective, per term and condition G below, take authorization for the cactus wren shall become effective upon the listing of the species under the Federal Endangered Species Act of 1973, as amended, (Act) to the extent that take would otherwise be prohibited under section 9 of the Act, and its implementing regulations, or pursuant to a rule promulgated under section 4(d) of the Act.

G. As noted in the Implementing Agreement, Section V.A.3.a(1), take authorization for Western Shell Oil, Inc. (Shell) shall become effective upon demonstration in writing to the U.S. Fish and Wildlife Service (Service) of the transfer of ownership from Shell to the California Department of Parks and Recreation (State Parks) of the approximately 979-acre parcel depicted on Exhibit 23 of the Habitat Conservation Plan. Also as noted in the Implementing Agreement, Section V.A.3.a(2), take authorization for the Metropolitan Water District shall become effective upon demonstration in writing to the Service of the recordation of an open space/conservation easement and/or offer of dedication to State Parks.

H. This permit shall remain in effect for 50 years or until an earlier time as provided in the Implementing Agreement, including Section III.B., VII, or VIII.E..

I. The authorization granted by this permit is subject to full and complete compliance with, and implementation of, the Habitat Conservation Plan and Implementation Agreement, executed by the permittees, State Parks, and the Service. Attachment A summarizes the responsibilities of the applicants while conducting activities that may effect coastal California gnatcatchers and cactus wrens.

J. Upon locating dead, injured, or sick federally-listed endangered or threatened species, initial notification must be made within three (3) working days of the finding to the Service's Division of Law Enforcement, Torrance, California at (370 Amapola Avenue, Suite 114, Torrance, California 90501, telephone 310-297-0062) and The Service's Carlsbad Field Office at (2730 Loker Avenue West, Carlsbad, California 92008, telephone 619-431-9440). Also, the Service must be notified immediately, in the event that habitat loss exceeds the amount authorized in the Habitat Conservation Plan and Implementing Agreement. Written notification to both offices must be made within 5 calendar days.

K. As noted in the Implementing Agreement, Section V.A.3.b(3) and in the Habitat Conservation Plan, Section V, an annual report shall be prepared and submitted by a Shell/MWD funded biologist by December 31 of each year that the permit is in effect, beginning in 1997. One copy of the report shall be submitted to each of the following: 1) Regional Director, U.S. Fish and Wildlife Service 911 Northeast 11th Avenue, Portland, Oregon 97232, and 2) Field Supervisor, U.S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, California 92008. The annual report shall include the results of coastal sage scrub and cactus scrub habitat surveys, the cowbird trapping program, the population estimates, and the determination of the extent and the locations of habitat used by the coastal California gnatcatcher, cactus wren, and any other sensitive species present in the Northeast Preserve, Telegraph Canyon, and Carbon Canyon area. Following the completion of the restoration program, the Golf Course Habitat Conservation Area will be included in the annual reporting.

L. A copy of this permit and Attachment A must be in the possession of the permittees and designated individuals while conducting taking activities (construction or grading). Please refer to the permit number in all correspondence and reports concerning permit activities. Any questions you may have about this permit should be directed to the Field Supervisor, Carlsbad Field Office.

ATTACHMENT A

A copy of this Attachment must be in the possession of the permittees and designated individuals while conducting activities that may effect the coastal California gnatcatcher and cactus wren or their habitats. The following construction management and monitoring measures shall be implemented to minimize impacts to coastal California gnatcatchers, cactus wrens, and coastal sage and cactus scrub habitats:

1. Construction will be monitored by a U.S. Fish and Wildlife Service (Service) approved biologist, responsible to the project applicant. The contractor and the monitor will review the rough grading plans and staking to ensure that the grading is within the project footprint as described in the HCP. All temporary fencing or other markers will be clearly visible to construction personnel. No construction access, parking or storage of equipment or materials will be permitted within such marked areas. A monitoring biologist(s) will be on-site during brush-clearing and grading of all coastal sage and cactus scrub vegetation.

2. Prior to any construction or grading activities, education of all project personnel regarding the prevention of harm, harassment, injury, or death of wildlife will be provided by the biological monitor. This instruction shall be given as often as necessary to ensure that all personnel working on-site are adequately briefed in the matter.

3. Except as necessary to respond to public health and safety concerns, or otherwise authorized by the Service, no physical disturbance of coastal sage or cactus scrub occupied by nesting coastal California gnatcatcher or cactus wrens will occur in the breeding season (approximately February 15 through August 30). Shell/MWD will provide the Service with maximum practicable notice of the need to proceed under such circumstances to allow for avoidance or other technique. With regard to construction required on the Shell project site, the breeding season limitation shall apply; provided that construction activities necessitating unexpected slope stabilization or erosion control measures ans emergency facility repairs be undertaken subject to the foregoing notice provision ans minimization of impacts requirement.

4. Shell/MWD, as appropriate, will notify the Service at least seven (7), preferably fourteen (14) calendar days prior to the clearing of cactus or coastal sage scrub habitat.

5. The monitoring biologist(s) will flush coastal California gnatcatchers, cactus wrens, and other wildlife from occupied habitat areas immediately prior to brush-clearing and earth-moving activities. The monitoring biologist(s) will ensure that no coastal California gnatcatchers or cactus wrens will be directly harmed by brush clearing and earth-moving equipment.

6. The monitor will be empowered to temporarily halt construction activities and make recommendations to ensure impact minimization, compliance with the relevant provisions of the incidental take statement, and that work does not take place in habitat areas outside the clearing limits as staked in the field.

7. Coastal sage or cactus scrub habitat within or immediately adjacent to project construction areas will be monitored. Prior to the commencement of grading operations or other activities involving significant soil disturbance, a survey will be conducted to locate all coastal California gnatcatchers and cactus wrens within 100 feet of the outer extent of projected soil disturbance activities, and will be clearly marked and identified on the construction grading/operations plans so that the monitor can make informed recommendations. The purpose of this monitoring will be either to verify that the construction does not adversely affect coastal California gnatcatcher or cactus wren activity or to determine whether “take” occurs, whichever the case may be. If this monitoring indicates that unauthorized take of coastal California gnatcatchers or cactus wrens has occurred, construction will cease pending coordination with the Service.

8. Vehicle transportation routes between cut-and-fill locations will be restricted to a minimum number during construction. Earth-moving equipment will be confined to the narrowest practicable corridor during construction. Waste dirt or rubble will not be deposited on adjacent, native vegetation. Earth-moving equipment will avoid unnecessary maneuvering in areas adjacent to protected habitat. Preconstruction meetings involving the monitoring biologist, construction supervisors, and equipment operators will be conducted and documented to ensure adherence to these measures.

APPENDIX 18:

“Template Federal Register Notices of Permit Issuance

Template Federal Register Notices of Permit Issuance

Example 1: One Permit

U.S. DEPARTMENT OF INTERIOR

Fish and Wildlife Service

and/or

U.S. DEPARTMENT OF COMMERCE

National Marine Fisheries Service

Issuance of Permit for Incidental Take of Endangered (or Threatened) Species

On [date], a notice was published in the Federal Register ([vol. no.]) FR [first page no.], that an application has been filed with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service (Service or Services) by [applicant(s) name(s), city and state], for a permit to incidentally take, pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973 (16 USC 1539), as amended, [common and scientific name of species] on [location of activity(ies)] pursuant to the terms of the [name of Habitat Conservation Plan].

Notice is hereby given that on [date], as authorized by the provisions of the Act, the Service(s) issued a permit (PRT-_____) to the above named party(ies) subject to certain conditions set forth therein. The permit was granted only after the Service(s) determined that it was applied for in good faith, that granting the permit will not be to the disadvantage of the endangered [and/or threatened] species, and that it will be consistent with the purpose and policy set forth in the Endangered Species Act, as amended.

Additional information on this permit action may be requested by contacting the [name, address, and telephone number of office] between the hours of [hours] weekdays.

Date:_____

_____

[Name of person signing]
[Title of person signing]
U.S. Fish and Wildlife Service

_____

[Name of person signing]
[Title of person signing]
National Marine Fisheries Service

Template Federal Register Notices of Permit Issuance

Example 2: Multiple Permits

U.S. DEPARTMENT OF INTERIOR

Fish and Wildlife Service

and/or

U.S. DEPARTMENT OF COMMERCE

National Marine Fisheries Service

Issuance of Permit for Incidental Take of Endangered (or Threatened) Species

Notice is hereby given that the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service (Service or Services has(ve) taken the following action with regard to permit applications duly received pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1974 (16 USC 1539), as amended. Each permit listed as issued was granted only after the Service(s) determined that it was applied for in good faith, that granting the permit will not be to the disadvantage of the endangered [and/or threatened] species, and that it will be consistent with the purpose and policy set forth in the Endangered Species Act, as amended.

Additional information on this permit action may be requested by contacting the [name, address, and telephone number of office] between the hours of [hours] weekdays.

Date:_____

_____
[Name of person signing]
[Title of person signing]
U.S. Fish and Wildlife Service

_____
[Name of person signing]
[Title of person signing]
National Marine Fisheries Service

California State Mining and Geology Board (SMGB)

Encroachment Permits

City of El Segundo Encroachment Permit Conditions

City of El Segundo

Public Works Department

Date: February 25, 2005

ENCROACHMENT PERMIT CONDITIONS FOR WORK IN THE PUBLIC RIGHT-OF-WAY

Reference: Title 9 Chapter 2 –
City Municipal Code and City Council Resolution No. 4202 (Permit Fees)

Note: Contractors are hereby notified that these conditions are intended to assist them by drawing their attention to some of the City requirements and **DO NOT** constitute a complete all inclusive list.

A. GENERAL

1. City Standards:

All work shall comply with the latest edition of the "Standard Specifications for Public Works Construction (The Green book)", "The APWA Standard Plans for Public Works Construction" and "California/OSHA construction safety orders."

2. Traffic Control:

Lane closures/blockage/installation of arrow boards, etc. shall comply with the latest edition of the "Work Area Traffic Control Handbook (WATCH Manual)". A minimum one (1) lane of traffic in each direction and access to private and emergency vehicles must be maintained at all times.

3. Storm Water Pollution Control:

Contractor shall comply with the City Municipal Code, Title 5 Chapter 4, which establishes storm water and urban runoff pollution prevention controls. Generally it is the contractor's responsibility to ensure that non-storm generated water or storm water contaminated by construction activities (i.e.: dirt, wash water from concrete trucks, construction material/equipment pollutants, etc.) does not enter the City Storm Drain System. Cleanup of any such contamination in the City storm drain system shall be the responsibility of the permittee.

350 Main Street, El Segundo, CA 90245-3895 - TEL 310-524-2300 FAX 310-640-0489

Encroachment Permit Conditions
(Continued)

4. Excavation/Trenching:

Contractor shall notify USA (Underground Service Alert – Dig Alert), at 1-800-227-2600, and obtain a "Dig Alert Identification Number" a minimum of two (2) working days prior to the start of excavation/trenching.

All existing utilities shall be located and protected by the contractor to the satisfaction of the particular utility company.

All trenches, obstructions, potential hazards, and excavations shall be protected by an adequate number of flashing amber light barricades.

Trenches/excavation that are five (5) feet or more in depth requires a separate shoring permit from California/OSHA (State Division of Industrial Safety).

5. Working Hours:

Note: At the beginning of the work, construction activities include start up of equipment and other preparatory work. At the end of the work, construction activities include site clean up and securing the project site.

Unless otherwise specified, construction activities are limited to Monday through Friday 7:00 am until 4:00 pm.

Construction activities on Aviation Boulevard, Imperial Highway, El Segundo Boulevard, Mariposa Avenue (east of Virginia Street), Grand Avenue, Rosecrans Avenue, and adjacent to schools (during school open days) are limited to Monday through Friday 9:00 am until 3:00 pm.

No work is permitted on weekends, City holidays or rain days.

6. Sepulveda Boulevard:

Any work or traffic control on Sepulveda Boulevard (State Highway Route 1), or on City cross streets, which will impact Sepulveda Boulevard traffic, shall require a Caltrans Encroachment Permit, prior to applying for a City permit.

7. Water Needed for Construction:

Using water from private property connections, without approval by the property owner, shall not be permitted.

Any contractor/permittee found to be using water from a City fire hydrant, without a temporary construction water meter installed by the City Water Division, will be charged $500.00 per occurrence against their permit deposit.

Permittees that need City water shall put down a deposit for a temporary construction water meter with the Department of Administrative Services. Upon receiving the proper paperwork from the Department of Administrative Services, Water Division personnel will install a water meter on the fire hydrant that will be used by the permittee. Permittee shall bear the cost of water used and other associated costs.

B. LICENSES

1. Contractor shall maintain a valid Contractor's State License for the proper License Class throughout the term of this permit.

2. Contractor shall maintain a valid City Business License throughout the term of this permit.

C. INSURANCE

Contractor shall submit valid liability insurance certification and endorsement naming this City as additionally insured in a form and dollar limits acceptable to the City and maintain this insurance throughout the term of this permit.

D. REMOVAL AND REPLACEMENT OF SURFACE IMPROVEMENTS

1. General:

Bituminous pavement, concrete pavement, curbs, sidewalks, or driveways shall be removed by saw cutting and replaced in accordance with the Standard Specifications unless otherwise specified in these specifications.

2. Bituminous Pavement:

a. Thickness of Asphalt Concrete (AC) patch shall be a minimum 1" thicker than the thickness of the existing pavement. New AC shall be installed in courses not exceeding 4" in the thickness.

b. Prior to start of excavation AC pavement shall be saw cut and removed.

Encroachment Permit Conditions
(Continued)

c. At locations where the edge of the excavation falls within four feet (4') of the adjacent curb face or gutter toe, the existing AC pavement shall be removed and replaced to the curb face or gutter toe.

d. Thickness of aggregate base under the AC base shall be two inches (2") greater than the existing base. However, if there is no existing base, a minimum of six (6) inches of crushed aggregate base shall be provided.

e. Prior to installing the AC base course, saw cut and remove a minimum 12" width of pavement on each side of the original excavation. Any remaining broken AC pavement beyond this 12" width shall be trimmed by saw cutting to neat straight lines. Base course shall be C2-AR-4000.

f. Prior to installing the AC finish course, the AC base course plus an additional minimum 12" width of existing pavement on both sides shall be cold planed so as to result in a minimum finish surface thickness of 1 ½ inches. Finish course shall be D2-AR-4000.

g. All existing pavement striping and markings (stop signs and crosswalks for example) obliterated by the trenching shall be replaced in kind.

3. **Concrete Improvements:**

a. Concrete improvements shall be removed by saw cutting.

b. The limits of removal and replacements will be determined in the field by the City's inspector. Prior to start of the replacement work, Contractor shall call the City's inspector to determine the scope of replacement work.

Sidewalks:	Replace to nearest score marks / construction joints.
Curbs:	Replace to nearest cold joint or minimum 10 feet length.
Intersections:	Up to existing joints within three (3) feet from the trench saw cut.

c. Contractor shall be responsible to protect the installed concrete improvements until they are adequately cured and ready to accept traffic.

4. **Time Limits:**

The street surfaces of all excavations shall be restored immediately after backfill compaction by temporary resurfacing and maintained until permanent resurfacing. Base course of permanent resurfacing shall be installed within five (5) days of backfill compaction and the finish course of permanent resurfacing shall be installed within five (5) days of installing the base course. Sidewalks shall be poured within five (5) days of removing existing sidewalks.

Encroachment Permit Conditions
(Continued)

5. **Traffic Striping and Pavement Markings:**

Apply temporary and permanent striping in accordance with Section 310-5.6 of Standard Specifications.

Place temporary striping after the base course of AC pavement has been completed in the same configuration as the existing permanent striping so that traffic can be returned to normal patterns. This striping shall be considered temporary and it is the contractor's responsibility to place and maintain.

Place temporary dribble lines within 24 hours after final paving and place permanent striping and pavement marking within seven (7) calendar days after final paving.

6. **Trench Plating:**

Plates used shall be skid proof. AC ramps shall be installed at plate edges to prevent rough driving conditions. At the option of the City (particularly adjacent to residential areas), the plates will be required to be welded to minimize noise problems.

7. **Unobstructed Access to Properties/Pedestrians/Emergency Vehicles, Etc.:**

Unobstructed access to properties, pedestrians and emergency vehicles shall be maintained at all times. Unless permanent pavement is placed immediately, temporary asphalt (cold mix) pavement, minimum 2" in thickness, shall be placed and maintained at locations as determined by the City until permanent pavement is installed. City representatives have the right to enter upon the encroached right-of-way at any time for any purpose. Permittee waives any and all claims for damages incurred as the result of the City's use of its public property.

8. **Removal of USA Markings:**

Prior to final acceptance and as required by the City, Contractor shall remove all installed USA paint markings on pavement surfaces.

9. **Replacement of Existing Centerline Ties:**

All existing centerline ties, which are removed or damaged during construction, shall be replaced by licensed surveyor at the permittee's cost.

E. **Final Acceptance:**

It is the contractor's responsibility to call for final inspection and permit sign-off prior to processing of the deposit refund, less costs incurred by the City, for damages and corrective action.

City of Gardena Encroachment Permit Application Form

MINUTEMAN PRESS, GARDENA, CA 442181-08

INSTRUCTIONS TO APPLICANT

IMPORTANT
Use Ball Point Pen.
Press Firmly. No Erasures Allowed

VALIDATION

APPLICATION FOR ENCROACHMENT/CONSTRUCTION PERMIT

CITY OF GARDENA

ENGINEERING DIVISION
(310) 217-9528
24 HOUR NOTICE REQUIRED FOR ALL INSPECTIONS

PERMIT NO.	INSPECTOR'S COPY
ISSUED BY	DATE ISSUED

THIS PERMIT OR CERTIFIED COPY SHALL BE KEPT ON THE JOB TO BE SHOWN TO ANY AGENT OF THE CITY UPON REQUEST.

FOR APPLICANT TO FILL IN

BUILDING ADDRESS

PERMITTEE

MAIL ADDRESS

CITY | ZIP CODE | TEL. NO.

STATE LIC. NO. | CITY LIC. NO. | EMERGENCY TEL. NO.

OWNER

ADDRESS | TEL. NO.

SPECIAL REQUIREMENTS

DESCRIPTION OF WORK

STARTING DATE _____ EST. DATE OF COMPLETION _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION GIVEN IS CORRECT.

I AGREE TO COMPLY WITH ALL APPLICABLE CITY ORDINANCES AND STATE LAWS AND WITH THE REQUIREMENTS OF THIS PERMIT.

☐ I CERTIFY THAT I POSSESS A CURRENT WORKMEN'S COMPENSATION INSURANCE POLICY.
DATE OF EXPIRATION _____

☐ I CERTIFY THAT I AM THE LEGAL OWNER OF THE DESCRIBED PROPERTY.

SIGNATURE OF PERMITTEE _____ DATE _____

ADDRESS _____

AUTHORIZED AGENT _____

PERMITTEE SHALL CALL PUBLIC WORKS DEPARTMENT FOR INSPECTIONS (MINIMUM OF 24 HOURS PRIOR TO INSPECTION):

	DATE	INSPECTOR
☐ EXCAVATION		
☐ SUBGRADE		
☐ BACKFILL		
☐ BASE		
☐ FORMS		
☐ PAVEMENT		
☐ FINAL		

DESCRIPTION OF WORK

	DEPOSIT	FEE
SIDEWALK	$	$
CURB & GUTTER	$	$
DRIVEWAY	$	$
CURB DRAIN	$	$
PAVEMENT	$	$
SEWER CONNECTION	$	$
STREET TREE	$	$
	$	$
	$	$
	$	$
	$	$
	$	$
	$	$
TOTAL	$	$

RETURN DEPOSIT TO:

INSPECTOR'S SIGNATURE _____ DATE _____

NOTE: THIS PERMIT SHALL BECOME VOID UNLESS THE WORK PERMITTED IS COMMENCED AND DILIGENTLY PURSUED WITHIN 60 DAYS FROM ISSUANCE.

3227

City of Gardena Application for Excavation – Construction Permit

MINUTEMAN PRESS, GARDENA, CA 301474-CT

INSTRUCTIONS TO APPLICANT

IMPORTANT
Use Ball Point Pen.
Press Firmly. No Erasures Allowed

VALIDATION

APPLICATION FOR EXCAVATION - CONSTRUCTION PERMIT

CITY OF GARDENA

ENGINEERING DIVISION
(310) 217-9500 EXT. 329 OR 332
24 HOUR NOTICE REQUIRED FOR ALL INSPECTIONS

PERMIT NO.

INSPECTOR'S COPY

ISSUED BY

DATE ISSUED

THIS PERMIT OR CERTIFIED COPY SHALL BE KEPT ON THE JOB TO BE SHOWN TO ANY AGENT OF THE CITY UPON REQUEST.

FOR APPLICANT TO FILL IN

BUILDING ADDRESS

PERMITTEE

MAIL ADDRESS

CITY | ZIP CODE | TEL. NO.

STATE LIC. NO. | CITY LIC. NO. | EMERGENCY TEL. NO.

OWNER

ADDRESS | TEL. NO.

SPECIAL REQUIREMENTS

PERMITTEE SHALL CALL PUBLIC WORKS DEPARTMENT FOR INSPECTIONS (MINIMUM OF 24 HOURS PRIOR TO INSPECTION):

	DATE	INSPECTOR
☐ EXCAVATION		
☐ SUBGRADE		
☐ BACKFILL		
☐ BASE		
☐ FORMS		
☐ PAVEMENT		
☐ _____		
☐ _____		
☐ _____		
☐ _____		
☐ FINAL		

DESCRIPTION OF WORK

STARTING DATE _____ EST. DATE OF COMPLETION _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION GIVEN IS CORRECT.

I AGREE TO COMPLY WITH ALL APPLICABLE CITY ORDINANCES AND STATE LAWS AND WITH THE REQUIREMENTS OF THIS PERMIT.

☐ I CERTIFY THAT I POSSESS A CURRENT WORKMEN'S COMPENSATION INSURANCE POLICY.
DATE OF EXPIRATION _____

☐ I CERIFY THAT I AM THE LEGAL OWNER OF THE DESCRIBED PROPERTY

DATE _____

SIGNATURE OF PERMITTEE _____

ADDRESS _____

AUTHORIZED AGENT _____

DESCRIPTION OF WORK

	DEPOSIT	FEE
SIDEWALK	$	$
CURB & GUTTER	$	$
DRIVEWAY	$	$
CURB DRAIN	$	$
PAVEMENT	$	$
SEWER CONNECTION	$	$
STREET TREE	$	$
	$	$
	$	$
TOTAL	$	$

RETURN DEPOSIT TO

INSPECTOR'S SIGNATURE

DATE

NOTE: THIS PERMIT SHALL BECOME VOID UNLESS THE WORK PERMITTED IS COMMENCED AND DILIGENTLY PURSUED WITHIN 60 DAYS FROM ISSUANCE

City of Lawndale Encroachment and Excavation Permit

Department of Public Works
Engineering Division
Phone: (310) 349-2980
Fax: (310) 978-9862

Permit No. 31254

CITY OF HAWTHORNE

ENCROACHMENT AND EXCAVATION PERMIT

PERMITTEE / OWNER

Name _____

Address _____

_____

Phone _____(____)_____

Fax _____(____)_____

Cell Phone _____(____)_____

CONTRACTOR

Name _____

Address _____

_____

24-Hour Emergency Phone _____(____)_____

Contractor State License No. _____

City Business License No. _____

Insurance Verified Yes _____ No _____

I hereby acknowledge that I have read this application and state that the information given is correct.

This Permit is a temporary priviledge to encroach in Public Right of Way to the extent permitted. The City has the right to cancel such permit at any time.

I agree to comply with all applicable City Ordinances and state laws and with the requirements of this permit.

Signature of Permittee or Authorized Agent

X_____ Date_____

Address _____

Location of work (street, limits, or address)

_____

_____

City Atlas Map Page _____ Lot # _____

THIS PERMIT FOR:

- ☐ Street Closure
- ☐ Testing / Monitoring Well
- ☐ Street Improvement
- ☐ Sewer
- ☐ Underground Utility
- ☐ Overhead Utility
- ☐ Driveway Approach
- ☐ Sidewalk
- ☐ Curb & Gutter
- ☐ Fiber Optics
- ☐ Dumpster
- ☐ Other: _____

Description of Work: _____

_____

_____

_____

☐ Utility Plan Check has been completed for this project

Work Hours in the Public Right-of-Way 9 AM to 3:30 PM

A COPY OF THIS PERMIT SHALL BE MAINTAINED AT THE JOB SITE

THIS PERMIT IS VALID ONLY FOR DATES SHOWN

Starting date _____ Est. date completed _____

Plans attached _____ Dwg. No. _____

OFFICE USE ONLY

Permittee call Engineering Department at (310) 349-2980 for inspections checked below: 24 hours prior to inspection

No Installation / Work Shall Covered Prior Until Inspected by the City Staff

	DATE	INSPECTOR
☐ Continuous		
☐ Excavation		
☐ Forms		
☐ Backfill		
☐ Pavement		
☐ Pipe Installation		
☐ _____		
☐ Sewer / ☐ Gas		☐ Electrical / ☐ Fuel
☒ Final		

SPECIAL REQUIREMENTS

☐ One sack slurry cement in all pavement areas is required

_____

_____

☐ Soil Tests Required
☐ Traffic Control Plan Required (M.U.T.C.D.)
☐ Liability Insurance Required
☐ Site / Work shall be approved by an agency representative prior to beginning work.
☐ Preconstruction Meeting is Required
☐ All Trench repair shall be per City Standard
☐ Plans & Specifications shall be submitted to Engineering Division

Additional requirements:

_____

_____

_____

_____

Issued by _____ Date _____

Total Fees _____ CK # _____

DESCRIPTION OF WORK

EXCAVATION:

	UNITS	LENGTH	WIDTH	FEE
☐ AC pavement				
☐ PCC pavement				
☐ PCC sidewalk				
☐ PCC curb & Gutter				
☐ Driveway Approach				
☐ Monitoring Well(s)				
☐ Parkway				
☐ Fiber Optics Installation				
☐ Driveway Removal				
☐ Traffic Signal Installation				

☐ Conduit ☐ Service

SEWER:

- ☐ Property line connection
- ☐ Wye in street
- ☐ Saddle in street
- ☐ Manhole
- ☐ Other

Location

_____ feet _____ of _____ manhole

_____ feet _____ of _____ manhole

Depth

_____ feet, at property line

_____ feet, at property line

☐ Restoration Bond Required Amount _____

Minimum Bond $5000.00

Date Posted _____ Date Released _____

Release approved by _____

☐ Cash Restoration Deposit Amount _____

Minimum Cash Deposit $5000.00

Refund approved by _____

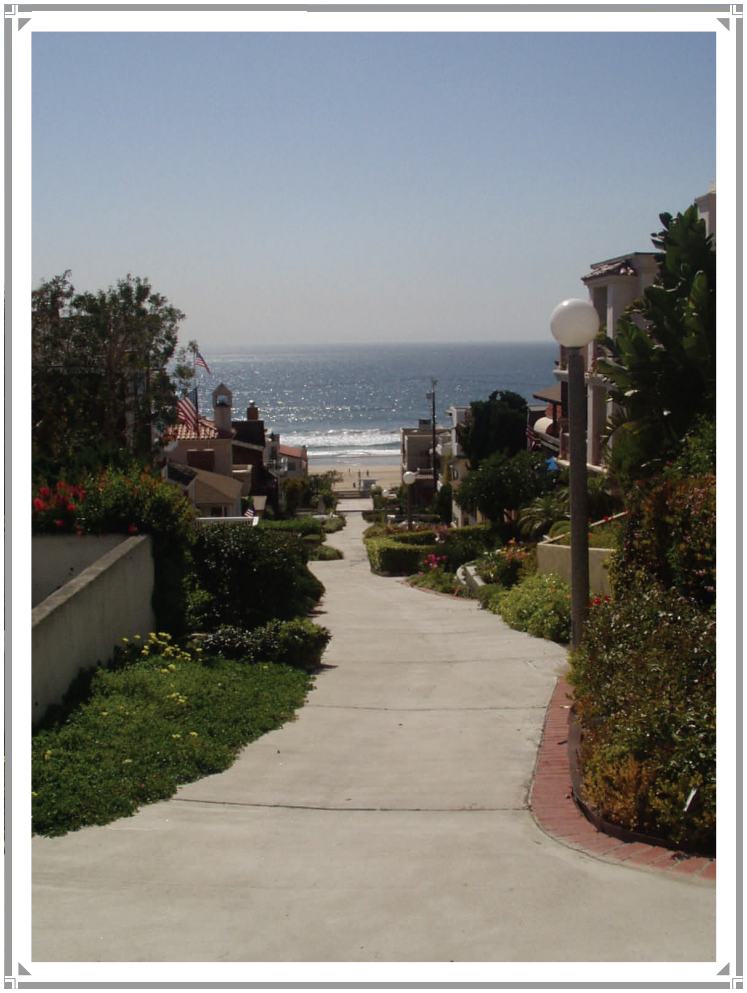
Date _____

Final Inspection MUST be requested and satisfactorily complete prior to any refund or Release of Bond

POST ON JOB

City of Manhattan Beach Construction and Landscaping on Public Property Booklet

Construction and Landscaping on Public Property



City of Manhattan Beach
Community Development Department
1400 Highland Avenue
310-802-5504
www.citymb.info
January, 2004

Construction and Landscaping on Public Property

The purpose of this document is to facilitate understanding of the ordinances and standards that regulate private construction on public property next to both walk streets and vehicular streets. Copies of these ordinances may be obtained through the Community Development Department. This manual is divided into five sections: General Standards, Walk Street Standards, El Porto Strand Standards, Vehicular Street Standards, and Submittal Requirements.

Encroachment Permits are required to allow small improvements on the public property that is used by the adjoining property owner. Improvements must be attractive and non-obtrusive to the public, consistent with building safety standards, and compatible with surrounding developments. In order to ensure that private construction on public property meets the goals of the community, the City Council adopted Ordinances 2039 and 2042 on February 18, 2003. These ordinances codified encroachment and street construction policies, guidelines and standards. Ordinance 2039 covers encroachments for private use (MBMC 7.36) and Ordinance 2042 covers street improvements for public use (MBMC 9.72.015).

Subject to certain standards and conditions, adjoining property owners may apply for an encroachment permit to construct a variety of improvements within the encroachment area (generally defined as the portion of public property located between the property line and the edge of the roadway, curb, or sidewalk).

The intent of these standards is to encourage low profile construction on public property and maintain vistas of the ocean and a sense of openness along these pedestrian corridors. Encroachment standards for walk streets generally allow for walkways, patios and decks, low fences, walls and landscaping.

Other than walk streets, the majority of the City's streets are constructed in a traditional fashion with a well defined edge of pavement and drainage systems. There are however, areas that have been developed without such well defined boundaries. In these cases, the public property may extend well beyond the edge of the paved roadway. In these areas the adjoining property owner may initiate the construction of allowed improvements. The City may also require the adjoining property owner to make improvements on public property when private improvements are proposed within either the encroachment area, or adjoining private property. In general, private improvements on public property adjacent to vehicular streets include low fences and walls, landscaping, pavement and various improvements such as walkways, curbs and parking pads.

General Standards

- Improvements not specifically addresssed in the following document are not permitted on public property.

- Landscaping is permitted without an encroachment permit in accordance with a submitted and approved landscape plan. Artificial landscape materials are prohibited.

- All encroachments must be in conformance with Title 5, Chapter 5.84 of the Municipal Code pertaining to storm water pollution control.

- Obstructions to neighboring scenic views must be avoided.

- Existing improvements which do not conform to current standards must be removed or brought into conformance if the related structure on the adjoining property is significantly remodeled or reconstructed or if any new significant construction is proposed in the encroachment area. Existing permitted improvements that have been made non-conforming by changes to these standards may otherwise remain provided any nonconforming element is not increased or expanded.

- Routine maintenance and repair may be performed on a nonconforming encroachment structure or improvement and replacement with a comparable improvement is permitted upon demonstration that the encroachment is deteriorated and creating an unsafe condition.

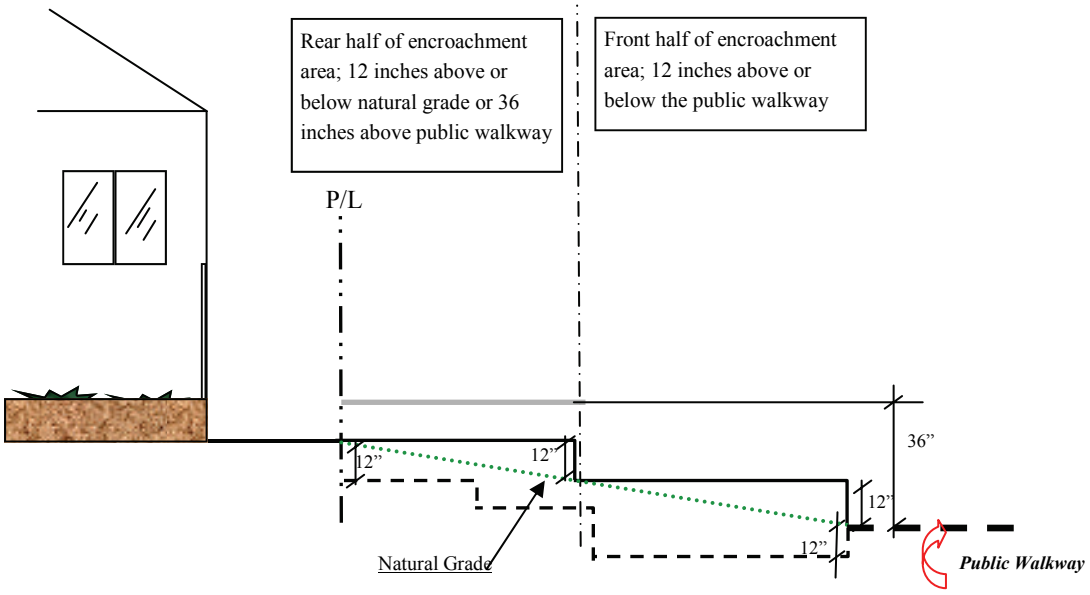
- Commercial use of the public property is prohibited, with the exception of sidewalk dining permits, building projections, roof access, and utility elements as determined appropriate by the Director of Community Development.

Walk Street Standards

USABLE SURFACES

Usable Surfaces are generally defined as any relatively level surface (hardscape or landscape) upon which a person can stand, excluding a walkway not exceeding 44 inches in width that provides access from the public property to private property.

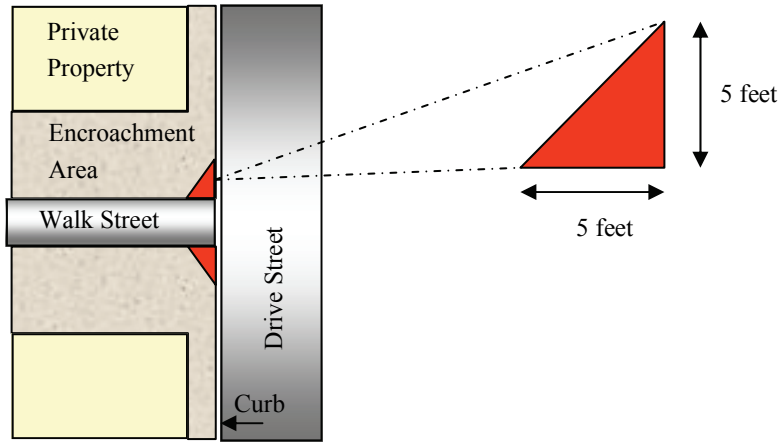
Within the front half of the encroachment area (adjacent to the public walkway), usable surfaces are limited to a maximum height of 12 inches above or below the adjacent public walkway. Within the rear half of the encroachment area (next to the private property), usable surfaces are limited to a maximum height of either: 36 inches above or below the adjacent public walkway, or 12 inches above or below the natural grade. “Natural Grade” is defined as a straight line from the improved public walkway grade to the existing front property line grade.



FENCES AND WALLS

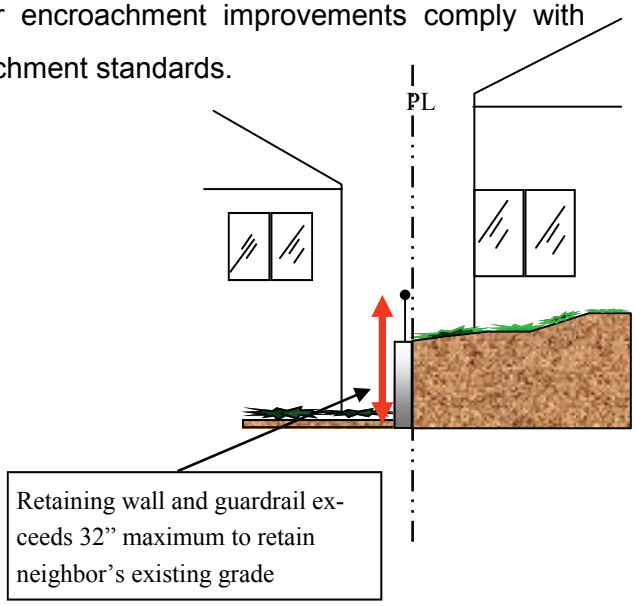
Fences and railings, including required safety handrails and guardrails, are permitted provided an open design is utilized. The maximum allowable height is 42 inches above the adjacent public walkway.

To help ensure pedestrians are visible to motorists, a 36 inches maximum height limit (measured from the adjacent curb level) is required within distance of 5 feet from the street corner.



Retaining walls (not including walkway risers), free-standing walls and closed design fences are permitted at a maximum height of 32 inches above the adjacent public walkway. Conditions requiring guardrails that exceed the 32 inch height limit are prohibited.

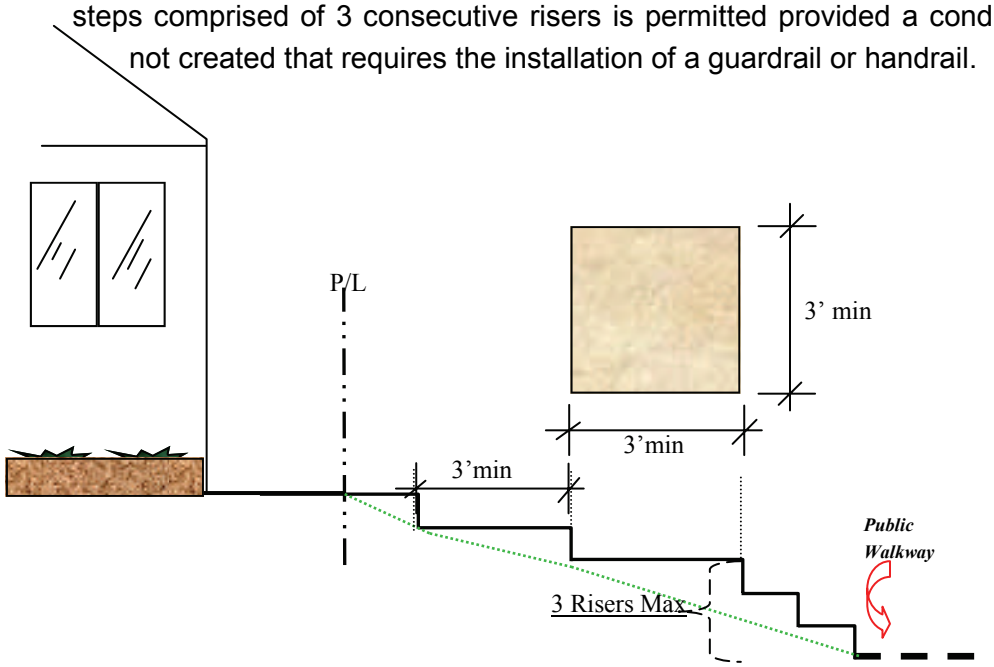
Exception: Retaining walls and related required safety railing that exceed the 32 inch limit may be constructed at the side boundaries of an encroachment area if necessary to retain a neighbor’s existing grade, provided all other encroachment improvements comply with applicable encroachment standards.



The total combined height of fences, railings, retaining walls (including walkway risers) shall not exceed a height of 42 inches as measured from lowest adjacent finished grade.

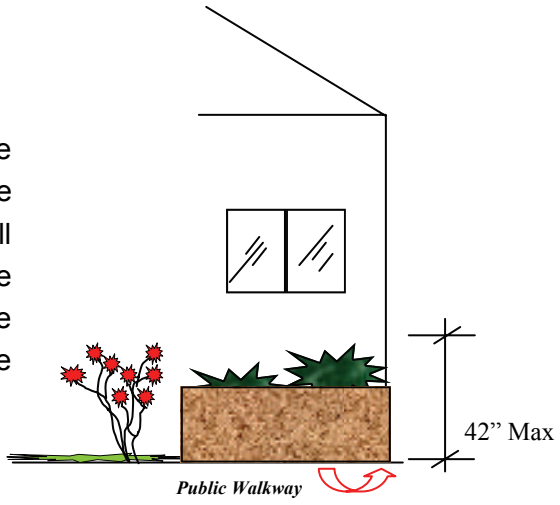
STEPS AND STAIRS

Steps and stairs are generally prohibited on public property, unless they are spaced a minimum of 3 feet apart, essentially creating a landing. One set of steps comprised of 3 consecutive risers is permitted provided a condition is not created that requires the installation of a guardrail or handrail.



LANDSCAPING

A minimum of one-third of the encroachment area shall be landscaped. Landscaping shall not project over or onto the public walkway and shall be limited to 42 inches above the adjacent public walkway.



If it is determined that a residential view is impaired, the Director of Community Development shall direct the owner of the property adjacent to the encroachment landscaping to trim the over-height landscaping to 42 inches maximum. Should the property owner fail to act, the Director of Community Development may cause the landscaping to be trimmed, with the expense borne by the property owner.

DRAINAGE

Drainage from a private collection system that discharges a concentrated flow shall be directed to a public vehicular alley or street via a non-erosive device pursuant to Public Works Department construction standards except as permitted by the Director of Public Works. Drainage is not allowed to be discharged in a concentrated flow over a public walkway.

UTILITIES

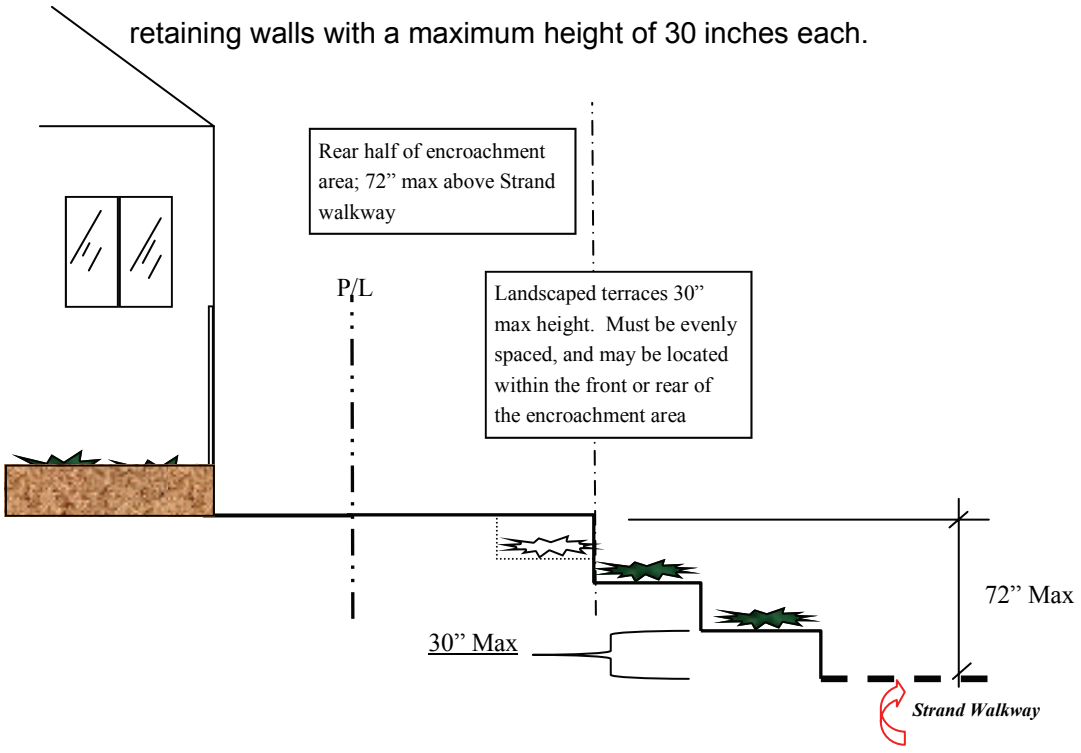
A minimum of 30 inches of clearance is required on each side of all water and sewer mains for free-standing and retaining walls with a continuous footing, unless otherwise approved by the Director of Public Works.

El Porto Strand Standards

In addition to the encroachments permitted in the Walk Street Standards, the following encroachments are permitted within the Strand public property north of Rosecrans Avenue due to unusual slope and underground utility location.

USABLE SURFACES

Usable surfaces are permitted within the rear half of the encroachment area (next to the private property) at a maximum height of 72 inches measured from the adjacent Strand walkway, provided they are accompanied by terraced landscape planters with evenly spaced retaining walls with a maximum height of 30 inches each.



FENCES AND WALLS

Fences and walls are permitted to be a maximum height of 42 inches above the adjacent Strand walkway except that terraced landscaped planter walls, as allowed in the Usable Surfaces section on the previous page may have a maximum combined height of 72 inches.

Corner properties bordering a parking lot entrance or exit are allowed to have walls and fences on the vehicular street side to a maximum height of 6 feet above the adjacent curb level except that a maximum height of 3 feet shall be permitted adjacent to driveway/roadway intersections.

Vehicular Street Standards (Private Improvements)

Where public property exists adjacent to private property that has not been improved for public use, the unimproved areas may be developed according to the following standards. These areas are labled as "Encroachment Area" on the following two diagrams (pages 14 and 15).

FENCES AND WALLS

Fences and walls are limited to a maximum height of 42 inches, measured from the existing adjacent public property grade at the fence or wall location. Open-design fences or guard rails required by the Building Official to exceed the 42 inch maximum height are allowed on top of retaining walls if necessary to retain a neighbor's grade at a side property line.

A minimum setback of 2 feet is required behind existing or required street improvements (labled as "Lowscape" on the following diagrams). These areas may be improved with low-lying landscape, such as ground-cover or grass.

VISIBILITY AND ACCESS

To ensure visibility and access at street corners, limitations may be required for corner properties. Additional limitations may be imposed on fences and walls near driveways to ensure traffic visibility. As these situations need to be evaluated on a case-by-case basis, please contact the City Public Works Department for more information (310) 802-5300.

MATERIALS

Ground cover such as pavement (including brick or other decorative surfaces) and landscaping are permitted on the existing grade in the encroachment area. Decks or similar structures placed on or elevated above the existing public property are prohibited.

Loose gravel and similar material as determined by the Public Works Department are not permitted.

GRADING

Significant alteration of the existing public property grade is prohibited, unless determined to be necessary to accommodate a required public street improvement.

DRAINAGE

Drainage from a private collection system that discharges a concentrated flow shall be directed to a public vehicular alley or street via a non-erosive device pursuant to Public Works Department construction standards except as permitted by the Director of Public Works. Drainage is not allowed to be discharged in a concentrated flow over a public walkway.

UTILITIES

A minimum of 30 inches of clearance is required on each side of all water and sewer mains for free-standing and retaining walls with a continuous footing, unless otherwise approved by the Director of Public Works.

Vehicular Street Standards (Required Improvements for Public Uses)

Pursuant to Ordinance 2042, street improvements, including sidewalks, curbs, gutters, parking pads and paving may be required by the Public Works Department for the purpose of maintaining or improving conditions related to drainage, visibility, access, maneuverability or public parking, and, if required, shall be constructed in compliance with City standards.

Street improvements will be required as a condition of a building permit on any property abutting public property which would result in the alteration or addition of more than fifty percent (50%) of the value of the existing structure located on private property.

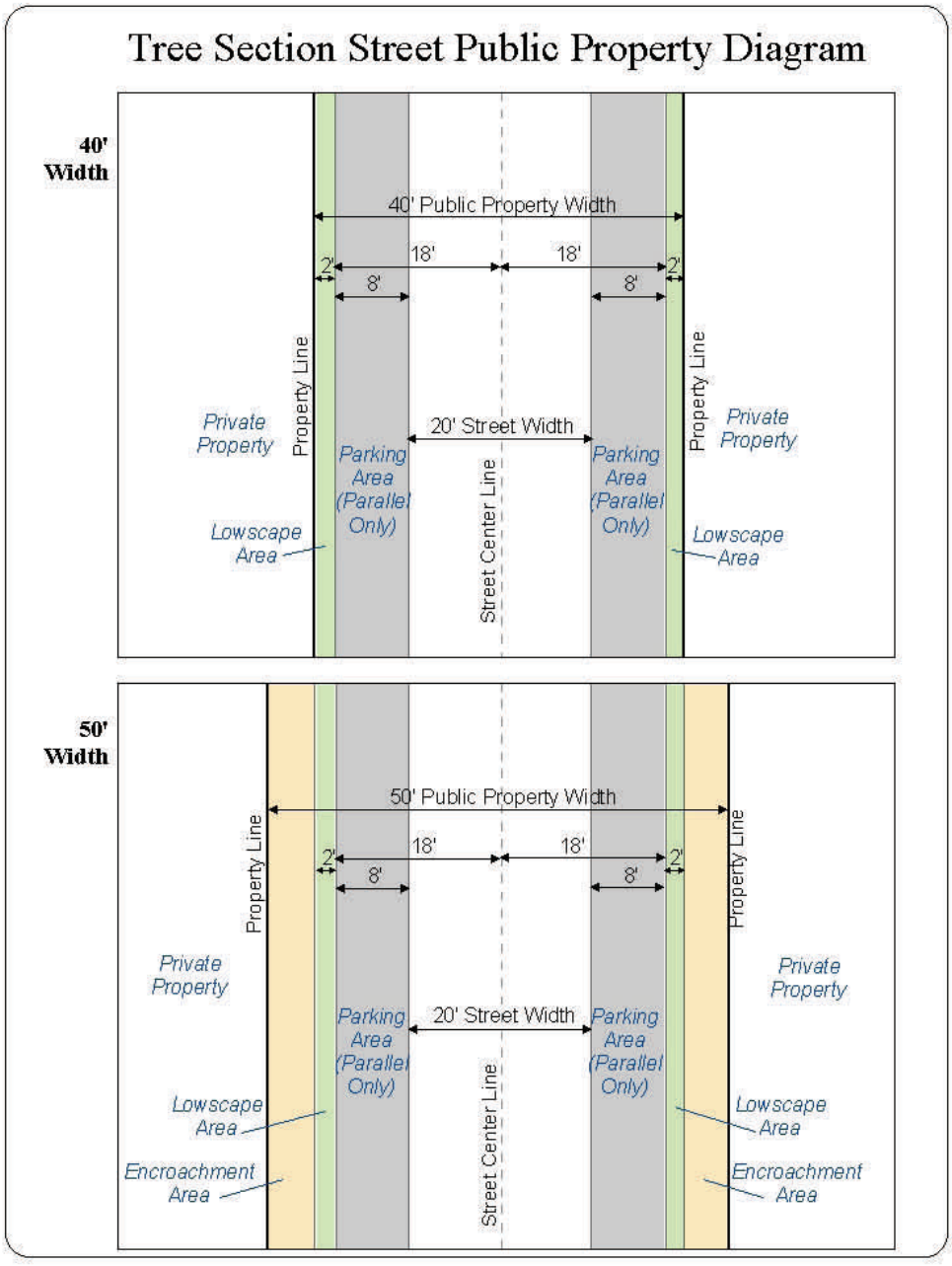
The following diagrams are intended to help the private property owner determine the appropriate locations for both “private” and “required” public property improvements throughout different areas of the City.

TREE SECTION

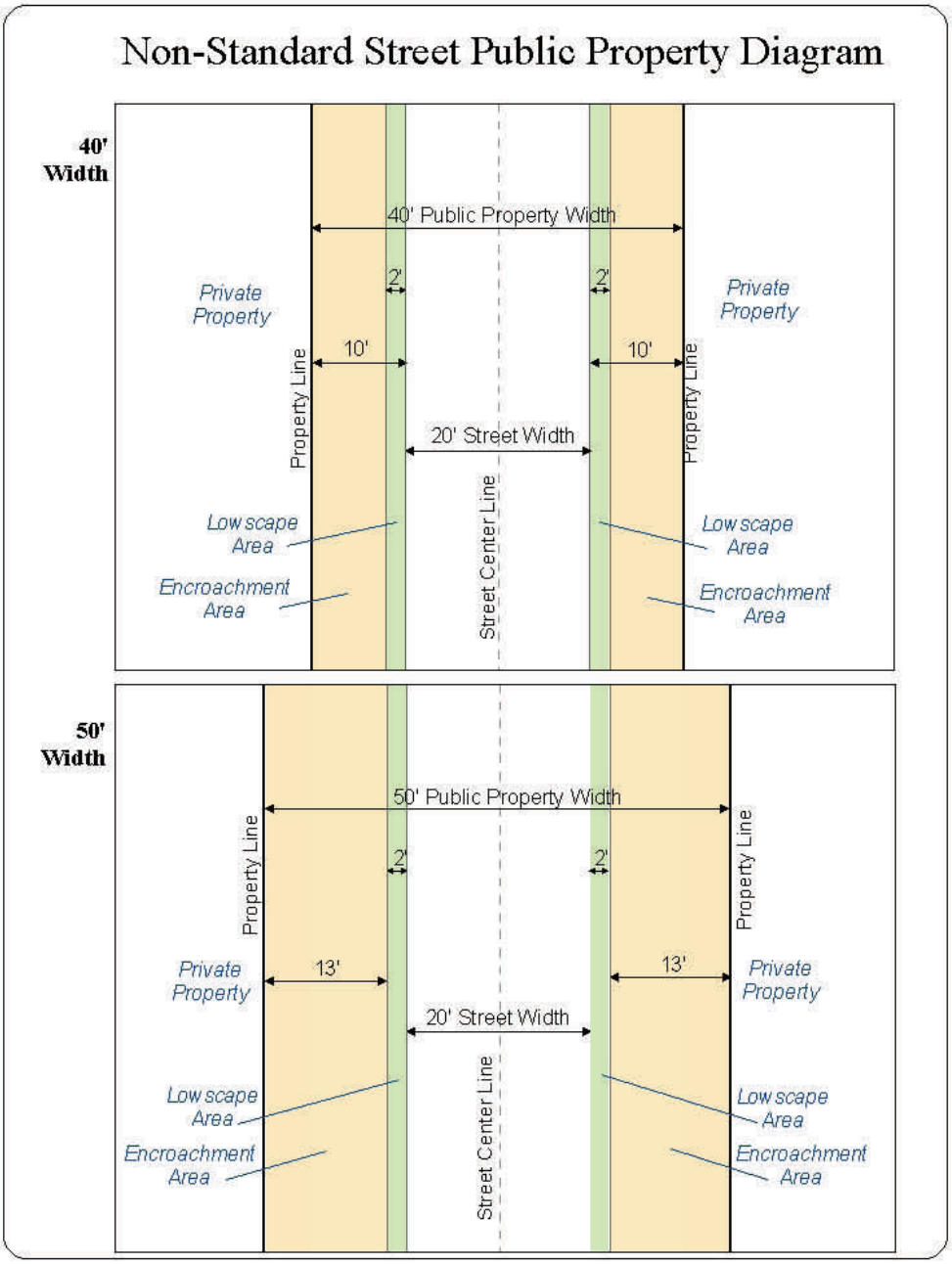
The Tree Section of Manhattan Beach is bounded by Rosecrans Avenue on the North, Sepulveda Boulevard on the East, Manhattan Beach Boulevard to the South; and a West boundary beginning with Manhattan Beach Boulevard and progressing north on Valley and again north along Blanche and Bell (as seen on the following map).

Tree Section Public Property Width

The following diagrams illustrate improvements which may be required within the Tree Section.



This diagram illustrates improvements on non-standard streets (ie. no improved curb, gutter and sidewalk). These areas are generally not located within the Tree Section, with some exceptions.



Submittal and Process Requirements

SUBMITTAL

The following items may be required for an Encroachment Permit for private development on the public property. The encroachment plan shall be included in the blueprint drawings submitted for development on private property if the Encroachment Permit is proposed in conjunction with a Building Permit Application. If no other building construction is being proposed, other than the construction in the encroachment area, drawings shall be submitted independently. An Encroachment Permit Application must also be completed and submitted along with the required plans. Plans that do not conform to the standards explained in this document can only be approved by the City Council after review by the City Parking and Public Improvements Commission (PPIC). It is recommended that conceptual plans be reviewed with a planner and the Public Works Department prior to the preparation of final plans.

The following list consists of the general requirements for permit submittal. More or less information may be required depending on the complexity of the project.

1. FOUR (4) COPIES OF ARCHITECTURAL PLANS, with the following items:

   Site Plan, **Elevation Drawings** from the front and both sides, and **Cross Section Views** showing, dimensioning, and labeling the following:

   - North arrow;
   - Appropriate scale for legibility;
   - Encroachment area boundaries, adjacent property lines, adjacent public right-of-way improvements (such as sidewalk, street, walk street, etc.), and adjacent street and walk street centerlines;

- Elevation points of public walkway (edge of walkway, top of curb, etc.), neighboring private property grades, and finished surfaces (decks, patios, landings, etc);
- Elevation points of all structures (top of wall, top of fence, etc.), finished surface, existing grade, and finished grade;
- Location and elevation (finished floor, finished grade) of adjoining building on private property;
- Existing and proposed structures, fences, planters, and retaining walls;
- Proposed materials for all new construction;
- Existing and proposed steps, landings, decks, patios, handrails, and guardrails;
- Existing and proposed utilities within the public property including: water mains, house water meter boxes, sewer main lines, manholes and clean-outs, street lighting, and electrical power lines;
- Existing and proposed lighting;
- Existing and proposed landscaped areas; and
- Elevation points of landscaped areas (finished grade).

Landscape Plan of proposed and existing-to-remain landscaping showing:

- All irrigation (sprinkler heads, backflow device, etc.);
- Types of landscaping (ground cover, shrub, tree, etc.), common and botanical names, size, and quantities of plants; and
- Percentage of proposed public property landscaping.

Drainage Plan showing:

- Proposed drainage pattern; and
- That all site drainage will terminate at an approved public way location via a non-erosive device.

2. **TOPOGRAPHIC/BOUNDARY SURVEY** may also be required depending upon scope of project.

.

FINAL APPROVAL

An on-site inspection is required for development on public property and will be conducted by either the Building Division, Planning Division, or Public Works Department depending on the nature of the improvements. Prior to final inspection of encroachment improvements, the property owner will be required to provide the following:

- Insurance endorsement and certificate of insurance naming the City as additional insured; and
- A notarized Encroachment Permit Agreement that contains the terms and conditions of the permit approval.

REVOCATION

Permits may be modified or revoked by the City Council if the applicant fails to comply with any of the encroachment requirements.

FURTHER INFORMATION

For questions or further information regarding private construction on public property, please visit the City's website at www.citymb.info, contact the Planning Division at (310) 802-5504, or visit the Community Development Counter Monday through Friday between the hours of 8:00 AM to 5:00 PM.

City of Manhattan Beach Encroachment Permit Application

ENCROACHMENT PERMIT APPLICATION

Chapter 7.36 MBMC

Manhattan Beach City Hall 1400 Highland Avenue Manhattan Beach, CA 90266

Telephone (310) 802-5500 FAX (310) 802-5501 TDD (310) 546-3501

Applicant/Agent-Name/number_____Date _____

Owners **MAILING** Address _____Phone # (____)_____

City:_____State:_____ Zip:_____E-mail _____

PROJECT Address _____

Encroachment Located on_____ Street, Avenue, etc. (If on more than one street, note **both**)

Name(s) of **LEGAL OWNER**(s) **(AS SHOWN ON TITLE)**_____

_____

Proposed Encroachment **(Check all that apply and describe)** ☐ **Deck/Patio**_____ ☐ **Fence/Wall**_____

☐ **Walkway/landings**_____ ☐ **Steps**_____ ☐ **Landscaping**_____

☐ **Irrigation (Plumbing permit required)** ☐ **Lighting/Electrical (Electrical Permit Required)** ☐ **Other (Describe)**____

_____

Owner certifies he/she has read the standard Encroachment Permit Standards, shall comply with said Standards, and shall not commence the construction of any private improvements in the public right of way without proper approval by the Community Development Department. This Encroachment Permit shall be valid for six (6) months after issuance. Additionally, a right-of-way permit shall be required for all work in the public right-of-way.

Signature (s) _____

Fee Schedule			
	❑ Permit Application	$1,495.00	Permit Fee (4502): _____
	❑ Permit Transfer or Minor Revision	$700.00	Total: _____
	❑ Permit Appeal to PPIC	$500.00	

For Office Use Only:

Legal Description _____

Map Book _____ Page (s) _____ APN_____

Bldg Permit # _____ (if applicable) New House: Yes___ No___

Comments/Notes: Water Main location:_____

Sewer Main location:_____

Public Works OK: Yes___ No___

Agreement Submitted: Yes___ No___ **Insurance Submitted:** Yes____ No____

Other:_____

_____

Approved / Denied _____ Date _____

Community Development Department

City of Redondo Beach Engineering Permit Guidelines

CITY OF REDONDO BEACH
DEPARTMENT OF ENGINEERING & BUILDING SERVICES
ENGINEERING PERMIT GUIDELINES

REGULATIONS

- **PURSUANT TO TITLE 7 OF THE REDONDO BEACH MUNICIPAL CODE, NO WORK SHALL BE PERFORMED WITHIN THE PUBLIC RIGHT-OF-WAY, WITHOUT FIRST OBTAINING A PERMIT FROM THE CITY ENGINEER.**
- **ALL WORKS WITHIN THE PUBLIC RIGHT-OF WAY SHALL BE PERFORMED BY A STATE LICENSED CONTRACTOR OF THE PROPER LICENSE CLASS.**
- THIS PERMIT SHALL BECOME **NULL AND VOID** IF WORK PERMITTED THEREBY IS PERFORMED IN VIOLATION OF ANY APPLICABLE FEDERAL, STATE OR LOCAL LAW, RULE OR REGULATION, INCLUDING THIS PERMIT GUIDELINES.
- THIS PERMIT IS VALID ONLY TO THE EXTENT OF THE JURISDICTION OF THE CITY OF REDONDO BEACH. PERMITS REQUIRED BY OTHER INTERESTED AGENCIES IS THE RESPONSIBILITY OF BOTH, THE PERMITTEE AND CONTRACTOR.
- THIS PERMIT IS SUBJECT TO **PRIOR** ACTIVE PERMITS, AGREEMENTS, COVENANTS, EASEMENTS, PRIVILEGES AND ALL OTHER RIGHTS, RECORDED AND UNRECORDED, IN THE AREA OF THE PERMITTED WORK. IT IS THE RESPONSIBILITY OF BOTH, THE PERMITTEE AND THE CONTRACTOR, TO MAKE THE NECESSARY ARRANGEMENT WITH THE HOLDERS OF SUCH RIGHTS.
- UPON A WRITTEN NOTICE, THE CITY ENGINEER AND/OR HIS REPRESENTATIVE MAY CANCEL OR REVOKE THIS PERMIT FOR ANY CAUSE WHATSOEVER. CONSEQUENTLY, THE CONTRACTOR, SHALL RESTORE ALL AFFECTED IMPROVEMENTS TO ITS ORIGINAL CONDITION, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE, AT CONTRACTOR'S SOLE COST, AND VACATE THE PUBLIC RIGHT-OF-WAY. SHOULD THE CONTRACTOR, FAIL TO RESTORE THE AFFECTED IMPROVEMENTS TO ITS ORIGINAL CONDITION, THE CITY SHALL EITHER PERFORM THE RESTORATION WORK, OR HAVE THE WORK PERFORMED BY AN OUTSIDE CONTRACTOR. **THE PERMITTEE AND THE CONTRACTOR, JOINTLY AND INDIVIDUALLY, HEREBY AGREE TO REIMBURSE THE CITY FOR THE COST OF SAID CITY-FINANCED RESTORATION WORK, WITHIN THIRTY (30) CALENDAR DAYS FROM THE DATE OF RECEIPT OF A STATEMENT FROM THE CITY.**
- **ANY COST INCURRED BY THE PERMITTEE AND/OR THE CONTRACTOR, AS A RESULT OF THE CONDITIONS OF THIS PERMIT OR AS A RESULT OF THE CITY EXERCISING ANY OF THE CITY'S RIGHTS OR AUTHORITIES, SHALL BE BORN BY THE PERMITTEE AND/OR THE CONTRACTOR RESPECTIVELY.**

LICENSING

- CONTRACTOR SHALL MAINTAIN AN ACTIVE CONTRACTOR'S STATE LICENSE OF THE PROPER LICENSE CLASS, THROUGHOUT THE TERM OF THIS PERMIT.
- CONTRACTOR SHALL MAINTAIN AN ACTIVE REDONDO BEACH CITY BUSINESS LICENSE, THROUGHOUT THE TERM OF THIS PERMIT.

INSURANCE, SUBROGATION & INDEMNITY

- PERMITTEE AND/OR CONTRACTOR SHALL MAINTAIN ON CITY FILES, THROUGHOUT THE TERM OF THIS PERMIT, A **CITY-APPROVED GENERAL LIABILITY INSURANCE POLICY AND ENDORSEMENT NAMING THE CITY ADDITIONAL INSURED ON PRIMARY BASIS. INSURERS MUST BE ADMITTED TO DO BUSINESS IN THE STATE OF CALIFORNIA AND POSSESS A CURRENT A.M. BEST'S RATING OF NO LESS THAN "A:VII".**
- PERMITTEE AND/OR CONTRACTOR SHALL MAINTAIN ON CITY FILES, THROUGHOUT THE TERM OF THIS PERMIT, A **CITY-APPROVED WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY OR DECLARATION.**
- **SIGNING THIS PERMIT IS PRIMA FACIE EVIDENCE THAT PERMITTEE AND/OR CONTRACTOR, JOINTLY AND INDIVIDUALLY, HEREBY WAIVE(S) THEIR/ITS RIGHT OF SUBROGATION AGAINST THE CITY OF REDONDO BEACH, ITS OFFICERS, ELECTED AND APPOINTED OFFICIALS, EMPLOYEES AND VOLUNTEERS FOR ANY LOSS, LIABILITY, DAMAGE, OR COST SUSTAINED BY ANY PERSON OR PROPERTY, ARISING OUT OF WORK OR OPERATIONS PERFORMED BY OR ON BEHALF OF THE PERMITTEE AND/OR CONTRACTOR, INCLUDING MATERIALS, PARTS, OR EQUIPMENT FURNISHED IN CONNECTION WITH SUCH WORK OR OPERATIONS.**
- **SIGNING THIS PERMIT IS PRIMA FACIE EVIDENCE THAT PERMITTEE AND/OR CONTRACTOR, JOINTLY AND INDIVIDUALLY, HEREBY AGREE(S) TO INDEMNIFY, DEFEND AND HOLD HARMLESS THE CITY OF REDONDO BEACH, ITS OFFICERS, ELECTED AND APPOINTED OFFICIALS, EMPLOYEES AND VOLUNTEERS AGAINST ANY LOSS, LIABILITY, DAMAGE, OR COST SUSTAINED BY ANY PERSON OR PROPERTY, ARISING OUT OF WORK OR OPERATIONS PERFORMED BY OR ON BEHALF OF THE PERMITTEE AND/OR CONTRACTOR, INCLUDING MATERIALS, PARTS, OR EQUIPMENT FURNISHED IN CONNECTION WITH SUCH WORK OR OPERATIONS.**

SIGNS & NOTIFICATION

- **PERMITTEE AND/OR CONTRACTOR SHALL POST ONE (1), 18"X12", WEATHERPROOF SIGN AT EVERY ENTRANCE TO EACH BLOCK OF THE AFFECTED PUBLIC RIGHT-OF-WAY. SAID SIGN SHALL CONTAIN THE NAMES OF THE PERMITTEE AND THE CONTRACTOR, THE CONSTRUCTION HOURS AND A 24-HOUR TELEPHONE NUMBER.**
- PERMITTEE AND/OR CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF ENGINEERING AND BUILDING SERVICES **TWO (2) WORKING DAYS PRIOR TO THE COMMENCEMENT OF ANY WORK** WITHIN THE PUBLIC RIGHT-OF-WAY.
- PERMITTEE AND/OR CONTRACTOR SHALL NOTIFY NEIGHBORING RESIDENTS AND BUSINESSES **TWO (2) WORKING DAYS PRIOR TO THE COMMENCEMENT OF ANY WORK** WITHIN THE PUBLIC RIGHT-OF-WAY.
- WRITTEN NOTICES SHALL PROVIDE THE PERMITTEE'S AND/OR CONTRACTOR'S 24-HOUR TELEPHONE NUMBER, THE NATURE OF THE PROPOSED WORK AS WELL AS THE ANTICIPATED TIME OF COMMENCEMENT AND COMPLETION OF SAID WORK.
- **THE CITY ENGINEER AND/OR HIS REPRESENTATIVE SHALL APPROVE ALL WRITTEN NOTICES PRIOR TO DISTRIBUTION.**

TIME

- **ACTUAL CONSTRUCTION SHALL COMMENCE NO EARLIER THAN 7:00 A.M. AND SHALL CEASE NO LATER THAN 6:00 P.M., MONDAY THROUGH FRIDAY.**
- WORK WITHIN THE PUBLIC RIGHT-OF-WAY, SHALL BE PERFORMED BETWEEN THE HOURS OF **9:00 A.M. AND 3:00 P.M., MONDAY THROUGH FRIDAY**, IF SAID WORK FALLS WITHIN THE FOLLOWING MAJOR THOROUGHFARES:

  1. **AVIATION BOULEVARD.**
  2. **BERYL STREET.**
  3. **CAMINO REAL.**
  4. **CATALINA AVENUE.**
  5. **INGLEWOOD AVENUE.**
  6. **MANHATTAN BEACH BOULEVARD.**
  7. **MARINE AVENUE.**
  8. **PALOS VERDES BOULEVARD.**
  9. **PROSPECT AVENUE.**
  10. **TORRANCE BOULEVARD.**
  11. **190TH / ANITA STREET.**

  NO WORK WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED DURING THE FOLLOWING HOLIDAYS.

  1. **MEMORIAL DAY.**
  2. **INDEPENDENCE DAY.**
  3. **LABOR DAY.**
  4. **THANKSGIVING DAY AND THE FOLLOWING DAY.**
  5. **CHRISTMAS DAY AND THE PREVIOUS DAY.**
  6. **NEW YEARS DAY AND THE PREVIOUS DAY.**

- **NO WORK WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED ON SATURDAYS WITHOUT THE PRIOR WRITTEN CONSENT OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE. WORK AUTHORIZED FOR SATURDAYS, SHALL BE PERFORMED BETWEEN THE HOURS OF 9:00 A.M. AND 5:00 P.M.**
- **NO WORK WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED ON SUNDAYS.**
- THIS PERMIT SHALL BECOME **NULL AND VOID** UNLESS WORK PERMITTED THEREBY IS COMMENCED AND DILIGENTLY PURSUED WITHIN **(180) CALENDAR DAYS** FROM THE DATE OF ISSUANCE OF THIS PERMIT.
- THIS PERMIT SHALL BECOME **NULL AND VOID** IF WORK PERMITTED THEREBY IS SUSPENDED FOR ANY REASON WHATSOEVER, AT ANY TIME DURING CONSTRUCTION, FOR **(180) CALENDAR DAYS**.

UTILITIES

- PERMITTEE AND/OR CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT AT ITS TOLL FREE NUMBER, **1-800-227-2600, TWO (2) WORKING DAYS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION**. SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER TO BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID.
- CONTRACTOR SHALL LOCATE AND PROTECT EXISTING UTILITIES AT CONTRACTOR'S SOLE COST.
- CONTRACTOR SHALL REPAIR, AT THE CONTRACTOR'S SOLE COST, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE, ANY DAMAGE INFLICTED BY OR ON BEHALF OF THE CONTRACTOR ON EXISTING UTILITIES.

LANDSCAPING

PERMITTEE AND/OR CONTRACTOR SHALL REPLACE IN KIND, AT THEIR/ITS COST, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE, TREES AND ALL OTHER LANDSCAPING AND IRRIGATION ELEMENTS THAT ARE REMOVED FROM PUBLIC RIGHT-OF-WAY PER THE APPROVED PROJECT PLANS OR PER THE DIRECTIONS OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.

TRAFFIC CONTROL

- CONTRACTOR SHALL SUBMIT TRAFFIC DELINEATION PLANS TO THE CITY ENGINEER AND/OR HIS REPRESENTATIVE FOR APPROVAL.
- WHEN THE REQUIREMENT FOR TRAFFIC DELINEATION PLANS IS WAIVED BY THE CITY ENGINEER AND/OR HIS REPRESENTATIVE, CONTRACTOR SHALL EXECUTE TRAFFIC DELINEATION IN ACCORDANCE WITH THE LATEST EDITION OF THE **BNI "WATCH MANUAL**", AS AMENDED, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.

- CONTRACTOR SHALL OBTAIN APPROVAL OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE, AS WELL AS THE POLICE DEPARTMENT, **PRIOR** TO POSTING NO-PARKING SIGNS.
- CONTRACTOR SHALL POST NO-PARKING SIGNS **(72) HOURS PRIOR TO ENFORCEMENT.**
- CONTRACTOR SHALL ENSURE THAT COMMERCIAL VEHICLES TRANSPORTING SOIL, EQUIPMENT OR CONSTRUCTION MATERIALS, AND HAVING UNLADEN WEIGHT, AS DEFINED IN SECTION 660 OF CVC, OF 6,000 POUNDS OR MORE, OR HAVING MANUFACTURER'S GROSS WEIGHT RATING, AS DEFINED IN SECTION 390 OF CVC, OF 10,000 POUNDS OR MORE, SHALL USE DESIGNATED TRUCK ROUTE TO COMMUTE TO PROJECT SITE. ANY COMMERCIAL VEHICLE HAVING A FULLY LADEN WEIGHT OF 20,000 POUNDS OR MORE **SHALL NOT USE CONDITIONAL TRUCK ROUTE** . MAPS SHOWING TRUCK ROUTES ARE AVAILABLE FROM THE DEPARTMENT OF ENGINEERING AND BUILDING SERVICES.

PERFORMANCE

- CONTRACTOR SHALL ENSURE THAT **ALL WORKS** COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITION OF **CAL/OSHA CONSTRUCTION SAFETY ORDERS**, AS AMENDED, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE. EXCAVATIONS EQUALS OR EXCEEDS FIVE (5) FEET IN DEPTH, INTO WHICH A PERSON IS REQUIRED TO DESCEND, AND THE CONSTRUCTION OR THE DEMOLITION OF ANY SCAFFOLDING FALSEWORK, BUILDING OR STRUCTURE MORE THAN THREE STORIES HIGH, REQUIRE A SEPARATE PERMIT FROM CAL/OSHA.
- CONTRACTOR SHALL ENSURE THAT **ALL WORKS** COMPLY WITH THE REQUIREMENTS OF THE **CLEAN WATER ACT (CWA)** AND THE **NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)**, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE. CONTRACTOR SHALL ADHERE TO THE SELECTED **BEST MANAGEMENT PRACTICES (BMP)** PLAN AND ALL ADDITIONAL CORRECTIVE STEPS AS REQUIRED BY THE CITY ENGINEER AND/OR HIS REPRESENTATIVE. **CONTRACTOR IS HEREBY ADVISED THAT CONTRACTOR SHALL BE SUBJECT TO FINES FROM THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (CRWQCB), THE STATE DEPARTMENT OF FISH AND GAME AND THE UNITED STATES COAST GUARD FOR ANY WATER POLLUTION CAUSED BY THE CONTRACTOR.**
- UNLESS DIRECTED OTHERWISE BY THE CITY, CONTRACTOR SHALL ENSURE THAT **ALL WORKS WITHIN THE PUBLIC RIGHT-OF-WAY**, COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE **AMERICAN PUBLIC WORKS ASSOCIATION (APWA) STANDARD PLANS AND SPECIFICATIONS**, AS AMENDED, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT THE CONSTRUCTION, DEMOLITION OR ABANDONMENT OF WATER WELLS, MONITORING WELLS AND CATHODIC PROTECTION WELLS, COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE **CALIFORNIA WELL STANDARDS**, ISSUED BY THE **CALIFORNIA DEPARTMENT OF WATER RESOURCES**, AS AMENDED, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- PERMITTEE AND/OR CONTRACTOR SHALL KEEP THE PUBLIC RIGHT-OF-WAY CLEAN AND CLEAR FOR PEDESTRIAN AND VEHICULAR TRAFFIC AT ALL TIMES, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- PERMITTEE AND/OR CONTRACTOR SHALL STORE NEITHER DEBRIS, MATERIALS NOR EQUIPMENT WITHIN THE PUBLIC RIGHT-OF-WAY, WITHOUT THE **PRIOR WRITTEN CONSENT** OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- PERMITTEE AND/OR CONTRACTOR SHALL ENFORCE THE CITY'S DUST CONTROL REQUIREMENTS AT ALL TIMES, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- PERMITTEE AND/OR CONTRACTOR SHALL ENFORCE THE CITY'S NOISE CONTROL REQUIREMENTS AT ALL TIMES, TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
- **CONTRACTOR'S COPY OF THIS PERMIT, INCLUDING ALL ATTACHMENTS, ALONG WITH AN APPROVED SET OF PROJECT PLANS AND SPECIFICATIONS, SHALL BE KEPT AT THE PROJECT SITE, READY FOR INSPECTION BY ANY AUTHORIZED AGENT OF THE CITY, UPON DEMAND.**

REPORTS

PERMITTEE AND/OR CONTRACTOR SHALL SUBMIT THE FOLLOWING TO THE DEPARTMENT OF ENGINEERING AND BUILDING SERVICES, DURING CONSTRUCTION AND **PRIOR TO REQUESTING FINAL INSPECTION:**

1. CONCRETE CLASS REPORTS.
2. ASPHALT CLASS REPORTS.
3. COMPACTION REPORTS.
4. ALL OTHER REPORTS AND DOCUMENTS AS REQUESTED BY THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.

INSPECTION

- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT ALL WORKS WITHIN THE PUBLIC RIGHT-OF-WAY ARE INSPECTED AND APPROVED BY THE PUBLIC WORKS INSPECTOR.
- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT STORM DRAIN SYSTEMS, SUMP PUMPS, AND OIL/WATER SEPARATORS, ON PRIVATE PROPERTY, ARE INSPECTED AND APPROVED BY THE PUBLIC WORKS INSPECTOR.
- PERMITTEE AND/OR CONTRACTOR SHALL ARRANGE FOR PUBLIC WORKS INSPECTION **(24) HOURS IN ADVANCE.**
- PERMITTEE AND/OR CONTRACTOR SHALL CONTACT THE DEPARTMENT OF ENGINEERING AND BUILDING SERVICES AT **(310) 318-0661** FOR ALL INSPECTION REQUESTS.
- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT **FIRST INSPECTION** TAKE PLACE WHEN **ONE OR MORE** OF THE FOLLOWING OCCUR:

  1. ALL FORMS HAVE BEEN PROPERLY INSTALLED AND ARE READY TO RECEIVE CONCRETE.
  2. A SUBSTRATUM IN A PAVEMENT SECTION HAS BEEN PROPERLY INSTALLED, COMPACTED, HAD PASSED THE REQUIRED COMPACTION TEST, PRIMED AND IS READY TO RECEIVE THE NEXT LAYER OF PAVEMENT.
  3. ALL PIPES AND CONDUITS HAVE BEEN PROPERLY INSTALLED INTO THEIR TRENCHES, AND ARE READY TO BE COVERED.

- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT **SECOND INSPECTION** TAKE PLACE WHEN **ONE OR MORE** OF THE FOLLOWING OCCUR:

  1. CONCRETE IS BEING POURED AND FINISHED.
  2. SUBBASE, BASE OR ASPHALTIC CONCRETE LAYER IS BEING INSTALLED.
  3. TRENCHES ARE BEING BACKFILLED AND COMPACTED.

- PERMITTEE AND/OR CONTRACTOR SHALL ENSURE THAT **FINAL INSPECTION** TAKE PLACE SUBSEQUENT TO **ALL** OF THE FOLLOWING:

  1. ALL REQUIRED REPORTS AND/OR DOCUMENTS HAVE BEEN RECEIVED AND ACCEPTED BY THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.
  2. ALL PERMITTED WORK IS COMPLETED.
  3. THE ENTIRE PROJECT HAS BEEN INSPECTED AND FINALIZED BY THE CITY'S BUILDING DIVISION.

DEPOSITS AND BONDS

- IF ALL WORKS ARE INSPECTED AND FOUND TO BE IN ORDER, POSTED DEPOSITS AND BONDS SHALL BE RELEASED WITHIN **APPROXIMATELY THIRTY (30) CALENDAR DAYS FROM THE DATE OF FINAL INSPECTION**, LESS ANY AND ALL CHARGES AND PENALTIES INCURRED.
- IF CITY CREWS ARE CALLED UPON TO PERFORM WORK WITHIN THE PUBLIC RIGHT-OF-WAY, DUE TO THE NEGLIGENCE OF THE PERMITTEE AND/OR CONTRACTOR, ALL EXPENSES INCURRED BY THE CITY CREWS, SHALL BE DEDUCTED FROM ANY AND ALL DEPOSITS AND BONDS POSTED WITH THE CITY BY THE PERMITTEE AND/OR CONTRACTOR.

CIVIL DEBT

IF ALL DEPOSITS AND BONDS POSTED BY THE PERMITTEE WITH THE CITY ARE NOT SUFFICIENT TO COVER CHARGES AND PENALTIES INCURRED BY THE PERMITTEE, THEN THE BALANCE OF ANY AND ALL PENALTIES AND CHARGES INCURRED BY THE PERMITTEE SHALL BE CHARGED AS A CIVIL DEBT TO THE PERMITTEE, AND MAY BE COLLECTED BY THE CITY IN THE SAME MANNER AS IT COLLECTS ANY OTHER CIVIL DEBT OR OBLIGATION.

STATEMENT AND AGREEMENT

WE, THE PERMITTEE AND THE CONTRACTOR, HEREBY STATE THAT WE HAVE READ AND UNDERSTAND THE ABOVE GUIDELINES OF THIS PERMIT. WE, THE PERMITTEE AND THE CONTRACTOR, HEREBY AGREE TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS INCLUDING THE ABOVE GUIDELINES OF THIS PERMIT.

NAME OF PERMITTEE: _____

SIGNATURE OF PERMITTEE OR AUTHORIZED AGENT: _____

NAME OF CONTRACTOR: _____

SIGNATURE OF CONTRACTOR OR AUTHORIZED AGENT:
_____

PROJECT ADDRESS: _____

DATE: _____ **PERMIT NO.:** _____

City of Redondo Beach Engineering Permit Application

CITY OF REDONDO BEACH
DEPARTMENT OF ENGINEERING & BUILDING SERVICES
ENGINEERING PERMIT

PERMITTEE

NAME: _____ ☐ **PAYER**

ADDRESS: _____

CITY: _____ ZIP: _____

HOME PHONE: (____)_____ WORK PHONE: (____)_____

CITY BUSINESS LICENSE: _____ EXPIRES: _____

CONTRACTOR

I, THE UNDERSIGNED, HEREBY DECLARE THAT I AM A CONTRACTOR LICENSED UNDER THE PROVISIONS OF SECTION 7000, CHAPTER 9, DIVISION 3 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT MY LICENSE, LISTED BELOW, IS AND WILL REMAIN IN FULL FORCE AND EFFECT FOR THE TERM OF THIS PERMIT.

NAME: _____ ☐ **PAYER**

ADDRESS: _____

CITY: _____ ZIP: _____

BUSINESS PHONE: (____)_____ 24 HR. PHONE: (____)_____

STATE LICENSE NO: _____ CLASS: _____ EXPIRES: _____

CITY BUSINESS LICENSE: _____ EXPIRES: _____

PERMIT TYPE

WORK WITHIN THE PUBLIC RIGHT-OF-WAY

☐ ROAD ☐ SEWER ☐ DRAINAGE ☐ ENCROACHMENT

☐ DUMPSTER ☐ WELL ☐ NEWS RACK ☐ BANNER

☐ UTILITIES ☐ AGREEMENT ☐ OTHER: _____

WORK DESCRIPTION: _____

WORK WITHIN PRIVATE PROPERTY

☐ GRADING ☐ DEMOLITION ☐ OTHER: _____

WORK DESCRIPTION: _____

WE, THE PERMITTEE AND THE CONTRACTOR, INDIVIDUALLY AND COLLECTIVELY, HEREBY ACKNOWLEDGE THAT WE HAVE READ THIS APPLICATION, AND STATE THAT THE INFORMATION THAT WE HAVE GIVEN ABOVE, IS CORRECT. WE, THE PERMITTEE AND THE CONTRACTOR, INDIVIDUALLY AND COLLECTIVELY, UNDERSTAND THAT THE WORK DESCRIBED ABOVE WILL BE PERFORMED STRICTLY BY THE ABOVE LISTED CONTRACTOR. WE, THE PERMITTEE AND THE CONTRACTOR, INDIVIDUALLY AND COLLECTIVELY, HEREBY AGREE TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS, INCLUDING THE ATTACHED GUIDELINES OF THIS PERMIT.

SIGNATURE OF PERMITTEE
OR AUTHORIZED AGENT: _____ DATE: _____

SIGNATURE OF CONTRACTOR
OR AUTHORIZED AGENT: _____ DATE: _____

ISSUED BY: _____ DATE: _____

PERMIT NO.

RECEIPT NO.

PROJECT ADDRESS:

ATTACHMENTS TO ORIGINAL

	COPY	EXPIRES
	PERMITTEE'S CA ID	
	CONTRACTOR'S CA ID	
	CONTRACTOR'S STATE LICENSE ID	
	INSURANCE CERTIFICATE	
	OTHER:	

	COPY
	NPDES FORMS
	PERMIT GUIDELINES
	SIGNATURE AUTHORIZATION
	INSPECTION

FEES, DEPOSIT, AND BOND

	PERMIT FEE	
	INSPECTION FEE	
	OTHER:	
	TOTAL FEES	

	CASH DEPOSIT	
	DEDUCTION	
	TOTAL REFUND	

PERFORMANCE BOND NO.

INSPECTION RECORD

1. _____

2. _____

☐ CONCRETE CLASS REPORT ☐ ASPHALT CLASS REPORT

☐ COMPACTION REPORT ☐ OTHER: _____

☐ **FINAL INSPECTION**

INSPECTED BY: _____ DATE: _____

RELEASED BY: _____ DATE: _____

WORK SHEET

City of Redondo Beach NPDES Certification Form

CITY OF REDONDO BEACH

DEPARTMENT OF ENGINEERING & BUILDING SERVICES

NPDES CERTIFICATION FORM

REGULATIONS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) IS THE PORTION OF ***THE CLEAN WATER ACT (CWA)*** THAT APPLIES TO THE PROTECTION OF RECEIVING WATERS. IF A PROJECT INVOLVES A CONSTRUCTION ACTIVITY THAT DISTURBS A GROUND SURFACE AREA OF ***FIVE (5)*** ACRES OR MORE, OR IF SAID ACTIVITY RESULTS IN THE DISTURBANCE OF LESS THAN ***FIVE (5)*** ACRES OF A GROUND SURFACE AREA BUT IS A PART OF A LARGER COMMON PLAN OF DEVELOPMENT OR SITE THAT EXCEEDS ***FIVE (5)*** ACRES, THE PROJECT WILL BE SUBJECT TO REQUIREMENTS OF THE CALIFORNIA GENERAL PERMIT FOR STORMWATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES ***(PERMIT NO. CAS000002)*** UNDER THE NPDES PROGRAM. WHEN A PROJECT IS SUBJECT TO THE REQUIREMENTS OF PERMIT NO. CAS000002, A ***NOTICE OF INTENT (NOI)*** IS REQUIRED TO BE FILED WITH THE ***STATE WATER RESOURCES CONTROL BOARD (SWRCB)*** AND A ***STORMWATER POLLUTION PREVENTION PLAN (SWPPP)*** IS REQUIRED TO BE PREPARED, APPROVED, IMPLEMENTED AND AVAILABLE AT THE PROJECT SITE FOR REVIEW AND VERIFICATION AT ALL TIMES.

PROJECT INFORMATION

PROJECT ADDRESS: _____ PERMIT NO.: _____

PERMITTEE: _____ CONTRACTOR: _____

STATEMENT (I)

WE, THE UNDERSIGNED, HEREBY STATE THAT WE HAVE READ, UNDERSTAND THE AFOREMENTIONED REGULATIONS AND THAT THIS PROJECT IS NOT SUBJECT TO THE REQUIREMENTS OF NPDES PERMIT NO. CAS000002.

_____ _____

SIGNATURE OF PERMITTEE OR AUTHORIZED REPRESENTATIVE — DATE

_____ _____

SIGNATURE OF CONTRACTOR OR AUTHORIZED REPRESENTATIVE — DATE

STATEMENT (II)

WE, THE UNDERSIGNED, HEREBY STATE THAT WE HAVE READ, UNDERSTAND THE AFOREMENTIONED REGULATIONS AND THAT THIS PROJECT IS SUBJECT TO THE REQUIREMENTS OF NPDES PERMIT NO. CAS000002. FURTHER, WE HEREBY STATE THAT A NOTICE OF INTENT (NOI) HAS BEEN FILED WITH THE STATE WATER RESOURCES CONTROL BOARD (SWRCB) AND THAT A STORMWATER POLLUTION PREVENTION PLAN HAS BEEN PREPARED, APPROVED AND SHALL BE FULLY IMPLEMENTED TO THE SATISFACTION OF THE CITY ENGINEER AND/OR HIS REPRESENTATIVE.

_____ _____

SIGNATURE OF PERMITTEE OR AUTHORIZED REPRESENTATIVE — DATE

_____ _____

SIGNATURE OF CONTRACTOR OR AUTHORIZED REPRESENTATIVE — DATE

LACDPW Construction and Encroachment Permit Requirements

THESE REQUIREMENTS ARE ATTACHED TO AND MADE A PART OF PERMIT NO. _____

Construction and Encroachment Permit Requirements

GENERAL REQUIREMENTS

1. All work shall comply with the current " GREENBOOK " (Standard Specifications for Public Works Construction) and " GRAYBOOK " (Additions and Amendments to the Standard Specifications for Public Works Construction), and applicable State and Local laws.

2. If at any time subsequent to the exercising of this Permit it becomes necessary again to repair such surface due to settlement or any other cause directly attributed to this Permit, the permittee shall pay the Director the cost of such additional repair or, the Director may require the permittee to make the repair. (Highway Permit Ordinance Section 16.14.040)

3. Authorization for excavations for removal or construction of substructures by this Permit require the Permittee to receive a "ticket number" from Underground Service Alert, telephone number 1-800-422-4133, and said "Ticket number" is entered on the face of the Permit by the permittee. Underground Service Alert requires a minimum of 48 hours notice prior to the beginning of excavation to verify the location of existing underground facilities. "GREENBOOK" (Section 5)

TRAFFIC REQUIREMENTS

1. Special Traffic Control Provisions must comply with current "GRAYBOOK" (Section 7-10.3) and "GREENBOOK" (Section 7-10) requirements unless a specific control plan is approved as part of the Permit.

2. No street shall be closed without prior approval of the Director or authorized representative. A written request, along with a traffic plan prepared by a civil engineer, an application must be to the County of Los Angeles Department of Public Works, Attention: Construction Division Permits Engineer, P.O. Box 1460, Alhambra, CA 91802-1460.

3. Streets to be posted, as "TEMPORARY NO PARKING" must be done 48 hours prior to starting work. Only County approved "TEMPORARY NO PARKING" signs shall be used. Signs are available for purchase at each Department of Public Works Permit Office.

REQUIREMENTS FOR PAVEMENT RESURFACING IN HIGHWAY PERMITTEE TO REPAIR

1. Installation of temporary or new pavement resurfacing must comply with Section 306-1.5 of the "GREENBOOK" and "GRAYBOOK"

LACDPW Road Closure Permit Guidelines

ROAD CLOSURE PERMIT GUIDELINES FOR BLOCK PARTIES, CARNIVALS, SPECIAL EVENTS AND CONSTRUCTION PROJECTS

1. An Encroachment Permit issued by the Los Angeles County Department of Public Works is required for any proposed road closure.

2. The Department of Public Works must determine that there will be no significant disruption in neighborhood circulation.

3. The Department of Public Works must notify the Supervisorial District office affected by the road closure.

4. Applicant must obtain the written agreement of all residents along the segment of street to be closed.

5. Applicant must obtain the concurrence for the closure from the Sheriffs and Fire Departments and the California Highway Patrol (CHP). Applicant must coordinate detours with any affected transit agency if there is a bus route(s) on the street.

6. Documentation of liability insurance coverage in the amount per the latest "Green Book" requirements with the County of Los Angeles named as co-insured along with the Department's Endorsement Form.

7. Applicant must provide the necessary barricades, signing and detour route to effectuate the closure including parked cars and other solid barricades placed across the entire street width.

8. In addition to the non-refundable permit issuance fee and a $250 security deposit to insure street clean-up, an inspection deposit of $100 minimum per day is required for every day that the traffic control apparatus (i.e. barricades, delineators, signing, etc.) is in use. If Traffic and Lighting Division (TNL) is reviewing the Traffic Detour Plan, an additional deposit will be required to cover the costs of the review. (Per Los Angeles County Highways Code 16.10.010)

9. Traffic Detour Plans for all major streets must be stamped and signed by a registered Civil Engineer. All other residential road closures may require same.

10. A complete permit application package must be submitted **at least 30 days prior** to the requested closure date. All the necessary approvals, agreements, insurance documentation, deposits, and fee must be submitted to:

COUNTY OF LOS ANGELES
Department of Public Works
Construction Division, 8th Floor
Permits and Subdivisions Section
P.O. Box 1460
Alhambra, CA 91802-1460

11. All permit requests for Parade \ Run \ Bike Ride \ Race events require a permit from the local Sheriffs office.

Los Angeles County Department of Public Works
Road Closure Permit
Consent Form

We are aware of the planned closure of _____ between
(STREET CLOSED)
_____ and _____ from
_____ to _____ Between the hours of _____ and _____.
(DATE) (DATE) (am / pm) (am / pm)

We have no objection as long as standard traffic control procedures are followed.

Los Angeles County Sheriff

_____
(print)

_____
(signature)

_____ Telephone

_____ Station

Los Angeles County Fire Department

_____
(print)

_____
(signature)

_____ Telephone

_____ Station

California Highway Patrol

_____
(print)

_____
(signature)

_____ Telephone

_____ Station

Los Angeles County Department of Public Works
Road Closure Permit Consent Form

We are aware of the planned closure of _____ between _____

(STREET CLOSED)

and _____ from _____ to _____ Between the hours of _____

(DATE) (DATE) (am / pm)

and _____ . **We have no objection as long as standard traffic control procedures are followed.**

(am / pm)

Street Address	Name (Please Print)	Signature	Phone No.

Caltrans Standard Encroachment Permit Application

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

STANDARD ENCROACHMENT PERMIT APPLICATION

TR-0100 (REV. 07/2007)

Permission is requested to encroach on the State Highway right-of-way as follows:
(Complete all BOXES [write N/A if not applicable])
This application is not complete until all requirements have been approved.

FOR CALTRANS USE
PERMIT NO.
DIST/CO/RTE/PM
SIMPLEX STAMP
DATE OF SIMPLEX STAMP

1. COUNTY	2. ROUTE	3. POSTMILE

4. ADDRESS OR STREET NAME	5. CITY

6. CROSS STREET *(Distance and direction from site)*	7. PORTION OF RIGHT-OF-WAY

8. WORK TO BE PERFORMED BY ☐ OWN FORCES ☐ CONTRACTOR	9. EST. START DATE	10. EST. COMPLETION DATE

11. EXCAVATION	MAX. DEPTH	AVG. DEPTH	AVG. WIDTH	LENGTH	SURFACE TYPE

12. EST. COST IN STATE HIGHWAY RIGHT-OF-WAY	FUNDING SOURCE(S) ☐ FEDERAL ☐ STATE ☐ LOCAL ☐ PRIVATE

13. PIPES	PRODUCT TYPE	DIAMETER	VOLTAGE / PSIG	14. CALTRANS PROJECT E.A. NUMBER

15. ☐ **Double Permit** **Parent Permit Number** _____

Applicant's Reference Number / Utility Work Order Number _____

16. **Have your plans been reviewed by another Caltrans branch?** ☐ **NO** ☐ **YES** (If "YES") **Who?**_____

17. **Completely describe work to be done within STATE highway right-of-way :**

Attach 6 complete sets of **FOLDED** plans (folded 8.5" x 11"), and any applicable specifications, calculations, maps, etc.
All dimensions shall be in U.S. Customary (English) Units.

18. **Is a city, county, or other agency involved in the approval of this project?**

☐ YES ***(If "YES", check type of project and attach environmental documentation and conditions of approval.)***

☐ COMMERCIAL DEVELOPMENT ☐ BUILDING ☐ GRADING ☐ OTHER_____

☐ CATEGORICALLY EXEMPT ☐ NEGATIVE DECLARATION ☐ ENVIRONMENTAL IMPACT REPORT ☐ OTHER_____

☐ NO ***(If "NO", please check the category below which best describes the project, and complete page 4 of this application.)***

☐ DRIVEWAY OR ROAD APPROACH, RECONSTRUCTION, MAINTENANCE, OR RESURFACING
☐ PUBLIC UTILITY MODIFICATIONS, EXTENSIONS, HOOKUPS
☐ FLAGS, SIGNS, BANNERS, DECORATIONS, PARADES AND CELEBRATIONS
☐ OTHER_____
☐ FENCE
☐ MAILBOX
☐ EROSION CONTROL
☐ LANDSCAPING

19. Will this project cause a substantial change in the significance of a historical resource (45 years or older), or cultural resource? ☐ YES ☐ NO
(If "YES", provide a description)

20. Is this project on an existing highway or street where the activity involves removal of a scenic resource including a significant tree or stand of trees, a rock outcropping or a historic building? ☐ YES ☐ NO (If "YES", provide a description)

21. **Is work being done on applicant's property?** ☐ YES ☐ NO (If "YES", attach site and grading plans.)

ADA NOTICE: For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write to Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814

STANDARD ENCROACHMENT PERMIT APPLICATION

TR-0100 (REV. 07/2007)

PERMIT NO.

22. Will this proposed project require the disturbance of soil? ☐ YES ☐ NO

If "YES", estimate the area within State Highway right-of-way in square feet AND acres: _____ (ft^2) AND _____ (acres)

estimate the area outside of State Highway right-of-way in square feet AND acres: _____ (ft^2) AND _____ (acres)

23. Will this proposed project require dewatering? ☐ YES ☐ NO

If "YES", estimate total gallons AND gallons/month._____(gallons) AND _____(gallons/month)

SOURCE*: ☐ STORM WATER ☐ NON-STORM WATER

(*See Caltrans SWMP for definitions of non-storm water discharge: http://www.dot.ca.gov/hq/env/stormwater/index.htm)

24. How will any storm water or ground water be disposed of from within or near the limits of this proposed project?

☐ Storm Drain System ☐ Combined Sewer / Storm System ☐ Storm Water Retention Basin

☐ Other (explain): _____

PLEASE READ THE FOLLOWING CLAUSES PRIOR TO SIGNING THIS ENCROACHMENT PERMIT APPLICATION.

The applicant, understands and herein agrees to that an encroachment permit can be denied, and/or a bond required for non-payment of prior or present encroachment permit fees. Encroachment Permit fees may still be due when an application is withdrawn or denied, and that a denial may be appealed, in accordance with the California Streets and Highways Code, Section 671.5. All work shall be done in accordance with Caltrans rules and regulations subject to inspection and approval.

The applicant, understands and herein agrees to the general provisions, special provisions and conditions of the encroachment permit, and to indemnify and hold harmless the State, its officers, directors, agents, employees and each of them (Indemnitees) from and against any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, judgments, losses and liabilities of every kind and nature whatsoever (Claims) arising out of or in connection with the issuance and/or use of this encroachment permit and the placement and subsequent operation and maintenance of said encroachment for: 1) bodily injury and/or death to persons including but not limited to the Applicant, the State and its officers, directors, agents and employees, the Indemnities, and the public; and 2) damage to property of anyone. Except as provided by law, the indemnification provisions stated above shall apply regardless of the existence or degree of fault of Indemnities. The Applicant, however, shall not be obligated to indemnify Indemnities for Claims arising from the sole negligence and willful misconduct of State, its officers, directors, agents or employees.

DISCHARGES OF STORM WATER AND NON-STORM WATER: Work within State Highway right-of-way shall be conducted in compliance with all applicable requirements of the National Pollutant Discharge Elimination System (NPDES) permit issued to the Department of Transportation (Department), to govern the discharge of storm water and non-storm water from its properties. Work shall also be in compliance with all other applicable Federal, State and Local laws and regulations, and with the Department's Encroachment Permits Manual and encroachment permit. Compliance with the Departments NPDES permit requires amongst other things, the preparation and submission of a Storm Water Pollution Protection Plan (SWPPP), or a Water Pollution Control Program (WPCP), and the approval of same by the appropriate reviewing authority prior to the start of any work. Information on the requirements may also be reviewed on the Department's Construction Website at:

http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm

25. NAME of APPLICANT or ORGANIZATION *(Print or Type)*	E-MAIL ADDRESS
ADDRESS of APPLICANT or ORGANIZATION WHERE PERMIT IS TO BE MAILED *(Include City and Zip Code)*	
PHONE NUMBER	FAX NUMBER

26. NAME of AUTHORIZED AGENT / ENGINEER *(Print or Type)*	**IS LETTER OF AUTHORIZATION ATTACHED?** ☐ **YES** ☐ **NO**	E-MAIL ADDRESS
ADDRESS of AUTHORIZED AGENT / ENGINEER *(Include City and Zip Code)*		
PHONE NUMBER	FAX NUMBER	

27. SIGNATURE of APPLICANT or AUTHORIZED AGENT	**28. PRINT OR TYPE NAME**	**29. TITLE**	**30. DATE**

STANDARD ENCROACHMENT PERMIT APPLICATION

TR-0100 (REV. 07/2007)

PERMIT NO.
WORK ORDER/REFERENCE NUMBER

FEE CALCULATION -- FOR CALTRANS USE

☐ CASH ☐ CREDIT CARD NAME ON CARD _____ PHONE NUMBER _____

☐ CHECK NUMBER _____ NAME ON CHECK _____ PHONE NUMBER _____

☐ EXEMPT ☐ PROJECT EA __ __ __ __ __ __ ☐ DEFERRED BILLING (Utility)

CALCULATED BY	(1)		(2)		
REVIEW 1. _____ HOURS @ $_____ * 2. _____ HOURS @ $_____ *	1. FEE / DEPOSIT $_____	DATE	2. FEE / DEPOSIT $_____	DATE	TOTAL FEE / DEPOSIT $_____ $_____
INSPECTION 1. _____ HOURS @ $_____ * 2. _____ HOURS @ $_____ *	1. FEE / DEPOSIT $_____	DATE	2. FEE / DEPOSIT $_____	DATE	TOTAL FEE / DEPOSIT $_____ $_____
FIELD WORK _____ HOURS @ $_____ *	$_____		$_____		$_____
EQUIPMENT & MATERIALS	DEPOSIT $_____	DATE	DEPOSIT $_____	DATE	DEPOSIT $_____
CASH DEPOSIT IN LIEU OF BOND	$_____		$_____		$_____
TOTAL COLLECTED **CASHIER'S INITIALS**	$_____ _____		$_____ _____		$_____

** The current hourly rate is set annually by Headquarters Accounting. District Office staff do not have authority to modify this rate.*

PERFORMANCE BOND	☐	DATE	AMOUNT $
PAYMENT BOND	☐	DATE	AMOUNT $
LIABILITY INSURANCE REQUIRED?		☐ YES ☐ NO	AMOUNT $

INSTRUCTIONS
for completing page 4

This page needs to be completed when the proposed project DOES NOT involve a City, County or other public agency.

Your answers to these questions will assist departmental staff in identifying any physical, biological, social or economic resources that may be affected by your proposed project within the State highway right-of-way. And, to determine which type of environmental studies may be required to approve your application for an encroachment permit.

It is the applicant's responsibility for the production of all required environmental documentation and supporting studies, in some cases this may be costly and time-consuming. If possible, attach photographs of the location of the proposed project.

Please answer these questions to the best of your ability. Provide a description of any "YES" answers (type, name, number, etc.)

1. **Will any existing vegetation and/or landscaping within the highway right-of-way be disturbed?**

2. **Are there waterways (e.g. river, creek, pond, natural pool or dry streambed) adjacent to or within the limits of the project or highway right-of-way?**

3. **Is the proposed project located within five miles of the coast line?**

4. **Will the proposed project generate construction noise levels greater than 86 dBA (e.g. jack-hammering, pile driving)?**

5. **Will the proposed project incorporate land from a public park, recreation area or wildlife refuge open to the public?**

6. **Are there any recreational trails or paths within the limits of the proposed project or highway right-of-way?**

7. **Will the proposed project impact any structures, buildings, rail lines, or bridges within highway right-of-way?**

8. **Will the proposed project impact access to any businesses or residences?**

9. **Will the proposed project impact any existing public utilities or public services?**

10. **Will the proposed project impact existing pedestrian facilities, such as sidewalks, crosswalks, or overcrossings?**

11. **Will new lighting be constructed within or adjacent to highway right-of-way?**

Caltrans Instructions for Completing the Standard Encroachment Permit Application

INSTRUCTIONS FOR COMPLETING THE
STANDARD ENCROACHMENT PERMIT APPLICATION

Please complete items 1 through 30. Insert "N/A" in the boxes, if it does not apply to your project. Submit all of the required attachments with the application (described in Section VII, A & B).

All dimensions shall be in US Customary (English) Units.

1 – 5: County, highway route number, highway postmile (location of work), address of work site (if the property does not have an address, enter street or road name), and city.

6: Distance and the direction from the nearest cross street to the work site (e.g., 500 ft north of C Street).

7: Portion of State right-of-way where work will occur (pavement, shoulder, back of curb, slope, ditch, etc.)

8: Indicate whether a contractor or your own work forces will perform the work.

9 – 10: Estimated start and completion dates for the permit work.

11: Maximum depth, average depth, average width and length. Describe the existing highway surface type (concrete, asphalt, gravel, dirt, etc.) of the excavation area.

12: Estimated cost for all work to be done within State right-of-way, and funding source(s).

13: Type of pipe or conduit material to be used and product (water, gas, etc.), the diameter, and voltage of electrical current or pressure of liquid or gas.

14: E.A. number if this is a State project, capital project, or joint venture project.

15: Indicate if you are applying for a "Double Permit" and list the "Parent Permit Number". Your company's reference number or utility work order number for this project.

16: Has another Caltrans branch seen or reviewed your plans? Who?

17: Describe the proposed work to be done entirely. If applicable, attach six (6) complete sets of FOLDED plans (folded 8-½" X 11") and any applicable specifications, calculations, maps, etc.

18: Check "YES", if you are getting a permit or approval from another agency (City, County, etc.), and an environmental determination has been made. If your project is Exempt, then check the Categorically Exempt, Negative Declaration, Environmental Impact Report box if one has been prepared. Attach a copy of the approved document and a copy of the Notice of Determination.

If you check "NO", check the box of the appropriate type of work to be done, or check "other" and fill in the type of work to be done.

19: A Historical Resource includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript that has historical or archeological significance, or significance in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.

20: In this context a Scenic Resource includes, but is not limited to, trees that display outstanding features of form or age; unique, massive rock formations; historic buildings that are rare examples of their period, style, design, or which have special architectural features and details of importance.

21: Is there any work being done on the applicant's property?

22: Indicate if the propose project will require the disturbance of soil. If "YES", estimate the area within **AND** outside of State Highway right-of-way in square feet **AND** acres.

23: Indicate if the proposed project will require dewatering. If "YES", estimate volume in total gallons **AND** gallons per month. Also indicate the source (Storm Water or Non-Storm Water, see Caltrans SWMP for definitions of non-storm water discharge)

http://www.dot.ca.gov/hq/env/stormwater/index.htm

24: Indicate how any storm water or ground water will be disposed of from or near the limits of the proposed project.

25: Name of the applicant or organization applying for the permit. List e-mail address if applicable, the address where the permit is to be mailed, phone and a fax numbers.

26: Name of the authorized agent or engineer on behalf of the applicant or organization. Attach letter of authorization signed by the applicant or organization, e-mail address if applicable, address, phone and fax numbers.

27 - 28: Signature shall be that of the applicant or applicant's authorized agent.

29: Title (owner, president, etc.).

30: Date of the signature.

California State Lands Commission (SLC)

Right-of-Way Permit / Land Use Lease

Application for Lease of State Lands

CLEAR FORM SAVE PDF PRINT

APPLICATION FOR LEASE OF STATE LANDS

PART I

GENERAL DATA

SECTION A: IDENTIFICATION OF APPLICANT AND CONTACT INFORMATION

Notice to individual(s) (natural person(s)): This page of the completed application containing personal information will not be subject to public disclosure. See Privacy Notice in Part V of this Application.

1. Applicant:

Name:		
Mailing Address:		
City:	State:	Zip:
Phone:	FAX:	
E-mail Address:		

2. Applicant's authorized agent or representative (if any):

Name:		
Mailing Address:		
City:	State:	Zip:
Phone:	FAX:	
E-mail Address:		

☐ If you are ***an elected or appointed official*** as specified in Government Code section 6254.21, check this box. If you do not check this box, by signing this application you are deemed to have given consent to have your home address (when it is the project location) posted on the Internet.

Title: _____

Agency or Branch of Government: _____

INSTRUCTIONS TO COMMISSION STAFF:

Separate this page (Page 1A) from the rest of the application and place in a Confidential Envelope.

Do not disclose the information on this page unless approved by the Commission's Legal Office to avoid the possible disclosure of "personal information" as defined by the Information Practices Act (Civil Code section 1798.3).

APPLICATION FOR LEASE OF STATE LANDS

PART I

GENERAL DATA

SECTION A: IDENTIFICATION OF APPLICANT

1. Applicant:

Name:

2. Applicant's authorized agent or representative (if any):

Name:

As part of the application, the applicant's authorized agent or representative must submit evidence of the agency agreement.

3. Who should receive correspondence relevant to this application? (Check one)

☐ Applicant ☐ Authorized agent or Representative ☐ Both

FOR COMMISSION USE ONLY:	
Date Received:	
Work Order No.:	*Assigned to:*
Type of Document:	
Filing Fee:	*Processing Fee:*
Other Fees:	

SECTION B: LEGAL STATUS OF APPLICANT

Check one of the following and submit the required information:

☐ INDIVIDUAL(S): (See Privacy Notice in Part V of Application)

☐ TRUST(S): Attach a copy of the trust agreement(s) and all amendments, if any. See Privacy Notice in Part V of Application if trustee(s) are individual(s).

☐ CORPORATION: Attach a Certificate of Incorporation issued by the State of California or a Certificate of Incorporation issued by the State of incorporation with the Certificate of Good Standing of Foreign Corporation issued by the Secretary of State of California authorizing the transaction of business in California; Articles of Incorporation and/or By-Laws; a certified statement of the names of the corporate president, secretary and/or

officer(s) authorized to execute contracts; and a board resolution or other evidence of authority to enter into the requested transaction.

☐ PARTNERSHIP: Attach a certified copy of the partnership statement and partnership agreement. If no partnership statement has been filed in the county in which the partnership does business, so state in the application and provide all particulars of the partnership.

☐ LIMITED LIABILITY COMPANY: Attach a copy of the Articles of Organization and Certificates of Amendment issued by the State; company organization; and operating rules and regulations.

☐ PUBLIC AGENCY: Generally, all permits and leases issued by the State Lands Commission require monetary consideration. However, a public agency applicant may qualify for a rent-free lease/permit. In order to so qualify, the applicant must submit in writing a statement of justification for the rent-free status, which status shall be based on a statewide, as compared to a primarily local, public benefit. Such statement shall detail the statewide public benefit derived from the project. The State Lands Commission shall determine whether a statewide public benefit is derived from the project.

Leases and permits involving "School Lands" cannot qualify for rent-free status.

Public agencies will also be required to submit evidence of the authority of the official(s) to execute contracts together with a resolution or other document authorizing execution of the appropriate lease or permit.

☐ OTHER: State the nature, membership and other particulars regarding the legal status of applicant. Provide legal documentation establishing the authority of applicant to enter into the requested transaction, and designating who is authorized to act on behalf of applicant.

SECTION C: PROJECT LOCATION

County:
If unincorporated, nearest City:
Waterway:
Township, Range, Section and Reference Meridian:
Assessor's Parcel No. (of property in question or adjoining property):
Upland Address:

SECTION D: TYPE OF PROJECT AND AUTHORIZATION

You will be asked to provide specific project information in Parts II and III of this application.

1. Please check the type(s) of activity for which you are seeking Commission authorization (check all that apply):

   ☐ Commercial (Income producing uses such as marinas, restaurants, clubhouses, recreation piers or facilities, docks, moorings, buoys, helicopter pads, decks or fuel service facilities)

   ☐ Industrial (Uses such as oil terminals, piers, wharves, warehouses, storage sites, moorings, dolphins and islands together with necessary appurtenances)

   ☐ Right-of-Way (Uses such as roadways, power lines, pipelines or outfall lines)

- ☐ Public Agency (Uses such as public roads, bridges, or for recreational, ecological or open space purposes)
- ☐ Non-commercial (Uses such as piers, boatlifts, boathouses, mooring buoys, marker buoys, speed buoys, swim areas, swim platforms/floats, stringlines, fishing platforms, recreational marine storage)
- ☐ Protective Structure (Riprap, seawall, groins, jetties, breakwaters, bulkheads, etc.)
- ☐ Grazing or other Agricultural Use.
- ☐ Dredging (Please check if any portion of the proposed project will involve dredging during construction or ongoing maintenance of the project.)
- ☐ Sand and/or Gravel Extraction.
- ☐ Salvage (Salvage of any abandoned property on State-owned lands; see Public Resources Code Section 6309)
- ☐ Other (please describe): _____

2. Please indicate whether you are seeking Commission authorization for (check all that apply):
   - ☐ A lease or permit for a proposed new use of State-owned land.
   - ☐ A lease for the continuation of an existing use of State-owned land not previously under lease.
   - ☐ A new lease where a prior lease has expired.*
   - ☐ A new lease for a lease that has not yet expired.*
   - ☐ An amendment of an existing lease.**
   - ☐ A sublease of an existing lease.**
   - ☐ Consent to encumber an existing lease.**
   - ☐ An assignment of an existing lease.**
   - ☐ Other (please describe):

*** Where applicable, please indicate file number of existing or prior lease _____.**

SECTION E: PROPERTY DESCRIPTION, INCLUDING TITLE AND BOUNDARY INFORMATION

1. Submit a copy of the current vesting document (deed) for the property lying landward (if applicable) of and/or adjacent to the State lands you seek to use. If you are not the owner of this adjacent property, submit a copy of a lease, permit, or other evidence of your right to use this property. If there have been several transfers of ownership since the prior lease or expiring lease, please submit copies of the intervening ownership vesting documents (chain of ownership) to the current deed.

2. Submit a detailed plan or plot of proposed lease areas and existing and proposed structures showing their locations and dimensions with respect to property lines, and high and low water with reference to the datum of water line elevation used at the location.

3. Submit a vicinity map (8 ½" x 11" with scale) showing the general area and the project site in relation to the shoreline, major roadways, and other landmarks.

4. Submit a legal description of the area to be leased from the State, tied to a monument or monuments of record. The area to be leased includes the area occupied by the structures, or otherwise needed for the proposed project.

5. Provide the following photographs (*label all photos and list the date the photo was taken*):

    a) Photos of the State lands you seek to use. If the State lands you seek to use are a water body, then provide photos looking towards the upland property and photos looking to both sides and out toward the State lands.

    b) Photos of any improvements or structures on the State lands and the adjoining uplands.

SECTION F: OTHER GOVERNMENTAL JURISDICTIONS

On a separate sheet of paper or attachment, please provide the following information.

1. List, provide contact information for, and identify the status of applications submitted to other public agencies having approval authority over your proposed project (i.e., U.S. Army Corps of Engineers, local or regional planning bodies, city and/or county governmental permitting authorities, air or water quality boards, California Coastal Commission, San Francisco Bay Conservation and Development Commission, Tahoe Regional Planning Agency, etc.).

2. If applicable, submit the following with the application: (a) U.S. Army Corps of Engineers Public Notice or Letter of Approval for the project; (b) the number assigned to the project from the San Francisco Bay Conservation and Development Commission or California Coastal Commission; and (c) copies of any previously obtained existing approvals. Note: You may be required to submit the results of any consultation, e.g., Letter of Concurrence or Biological Opinion from the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, for your project prior to consideration of your application by the Commission.

3. Identify any General Plan and Specific Plans that include the area in which the project will be located, including the date of the most recent revision to such Plan(s). What is the land use designation and zoning of the upland portion of the project under the General Plan and any applicable Specific Plan? Will the project require an amendment of the General and/or the Specific Plan? Will a variance from the existing zoning be required? Please provide the

name and telephone number of the individual(s) contacted within the local jurisdiction to answer the foregoing questions.

4. You will be required to submit a copy of local approvals (city and/or county) for your project prior to consideration of your application by the State Lands Commission. If you cannot obtain local approval of your project prior to consideration by the State Lands Commission, you must submit a letter or other document from the local agency setting forth the status of your local application and any concerns the local governmental agency has regarding your project.

PART II

SPECIFIC PROJECT INFORMATION

Please complete this Part II as indicated below. Submit responses on separate 8½" x 11" paper, indicating clearly the number (below) to which each response applies.

SECTION A: EXISTING CONDITIONS

1. Describe in detail existing activities, uses and improvements at the proposed project site, both on water covered lands ("water bodies") and on adjacent uplands. Provide construction dates of all existing improvements. Indicate whether facilities are temporary or permanent.

2. Describe existing public use of the water body and adjacent uplands, the type and frequency of the public use, and any existing public access to the water body across the project site.

3. Identify the type and location of any known habitat of rare, threatened, or endangered species of plant or animal within a one-mile radius of the proposed project site. Information in this regard may be acquired from the California Department of Fish and Game (http://www.dfg.ca.gov/biogeodata/cnddb/) the U.S. Fish and Wildlife Service (http://www.fws.gov/cno/), and/or National Marine Fisheries Service (http://www.nmfs.noaa.gov/pr/permits/esa_permits.htm). If the project area may have occurrences of rare, threatened, or endangered species, then provide a Biological Assessment that describes the species or potential species within the project limits. You may be required to provide maps and aerial or ground photographs which delineate existing vegetation at the proposed project site and along the shore of the water body upon which the project is to be located within a one-half (½) mile radius of the limits of the proposed project. Where appropriate, provide a delineation of waters of the U.S., including all wetlands, based on the current U.S. Army Corps of Engineers methodologies within the project limits.

4. Does the existing use involve a **pipeline**? ☐ Yes ☐ No

   If **YES**, describe the pipeline, its use, and if applicable provide the most current pipeline integrity test results and photographs of signage.

5. Does the existing use involve a **marina**? ☐ Yes ☐ No

   If **YES**, list and describe, within one river or lakeshore mile of the site:

   (a) Existing marina facilities (indicating for each facility) available berthing by berth size, whether finger, slip or side tie, fuel facilities, pump outs, accommodation docks, restrooms, restaurants, grocery stores, and other ancillary facilities.

   (b) Public and private boat launching and storage facilities.

   (c) Public fishing access and parking availability.

   (d) Other recreational facilities open to the public which are used for swimming, sunbathing, picnicking, sightseeing, etc.

Provide a site map illustrating the approximate distances of each of these facilities from the proposed project site.

SECTION B: PROJECT DESCRIPTION INVOLVING NEW CONSTRUCTION, EXPANSION, ALTERATIONS, CHANGE OF USE, OR USE NOT PREVIOUSLY AUTHORIZED BY THE COMMISSION

SUBSECTION 1: ALL PROJECTS. *All applicants should respond to (a) - (d) below.*

a. Provide a project development plan which clearly shows the following:

   (1) A full set of design plans that show the proposed improvements, existing topographic features, and dimensions of the area to be occupied within any water body. (This should include identification of the width of the waterway at the project site).

   Note: The plans submitted by the Applicant or Agent are the basis for action by the Commission. Any change to the plans during the application process requires an amendment to the application. If the proposed project is not constructed as set forth in the plans submitted with the application, Applicant agrees that this shall constitute a default of any lease granted as a result of the application and that the Commission may take such action(s) available to it as provided by the lease provisions or such other and further relief available at law or in equity as it may deem proper.

   (2) The nature and location of all significant project features, including, but not limited to, the number, size and design of any berths, boat ramps or launches; the type, dimensions and location of any associated commercial facilities, utilities, parking, public access, and marine services; and any proposed exterior lighting or other security measures.

   (3) The type and location of any existing vegetation which will be preserved, any existing vegetation proposed for removal, and any planned restoration of vegetation or landscaping.

   (4) The size of the proposed project relative to any other improvements or facilities within 100 feet upstream or downstream of the proposed project site, including facilities on the opposite bank, particularly with regard to its linear extension into and along the water body.

b. If the project will involve construction, describe in detail the construction methods and equipment which will be used and the anticipated time frame for construction activities.

c. Describe how the project will affect any levees in the project area. Identify existing ecological and/or habitat features along the levee, and any proposed alterations or modifications to any levees and associated ecological and/or habitat features.

d. Identify any project features which you believe will avoid or mitigate any effects of moving vessels (e.g., wave wash) on the proposed facility or shore of the water body.

e. If the project involves development, in an area subject to tidal action, provide a risk analysis, implications of failure, and adaptation strategies for addressing projected sea level rise of 16 inches by year 2050 and 55 inches by year 2100, relative to the projected life expectancy of the project. Adaptation strategies may include alternate project designs to prevent impacts.

f. What engineering standards are being relied on to address potential impacts from sea level rise on proposed or existing facilities throughout the life of the project?

SUBSECTION 2: SPECIFIC PROJECTS. *Applicants should respond only to those paragraphs which apply to their project.*

a. Does the proposed project involve a **MARINA OR OTHER MULTIPLE BERTHING FACILITY**?	☐ Yes	☐ No

*(If **NO**, go to (b) below. If **YES**, provide the following information.)*

(1) List and describe, within one river or lakeshore mile of the site:
   (a) Existing or proposed marina facilities (indicating for each facility) available berthing by berth size, whether finger, slip or side tie, fuel facilities, pump outs, accommodation docks, restrooms, restaurants, grocery stores, and other ancillary facilities.
   (b) Public and private boat launching and storage facilities.
   (c) Public fishing access and parking availability.
   (d) Other recreational facilities open to the public which are used for swimming, sunbathing, picnicking, sightseeing, etc.

   Provide a site map illustrating the approximate distances of each of these facilities from the proposed project site.

(2) Identify whatever provisions are proposed for sewage disposal from boats, commercial uses, etc. If none, please identify the nearest pump-out facility, by name, location, and operating hours.

(3) Identify whatever provisions are proposed for recycling and/or litter/garbage disposal, including frequency of pick-up.

(4) Identify any proposed fueling facility and fully describe spill prevention and control features. Are fueling stations such that they are accessible by boat without entering or passing through the main berthing area, in order to avoid collisions? Provide a spill contingency plan and list equipment and training needed to implement the plan.

(5) Describe any proposed vessel maintenance facility, i.e., its capacity, typical activities and quantities of potentially toxic materials expected to be used. Boat maintenance areas should be designed so that all maintenance activities that are significant potential sources of pollution can be accomplished over dry land and under roofs (where practical), allowing for proper control of by-products, debris, residues, solvents, spills, and stormwater runoff. All drains from maintenance areas should lead to a sump, holding tank, or pump-out facility from which the wastes can later be extracted for treatment and/or disposal. Indicate whether maintenance areas drain directly into surface or ground water or wetlands.

   Will curbs, berms or other barriers be built or placed around areas used for the storage of liquid hazardous materials to contain spills?

   If no boat maintenance facility is proposed, identify the off-site facility (ies) most likely to be used.

(6) Identify the location of any engine and hull washing activities, expected numbers of washings and the types of detergents proposed for use. Only phosphate-free and biodegradable detergents should be used for boat washing.

(7) Describe any proposed pollution control measures for vessel maintenance and haul-out facilities. Examples include:

- Use of tarps and vacuums to collect solid wastes produced by cleaning and repair of boats. Such wastes should be prevented from entering adjacent water.
- Vacuum or sweep up and catch debris, sawdust, sandings, and trash from boat maintenance areas on a regular basis so that runoff will not carry it into the water.
- An oil/water separator should be used on outside drains and be maintained to ensure performance.
- Tarps should be used to catch spills of paints, solvents, or other liquid materials used in the repair or maintenance of boats.
- Used antifreeze should be stored in a barrel labeled "Waste Antifreeze Only" and should be recycled.

(8) Describe any special measures proposed to control the quality and quantity of urban and other runoff from surrounding areas.

(9) Describe the terms and conditions under which periodic and transient berthing will be permitted at the proposed facility, and how those terms and conditions will be enforced. Indicate percentage of dry boat storage compared to wet slips.

(10) Identify the method of handling fish wastes back into the natural ecosystem. Indicate how recycling of fish wastes will not degrade water quality or cause other adverse environmental impacts.

(11) Describe the depth and location of navigation and access channels, if any. Are these channels located in areas with safe and convenient access to waters of navigable depth, based on the kind of vessel(s) expected to use the facility?

(12) Describe the stormwater management system. Does the system provide a bypass or overflow systems so that the peak discharge from a 10-year, 14-hour storm will be safely conveyed to an erosion and scour-protected storm water outfall?

(13) For proposed offstream marinas or berthing facilities, provide a water circulation plan for the facility which has been prepared and certified by a qualified hydrologic engineer. Such plan must indicate the direction and amount of flushing action in the facility.

b. Does the proposed project involve a **LAUNCH RAMP OR OTHER LAUNCHING FACILITY**?	☐ Yes	☐ No

*(If **NO**, go to (c) below. If **YES**, provide the following information.)*

(1) The capacity of related parking areas for boats, trailers, and vehicles.

(2) Any ancillary features such as restrooms, trash disposal bins, and the like.

(3) Any provisions for pump out and disposal of bilge water.

(4) Any provisions for the identification, inspection, cleaning, and disposal of non-native species.

c. Does the proposed project involve **DREDGING OR DREDGED MATERIAL DISPOSAL?**	☐ Yes	☐ No

*(If **NO**, go to (d) below. If **YES**, provide the following information. <u>This section is to be prepared and certified by a qualified engineer with relevant expertise</u>.)*

(1) Provide the purpose for the proposed dredging activity.

(2) An estimate of the amount and description of the method of dredging necessary to complete construction of the proposed project.

(3) An estimate of the amount and frequency and a description of the method of any maintenance dredging anticipated for operation and maintenance of the project.

(4) Identification and estimate of amounts and persistence of contaminants which may be released from the sediments during dredging, and during construction and operation and maintenance of the proposed project.

(5) The method and location of disposal of dredged materials.

(6) During dredging operations, will the dredging result in turbidity? If so, indicate how turbidity can be minimized (e.g., through the proper placement of silt screens or turbidity curtains).

(7) Describe how the need to dredge has been minimized or avoided. For example, the marina could be sited adjacent to deep water and the area to be dredged could be the minimum needed for the marina itself, including the docking areas, fairways, and channels, and for other maneuvering areas that are needed. Is the bottom of the marina deeper than the adjacent open water?

(8) Has siting been planned near currently permitted public areas for disposal of dredged materials? How far is it to the disposal area?

(9) Provide a copy of the Sampling and Analysis Plan and results.

(10) For projects located within San Francisco Bay and under the jurisdiction of the San Francisco Bay Conservation and Development Commission, provide an approval letter issued by the Dredged Material Management Organization (DMMO).

d. Does the proposed project involve **GRAZING?**	☐ Yes	☐ No

*(If **NO**, go to Subsection 3 below. If **YES**, provide the following information.)*

(1) Indicate the type and number of animals that will be located on State lands.

(2) Indicate the months during which the animals will be located on State lands.

(3) Estimate the carrying capacity of each parcel applied for.

(4) Indicate whether applicant holds a current grazing permit from the U.S. Bureau of Land Management (BLM). If so, indicate when the permit expires, and provide a map showing the location of the grazing allotment.

(5) Indicate whether there are any known water sources on the parcel(s) applied for. If such water sources are inadequate for the number of animals to be located on the State land, indicate how you will provide additional water.

SUBSECTION 3: PROJECT SITING AND FEASIBILITY. *Complete if the proposed project is a commercial or industrial use as defined in Part I, Section D, above.*

a. If the project involves berthing or docking facilities, describe how siting has been planned to ensure that tides and currents are adequate to flush the site, or renew its water regularly. Will water quality standards be violated?

b. Will the project be sited away from wetlands, shellfish resources, submerged aquatic vegetation, and critical habitat areas?

c. Is the project sited such that it will have easy access to roads, utilities, public sewers (where available), and water lines?

d. Were alternative sites considered for the proposed project? If the answer is no, please explain. If the answer is yes, please identify such alternative sites. List any criteria used during the site selection process: 1) What factors were used in the selection of the proposed site? 2) What factors make this site superior for the proposed project?

e. On what basis is there a demonstrated public need for the proposed project at the designated location?

f. Please furnish any studies, which demonstrate demand for and feasibility of the proposed project. What is the minimum size or level of activity necessary to sustain the commercial viability of the project?

g. If the proposed project will generate revenue, estimate the anticipated annual gross and net revenues and show your basis for the estimates.

h. Describe any other existing or proposed projects that will be related to or dependent upon this project, will be affected by this project, or will affect this project, and explain the anticipated relationship or effect.

SUBSECTION 4: PUBLIC BENEFIT

Describe any statewide, regional or local benefits of the proposed project, if any, and the extent to which such benefits are provided by other facilities in the vicinity of the proposed project site.

PART III

PROJECT ENVIRONMENTAL DATA

SECTION A: ENVIRONMENTAL SETTING

1. Describe the project site as it presently exists. Include information such as topography, soil stability, plants and animals, and any cultural, historical or scenic aspects. Describe any existing structures on the site, the use of the structures, and whether they will be retained or removed. Include photograph(s) of the site. Information regarding historic or archaeologically significant values within the site may be obtained from the California Historic Resources Information System Information Center for the county in which the project is to be located. (For more information click on the CHRIS/IC tab at www.ohp.parks.ca.gov.)

2. Describe the surrounding properties. Include information such as topography, soil stability, plants and animals, and any cultural, historic or scenic aspects. Indicate the type of land use, (e.g. residential, commercial, agricultural, etc.) intensity of land use (e.g., single-family dwellings, apartments, shops, etc.) and the scale of development. Include photographs.

3. Include a statement of the proposed liquid, solid or gaseous waste disposal methods necessary for the protection and preservation of existing land and water uses.

4. For Development Projects only (see Part IV for definition), provide information on whether any portion of the project site is on the list of known hazardous materials sites also known as the "Cortese List" maintained by the California Environmental Protection Agency (CalEPA). (For more information see: http://www.calepa.ca.gov/SiteCleanup/CorteseList/ and Government Code section 65962.5.)

SECTION B: ASSESSMENT OF ENVIRONMENTAL IMPACTS

All phases of a project, such as planning, acquisition, development, and operation, shall be considered when evaluating its impact on the environment. Please answer the following questions by placing a check in the appropriate box. Provide an explanation of each answer on a separate 8½" x 11" paper, listing, as appropriate, studies, documents, or other information used to support your answer.

Will the project involve:	Yes	Maybe	No
1. A change in existing features of any bays, tidelands, beaches, lakes, or hills, or substantial alteration of ground contours?	☐	☐	☐
2. A change in scenic views from existing residential areas or public lands or roads?	☐	☐	☐
3. A change in pattern, scale or character of the land use at or in the general area of the project?	☐	☐	☐
4. Impacts to plants or animals?	☐	☐	☐
5. The potential introduction or spread of non-native species?	☐	☐	☐
6. Any feature subject to sea level rise or other effects associated with climate change over the life of the project? If so, please explain in detail and address any planned adaptation strategies.	☐	☐	☐
7. Generation of solid or liquid waste or litter?	☐	☐	☐

Will the project involve:	Yes	Maybe	No
8. A violation of any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐
9. A change in the amount of greenhouse gas emissions?	☐	☐	☐
10. Generation of, or additional, dust, smoke, fumes or odors in the vicinity?	☐	☐	☐
11. A change in ocean, bay, lake, stream or ground water quality or quantity or an altering of existing drainage patterns?	☐	☐	☐
12. A change in existing noise or vibration levels in the vicinity?	☐	☐	☐
13. Construction on filled land or on a slope of 10% or more?	☐	☐	☐
14. Creation of a significant hazard to the public or the environment?	☐	☐	☐
15. Any activity on a hazardous materials site (a site included on any list compiled pursuant to Government Code section 65962.5)?	☐	☐	☐
16. Use or disposal of potentially hazardous materials such as flammable, toxic, or radioactive substances, or explosives?	☐	☐	☐
17. An increase in traffic?	☐	☐	☐
18. A change in demand for municipal services (e.g., police, fire, water, sewage, electricity, gas)?	☐	☐	☐
19. An increase in fossil fuel consumption (e.g. electricity, oil, natural gas)?	☐	☐	☐
20. A larger project or a series of projects?	☐	☐	☐
21. Historic structures and/or archeological sites?	☐	☐	☐

SECTION C: STATE LANDS COMMISSION AS A RESPONSIBLE AGENCY

When it is determined that the Commission is a Responsible Agency under the California Environmental Quality Act (CEQA) (another governmental agency prepares the appropriate environmental documentation), the applicant must submit the following materials as early as possible in the application process and substantially prior to scheduling the application for consideration by the Commission:

1. A copy of the project's environmental documents prepared by the Lead Agency, i.e. the Initial Study, Negative Declaration or Mitigated Negative Declaration, or the draft and Final Environmental Impact Report (EIR), and evidence that these documents were circulated through the State Clearinghouse pursuant to the CEQA Guidelines (Title 14, California Code of Regulations, Section 15073 or 15087).

2. A copy of any environmental mitigation monitoring program prepared and adopted by the Lead Agency pursuant to Public Resources Code Section 21080.6.

3. A copy of the "Findings" made by the Lead Agency relative to potential environmental impacts of the project as approved by the Lead Agency, pursuant to Section 15091 of the CEQA Guidelines.

4. A copy of the Statement of Overriding Considerations made by the Lead Agency if one was necessary.

5. A copy of the Notice of Determination filed with the Office of Planning and Research by the Lead Agency.

PART IV

PERMIT STREAMLINING ACT

(Government Code Section 65920 and following).

Government Code Section 65927 defines "development" as "…on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision pursuant to the Subdivision Map Act (commencing with Section 66410 of the Government Code), and any other division of land except where the land division is brought about in connection with the purchase of such land by a public agency for public recreational use; change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions to the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511 of the Public Resources Code).

As used in this section, 'structure' includes, but is not limited to, any building, road pipe, flume, conduit, siphon, aqueduct, telephone line, and electrical power transmission and distribution line."

Government Code Section 65928 defines a "development project" as "…any project undertaken for the purpose of development. 'Development project' includes a project involving the issuance of a permit for construction or reconstruction but not a permit to operate. 'Development project' does not include any ministerial projects to be carried out or approved by public agencies."

Government Code Section 65943 - Please complete the following statement:

The project that is the subject of this application ☐ *is* ☐ *is not* a development project as defined by Government Code Section 65928.

Your application will not be complete without this information.

PART V

PRIVACY NOTICE AND CERTIFICATION

PRIVACY NOTICE FOR INDIVIDUAL(S) (see Part I, Section B)
Section 1798.17 of the Civil Code requires this notice be provided when collecting personal information from individuals. Each individual has the right to review his or her personal information maintained by this agency, unless access is exempted by law. An individual means a natural person.
AGENCY NAME / DIVISION California State Lands Commission / Land Management Division
TITLE OF OFFICIAL RESPONSIBLE FOR MAINTENANCE OF THE INFORMATION Records Manager
BUSINESS ADDRESS OF OFFICIAL / TELEPHONE 100 Howe Avenue, Suite 100 South, Sacramento, California 95825 / (916) 574-1900
AUTHORITY THAT AUTHORIZES THE MAINTENANCE OF THE INFORMATION Public Resources Code Section 6501 et seq.
THE FOLLOWING ITEMS OF INFORMATION ARE VOLUNTARY, ALL OTHERS ARE MANDATORY All information requested on the application is mandatory, unless otherwise noted.
THE CONSEQUENCES, IF ANY, OF NOT PROVIDING ALL OR ANY PART OF THE REQUESTED INFORMATION The Application will not be deemed complete and may not be considered by the California State Lands Commission for approval. A lease may not be granted.
THE PRINCIPAL PURPOSE(S) WITHIN THE AGENCY FOR WHICH THE INFORMATION IS TO BE USED The information will be used to consider whether a lease of State lands is allowed by law and is in the best interests of the State. Information from the application including the Applicant's name and the project location may be posted permanently on the Internet at the Agency's website: www.slc.ca.gov. Applications will be retained for as long as allowed by the Agency's Records Retention Schedule as established in accordance with the State Administrative Manual and as approved by the Department of General Services. This may be for as long as the State has an interest in the land involved.
KNOWN OR FORESEEABLE DISCLOSURES OF THE INFORMATION PURSUANT TO CIVIL CODE SECTION 1798.24(e) or (f) Bureau of State Audits; local, state, and/or federal regulatory agencies with jurisdiction over any aspect of the proposed project.

For any Applicant submitting this application as an individual(s), Applicant acknowledges and agrees that by submitting this application the Applicant gives consent for information contained in the Application, except as set forth on page 1A, to be disclosed as described in the Privacy Notice above. This consent meets the consent requirements of Civil Code Section 1798.24.

*For **appointed or elected officials** specified in Government Code Section 6254.21: If you did not check the box on page 1A, by signing this application you are deemed to have given consent to have your home address (when it is the project location) posted on the Internet.*

I hereby certify under penalty of perjury that I have read this completed application and all related exhibits and that, to the best of my knowledge, the information is full, complete, and correct. I understand that any misstatement or omission of the requested information or of any information subsequently requested shall be grounds for terminating the application or for denying a lease. I understand if a lease is executed by the State Lands Commission as a result of the application, the project will be constructed as described in the application. I further understand that if the project is not constructed as set forth in the application, this shall constitute a default of the lease and that the State Lands Commission may take such action(s) available to it as provided by the lease or to seek such other and further relief as it may determine proper and as authorized by law.

Signature of Applicant: _____ Date: _____

Signature of Co-Applicant: _____ Date: _____

By: _____ Title: _____
(If Agent)

Date: _____

NOTE: Please remember to submit the fees as outlined on pages viii and ix of the Application Guidelines. You need to return all pages of the Application for Lease of State Lands.

Application Guidelines Regarding Leasing of State Lands

APPLICATION GUIDELINES

GENERAL INFORMATION AND APPLICATION MATERIALS REGARDING LEASING OF STATE LANDS

The State Lands Commission ("Commission") has jurisdiction and management control over those public trust lands of the State received by the State upon its admission to the United States in 1850 ("sovereign lands"). Generally these sovereign lands include all ungranted tidelands and submerged lands, beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits. The Commission manages these sovereign lands for the benefit of all the people of the State, subject to the Public Trust for water related commerce, navigation, fisheries, recreation, open space and other recognized Public Trust uses. In addition the State manages lands received after Statehood including Swamp and Overflowed lands and School lands. The Commission's Land Management Division in Sacramento administers the leasing of these lands, sand and gravel extraction from these lands, and dredging or disposal of dredged material on these lands. The Commission also manages the development of all mineral resources contained on such lands.

Land Ownership Determination

Upon receipt of an application or an inquiry about use of State lands, the Commission's Title Unit reviews its files and information submitted by the applicant to determine the extent of the State's property interest in the proposed project site. In some cases, the complex nature of the title to the lands may result in the applicant having to submit a title report (preliminary report of title or title policy) as part of the application process.

Leasing Practices

The lands managed by the Commission vary widely in character and utility. The Commission maintains multiple-use management practices to assure that the greatest possible public benefit is derived from these lands. The Commission will consider numerous factors in determining whether or not a proposed use of the State's land is appropriate, including, but not limited to, the potential impacts on and the consistency with the Public Trust under which the Commission holds the State's sovereign lands, protection of natural resources and other environmental values, and preservation or enhancement of the public's access to State lands. Other factors that the Commission will also consider are the size, location, intended use, and described need for the project/structure/facility, its relationship to the surrounding environment and if the size of the project/structure/facility is appropriate for the location and type of use or operation proposed.

Applicants are advised that the Commission’s standard lease provisions prohibit any structure that could be used as a residence or a floating residence. These types of structures may include, but are not limited to, a boat, barge, houseboat, trailer, cabin, enclosed patio, sunroom, office, sundeck, apartment, or any combination of such structures.

Applicants are advised that the Commission is under no obligation to approve any application submitted to it. The Commission may approve, condition, or deny any application, based upon the above referenced factors or other issues raised during the application review process.

California Environmental Quality Act (CEQA)

The issuance of any lease, permit or other entitlement for use of State lands by the Commission requires review for compliance with the California Environmental Quality Act (CEQA). The terms of CEQA may be found in the California Public Resources Code (PRC), Sections 21000 et seq., and in the State CEQA Guidelines, California Code of Regulations (CCR), Title 14, Sections 15000 et seq. No proposed project will be approved until the requirements of CEQA have been met.

Additionally, if the application involves lands found to contain "Significant Environmental Values" within the meaning of PRC Section 6370, consistency of the proposed use with the identified values must also be determined through the CEQA review process. Pursuant to its regulations, the Commission may not issue a lease for use of "Significant Lands" if such use is detrimental to the identified values.

Most leases, permits or other entitlements for use of State lands require approvals from other public agencies. On many proposed projects the Commission is the Lead Agency under CEQA (the public agency with the principal responsibility for carrying out or approving a project).

Where the Commission is the Lead Agency under CEQA, its initial step in reviewing an application is to determine whether the proposed project is exempt from CEQA. Exemptions from CEQA are either statutory or categorical. A listing of some exemptions may be found in the Commission's administrative regulations (CCR, Title 2, Section 2905) and others may be found in Title 14 of the California Code of Regulations. Categorical exemptions will not apply if there is a reasonable possibility that a proposed project will have a significant effect on the environment due to unusual circumstances, or if another exception applies.

If a proposed project is not exempt from CEQA, the staff of the Commission conducts an Initial Study to determine whether the proposed project may have a significant effect on the environment. The Initial Study is circulated to Responsible, Trustee, and interested public agencies and others who have expressed an interest in such documents of the Commission for review and comment. The circulation period is normally 30 days. Based upon the responses received and Commission staff analysis, a determination is made as to whether a Negative Declaration or an Environmental Impact Report is required.

A Negative Declaration ("ND") is the less complex of the two documents. Generally, the ND consists of the Initial Study accompanied by a recommendation by the Commission staff that the proposed project would not have a significant effect on the environment. If the ND contains mitigation measures that help ensure that the proposed project is not environmentally harmful, then it is considered to be a Mitigated ND (MND). The ND or MND is circulated for 30 days to appropriate agencies and interested persons. This review is provided through the State Clearinghouse. If no significant environmental effects are identified, the Commission considers the ND or MND together with any comments received, and either does or does not adopt the ND or MND, and then either approves or disapproves the proposed project.

An Environmental Impact Report ("EIR") is required in instances where responses to the Initial Study reflect concern that the proposed project may or will have a significant effect on the environment. In some cases it is clear without preparation of an Initial Study that a project

could have a significant effect on the environment. In such cases, the EIR process may begin without preparation of an Initial Study. Usually a third party consultant will be hired by the Commission to prepare the EIR.

In most instances, the preparation of an EIR takes from six to nine months. The Commission staff will prepare a Notice of Preparation that is circulated for 30 days, and will hold a scoping meeting during that time, to obtain specific detail about the scope and content of environmental information to include in the EIR. Later, a Draft EIR is circulated for 45 days to agencies and individuals concerned about the project. The State Clearinghouse provides for circulation to State agencies. During the 45-day review period, a public hearing may be held. Comments and recommendations received and significant environmental points raised in the review and consultation process are responded to in the Final EIR. This document is then circulated for an additional 15 days to those agencies and persons who commented on the Draft EIR. After the review period has ended, the Final EIR is presented to the Commission for certification, and the proposed project, including any recommended alterations or mitigation measures, is presented to the Commission for approval or disapproval.

The applicant will be required to cover the costs of preparation of the environmental documentation for the project. Experience has shown that ND/MND and EIR costs vary considerably, from several hundred to hundreds of thousands of dollars. The applicant must deposit an amount specified by the staff of the Commission within 21 days after Commission staff gives written notice of the anticipated costs of environmental processing, and will be required to execute a reimbursement agreement committing to full payment of the Commission's costs. (IMPORTANT: Please refer to Submittal of Fees below for more specific information regarding payment of Commission costs in processing your application.) If the cost for the preparation of a ND/MND or EIR exceeds the amount deposited, the amount of excess costs must be deposited within 15 days after written notice is given. Any unexpended portion of the deposit will be refunded to the applicant after the ND/MND or EIR is determined by the Commission to be adequate. Should the applicant fail to deposit the requested funds, the application may be canceled without further notice. Staff will not contact consultants regarding preparation of an EIR until required deposits and reimbursement agreements are received.

Where the Commission is a Responsible Agency as defined in CEQA (a permitting agency other than the Lead Agency), it must review the environmental documentation prepared by the Lead Agency, and comply with all applicable, substantive, and procedural requirements of CEQA.

Permit Streamlining Act: Time Constraints/Completeness of Application

Not later than 30 calendar days after the Commission receives an application for a development project, the staff will notify the applicant in writing whether the application is complete. Please see PART IV of the attached application form for the definition of "development project".

Staff of the Commission shall deem an application complete if:

1. The data submitted are sufficient to allow the staff of the Commission to locate and describe the nature and extent of State-owned land to be utilized in the project;

2. The applicant submits all deposits and fees required by the Commission (See Submittal of Fees below);

3. The applicant submits project specific information and environmental data sufficient for the Commission to determine the level and scope of environmental review required under CEQA and the State CEQA Guidelines (see Parts II and III);

4. The applicant submits data sufficient for the State to determine the fair rental to be paid the State for the applicant's use of the State's property; and

5. The data submitted by the applicant are sufficient to allow staff of the Commission to begin an analysis to determine if the application is: (a) consistent with Commission policies, practices and procedures; (b) conducive to public access; (c) consistent with environmental safeguards and policies of the State; and (d) otherwise in the best interests of the State.

In the event the application is determined not to be complete, the staff will specify what additional information is required. Upon receipt of any additional material, the staff will respond within 30 days as to whether the application is complete. Should the applicant fail to provide a complete application within a reasonable period of time, the file may be closed and all or any part of the fees retained by the Commission. Please see Notice on Page vii in the Application Instructions section. There is an appeal process whereby an applicant may appeal the determination of the staff that the application is incomplete. The adequate completion of Parts I through V of the Application for Lease of State Lands shall constitute a complete application.

After an application is found to be complete, the applicant may be required to submit additional information to clarify, amplify, correct, or otherwise supplement the information requested in the application form.

Under the Permit Streamlining Act, when the Commission is the Lead Agency for a development project and an EIR is prepared, the Commission must approve or disapprove the proposed project within 180 days from the date the EIR is certified. If a combined EIR/EIS (under CEQA and NEPA) is being prepared the Commission must approve or disapprove a development project within 90 days after the combined document is completed and approved. When an ND/MND is prepared or if the development project is exempt from CEQA the development project shall be approved or disapproved within 60 days from the date of adoption of the ND/MND or from the date the project is determined by the Commission to be exempt from CEQA.

When the Commission is acting as a Responsible Agency, the Commission must approve or disapprove the proposed project within 180 days after the Commission deems the application complete or 180 days after the Lead Agency approved the project, whichever is later.

The following are some of the circumstances that may cause the Commission to deny a project:

1. Failure of an applicant to furnish requested additional information;
2. Environmental considerations;
3. Failure to meet any statutory requirements;
4. Failure to submit requested additional fees;
5. Failure to conclude negotiations or to execute documents;
6. Inability of applicant to meet financial qualifications as deemed appropriate by the staff;
7. Misrepresentation by the applicant or its agent; or
8. Inconsistency with Public Trust Doctrine restrictions, resources, values, uses or needs (For more information, please visit our website: http://www.slc.ca.gov/Misc_Pages/Public_Trust.html http://www.slc.ca.gov/Policy_Statements/Public_Trust_Home_Page.html).
9. The proposed activity, use, or project is determined not to be in the State's best interest.

This list should not be considered exhaustive.

Miscellaneous Information

The following concerns all applications:

An applicant acquires no property interest in State lands or the right to the use of State lands until the Commission has authorized a lease, permit, or other entitlement, and until the lease, permit, or other entitlement is complete in all respects and has been executed on behalf of the applicant and the State.

An application is not transferable; therefore, an agent should not submit an application without disclosing his or her status, authorization to act as agent, and the principal's identity; nor should an application be submitted with the intention of transferring the application or an interest in an application at a later date.

The preceding information is an outline of the general requirements and procedures applicable to all surface leasing developments. Prospective applicants wishing to obtain a lease, permit, or other entitlement for use of State lands should read and complete the attached application form and any attached parts that may be applicable and return it together with the data requested to the staff of the Commission for review and processing. Questions involving the surface leasing of State lands and the completed application form should be directed to:

California State Lands Commission
Land Management Division
100 Howe Avenue, Suite 100 South
Sacramento, California 95825-8202
Telephone: (916) 574-1940

Accommodations for the Deaf and Hearing Impaired

The State Lands Commission has available the services of the California Relay Service to provide telephone capabilities to deaf or hearing impaired persons. The telephone number of the California Relay Service is 1-800-735-2929 (TDD/TT). In addition, a sign language interpreter will be provided, upon reasonable advance notification of need by a deaf or hearing impaired individual.

APPLICATION INSTRUCTIONS FOR LEASE OF STATE LANDS

This application form has been developed in accordance with California Government Code Section 65940. The form has been designed to apply for a lease for a variety of surface use situations including commercial, industrial, right-of-way, and recreational uses. The form requires an applicant to fully describe its proposed use of State lands and consists of the following parts:

Part I – General Data;
Part II – Specific Project Information;
Part III – Project Environmental Data;
Part IV – Permit Streamlining Act; and
Part V – Privacy Notice and Certification.

The information sought in this application form is required from the applicant, and the sufficiency of the information provided by the applicant will be the basis by which the staff will determine the completeness of the application as specified in Government Code Section 65940.

Government Code Section 65941.5 requires the State Lands Commission to notify its applicants of the public notice distribution requirements under applicable provisions of law relative to any proposed Commission action on applications for development projects. The notice distribution requirements are contained in Government Code Section 11125, and include, but are not limited to, notice to any person who requests that notice in writing and posting on the Internet at least 10 days in advance of the meeting.

When completing this application, please type or print clearly and submit it to the principal office of the Commission in Sacramento. Please answer all applicable questions and write "N.A." where questions do not apply. In addition, please submit any information believed important in support of the application. Applications for any use or entitlement of State lands, including but not limited to, applications for amendments, assignments, new leases for continuation of existing uses, or replacements of existing leases or permits, must be submitted on this form. Requests or inquiries not submitted on this form will not be considered applications and will be returned to the submitting party. (IMPORTANT: Submittal of the application form will NOT be considered an application unless accompanied by the Filing Fee and appropriate Minimum Expense Deposit set forth in Submittal of Fees below.)

CALIFORNIA PUBLIC RECORDS ACT

This application and all supporting information will become part of the official file and cannot be returned. The application and all supporting information may become a public record subject to disclosure to anyone who asks for it under the California Public Records Act (Government Code Section 6250 and following). Information considered confidential by the Applicant including, but not limited to, financial data, trade secrets, or other proprietary information may be withheld from public view if requested by the Applicant and allowed by law. This information should be clearly marked “CONFIDENTIAL” on each page.

The application information outlined on the following forms is necessary in order to process the application for use of State land. You have the right to review files maintained about your

project by the Commission, except as otherwise provided by law. The Commission Records Manager, State Lands Commission, 100 Howe Avenue, Suite 100 South, Sacramento, California, 95825, telephone (916) 574-1900, is responsible for maintenance of the information which is collected by the Commission.

NOTICE

If an application becomes inactive for a period of six months, the application will be terminated and all fees submitted with the application will be forfeited, subject only to the return of any unused deposit of processing fees. An application will be considered inactive if the applicant fails to provide requested information or indicate in writing why such information is not forthcoming for a period of ninety days following written request for such information by Commission staff.

PROCESSING COSTS

In addition to the costs of preparation of environmental documentation for the proposed project, the applicant is required to pay for all Commission staff costs and other costs and expenses for processing this application. The applicant shall deposit with the Commission the applicable Minimum Expense Deposit as set forth in Submittal of Fees below, and submit an executed reimbursement agreement to cover those costs. A reimbursement agreement form will be provided by Commission staff following review of the application and an estimate of anticipated Commission costs. If any reimbursement agreement(s) and any payment required under any reimbursement agreement(s), is (are) not received within 21 days of written request, the application may be canceled. Processing costs and environmental fees are calculated based on actual or estimated costs plus proportional overhead. If the deposit amount is less than those costs, the applicant will be required to submit additional costs within the allowable time period. If the deposit amount is more than these costs, the applicant will be refunded the difference.

Please note that if your application is ultimately approved by the Commission, you may also be charged other fees as provided by law, including, but not limited to environmental review fees charged by the California Department of Fish and Game, pursuant to Fish and Game Code Section 711.4.

Application Processing

It is the practice of the Commission to recover all costs for the processing of leases, permits, or other entitlements for the use of State land.

As soon as the application is accepted as complete, the staff will take all steps necessary, including but not limited to title work, land descriptions, appraisals, and environmental review to process the application. In some cases, the terms and conditions of a Commission lease, permit, or entitlement are subject to negotiation on a case-by-case basis based on relevant facts. Once the terms and conditions have been agreed to and the lease, permit, or entitlement has been executed by the applicant, staff will place the item on the agenda for consideration by the Commission at a regularly-scheduled meeting. Items to be considered by the Commission must be finalized at least one month prior to the scheduled meeting.

Submittal of Fees

Each applicant is required to pay the Commission's costs of processing the application. Each applicant, at the time of filing an application, shall submit a Filing Fee and the appropriate Minimum Expense Deposit for processing fees as set forth below. Each applicant will also be required to execute a reimbursement agreement to cover the total cost of processing the application (see below). The Minimum Expense Deposits listed below are based upon typical Commission costs in processing routine uncomplicated transactions, and may not cover the total cost of processing your application.

A. Filing Fee. *Same fee required of all applicants.* $ 25.00

B. Minimum Expense Deposits for Processing Fees. *Use the chart below to determine the deposit required for this project.*

Transaction	Minimum Expense Deposit
(a) Commercial Lease (New)	$17,500.00
(b) Industrial Lease (New)	$25,000.00
(c) Right of Way	$ 2,500.00
(d) Public Agency Lease/Permit	$ 3,000.00
(e) Non-Commercial Lease	$ 1,200.00
(f) Protective Structure	$ 2,500.00
(g) Grazing or other Agricultural Lease	$ 2,500.00
(h) Dredging Lease	$ 1,500.00
(i) Consent to Encumber Leasehold	$ 1,000.00
(j) Assignment not involving amendment of Lease	$ 1,000.00
(k) Amendment of Lease to accommodate Lessee	$ 2,000.00
(l) Sublease Approval	$ 1,500.00
(m) Most other transactions not listed above	$ 1,500.00

In addition to the above listed application processing fees, the Commission may require reimbursement of its costs in providing other services associated with processing applications for leases. These services include but are not limited to:

1. Processing environmental documents (See General Information enclosed with this application).
2. Review of environmental documents by the California Department of Fish and Game (See Fish and Game Code Section 711.4).
3. Advertising or public notification.
4. Duplicating or certifying papers.
5. Searching records or ordering title reports.
6. Processing archaeological, biological (including Tahoe Yellow Cress) or other necessary surveys.
7. Appraisals.

8. Monitoring compliance with environmental mitigation requirements of lease.
9. Lease management, including rent reviews, compliance with lease terms, etc.
10. Engineering Review.

Upon receipt of your application form and determination by staff of estimated costs to process your application, you will be provided a reimbursement agreement to assure recovery by the Commission of the total cost to process your application for the use of State land.

NOTE: The California State Lands Commission accepts MasterCard, Visa, and Novus/Discover Cards for payments including filing fees, application fees, rent, etc. If you wish to use this method of payment, please contact our Accounting Office at (916) 574-0397.

MISCELLANEOUS

The Commission encourages applicants to contact or meet with the Commission's staff prior to or after submitting an application to clarify the sufficiency of information needed to deem an application complete, in particular, information required in Parts II and III. This may streamline the application process by providing information to the staff in determining whether or not to recommend the project to the Commission.

The conduct of the Commission is governed by California Public Resources Code Sections 6000 et seq. and Title 2, Division 3, Sections 1900 et seq. of the California Code of Regulations. These provisions are included herein by reference.

DEFINITIONS

1) CCR: California Code of Regulations

2) CEQA: California Environmental Quality Act: Public Resources Code Sections 21000 et seq.

3) EIR: Environmental Impact Report

4) ND/MND: Negative Declaration/Mitigated Negative Declaration

5) PRC: Public Resources Code

6) "Proposed Project" shall include the construction, operation, and maintenance of a new facility, a change in an existing facility, or the continued use of State land for an existing facility for which Commission authorization has expired or never been granted.

7) "Water body" shall include the Pacific Ocean and any river, stream, slough, lake, bay, estuary, inlet, or strait.

Appendix 7:A

Cost Estimates

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

WORK AREA DESCRIPTION	SCENARIO 1		SCENARIO 2		SCENARIO 3A				SCENARIO 3B		SCENARIO 4	
	10 MGD		20 MGD		10 MGD w/ 40 MGD BB		30 MGD Exp to 40 MGD		40 MGD		60 MGD	
	ES	RB	ES	RB	ES	RB	ES	RB	ES	RB	ES	RB
SUMMARY SHEET												
TOTAL CAPITAL COST PW ($/1000)												
LOW	$142,488	$138,121	$261,767	$265,833	$165,734	$169,642	$262,264	$258,981	$393,789	$394,843	$635,003	$641,168
BASE	$158,535	$153,677	$291,248	$295,772	$184,399	$188,748	$291,801	$288,148	$438,140	$439,312	$706,520	$713,379
HIGH	$177,345	$171,910	$325,803	$330,864	$206,277	$211,142	$326,422	$322,335	$490,122	$491,434	$790,344	$798,017
TOTAL ANNUAL O&M COST ($/1000)	$9,944	$9,925	$17,669	$17,656	$10,391	$10,403	$23,305	$23,219	$33,696	$33,621	$49,554	$49,631
O&M PW ($/1000)	$131,628	$131,373	$233,882	$233,703	$137,545	$137,691	$266,517	$265,526	$446,016	$445,026	$655,911	$656,932
TOTAL PW (CAP AND O&M) ($/1000)												
LOW	$274,120	$269,490	$495,650	$499,540	$303,280	$307,330	$528,780	$524,510	$839,800	$839,870	$1,290,910	$1,298,100
BASE	$290,160	$285,050	$525,130	$529,480	$321,940	$326,440	$558,320	$553,670	$884,160	$884,340	$1,362,430	$1,370,310
HIGH	$308,970	$303,280	$559,680	$564,570	$343,820	$348,830	$592,940	$587,860	$936,140	$936,460	$1,446,260	$1,454,950
ANNUALIZED COST ($/1000)												
LOW	$20,710	$20,360	$37,450	$37,740	$22,910	$23,220	$39,950	$39,630	$63,450	$63,450	$97,530	$98,070
BASE	$21,920	$21,540	$39,670	$40,000	$24,320	$24,660	$42,180	$41,830	$66,800	$66,810	$102,930	$103,530
HIGH	$23,340	$22,910	$42,280	$42,650	$25,980	$26,350	$44,800	$44,410	$70,730	$70,750	$109,260	$109,920
ANNUALIZED COST PER 1,000 GAL												
LOW	$5.67	$5.58	$5.13	$5.17	$6.28	$6.36	$3.65	$3.62	$4.35	$4.35	$4.45	$4.48
BASE	$6.01	$5.90	$5.43	$5.48	$6.66	$6.76	$3.85	$3.82	$4.58	$4.58	$4.70	$4.73
HIGH	$6.39	$6.28	$5.79	$5.84	$7.12	$7.22	$4.09	$4.06	$4.84	$4.85	$4.99	$5.02
ANNUALIZED COST PER AF												
LOW	$1,849	$1,818	$1,672	$1,685	$2,045	$2,073	$1,189	$1,179	$1,416	$1,416	$1,451	$1,459
BASE	$1,957	$1,923	$1,771	$1,785	$2,171	$2,202	$1,255	$1,245	$1,491	$1,491	$1,531	$1,540
HIGH	$2,084	$2,045	$1,887	$1,904	$2,319	$2,352	$1,333	$1,322	$1,579	$1,579	$1,626	$1,636

Cost Scenario	Description
1	10 MGD Facility, West Basin Only, Tie-in to WB3, 4, & 5, No Expansion Capabilities
2	20 MGD Facility, West Basin and MWD, Tie-in to WB Feeder and WC Turnouts, Connect Downstream of Turnouts, No Expansion Capabilities
3	10 MGD + 30 MGD Facility, West Basin and MWD, Tie-in to WB and WC Feeders, 40 MGD Backbone for Expansion
a	10 MGD with 40 MGD Backbone (all facilities sized for 10 MGD, except for intake screens and piping, product water conveyance piping, and the admin/maint building which are sized for 40 MGD backbone) 30 MGD Expansion to 40 MGD (build out cost for additional 30 MGD)
b	Cost to Build 40 MGD all at once
4	60 MGD Facility, West Basin and MWD, Tie-in to Sepulveda Feeder, No Expansion Capabilities, 2017 Online

Cost Estimate Assumptions

Description			Qty.	Unit	Unit Cost	Project Cost
			AVG			
Installation	20-40%	*	30%		Cost Estimated as Percentage	
Piping	5-10%	*	7.5%		Cost Estimated as Percentage	
Electrical	5-15%	*	10%		Cost Estimated as Percentage	
Instrumentation	5-10%	*	7.5%		Cost Estimated as Percentage	
HVAC, Plumbing, & Architectural	2-5%	*	3.5%		Cost Estimated as Percentage	
Sitework	10-15%	*	12.5%		Cost Estimated as Percentage	
Geotechnical Improvements (Structural Piles)			25%		Cost Estimated as Percentage	
Subtotal						
Mobilization / Demobilization	1-2%	**	1.5%		Cost Estimated as Percentage	
Bonds & Insurance	0.5-1.5%	**	0.5%		Cost Estimated as Percentage	
Overhead & Profit	8-15%	**	12%		Cost Estimated as Percentage	
Contingency	10-50%	**	30%		Cost Estimated as Percentage	
Subtotal Construction Cost						
Professional Services (Permitting, Engineering, etc.)	15-20%	***	18%		Cost Estimated as Percentage	

* Percentage of Equipment Cost - the specific number should be selected on the application/system
** Percentage of Direct Subtotal
***Percentage of Construction Subtotal

O&M Assumptions

Design Payback Period (Years)	20	Replacement Annualization Factor	0.0821
Replacement Period for Equipment (Years)	10	Replacement Present Worth Factor	0.6564
Discount Rate	4.3%	Salvage Present Worth Factor	0.4308
Annual O&M Present Worth Factor	13.2363	Annualization Factor	0.0755

Solids removal not included.
Coagulent addition is periodic based on water quality and is not included.

Electricity Rate	kWh	$0.095	12 kV Service
	kWh	$0.075	66 kV Service

Chemical	Unit	Unit Price
Sodium Hypochlorite (12.5%)	gal	$1.15
Aqueous Ammonia (29.4%)	gal	$1.50
Scale Inhibitor (Organo-Phosphonate)	lb	$0.80
CO2	lb	$0.045
Lime (<90%)	lb	$0.084
Caustic (25%)	gal	$1.90

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 10 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$5,800,000	6%		
2.0	PRETREATMENT	$24,130,000	24%		
3.0	REVERSE OSMOSIS	$36,640,000	37%		
4.0	POST-TREATMENT & DISINFECTION	$4,530,000	5%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$16,290,000	16%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$2,570,000	3%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	2%		
8.0	ELECTRICAL BUILDING	$620,000	1%		
9.0	ADMIN/MAINT	$6,940,000	7%		
	SUBTOTAL	**$99,520,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$995,200	$1,990,400	$1,990,400
	BONDS & INSURANCE		$497,600	$995,200	$1,492,800
	OVERHEAD & PROFIT		$7,961,600	$11,942,400	$14,928,000
	UN-PRICED ALLOWANCES (CONTINGENCY)		$14,928,000	$19,904,000	$29,856,000
	SUBTOTAL CONSTRUCTION COST		**$123,902,400**	**$134,352,000**	**$147,787,200**
	PROFESSIONAL SERVICES		$18,585,360	$24,183,360	$29,557,440
	TOTAL CAPITAL COST		**$142,487,760**	**$158,535,360**	**$177,344,640**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$3,630,000	$48,050,000	37%	
2.0	CHEMICALS	$1,496,000	$19,800,000	15%	
3.0	MAINTENANCE & MATERIALS	$620,000	$8,210,000	6%	
4.0	LABOR (14 FTE @ $100/hr)	$2,912,000	$38,540,000	29%	
5.0	REPLACEMENT	$1,286,423	$17,027,519	13%	
	TOTAL O&M COST	**$9,944,423**	**$131,627,519**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	24" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	30" HDPE BURIED SECTION	155	LF	$69	$41	$110	$17,112
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$120	$72	$192	$5,760
	24" 90-DEG BEND	2	EA	$650	$390	$1,040	$2,080
	30" 45-DEG BEND	4	EA	$1,250	$750	$2,000	$8,000
	30"X24" REDUCER	2	EA	$2,500	$1,500	$4,000	$8,000
	30"X24" TEE	2	EA	$2,500	$1,500	$4,000	$8,000
	30"X30" TEE	2	EA	$2,500	$1,500	$4,000	$8,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 30" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (24" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	10	EA	$1,200	$720	$1,920	$19,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,078,552**
1.2	**CONVEYANCE PIPES**						
	30" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$120	$72	$192	$494,784
	30" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$120	$72	$192	$494,784
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,489,568**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	30" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$120	$36	$156	$187,200
	30" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$129	$39	$168	$201,240
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$38,844	$38,844
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$512,004**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, VTP, 400 HP	3	EA	$325,000	$97,500	$422,500	$1,267,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL EVELATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	1,230	SF	$140	$60	$200	$246,000
	STRUCTURAL PILES	1	25%			$61,500	$61,500
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - RAW WATER PUMP STATION						**$1,653,315**
	SUBTOTAL - INTAKE /DISCHARGE						**$4,733,439**
	PIPING*		7.5%				$123,999
	ELECTRICAL*		10%				$165,332
	INSTRUMENTATION*		7.5%				$123,999
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$57,866
	SITEWORK		12.5%				$591,680
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$5,796,314**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	3,761,706	kWh	$0.075	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000
	INTAKE SCREENS MAINTENANCE	1	LS	$33,500	$34,000	$450,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	2	EA	$600,000	$180,000	$780,000	$1,560,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	1	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	DISK FILTER BUILDING	850	SF	$140	$60	$200	$170,000
	STRUCTURAL PILES	1	25%			$42,500	$42,500
	SUBTOTAL - DISK FILTERS						**$1,772,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	3	EA	$94,000	$28,200	$122,200	$366,600
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	2,150	SF	$140	$60	$200	$430,000
	STRUCTURAL PILES	1	25%			$107,500	$107,500
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$904,100**
2.1c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$8,700,000	$2,610,000	$11,310,000	$11,310,000
	MF/UF TRAINS **(5)**	6	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	1	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	1	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	7,500	SF	$120	$50	$170	$1,275,000
	STRUCTURAL PILES	1	25%			$318,750	$318,750
	SUBTOTAL - MF/UF SYSTEM						**$12,903,750**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.3 MG **(7)**	1	EA	$130,000	$39,000	$169,000	$169,000
	TANK COATING	5,372	SF	$8	$3	$11	$59,092
	EQUIPMENT PAD	115	CY	$872	$392	$1,264	$145,360
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$373,452**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	3	EA	$500,000	$150,000	$650,000	$1,950,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$2,649,375**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,400	SF	$4	$1	$5	$7,280
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,050	SF	$100	$30	$130	$136,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$284,820**
	SUBTOTAL - PRETREATMENT						**$17,115,497**
	PIPING		7.5%				$1,283,662
	ELECTRICAL		10%				$1,711,550
	INSTRUMENTATION		7.5%				$1,283,662
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$599,042
	SITEWORK		12.5%				$2,139,437
	PROJECT SUBTOTAL - PRETREATMENT						**$24,132,851**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	3,503,141	kWh	$0.075	$263,000	$3,481,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	274,480	GALS	$1.15	$316,000	$4,183,000
	AQ AMMONIA (29.4%)	31,938	GALS	$1.50	$48,000	$635,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0 REVERSE OSMOSIS							
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$17,500,000	$5,250,000	$22,750,000	$22,750,000
	CARTRIDGE FILTERS **(9)**	2	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	2	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	2	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	2	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	1	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	1	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$25,937,500**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$47,068**
	SUBTOTAL - REVERSE OSMOSIS						**$25,984,568**
	PIPING		7.5%				$1,948,843
	ELECTRICAL		10%				$2,598,457
	INSTRUMENTATION		7.5%				$1,948,843
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$909,460
	SITEWORK		12.5%				$3,248,071
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$36,638,241**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	32,970,739	kWh	$0.075	$2,473,000	$32,733,000
	RO 2ND PASS PUMPS POWER	687,283	kWh	$0.075	$52,000	$688,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	47,085	LBS	$0.80	$38,000	$503,000
	CAUSTIC (25%)	109,500	GALS	$1.90	$208,000	$2,753,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	3	EA	$285,000	$85,500	$370,500	$1,111,500
	POST-TREATMENT P.S. BUILDING	900	SF	$140	$60	$200	$180,000
	STRUCTURAL PILES	1	25%			$45,000	$45,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - POST-TREATMENT P.S.						**$1,360,875**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$350,000	$105,000	$455,000	$455,000
	HYDRATED LIME SLURRY SYSTEM	1	EA	$325,000	$97,500	$422,500	$422,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	1	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	EA				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$1,722,500**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	35	CY	$260	$78	$338	$11,830
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	740	SF	$4	$1	$5	$3,848
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	475	SF	$100	$30	$130	$61,750
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$130,428**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$3,213,803**
	PIPING		7.5%				$241,035
	ELECTRICAL		10%				$321,380
	INSTRUMENTATION		7.5%				$241,035
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$112,483
	SITEWORK		12.5%				$401,725
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$4,531,462**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	733,991	kWh	$0.075	$55,000	$728,000
	CHEMICAL COSTS					
	CO2	2,573,250	LBS	$0.045	$116,000	$1,535,000
	LIME (>90%)	1,903,475	LBS	$0.084	$160,000	$2,118,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 2.5 MG	1	EA	$1,400,000	$420,000	$1,820,000	$1,820,000
	SUBTOTAL - CLEARWELL						**$1,820,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	3	EA	$125,000	$37,500	$162,500	$487,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL EVELATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SURGE TANK, 5,000 GAL	1	EA	$50,000	$15,000	$65,000	$65,000
	SUBTOTAL - PRODUCT WATER P.S.						**$1,305,815**
5.3	**CONVEYANCE PIPELINE**						
	24" CMLC STEEL PIPE, BACKBONE FEEDER	14,680	LF	$298	$89	$387	$5,687,032
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	6,660	LF	$298	$89	$387	$2,580,084
	SUBTOTAL - CONVEYANCE PIPELINE						**$8,267,116**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$16,000	$16,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	SODIUM HYPO STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	35	CY	$260	$78	$338	$11,830
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	740	SF	$4	$1	$5	$3,848
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	475	SF	$100	$30	$130	$61,750
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$162,428**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$11,555,359**
	PIPING		7.5%				$866,652
	ELECTRICAL		10%				$1,155,536
	INSTRUMENTATION		7.5%				$866,652
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$404,438
	SITEWORK		12.5%				$1,444,420
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$16,293,056**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	5,404,846	kWh	$0.075	$405,000	$5,361,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	151,475	GALS	$1.90	$288,000	$3,812,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	30" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$120	$60	$180	$374,040
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$374,040**
6.2	**DIFFUSERS**						
	24" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	30" HDPE BURIED SECTION	205	LF	$120	$60	$180	$36,900
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	24" 45-DEG BEND	1	EA	$650	$325	$975	$975
	30" 45-DEG BEND	3	EA	$1,250	$625	$1,875	$5,625
	30"X24" REDUCER	1	EA	$2,500	$1,250	$3,750	$3,750
	24" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 30" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (24" PIPE) TO BALAST BURIED PIPES	8	EA	$600	$300	$900	$7,200
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	9	EA	$1,200	$600	$1,800	$16,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$647,723**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$550,000	$165,000	$715,000	$715,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$715,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$25,000	$7,500	$33,000	$66,000
	PH ADJUSTMENT	1	LS	$15,000	$4,500	$20,000	$20,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$86,000**
	SUBTOTAL - RESIDUALS HANDLING						**$1,822,763**
	PIPING		7.5%				$136,707
	ELECTRICAL		10%				$182,276
	INSTRUMENTATION		7.5%				$136,707
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$63,797
	SITEWORK		12.5%				$227,845
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$2,570,095**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0	**POWER SUPPLY**						
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	2,500	SF	$120	$50	$170	$425,000
	STRUCTURAL PILES	1	25%			$106,250	$106,250
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$18,594
	SITEWORK		12.5%				$66,406
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$616,250**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	6,000	SF	$120	$50	$170	$1,020,000
	STRUCTURAL PILES	1	25%			$255,000	$255,000
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,312,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$4,919,500**
	PIPING		7.5%				$368,963
	ELECTRICAL		10%				$491,950
	INSTRUMENTATION		7.5%				$368,963
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$172,183
	SITEWORK		12.5%				$614,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$6,936,495**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 10 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$5,240,000	5%		
2.0	PRETREATMENT	$24,130,000	25%		
3.0	REVERSE OSMOSIS	$36,640,000	38%		
4.0	POST-TREATMENT & DISINFECTION	$4,530,000	5%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$14,090,000	15%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$2,280,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	2%		
8.0	ELECTRICAL BUILDING	$620,000	1%		
9.0	ADMIN/MAINT	$6,940,000	7%		
	SUBTOTAL	**$96,470,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$964,700	$1,929,400	$1,929,400
	BONDS & INSURANCE		$482,350	$964,700	$1,447,050
	OVERHEAD & PROFIT		$7,717,600	$11,576,400	$14,470,500
	UN-PRICED ALLOWANCES (CONTINGENCY)		$14,470,500	$19,294,000	$28,941,000
	SUBTOTAL CONSTRUCTION COST		**$120,105,150**	**$130,234,500**	**$143,257,950**
	PROFESSIONAL SERVICES		$18,015,773	$23,442,210	$28,651,590
	TOTAL CAPITAL COST		**$138,120,923**	**$153,676,710**	**$171,909,540**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$3,615,000	$47,850,000	36%	
2.0	CHEMICALS	$1,495,000	$19,790,000	15%	
3.0	MAINTENANCE & MATERIALS	$620,000	$8,210,000	6%	
4.0	LABOR (14 FTE @ $100/hr)	$2,912,000	$38,540,000	29%	
5.0	REPLACEMENT	$1,283,065	$16,983,070	13%	
	TOTAL O&M COST	**$9,925,065**	**$131,373,070**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 10 MGD
SITE: REDONDO BEACH

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	24" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	30" HDPE BURIED SECTION	130	LF	$69	$41	$110	$14,352
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$120	$72	$192	$5,760
	24" 90-DEG BEND	2	EA	$650	$390	$1,040	$2,080
	30" 45-DEG BEND	2	EA	$1,250	$750	$2,000	$4,000
	30"X24" REDUCER	2	EA	$2,500	$1,500	$4,000	$8,000
	30"X24" TEE	2	EA	$2,500	$1,500	$4,000	$8,000
	30"X30" TEE	2	EA	$2,500	$1,500	$4,000	$8,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 30" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (24" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	8	EA	$1,200	$720	$1,920	$15,360
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,035,952**
1.2	**CONVEYANCE PIPES**						
	30" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$120	$72	$192	$395,520
	30" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$120	$72	$192	$395,520
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,291,040**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	30" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$120	$36	$156	$78,000
	30" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$129	$39	$168	$83,850
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$16,185	$16,185
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$262,755**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	3	EA	$325,000	$97,500	$422,500	$1,267,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL EVELATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	1,230	SF	$140	$60	$200	$246,000
	STRUCTURAL PILES	1	25%			$61,500	$61,500
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - RAW WATER PUMP STATION						**$1,653,315**
	SUBTOTAL - INTAKE /DISCHARGE						**$4,243,062**
	PIPING*		7.5%				$123,999
	ELECTRICAL*		10%				$165,332
	INSTRUMENTATION*		7.5%				$123,999
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$57,866
	SITEWORK		12.5%				$530,383
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$5,244,640**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	3,761,706	kWh	$0.075	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000
	INTAKE SCREENS MAINTENANCE	1	LS	$33,500	$34,000	$450,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	2	EA	$600,000	$180,000	$780,000	$1,560,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	1	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	DISK FILTER BUILDING	850	SF	$140	$60	$200	$170,000
	STRUCTURAL PILES	1	25%			$42,500	$42,500
	SUBTOTAL - DISK FILTERS						**$1,772,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	3	EA	$94,000	$28,200	$122,200	$366,600
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	2,150	SF	$140	$60	$200	$430,000
	STRUCTURAL PILES	1	25%			$107,500	$107,500
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$904,100**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$8,700,000	$2,610,000	$11,310,000	$11,310,000
	MF/UF TRAINS **(5)**	6	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	1	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	1	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	7,500	SF	$120	$50	$170	$1,275,000
	STRUCTURAL PILES	1	25%			$318,750	$318,750
	SUBTOTAL - MF/UF SYSTEM						**$12,903,750**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.3 MG **(7)**	1	EA	$130,000	$39,000	$169,000	$169,000
	TANK COATING	5,372	SF	$8	$3	$11	$59,092
	EQUIPMENT PAD	115	CY	$872	$392	$1,264	$145,360
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$373,452**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	3	EA	$500,000	$150,000	$650,000	$1,950,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$2,649,375**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,400	SF	$4	$1	$5	$7,280
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,050	SF	$100	$30	$130	$136,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$284,820**
	SUBTOTAL - PRETREATMENT						**$17,115,497**
	PIPING		7.5%				$1,283,662
	ELECTRICAL		10%				$1,711,550
	INSTRUMENTATION		7.5%				$1,283,662
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$599,042
	SITEWORK		12.5%				$2,139,437
	PROJECT SUBTOTAL - PRETREATMENT						**$24,132,851**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	3,503,141	kWh	$0.075	$263,000	$3,481,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	274,480	GALS	$1.15	$316,000	$4,183,000
	AQ AMMONIA (29.4%)	31,281	GALS	$1.50	$47,000	$622,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0 REVERSE OSMOSIS							
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$17,500,000	$5,250,000	$22,750,000	$22,750,000
	CARTRIDGE FILTERS **(9)**	2	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	2	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	2	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	2	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	1	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	1	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$25,937,500**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$47,068**
	SUBTOTAL - REVERSE OSMOSIS						**$25,984,568**
	PIPING		7.5%				$1,948,843
	ELECTRICAL		10%				$2,598,457
	INSTRUMENTATION		7.5%				$1,948,843
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$909,460
	SITEWORK		12.5%				$3,248,071
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$36,638,241**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	32,970,739	kWh	$0.075	$2,473,000	$32,733,000
	RO 2ND PASS PUMPS POWER	687,283	kWh	$0.075	$52,000	$688,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	47,085	LBS	$0.80	$38,000	$503,000
	CAUSTIC (25%)	109,500	GALS	$1.90	$208,000	$2,753,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	3	EA	$285,000	$85,500	$370,500	$1,111,500
	POST-TREATMENT P.S. BUILDING	900	SF	$140	$60	$200	$180,000
	STRUCTURAL PILES	1	25%			$45,000	$45,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - POST-TREATMENT P.S.						**$1,360,875**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$350,000	$105,000	$455,000	$455,000
	HYDRATED LIME SLURRY SYSTEM	1	EA	$325,000	$97,500	$422,500	$422,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	1	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$1,722,500**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	35	CY	$260	$78	$338	$11,830
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	740	SF	$4	$1	$5	$3,848
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	475	SF	$100	$30	$130	$61,750
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$130,428**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$3,213,803**
	PIPING		7.5%				$241,035
	ELECTRICAL		10%				$321,380
	INSTRUMENTATION		7.5%				$241,035
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$112,483
	SITEWORK		12.5%				$401,725
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$4,531,462**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	733,991	kWh	$0.075	$55,000	$728,000
	CHEMICAL COSTS					
	CO2	2,573,250	LBS	$0.045	$116,000	$1,535,000
	LIME (>90%)	1,903,475	LBS	$0.084	$160,000	$2,118,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 2.5 MG	1	EA	$1,400,000	$420,000	$1,820,000	$1,820,000
	SUBTOTAL - CLEARWELL						**$1,820,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	3	EA	$125,000	$37,500	$162,500	$487,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL EVELATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SURGE TANK, 5,000 GAL	1	EA	$50,000	$15,000	$65,000	$65,000
	SUBTOTAL - PRODUCT WATER P.S.						**$1,305,815**
5.3	**CONVEYANCE PIPELINE**						
	24" CMLC STEEL PIPE, BACKBONE FEEDER	15,950	LF	$298	$89	$387	$6,179,030
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	1,360	LF	$298	$89	$387	$526,864
	SUBTOTAL - CONVEYANCE PIPELINE						**$6,705,894**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$16,000	$16,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	SODIUM HYPO STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$11,000	$11,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	35	CY	$260	$78	$338	$11,830
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	740	SF	$4	$1	$5	$3,848
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	475	SF	$100	$30	$130	$61,750
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$162,428**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$9,994,137**
	PIPING		7.5%				$749,560
	ELECTRICAL		10%				$999,414
	INSTRUMENTATION		7.5%				$749,560
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$349,795
	SITEWORK		12.5%				$1,249,267
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$14,091,733**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	5,204,667	kWh	$0.075	$390,000	$5,162,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	151,475	GALS	$1.90	$288,000	$3,812,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	30" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$120	$60	$180	$333,000
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$333,000**
6.2	**DIFFUSERS**						
	24" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	30" HDPE BURIED SECTION	90	LF	$120	$60	$180	$16,200
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	24" 45-DEG BEND	1	EA	$650	$325	$975	$975
	30" 45-DEG BEND	3	EA	$1,250	$625	$1,875	$5,625
	30"X24" REDUCER	1	EA	$2,500	$1,250	$3,750	$3,750
	24" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 30" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (24" PIPE) TO BALAST BURIED PIPES	8	EA	$600	$300	$900	$7,200
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	4	EA	$1,200	$600	$1,800	$7,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$480,023**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$550,000	$165,000	$715,000	$715,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$715,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$25,000	$7,500	$33,000	$66,000
	PH ADJUSTMENT	1	LS	$15,000	$4,500	$20,000	$20,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$86,000**
	SUBTOTAL - RESIDUALS HANDLING						**$1,614,023**
	PIPING		7.5%				$121,052
	ELECTRICAL		10%				$161,402
	INSTRUMENTATION		7.5%				$121,052
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$56,491
	SITEWORK		12.5%				$201,753
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$2,275,772**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0	**POWER SUPPLY**						
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	2,500	SF	$120	$50	$170	$425,000
	STRUCTURAL PILES	1	25%			$106,250	$106,250
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$18,594
	SITEWORK		12.5%				$66,406
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$616,250**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	6,000	SF	$120	$50	$170	$1,020,000
	STRUCTURAL PILES	1	25%			$255,000	$255,000
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,312,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$4,919,500**
	PIPING		7.5%				$368,963
	ELECTRICAL		10%				$491,950
	INSTRUMENTATION		7.5%				$368,963
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$172,183
	SITEWORK		12.5%				$614,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$6,936,495**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 20 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$7,580,000	4%		
2.0	PRETREATMENT	$46,050,000	25%		
3.0	REVERSE OSMOSIS	$73,240,000	40%		
4.0	POST-TREATMENT & DISINFECTION	$8,340,000	5%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$33,030,000	18%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$3,790,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,230,000	1%		
9.0	ADMIN/MAINT	$7,570,000	4%		
	SUBTOTAL	**$182,830,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,828,300	$3,656,600	$3,656,600
	BONDS & INSURANCE		$914,150	$1,828,300	$2,742,450
	OVERHEAD & PROFIT		$14,626,400	$21,939,600	$27,424,500
	UN-PRICED ALLOWANCES (CONTINGENCY)		$27,424,500	$36,566,000	$54,849,000
	SUBTOTAL CONSTRUCTION COST		**$227,623,350**	**$246,820,500**	**$271,502,550**
	PROFESSIONAL SERVICES		$34,143,503	$44,427,690	$54,300,510
	TOTAL CAPITAL COST		**$261,766,853**	**$291,248,190**	**$325,803,060**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$7,239,000	$95,820,000	41%	
2.0	CHEMICALS	$3,144,000	$41,620,000	18%	
3.0	MAINTENANCE & MATERIALS	$651,000	$8,620,000	4%	
4.0	LABOR (20 FTE @ $100/hr)	$4,160,000	$55,060,000	24%	
5.0	REPLACEMENT	$2,475,126	$32,761,587	14%	
	TOTAL O&M COST	**$17,669,126**	**$233,881,587**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	30" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	42" HDPE BURIED SECTION	155	LF	$69	$41	$110	$17,112
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$138	$83	$221	$6,624
	30" 90-DEG BEND	2	EA	$750	$450	$1,200	$2,400
	42" 45-DEG BEND	4	EA	$1,500	$900	$2,400	$9,600
	42"X30" REDUCER	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X30" TEE	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X42" TEE	2	EA	$3,200	$1,920	$5,120	$10,240
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 42" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	10	EA	$1,200	$720	$1,920	$19,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,086,776**
1.2	**CONVEYANCE PIPES**						
	42" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$138	$83	$221	$569,002
	42" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$138	$83	$221	$569,002
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,638,003**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	42" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$138	$41	$179	$215,280
	42" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$138	$41	$179	$215,280
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$43,056	$43,056
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$558,336**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, VTP, 400 HP	5	EA	$325,000	$97,500	$422,500	$2,112,500
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	2,052	SF	$140	$60	$200	$410,400
	STRUCTURAL PILES	1	25%			$102,600	$102,600
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - RAW WATER PUMP STATION						**$2,753,625**
	SUBTOTAL - INTAKE /DISCHARGE						**$6,036,740**
	PIPING*		7.5%				$206,522
	ELECTRICAL*		10%				$275,363
	INSTRUMENTATION*		7.5%				$206,522
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$96,377
	SITEWORK		12.5%				$754,593
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$7,576,116**

*APPLIED TO 1.4 ONLY

ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
RAW WATER PUMP POWER	7,523,412	kWh	$0.075	$564,000	$7,465,000
MAINTENANCE & MATERIALS	1	LS	$65,000	$65,000	$860,000
INTAKE SCREENS MAINTENANCE	1	LS	$35,000	$35,000	$463,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	3	EA	$600,000	$180,000	$780,000	$2,340,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	2	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	2	EA				Incl. Above
	DISK FILTER BUILDING	1,250	SF	$140	$60	$200	$250,000
	STRUCTURAL PILES	1	25%			$62,500	$62,500
	SUBTOTAL - DISK FILTERS						**$2,652,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	5	EA	$94,000	$28,200	$122,200	$611,000
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	3,600	SF	$140	$60	$200	$720,000
	STRUCTURAL PILES	1	25%			$180,000	$180,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$1,511,000**
2.1c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$17,400,000	$5,220,000	$22,620,000	$22,620,000
	MF/UF TRAINS **(5)**	12	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	2	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	2	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - MF/UF SYSTEM						**$25,807,500**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.6 MG **(7)**	1	EA	$212,100	$63,630	$275,730	$275,730
	TANK COATING	10,930	SF	$8	$3	$11	$120,230
	EQUIPMENT PAD	150	CY	$872	$392	$1,264	$189,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$585,560**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	5	EA	$500,000	$150,000	$650,000	$3,250,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$4,415,625**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$7,540	$7,540
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,498	SF	$4	$1	$5	$7,790
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,100	SF	$100	$30	$130	$143,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$342,140**
	SUBTOTAL - PRETREATMENT						**$32,661,825**
	PIPING		7.5%				$2,449,637
	ELECTRICAL		10%				$3,266,182
	INSTRUMENTATION		7.5%				$2,449,637
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,143,164
	SITEWORK		12.5%				$4,082,728
	PROJECT SUBTOTAL - PRETREATMENT						**$46,053,173**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	7,006,282	kWh	$0.075	$525,000	$6,949,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	548,789	GALS	$1.15	$631,000	$8,352,000
	AQ AMMONIA (29.4%)	62,569	GALS	$1.50	$94,000	$1,244,000
	MAINTENANCE & MATERIALS	1	LS	$65,000	$65,000	$860,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$35,000,000	$10,500,000	$45,500,000	$45,500,000
	CARTRIDGE FILTERS **(9)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	4	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	4	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	2	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	2	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$51,875,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$65,068**
	SUBTOTAL - REVERSE OSMOSIS						**$51,940,068**
	PIPING		7.5%				$3,895,505
	ELECTRICAL		10%				$5,194,007
	INSTRUMENTATION		7.5%				$3,895,505
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,817,902
	SITEWORK		12.5%				$6,492,509
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$73,235,496**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	65,941,478	kWh	$0.075	$4,946,000	$65,467,000
	RO 2ND PASS PUMPS POWER	1,374,566	kWh	$0.075	$103,000	$1,363,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	94,170	LBS	$0.80	$75,000	$993,000
	CAUSTIC (25%)	216,810	GALS	$1.90	$412,000	$5,453,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	5	EA	$285,000	$85,500	$370,500	$1,852,500
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - POST-TREATMENT P.S.						**$2,268,125**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$700,000	$210,000	$910,000	$910,000
	HYDRATED LIME SLURRY SYSTEM	2	EA	$325,000	$97,500	$422,500	$845,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	2	EA				Incl. Above
	SATURATOR	2	EA				Incl. Above
	LIME CONTACT TANK **(17)**	2	EA	$650,000	$195,000	$845,000	$1,690,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$3,445,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	58	CY	$260	$78	$338	$19,604
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,150	SF	$4	$1	$5	$5,980
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	810	SF	$100	$30	$130	$105,300
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$201,884**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$5,915,009**
	PIPING		7.5%				$443,626
	ELECTRICAL		10%				$591,501
	INSTRUMENTATION		7.5%				$443,626
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$207,025
	SITEWORK		12.5%				$739,376
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,340,163**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	1,467,983	kWh	$0.075	$110,000	$1,456,000
	CHEMICAL COSTS					
	CO2	5,146,593	LBS	$0.045	$232,000	$3,071,000
	LIME (>90%)	3,806,651	LBS	$0.084	$320,000	$4,236,000
	SODIUM HYPOCHLORITE (12.5%)	243,365	GALS	$1.15	$280,000	$3,706,000
	AQ AMMONIA (29.4%)	27,747	GALS	$1.50	$42,000	$556,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 5 MG	1	EA	$2,423,077	$726,923	$3,150,000	$3,150,000
	SUBTOTAL - CLEARWELL						**$3,150,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	5	EA	$184,415	$55,325	$239,740	$1,198,698
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SURGE TANK, 15,000 GAL	1	EA	$150,000	$45,000	$195,000	$195,000
	SUBTOTAL - PRODUCT WATER P.S.						**$2,646,823**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	14,680	LF	$548	$164	$713	$10,463,948
	24" CMLC STEEL PIPE, BACKBONE FEEDER	11,920	LF	$298	$89	$388	$4,620,132
	16" CMLC STEEL PIPE, WEST COAST FEEDER	6,470	LF	$162	$49	$211	$1,363,339
	16" CMLC STEEL PIPE, WEST BASIN FEEDER	2,835	LF	$162	$49	$211	$597,383
	12" CMLC STEEL PIPE, WEST BASIN FEEDER	2,414	LF	$105	$32	$137	$329,950
	SUBTOTAL - CONVEYANCE PIPELINE						**$17,374,752**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 8,000 GAL	2	EA	$12,000	$3,600	$16,000	$32,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 2,000 GAL	1	EA	$2,800	$840	$4,000	$4,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	53	CY	$260	$78	$338	$17,914
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,055	SF	$4	$1	$5	$5,486
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	730	SF	$100	$30	$130	$94,900
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$255,300**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$23,426,875**
	PIPING		7.5%				$1,757,016
	ELECTRICAL		10%				$2,342,688
	INSTRUMENTATION		7.5%				$1,757,016
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$819,941
	SITEWORK		12.5%				$2,928,359
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$33,031,894**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	11,877,316	kWh	$0.075	$891,000	$11,794,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	303,315	GALS	$1.90	$576,000	$7,624,000
	SODIUM HYPOCHLORITE (12.5%)	365,048	GALS	$1.15	$420,000	$5,559,000
	AQ AMMONIA (29.4%)	41,620	GALS	$1.50	$62,000	$821,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	42" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$138	$69	$207	$430,146
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$430,146**
6.2	**DIFFUSERS**						
	36" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	42" HDPE BURIED SECTION	205	LF	$138	$69	$207	$42,435
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	36" 45-DEG BEND	1	EA	$1,250	$625	$1,875	$1,875
	42" 45-DEG BEND	3	EA	$1,500	$750	$2,250	$6,750
	42"X36" REDUCER	1	EA	$3,200	$1,600	$4,800	$4,800
	36" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 42" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (36" PIPE) TO BALAST BURIED PIPES	8	EA	$900	$450	$1,350	$10,800
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	9	EA	$1,200	$600	$1,800	$16,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$659,933**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$1,430,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$50,000	$15,000	$65,000	$130,000
	PH ADJUSTMENT	1	LS	$30,000	$9,000	$39,000	$39,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$169,000**
	SUBTOTAL - RESIDUALS HANDLING						**$2,689,079**
	PIPING		7.5%				$201,681
	ELECTRICAL		10%				$268,908
	INSTRUMENTATION		7.5%				$201,681
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$94,118
	SITEWORK		12.5%				$336,135
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$3,791,601**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	5,000	SF	$120	$50	$170	$850,000
	STRUCTURAL PILES	1	25%			$212,500	$212,500
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$37,188
	SITEWORK		12.5%				$132,813
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,232,500**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	8,100	SF	$120	$50	$170	$1,377,000
	STRUCTURAL PILES	1	25%			$344,250	$344,250
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,758,250**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$5,365,750**
	PIPING		7.5%				$402,431
	ELECTRICAL		10%				$536,575
	INSTRUMENTATION		7.5%				$402,431
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$187,801
	SITEWORK		12.5%				$670,719
	PROJECT SUBTOTAL - ADMIN/MAINT						**$7,565,708**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 20 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$6,970,000	4%		
2.0	PRETREATMENT	$46,050,000	25%		
3.0	REVERSE OSMOSIS	$73,240,000	39%		
4.0	POST-TREATMENT & DISINFECTION	$8,340,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$36,790,000	20%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$3,480,000	2%		
7.0	POWER SUPPLY (REDUNDANY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,230,000	1%		
9.0	ADMIN/MAINT	$7,570,000	4%		
	SUBTOTAL	**$185,670,000**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,856,700	$3,713,400	$3,713,400
	BONDS & INSURANCE		$928,350	$1,856,700	$2,785,050
	OVERHEAD & PROFIT		$14,853,600	$22,280,400	$27,850,500
	UN-PRICED ALLOWANCES (CONTINGENCY)		$27,850,500	$37,134,000	$55,701,000
	SUBTOTAL CONSTRUCTION COST		**$231,159,150**	**$250,654,500**	**$275,719,950**
	PROFESSIONAL SERVICES		$34,673,873	$45,117,810	$55,143,990
	TOTAL CAPITAL COST		**$265,833,023**	**$295,772,310**	**$330,863,940**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$7,219,000	$95,550,000	41%	
2.0	CHEMICALS	$3,144,000	$41,620,000	18%	
3.0	MAINTENANCE & MATERIALS	$654,000	$8,660,000	4%	
4.0	LABOR (20 FTE @ $100/hr)	$4,160,000	$55,060,000	24%	
5.0	REPLACEMENT	$2,479,007	$32,812,960	14%	
	TOTAL O&M COST	**$17,656,007**	**$233,702,960**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	30" HDPE BURIED SECTION	80	LF	$69	$41	$110	$8,832
	42" HDPE BURIED SECTION	130	LF	$138	$83	$221	$28,704
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	30" 90-DEG BEND	2	EA	$750	$450	$1,200	$2,400
	42" 45-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	42"X30" REDUCER	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X30" TEE	2	EA	$3,000	$1,800	$4,800	$9,600
	42"X42" TEE	2	EA	$3,200	$1,920	$5,120	$10,240
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 42" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$33,600	$20,160	$53,760	$215,040
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (30" PIPE) TO BALAST BURIED PIPES	4	EA	$600	$360	$960	$3,840
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	8	EA	$1,200	$720	$1,920	$15,360
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,054,416**
1.2	**CONVEYANCE PIPES**						
	42" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$138	$83	$221	$454,848
	42" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$138	$83	$221	$454,848
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,409,696**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	42" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$138	$41	$179	$89,700
	42" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$138	$41	$179	$89,700
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$17,940	$17,940
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$282,060**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	5	EA	$325,000	$97,500	$422,500	$2,112,500
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	2,052	SF	$140	$60	$200	$410,400
	STRUCTURAL PILES	1	25%			$102,600	$102,600
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - RAW WATER PUMP STATION						**$2,753,625**
	SUBTOTAL - INTAKE /DISCHARGE						**$5,499,797**
	PIPING*		7.5%				$206,522
	ELECTRICAL*		10%				$275,363
	INSTRUMENTATION*		7.5%				$206,522
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$96,377
	SITEWORK		12.5%				$687,475
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$6,972,055**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	7,523,412	kWh	$0.075	$564,000	$7,465,000
	MAINTENANCE & MATERIALS	1	LS	$65,000	$65,000	$860,000
	INTAKE SCREENS MAINTENANCE	1	LS	$38,000	$38,000	$503,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	3	EA	$600,000	$180,000	$780,000	$2,340,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	2	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	2	EA				Incl. Above
	DISK FILTER BUILDING	1,250	SF	$140	$60	$200	$250,000
	STRUCTURAL PILES	1	25%			$62,500	$62,500
	SUBTOTAL - DISK FILTERS						**$2,652,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	5	EA	$94,000	$28,200	$122,200	$611,000
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	3,600	SF	$140	$60	$200	$720,000
	STRUCTURAL PILES	1	25%			$180,000	$180,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$1,511,000**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$17,400,000	$5,220,000	$22,620,000	$22,620,000
	MF/UF TRAINS **(5)**	12	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	2	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	2	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - MF/UF SYSTEM						**$25,807,500**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.6 MG **(7)**	1	EA	$212,100	$63,630	$275,730	$275,730
	TANK COATING	10,930	SF	$8	$3	$11	$120,230
	EQUIPMENT PAD	150	CY	$872	$392	$1,264	$189,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$585,560**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	5	EA	$500,000	$150,000	$650,000	$3,250,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$4,415,625**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$7,540	$7,540
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CHEMICAL HANDLING BUILDING	180	SF	$140	$60	$200	$36,000
	CHEMICAL STORAGE CONTAINMENT AREA	75	CY	$260	$78	$338	$25,350
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,498	SF	$4	$1	$5	$7,790
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,100	SF	$100	$30	$130	$143,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$342,140**
	SUBTOTAL - PRETREATMENT						**$32,661,825**
	PIPING		7.5%				$2,449,637
	ELECTRICAL		10%				$3,266,182
	INSTRUMENTATION		7.5%				$2,449,637
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,143,164
	SITEWORK		12.5%				$4,082,728
	PROJECT SUBTOTAL - PRETREATMENT						**$46,053,173**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	7,006,282	kWh	$0.075	$525,000	$6,949,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	548,789	GALS	$1.15	$631,000	$8,352,000
	AQ AMMONIA (29.4%)	62,569	GALS	$1.50	$94,000	$1,244,000
	MAINTENANCE & MATERIALS	1	LS	$65,000	$65,000	$860,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$35,000,000	$10,500,000	$45,500,000	$45,500,000
	CARTRIDGE FILTERS **(9)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	4	EA		$0	$0	Incl. Above
	RO TRAINS - 1ST PASS **(11)**	4	EA		$0	$0	Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	4	EA		$0	$0	Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	2	EA	$300,000	$90,000	$390,000	Incl. Above
	RO TRAINS - 2ND PASS **(14)**	2	EA		$0	$0	Incl. Above
	TRAIN PIPING & VALVES	1	LS		$0	$0	Incl. Above
	CIP TANK **(15)**	1	EA		$0	$0	Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA		$0	$0	Incl. Above
	RO PROCESS BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$51,875,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 400 GAL	1	EA	$600	$180	$780	$780
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	5	CY	$260	$78	$338	$1,690
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	115	SF	$4	$1	$5	$598
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	40	SF	$100	$30	$130	$5,200
	SUBTOTAL - RO CHEMICAL FACILITIES						**$65,068**
	SUBTOTAL - REVERSE OSMOSIS						**$51,940,068**
	PIPING		7.5%				$3,895,505
	ELECTRICAL		10%				$5,194,007
	INSTRUMENTATION		7.5%				$3,895,505
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,817,902
	SITEWORK		12.5%				$6,492,509
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$73,235,496**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	65,941,478	kWh	$0.075	$4,946,000	$65,467,000
	RO 2ND PASS PUMPS POWER	1,374,566	kWh	$0.075	$103,000	$1,363,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	94,170	LBS	$0.80	$75,000	$993,000
	CAUSTIC (25%)	216,810	GALS	$1.90	$412,000	$5,453,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	5	EA	$285,000	$85,500	$370,500	$1,852,500
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SUBTOTAL - POST-TREATMENT P.S.						**$2,268,125**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$700,000	$210,000	$910,000	$910,000
	HYDRATED LIME SLURRY SYSTEM	2	EA	$325,000	$97,500	$422,500	$845,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	2	LS				Incl. Above
	SATURATOR	2	EA				Incl. Above
	LIME CONTACT TANK **(17)**	2	EA	$650,000	$195,000	$845,000	$1,690,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$3,445,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,000	$16,000
	AQ AMMONIA STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,000	$2,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	58	CY	$260	$78	$338	$19,604
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,150	SF	$4	$1	$5	$5,980
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	810	SF	$100	$30	$130	$105,300
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$201,884**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$5,915,009**
	PIPING		7.5%				$443,626
	ELECTRICAL		10%				$591,501
	INSTRUMENTATION		7.5%				$443,626
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$207,025
	SITEWORK		12.5%				$739,376
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,340,163**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	1,467,983	kWh	$0.075	$110,000	$1,456,000
	CHEMICAL COSTS					
	CO2	5,146,593	LBS	$0.045	$232,000	$3,071,000
	LIME (>90%)	3,806,651	LBS	$0.084	$320,000	$4,236,000
	SODIUM HYPOCHLORITE (12.5%)	243,365	GALS	$1.15	$280,000	$3,706,000
	AQ AMMONIA (29.4%)	27,747	GALS	$1.50	$42,000	$556,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 5 MG	1	EA	$2,423,077	$726,923	$3,150,000	$3,150,000
	SUBTOTAL - CLEARWELL						**$3,150,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	5	EA	$184,415	$55,325	$239,740	$1,198,698
	WET WELL EXCAVATION	180	CY	$5	$15	$20	$3,600
	WET WELL SLAB	20	CY	$420	$280	$700	$14,000
	WET WELL WALLS	50	CY	$480	$320	$800	$40,000
	WET WELL EVELATED SLAB	20	CY	$660	$440	$1,100	$22,000
	SEDIMENTATION CHAMBER EXCAVATION	15	CY	$5	$15	$20	$300
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	5	CY	$480	$320	$800	$4,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$31,250	$9,375	$40,625	$40,625
	SURGE TANK, 15,000 GAL	1	EA	$150,000	$45,000	$195,000	$195,000
	SUBTOTAL - PRODUCT WATER P.S.						**$2,646,823**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	15,950	LF	$548	$164	$713	$11,369,208
	30" CMLC STEEL PIPE, BACKBONE FEEDER	10,480	LF	$417	$125	$542	$5,681,208
	18" CMLC STEEL PIPE, WEST COAST FEEDER	6,470	LF	$182	$55	$237	$1,532,652
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	1,360	LF	$298	$89	$388	$527,129
	16" CMLC STEEL PIPE, WEST BASIN FEEDER	2,835	LF	$162	$49	$211	$597,383
	12" CMLC STEEL PIPE, WEST BASIN FEEDER	2,414	LF	$105	$32	$137	$329,950
	SUBTOTAL - CONVEYANCE PIPELINE						**$20,037,531**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 8,000 GAL	2	EA	$12,000	$3,600	$16,000	$32,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 2,000 GAL	1	EA	$2,800	$840	$4,000	$4,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	53	CY	$260	$78	$338	$17,914
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,055	SF	$4	$1	$5	$5,486
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	730	SF	$100	$30	$130	$94,900
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$255,300**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$26,089,653**
	PIPING		7.5%				$1,956,724
	ELECTRICAL		10%				$2,608,965
	INSTRUMENTATION		7.5%				$1,956,724
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$913,138
	SITEWORK		12.5%				$3,261,207
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$36,786,411**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	11,610,410	kWh	$0.075	$871,000	$11,529,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	303,315	GALS	$1.90	$576,000	$7,624,000
	SODIUM HYPOCHLORITE (12.5%)	365,048	GALS	$1.15	$420,000	$5,559,000
	AQ AMMONIA (29.4%)	41,620	GALS	$1.50	$62,000	$821,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	42" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$138	$69	$207	$382,950
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$382,950**
6.2	**DIFFUSERS**						
	36" HDPE BURIED SECTION	150	LF	$100	$50	$150	$22,500
	42" HDPE BURIED SECTION	90	LF	$138	$69	$207	$18,630
	10" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$8	$4	$12	$360
	36" 45-DEG BEND	1	EA	$1,250	$625	$1,875	$1,875
	42" 45-DEG BEND	3	EA	$1,500	$750	$2,250	$6,750
	42"X36" REDUCER	1	EA	$3,200	$1,600	$4,800	$4,800
	36" BLIND FLANGE	1	EA	$475	$238	$713	$713
	RETROFIT STRUCT. AT END OF TUNNEL W/ 42" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (36" PIPE) TO BALAST BURIED PIPES	8	EA	$900	$450	$1,350	$10,800
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,200	$600	$1,800	$7,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	10" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$7,000	$3,500	$10,500	$52,500
	SUBTOTAL - DIFFUSERS						**$489,128**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$1,430,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$50,000	$15,000	$65,000	$130,000
	PH ADJUSTMENT	1	LS	$30,000	$9,000	$39,000	$39,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$169,000**
	SUBTOTAL - RESIDUALS HANDLING						**$2,471,078**
	PIPING		7.5%				$185,331
	ELECTRICAL		10%				$247,108
	INSTRUMENTATION		7.5%				$185,331
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$86,488
	SITEWORK		12.5%				$308,885
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$3,484,219**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	5,000	SF	$120	$50	$170	$850,000
	STRUCTURAL PILES	1	25%			$212,500	$212,500
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,062,500**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$37,188
	SITEWORK		12.5%				$132,813
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,232,500**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	8,100	SF	$120	$50	$170	$1,377,000
	STRUCTURAL PILES	1	25%			$344,250	$344,250
	LAB EQUIPMENT	1	LS			$37,000	$37,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$1,758,250**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$5,365,750**
	PIPING		7.5%				$402,431
	ELECTRICAL		10%				$536,575
	INSTRUMENTATION		7.5%				$402,431
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$187,801
	SITEWORK		12.5%				$670,719
	PROJECT SUBTOTAL - ADMIN/MAINT						**$7,565,708**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 10 (40) MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$7,313,000	6%		
2.0	PRETREATMENT	$24,318,040	21%		
3.0	REVERSE OSMOSIS	$36,690,000	32%		
4.0	POST-TREATMENT & DISINFECTION	$4,682,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$28,580,000	25%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$3,022,000	3%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	2%		
8.0	ELECTRICAL BUILDING	$616,000	1%		
9.0	ADMIN/MAINT	$8,535,000	7%		
	SUBTOTAL	**$115,756,040**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,157,560	$2,315,121	$2,315,121
	BONDS & INSURANCE		$578,780	$1,157,560	$1,736,341
	OVERHEAD & PROFIT		$9,260,483	$13,890,725	$17,363,406
	UN-PRICED ALLOWANCES (CONTINGENCY)		$17,363,406	$23,151,208	$34,726,812
	SUBTOTAL CONSTRUCTION COST		**$144,116,270**	**$156,270,654**	**$171,897,720**
	PROFESSIONAL SERVICES		$21,617,441	$28,128,718	$34,379,544
	TOTAL CAPITAL COST		**$165,733,711**	**$184,399,372**	**$206,277,264**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$4,038,000	$53,450,000	39%	
2.0	CHEMICALS	$1,496,000	$19,800,000	14%	
3.0	MAINTENANCE & MATERIALS	$620,000	$8,210,000	6%	
4.0	LABOR (14 FTE @ $100/hr)	$2,912,000	$38,540,000	28%	
5.0	REPLACEMENT	$1,325,483	$17,544,533	13%	
	TOTAL O&M COST	**$10,391,483**	**$137,544,533**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	42" HDPE BURIED SECTION	80	LF	$138	$83	$221	$17,664
	48" HDPE BURIED SECTION	155	LF	$192	$115	$307	$47,616
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	42" 90-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	48" 45-DEG BEND	4	EA	$2,500	$1,500	$4,000	$16,000
	48"X42" REDUCER	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X42" TEE	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 48" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	10	EA	$1,900	$1,140	$3,040	$30,400
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,600,880**
1.2	**CONVEYANCE PIPES**						
	48" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$192	$115	$307	$791,654
	48" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$192	$115	$307	$791,654
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,083,309**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	48" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$192	$58	$250	$299,520
	48" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$192	$58	$250	$299,520
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$59,904	$59,904
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$743,664**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	3	EA	$325,000	$97,500	$422,500	$1,267,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL ELEVATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION BUILDING	1,230	SF	$140	$60	$200	$246,000
	STRUCTURAL PILES	1	25%			$61,500	$61,500
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - RAW WATER PUMP STATION						**$1,653,315**
	SUBTOTAL - INTAKE /DISCHARGE						**$6,081,168**
	PIPING*		7.5%				$123,999
	ELECTRICAL*		10%				$165,332
	INSTRUMENTATION*		7.5%				$123,999
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$57,866
	SITEWORK		12.5%				$760,146
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$7,312,509**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	3,761,706	kWh	$0.075	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000
	INTAKE SCREENS MAINTENANCE	1	LS	$33,500	$34,000	$450,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	2	EA	$600,000	$180,000	$780,000	$1,560,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	1	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	DISK FILTER BUILDING	850	SF	$140	$60	$200	$170,000
	STRUCTURAL PILES	1	25%			$42,500	$42,500
	SUBTOTAL - DISK FILTERS						**$1,772,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	3	EA	$94,000	$28,200	$122,200	$366,600
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	2,150	SF	$140	$60	$200	$430,000
	STRUCTURAL PILES	1	25%			$107,500	$107,500
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$904,100**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$8,700,000	$2,610,000	$11,310,000	$11,310,000
	MF/UF TRAINS **(5)**	6	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	1	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	1	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	7,500	SF	$120	$50	$170	$1,275,000
	STRUCTURAL PILES	1	25%			$318,750	$318,750
	SUBTOTAL - MF/UF SYSTEM						**$12,903,750**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.3 MG **(7)**	1	EA	$130,000	$39,000	$169,000	$169,000
	TANK COATING	5,372	SF	$8	$3	$11	$59,092
	EQUIPMENT PAD	115	CY	$872	$392	$1,264	$145,360
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$373,452**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	3	EA	$500,000	$150,000	$650,000	$1,950,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$2,649,375**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	100	CY	$260	$78	$338	$33,800
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,050	SF	$4	$1	$5	$10,660
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,550	SF	$100	$30	$130	$201,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$416,160**
	SUBTOTAL - PRETREATMENT						**$17,246,837**
	PIPING		7.5%				$1,293,513
	ELECTRICAL		10%				$1,724,684
	INSTRUMENTATION		7.5%				$1,293,513
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$603,639
	SITEWORK		12.5%				$2,155,855
	PROJECT SUBTOTAL - PRETREATMENT						**$24,318,040**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	3,503,141	kWh	$0.075	$263,000	$3,481,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	274,480	GALS	$1.15	$316,000	$4,183,000
	AQ AMMONIA (29.4%)	31,938	GALS	$1.50	$48,000	$635,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0 REVERSE OSMOSIS							
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$17,500,000	$5,250,000	$22,750,000	$22,750,000
	CARTRIDGE FILTERS **(9)**	2	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	2	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	2	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	2	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	1	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	1	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$25,937,500**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	11	CY	$260	$78	$338	$3,718
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	233	SF	$4	$1	$5	$1,212
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	108	SF	$100	$30	$130	$14,040
	SUBTOTAL - RO CHEMICAL FACILITIES						**$83,980**
	SUBTOTAL - REVERSE OSMOSIS						**$26,021,480**
	PIPING		7.5%				$1,951,611
	ELECTRICAL		10%				$2,602,148
	INSTRUMENTATION		7.5%				$1,951,611
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$910,752
	SITEWORK		12.5%				$3,252,685
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$36,690,286**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	32,970,739	kWh	$0.075	$2,473,000	$32,733,000
	RO 2ND PASS PUMPS POWER	687,283	kWh	$0.075	$52,000	$688,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	47,085	LBS	$0.80	$38,000	$503,000
	CAUSTIC (25%)	109,500	GALS	$1.90	$208,000	$2,753,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	3	EA	$285,000	$85,500	$370,500	$1,111,500
	POST-TREATMENT P.S. BUILDING	900	SF	$140	$60	$200	$180,000
	STRUCTURAL PILES	1	25%			$45,000	$45,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - POST-TREATMENT P.S.						**$1,360,875**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$350,000	$105,000	$455,000	$455,000
	HYDRATED LIME SLURRY SYSTEM	1	EA	$325,000	$97,500	$422,500	$422,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	1	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$1,722,500**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$237,097**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$3,320,472**
	PIPING		7.5%				$249,035
	ELECTRICAL		10%				$332,047
	INSTRUMENTATION		7.5%				$249,035
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$116,217
	SITEWORK		12.5%				$415,059
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$4,681,865**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	733,991	kWh	$0.075	$55,000	$728,000
	CHEMICAL COSTS					
	CO2	2,573,250	LBS	$0.045	$116,000	$1,535,000
	LIME (>90%)	1,903,475	LBS	$0.084	$160,000	$2,118,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 2.5 MG	1	EA	$1,400,000	$420,000	$1,820,000	$1,820,000
	SUBTOTAL - CLEARWELL						**$1,820,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	3	EA	$125,000	$37,500	$162,500	$487,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL ELEVATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SURGE TANK, 5,000 GAL	1	EA	$100,000	$30,000	$130,000	$130,000
	SUBTOTAL - PRODUCT WATER P.S.						**$1,370,815**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	14,680	LF	$548	$164	$713	$10,463,948
	36" CMLC STEEL PIPE, WEST COAST FEEDER	5,260	LF	$548	$164	$713	$3,749,344
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	6,660	LF	$298	$89	$388	$2,581,383
	SUBTOTAL - CONVEYANCE PIPELINE						**$16,794,675**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$284,097**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$20,269,586**
	PIPING		7.5%				$1,520,219
	ELECTRICAL		10%				$2,026,959
	INSTRUMENTATION		7.5%				$1,520,219
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$709,436
	SITEWORK		12.5%				$2,533,698
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$28,580,117**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	10,843,056	kWh	$0.075	$813,000	$10,761,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	151,475	GALS	$1.90	$288,000	$3,812,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	48" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$192	$96	$288	$598,464
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$598,464**
6.2	**DIFFUSERS**						
	48" HDPE BURIED SECTION	355	LF	$192	$96	$288	$102,240
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	48" 45-DEG BEND	4	EA	$2,500	$1,250	$3,750	$15,000
	48" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 48" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	17	EA	$1,900	$950	$2,850	$48,450
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$743,790**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$550,000	$165,000	$715,000	$715,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$715,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$25,000	$7,500	$33,000	$66,000
	PH ADJUSTMENT	1	LS	$15,000	$4,500	$20,000	$20,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$86,000**
	SUBTOTAL - RESIDUALS HANDLING						**$2,143,254**
	PIPING		7.5%				$160,744
	ELECTRICAL		10%				$214,325
	INSTRUMENTATION		7.5%				$160,744
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$75,014
	SITEWORK		12.5%				$267,907
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$3,021,988**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	INTAKE SCREENS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	2,500	SF	$120	$50	$170	$425,000
	STRUCTURAL PILES	1	25%			$106,250	$106,250
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$18,594
	SITEWORK		12.5%				$66,406
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$616,250**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	11,200	SF	$120	$50	$170	$1,904,000
	STRUCTURAL PILES	1	25%			$476,000	$476,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$2,446,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,053,500**
	PIPING		7.5%				$454,013
	ELECTRICAL		10%				$605,350
	INSTRUMENTATION		7.5%				$454,013
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$211,873
	SITEWORK		12.5%				$756,688
	PROJECT SUBTOTAL - ADMIN/MAINT						**$8,535,435**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 10 (40) MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$6,462,000	5%		
2.0	PRETREATMENT	$24,318,040	21%		
3.0	REVERSE OSMOSIS	$36,690,000	31%		
4.0	POST-TREATMENT & DISINFECTION	$4,682,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$32,364,000	27%		
6.0	RESIDUALS HANDLING	$2,819,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	2%		
8.0	ELECTRICAL BUILDING	$616,000	1%		
9.0	ADMIN/MAINT	$8,535,000	7%		
	SUBTOTAL	**$118,486,040**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$1,184,860	$2,369,721	$2,369,721
	BONDS & INSURANCE		$592,430	$1,184,860	$1,777,291
	OVERHEAD & PROFIT		$9,478,883	$14,218,325	$17,772,906
	UN-PRICED ALLOWANCES (CONTINGENCY)		$17,772,906	$23,697,208	$35,545,812
	SUBTOTAL CONSTRUCTION COST		**$147,515,120**	**$159,956,154**	**$175,951,770**
	PROFESSIONAL SERVICES		$22,127,268	$28,792,108	$35,190,354
	TOTAL CAPITAL COST		**$169,642,388**	**$188,748,262**	**$211,142,124**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$4,036,000	$53,420,000	39%	
2.0	CHEMICALS	$1,496,000	$19,800,000	14%	
3.0	MAINTENANCE MATERIALS	$620,000	$8,210,000	6%	
4.0	LABOR (14 FTE @ $100/hr)	$2,912,000	$38,540,000	28%	
5.0	REPLACEMENT	$1,338,835	$17,721,267	13%	
	TOTAL O&M COST	**$10,402,835**	**$137,691,267**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	42" HDPE BURIED SECTION	80	LF	$138	$83	$221	$17,664
	48" HDPE BURIED SECTION	130	LF	$192	$115	$307	$39,936
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	42" 90-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	48" 45-DEG BEND	2	EA	$2,500	$1,500	$4,000	$8,000
	48"X42" REDUCER	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X42" TEE	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 48" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	8	EA	$1,900	$1,140	$3,040	$24,320
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,547,120**
1.2	**CONVEYANCE PIPES**						
	48" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$192	$115	$307	$632,832
	48" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$192	$115	$307	$632,832
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,765,664**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	48" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$192	$58	$250	$124,800
	48" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$192	$58	$250	$124,800
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$24,960	$24,960
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$359,280**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	3	EA	$325,000	$97,500	$422,500	$1,267,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL ELEVATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	RAW WATER PUMP STATION AND BUILDING	1,230	SF	$140	$60	$200	$246,000
	STRUCTURAL PILES	1	25%			$61,500	$61,500
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - RAW WATER PUMP STATION						**$1,653,315**
	SUBTOTAL - INTAKE /DISCHARGE						**$5,325,379**
	PIPING*		7.5%				$123,999
	ELECTRICAL*		10%				$165,332
	INSTRUMENTATION*		7.5%				$123,999
	HVAC, PLUMBING, & ARCHITECTURAL**		3.5%				$57,866
	SITEWORK		12.5%				$665,672
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$6,462,246**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	3,761,706	kWh	$0.075	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000
	INTAKE SCREENS MAINTENANCE	1	LS	$33,500	$34,000	$450,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	2	EA	$600,000	$180,000	$780,000	$1,560,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	1	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	DISK FILTER BUILDING	850	SF	$140	$60	$200	$170,000
	STRUCTURAL PILES	1	25%			$42,500	$42,500
	SUBTOTAL - DISK FILTERS						**$1,772,500**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	3	EA	$94,000	$28,200	$122,200	$366,600
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	2,150	SF	$140	$60	$200	$430,000
	STRUCTURAL PILES	1	25%			$107,500	$107,500
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$904,100**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$8,700,000	$2,610,000	$11,310,000	$11,310,000
	MF/UF TRAINS **(5)**	6	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	1	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	1	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	7,500	SF	$120	$50	$170	$1,275,000
	STRUCTURAL PILES	1	25%			$318,750	$318,750
	SUBTOTAL - MF/UF SYSTEM						**$12,903,750**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 0.3 MG **(7)**	1	EA	$130,000	$39,000	$169,000	$169,000
	TANK COATING	5,372	SF	$8	$3	$11	$59,092
	EQUIPMENT PAD	115	CY	$872	$392	$1,264	$145,360
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$373,452**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	3	EA	$500,000	$150,000	$650,000	$1,950,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$2,649,375**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,220	$25,220
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	AQ AMMONIA STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	100	CY	$260	$78	$338	$33,800
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,050	SF	$4	$1	$5	$10,660
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,550	SF	$100	$30	$130	$201,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$416,160**
	SUBTOTAL - PRETREATMENT						**$17,246,837**
	PIPING		7.5%				$1,293,513
	ELECTRICAL		10%				$1,724,684
	INSTRUMENTATION		7.5%				$1,293,513
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$603,639
	SITEWORK		12.5%				$2,155,855
	PROJECT SUBTOTAL - PRETREATMENT						**$24,318,040**

	ANNUAL O&M COSTS (INITIAL 10 MGD)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	3,503,141	kWh	$0.075	$263,000	$3,481,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	274,480	GALS	$1.15	$316,000	$4,183,000
	AQ AMMONIA (29.4%)	31,938	GALS	$1.50	$48,000	$635,000
	MAINTENANCE & MATERIALS	1	LS	$50,000	$50,000	$662,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0 REVERSE OSMOSIS							
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$17,500,000	$5,250,000	$22,750,000	$22,750,000
	CARTRIDGE FILTERS **(9)**	2	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	2	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	2	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	2	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	1	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	1	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	15,000	SF	$120	$50	$170	$2,550,000
	STRUCTURAL PILES	1	25%			$637,500	$637,500
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$25,937,500**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	11	CY	$260	$78	$338	$3,718
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	233	SF	$4	$1	$5	$1,212
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	108	SF	$100	$30	$130	$14,040
	SUBTOTAL - RO CHEMICAL FACILITIES						**$83,980**
	SUBTOTAL - REVERSE OSMOSIS						**$26,021,480**
	PIPING		7.5%				$1,951,611
	ELECTRICAL		10%				$2,602,148
	INSTRUMENTATION		7.5%				$1,951,611
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$910,752
	SITEWORK		12.5%				$3,252,685
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$36,690,286**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	32,970,739	kWh	$0.075	$2,473,000	$32,733,000
	RO 2ND PASS PUMPS POWER	687,283	kWh	$0.075	$52,000	$688,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	47,085	LBS	$0.80	$38,000	$503,000
	CAUSTIC (25%)	109,500	GALS	$1.90	$208,000	$2,753,000
	MAINTENANCE & MATERIALS	1	LS	$290,000	$290,000	$3,839,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	3	EA	$285,000	$85,500	$370,500	$1,111,500
	POST-TREATMENT P.S. BUILDING	900	SF	$140	$60	$200	$180,000
	STRUCTURAL PILES	1	25%			$45,000	$45,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SUBTOTAL - POST-TREATMENT P.S.						**$1,360,875**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 SYSTEM	1	LS	$350,000	$105,000	$455,000	$455,000
	HYDRATED LIME SLURRY SYSTEM	1	EA	$325,000	$97,500	$422,500	$422,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	1	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$1,722,500**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$237,097**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$3,320,472**
	PIPING		7.5%				$249,035
	ELECTRICAL		10%				$332,047
	INSTRUMENTATION		7.5%				$249,035
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$116,217
	SITEWORK		12.5%				$415,059
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$4,681,865**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	733,991	kWh	$0.075	$55,000	$728,000
	CHEMICAL COSTS					
	CO2	2,573,250	LBS	$0.045	$116,000	$1,535,000
	LIME (>90%)	1,903,475	LBS	$0.084	$160,000	$2,118,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 2.5 MG	1	EA	$1,400,000	$420,000	$1,820,000	$1,820,000
	SUBTOTAL - CLEARWELL						**$1,820,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	3	EA	$125,000	$37,500	$162,500	$487,500
	WET WELL EXCAVATION	108	CY	$5	$15	$20	$2,160
	WET WELL SLAB	12	CY	$420	$280	$700	$8,400
	WET WELL WALLS	30	CY	$480	$320	$800	$24,000
	WET WELL ELEVATED SLAB	12	CY	$660	$440	$1,100	$13,200
	SEDIMENTATION CHAMBER EXCAVATION	9	CY	$5	$15	$20	$180
	SEDIMENTATION CHAMBER SLAB	2	CY	$420	$280	$700	$1,400
	SEDIMENTATION CHAMBER WALLS	3	CY	$480	$320	$800	$2,400
	SEDIMENTATION CHAMBER ELEVATED SLAB	2	CY	$660	$440	$1,100	$2,200
	PRODUCT WATER P.S. BUILDING	2,700	SF	$140	$60	$200	$540,000
	STRUCTURAL PILES	1	25%			$135,000	$135,000
	OVERHEAD CRANE SYSTEM	1	LS	$18,750	$5,625	$24,375	$24,375
	SURGE TANK, 5,000 GAL	1	EA	$100,000	$30,000	$130,000	$130,000
	SUBTOTAL - PRODUCT WATER P.S.						**$1,370,815**
5.3	**CONVEYANCE PIPELINE**						
	42" CMLC STEEL PIPE, BACKBONE FEEDER	15,950	LF	$640	$192	$832	$13,270,400
	30" CMLC STEEL PIPE, BACKBONE FEEDER	10,480	LF	$417	$125	$542	$5,681,208
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	1,360	LF	$298	$89	$387	$526,864
	SUBTOTAL - CONVEYANCE PIPELINE						**$19,478,472**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	1	EA	$19,400	$5,820	$25,000	$25,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	1	EA	$15,800	$4,740	$21,000	$21,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$284,097**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$22,953,384**
	PIPING		7.5%				$1,721,504
	ELECTRICAL		10%				$2,295,338
	INSTRUMENTATION		7.5%				$1,721,504
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$803,368
	SITEWORK		12.5%				$2,869,173
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$32,364,271**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	10,809,692	kWh	$0.075	$811,000	$10,735,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	151,475	GALS	$1.90	$288,000	$3,812,000
	SODIUM HYPOCHLORITE (12.5%)	121,545	GALS	$1.15	$140,000	$1,853,000
	AQ AMMONIA (29.4%)	13,870	GALS	$1.50	$21,000	$278,000
	MAINTENANCE & MATERIALS	1	LS	$15,000	$15,000	$199,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	48" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$228	$114	$342	$632,700
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$632,700**
6.2	**DIFFUSERS**						
	48" HDPE BURIED SECTION	240	LF	$228	$114	$342	$82,080
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	48" 45-DEG BEND	2	EA	$3,000	$1,500	$4,500	$9,000
	48" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 48" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	12	EA	$1,900	$950	$2,850	$34,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$565,380**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$550,000	$165,000	$715,000	$715,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$715,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$25,000	$7,500	$33,000	$66,000
	PH ADJUSTMENT	1	LS	$15,000	$4,500	$20,000	$20,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$86,000**
	SUBTOTAL - RESIDUALS HANDLING						**$1,999,080**
	PIPING		7.5%				$149,931
	ELECTRICAL		10%				$199,908
	INSTRUMENTATION		7.5%				$149,931
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$69,968
	SITEWORK		12.5%				$249,885
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$2,818,703**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	2,500	SF	$120	$50	$170	$425,000
	STRUCTURAL PILES	1	25%			$106,250	$106,250
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	SUBTOTAL - ELECTRICAL BUILDING						**$531,250**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$18,594
	SITEWORK		12.5%				$66,406
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$616,250**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0 ADMIN/MAINT							
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	11,200	SF	$120	$50	$170	$1,904,000
	STRUCTURAL PILES	1	25%			$476,000	$476,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$2,446,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,053,500**
	PIPING		7.5%				$454,013
	ELECTRICAL		10%				$605,350
	INSTRUMENTATION		7.5%				$454,013
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$211,873
	SITEWORK		12.5%				$756,688
	PROJECT SUBTOTAL - ADMIN/MAINT						**$8,535,435**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 40 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$11,913,000	4%		
2.0	PRETREATMENT	$74,999,569	27%		
3.0	REVERSE OSMOSIS	$115,761,000	42%		
4.0	POST-TREATMENT & DISINFECTION	$12,230,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$42,015,000	15%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$5,615,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,972,000	1%		
9.0	ADMIN/MAINT	$8,535,000	3%		
	SUBTOTAL	**$275,040,569**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$2,750,406	$5,500,811	$5,500,811
	BONDS & INSURANCE		$1,375,203	$2,750,406	$4,125,609
	OVERHEAD & PROFIT		$22,003,246	$33,004,868	$41,256,085
	UN-PRICED ALLOWANCES (CONTINGENCY)		$41,256,085	$55,008,114	$82,512,171
	SUBTOTAL CONSTRUCTION COST		**$342,425,508**	**$371,304,768**	**$408,435,245**
	PROFESSIONAL SERVICES		$51,363,826	$66,834,858	$81,687,049
	TOTAL CAPITAL COST		**$393,789,334**	**$438,139,626**	**$490,122,294**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$16,280,000	$215,490,000	48%	
2.0	CHEMICALS	$5,967,000	$78,980,000	18%	
3.0	MAINTENANCE & MATERIALS	$769,000	$10,180,000	2%	
4.0	LABOR (32 FTE @ $100/hr)	$6,656,000	$88,100,000	20%	
5.0	REPLACEMENT	$4,024,196	$53,265,583	12%	
	TOTAL O&M COST	**$33,696,196**	**$446,015,583**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	42" HDPE BURIED SECTION	80	LF	$138	$83	$221	$17,664
	48" HDPE BURIED SECTION	155	LF	$192	$115	$307	$47,616
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	42" 90-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	48" 45-DEG BEND	4	EA	$2,500	$1,500	$4,000	$16,000
	48"X42" REDUCER	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X42" TEE	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 48" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	10	EA	$1,900	$1,140	$3,040	$30,400
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,600,880**
1.2	**CONVEYANCE PIPES**						
	48" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$192	$115	$307	$791,654
	48" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$192	$115	$307	$791,654
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,083,309**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	48" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$192	$58	$250	$299,520
	48" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$192	$58	$250	$299,520
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$59,904	$59,904
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$743,664**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	9	EA	$325,000	$97,500	$422,500	$3,802,500
	WET WELL EXCAVATION	350	CY	$5	$15	$20	$7,000
	WET WELL SLAB	35	CY	$420	$280	$700	$24,500
	WET WELL WALLS	80	CY	$480	$320	$800	$64,000
	WET WELL ELEVATED SLAB	35	CY	$660	$440	$1,100	$38,500
	SEDIMENTATION CHAMBER EXCAVATION	20	CY	$5	$15	$20	$400
	SEDIMENTATION CHAMBER SLAB	3	CY	$420	$280	$700	$2,100
	SEDIMENTATION CHAMBER WALLS	10	CY	$480	$320	$800	$8,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	3	CY	$660	$440	$1,100	$3,300
	RAW WATER PUMP STATION BUILDING	4,200	SF	$120	$50	$170	$714,000
	STRUCTURAL PILES	1	25%			$178,500	$178,500
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - RAW WATER PUMP STATION						**$4,915,925**
	SUBTOTAL - INTAKE /DISCHARGE						**$9,343,778**
	PIPING*		7.5%				$368,694
	ELECTRICAL*		10%				$491,593
	INSTRUMENTATION*		7.5%				$368,694
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$172,057
	SITEWORK		12.5%				$1,167,972
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$11,912,789**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	15,046,825	kWh	$0.075	$1,129,000	$14,944,000
	MAINTENANCE & MATERIALS	1	LS	$80,000	$80,000	$1,059,000
	INTAKE SCREENS MAINTENANCE	1	LS	$38,000	$38,000	$503,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	4	EA	$600,000	$180,000	$780,000	$3,120,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	3	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	3	EA				Incl. Above
	DISK FILTER BUILDING	2,100	SF	$140	$60	$200	$420,000
	STRUCTURAL PILES	1	25%			$105,000	$105,000
	SUBTOTAL - DISK FILTERS						**$3,645,000**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	9	EA	$94,000	$28,200	$122,200	$1,099,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	7,200	SF	$120	$50	$170	$1,224,000
	STRUCTURAL PILES	1	25%			$306,000	$306,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$2,629,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$29,000,000	$8,700,000	$37,700,000	$37,700,000
	MF/UF TRAINS **(5)**	24	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	3	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	3	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	20,000	SF	$120	$50	$170	$3,400,000
	STRUCTURAL PILES	1	25%			$850,000	$850,000
	SUBTOTAL - MF/UF SYSTEM						**$41,950,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.2 MG **(7)**	1	EA	$523,122	$156,937	$680,059	$680,059
	TANK COATING	18,290	SF	$8	$3	$11	$201,190
	EXCAVATION	10,000	CY	$5	$15	$20	$200,000
	EQUIPMENT PAD	280	CY	$872	$392	$1,264	$353,920
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$1,435,169**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	9	EA	$500,000	$150,000	$650,000	$5,850,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,900	SF	$140	$60	$200	$580,000
	STRUCTURAL PILES	1	25%			$145,000	$145,000
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$6,648,125**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	4	EA	$19,400	$5,820	$25,220	$100,880
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	100	CY	$260	$78	$338	$33,800
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,050	SF	$4	$1	$5	$10,660
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,550	SF	$100	$30	$130	$201,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$528,090**
	SUBTOTAL - PRETREATMENT						**$53,191,184**
	PIPING		7.5%				$3,989,339
	ELECTRICAL		10%				$5,319,118
	INSTRUMENTATION		7.5%				$3,989,339
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,861,691
	SITEWORK		12.5%				$6,648,898
	PROJECT SUBTOTAL - PRETREATMENT						**$74,999,569**

ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
MF/UF FILTRATE BOOSTER PUMP POWER	14,012,564	kWh	$0.075	$1,051,000	$13,911,000
CHEMICAL COSTS					
SODIUM HYPOCHLORITE (12.5%)	1,097,555	GALS	$1.15	$1,262,000	$16,704,000
AQ AMMONIA (29.4%)	125,195	GALS	$1.50	$188,000	$2,488,000
MAINTENANCE & MATERIALS	1	LS	$80,000	$80,000	$1,059,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$54,900,000	$16,470,000	$71,370,000	$71,370,000
	CARTRIDGE FILTERS **(9)**	8	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	8	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	8	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	8	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	4	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	4	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	50,000	SF	$120	$50	$170	$8,500,000
	STRUCTURAL PILES	1	25%			$2,125,000	$2,125,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$81,995,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	11	CY	$260	$78	$338	$3,718
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	233	SF	$4	$1	$5	$1,212
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	108	SF	$100	$30	$130	$14,040
	SUBTOTAL - RO CHEMICAL FACILITIES						**$104,980**
	SUBTOTAL - REVERSE OSMOSIS						**$82,099,980**
	PIPING		7.5%				$6,157,498
	ELECTRICAL		10%				$8,209,998
	INSTRUMENTATION		7.5%				$6,157,498
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,873,499
	SITEWORK		12.5%				$10,262,497
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$115,760,971**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	131,882,957	kWh	$0.075	$9,891,000	$130,921,000
	RO 2ND PASS PUMPS POWER	2,749,132	kWh	$0.075	$206,000	$2,727,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	188,340	LBS	$0.80	$151,000	$1,999,000
	CAUSTIC (25%)	433,985	GALS	$1.90	$825,000	$10,920,000
	MAINTENANCE & MATERIALS	1	LS	$365,000	$365,000	$4,831,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	9	EA	$285,000	$85,500	$370,500	$3,334,500
	POST-TREATMENT P.S. BUILDING	1,000	SF	$140	$60	$200	$200,000
	STRUCTURAL PILES	1	25%			$50,000	$50,000
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - POST-TREATMENT P.S.						**$3,657,625**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$735,000	$220,500	$955,500	$955,500
	HYDRATED LIME SLURRY SYSTEM	3	EA	$325,000	$97,500	$422,500	$1,267,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	3	EA	$650,000	$195,000	$845,000	$2,535,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$4,758,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$258,097**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,673,722**
	PIPING		7.5%				$650,529
	ELECTRICAL		10%				$867,372
	INSTRUMENTATION		7.5%				$650,529
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$303,580
	SITEWORK		12.5%				$1,084,215
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,229,948**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	2,935,966	kWh	$0.075	$220,000	$2,912,000
	CHEMICAL COSTS					
	CO2	10,293,365	LBS	$0.045	$463,000	$6,128,000
	LIME (>90%)	7,613,170	LBS	$0.084	$640,000	$8,471,000
	SODIUM HYPOCHLORITE (12.5%)	486,545	GALS	$1.15	$560,000	$7,412,000
	AQ AMMONIA (29.4%)	55,480	GALS	$1.50	$83,000	$1,099,000
	MAINTENANCE & MATERIALS	1	LS	$20,000	$20,000	$265,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 10 MG (BURIED)	1	EA	$4,800,000	$1,440,000	$6,240,000	$6,240,000
	EXCAVATION AND BACKFILL	1	LS			$175,000	$175,000
	SUBTOTAL - CLEARWELL						**$6,415,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	7	EA	$365,000	$109,500	$474,500	$3,321,500
	WET WELL EXCAVATION	400	CY	$5	$15	$20	$8,000
	WET WELL SLAB	40	CY	$420	$280	$700	$28,000
	WET WELL WALLS	100	CY	$480	$320	$800	$80,000
	WET WELL ELEVATED SLAB	40	CY	$660	$440	$1,100	$44,000
	SEDIMENTATION CHAMBER EXCAVATION	20	CY	$5	$15	$20	$400
	SEDIMENTATION CHAMBER SLAB	3	CY	$420	$280	$700	$2,100
	SEDIMENTATION CHAMBER WALLS	12	CY	$480	$320	$800	$9,600
	SEDIMENTATION CHAMBER ELEVATED SLAB	3	CY	$660	$440	$1,100	$3,300
	PRODUCT WATER P.S. BUILDING	8,750	SF	$120	$50	$170	$1,487,500
	STRUCTURAL PILES	1	25%			$371,875	$371,875
	OVERHEAD CRANE SYSTEM	1	LS	$43,750	$13,125	$56,875	$56,875
	SURGE TANK, 35,000 GAL	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - PRODUCT WATER P.S.						**$6,258,150**
5.3	**CONVEYANCE PIPELINE**						
	36" CMLC STEEL PIPE, BACKBONE FEEDER	14,680	LF	$548	$164	$713	$10,463,948
	36" CMLC STEEL PIPE, WEST COAST FEEDER	5,260	LF	$548	$164	$713	$3,749,344
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	6,660	LF	$298	$89	$388	$2,581,383
	SUBTOTAL - CONVEYANCE PIPELINE						**$16,794,675**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$330,097**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$29,797,921**
	PIPING		7.5%				$2,234,844
	ELECTRICAL		10%				$2,979,792
	INSTRUMENTATION		7.5%				$2,234,844
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,042,927
	SITEWORK		12.5%				$3,724,740
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$42,015,069**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	49,110,701	kWh	$0.075	$3,683,000	$48,749,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	606,265	GALS	$1.90	$1,152,000	$15,248,000
	SODIUM HYPOCHLORITE (12.5%)	486,545	GALS	$1.15	$560,000	$7,412,000
	AQ AMMONIA (29.4%)	55,480	GALS	$1.50	$83,000	$1,099,000
	MAINTENANCE & MATERIALS	1	LS	$20,000	$20,000	$265,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	48" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$192	$96	$288	$598,464
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$598,464**
6.2	**DIFFUSERS**						
	48" HDPE BURIED SECTION	355	LF	$192	$96	$288	$102,240
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	48" 45-DEG BEND	4	EA	$2,500	$1,250	$3,750	$15,000
	48" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 48" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	17	EA	$1,900	$950	$2,850	$48,450
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$743,790**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,800,000	$540,000	$2,340,000	$2,340,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$2,340,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$95,000	$28,500	$124,000	$248,000
	PH ADJUSTMENT	1	LS	$40,000	$12,000	$52,000	$52,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$300,000**
	SUBTOTAL - RESIDUALS HANDLING						**$3,982,254**
	PIPING		7.5%				$298,669
	ELECTRICAL		10%				$398,225
	INSTRUMENTATION		7.5%				$298,669
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$139,379
	SITEWORK		12.5%				$497,782
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$5,614,978**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	8,000	SF	$120	$50	$170	$1,360,000
	STRUCTURAL PILES	1	25%			$340,000	$340,000
	SUBTOTAL - ELECTRICAL BUILDING						**$1,700,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,700,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$59,500
	SITEWORK		12.5%				$212,500
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,972,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	11,200	SF	$120	$50	$170	$1,904,000
	STRUCTURAL PILES	1	25%			$476,000	$476,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$2,446,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,053,500**
	PIPING		7.5%				$454,013
	ELECTRICAL		10%				$605,350
	INSTRUMENTATION		7.5%				$454,013
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$211,873
	SITEWORK		12.5%				$756,688
	PROJECT SUBTOTAL - ADMIN/MAINT						**$8,535,435**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 40 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$11,063,000	4%		
2.0	PRETREATMENT	$74,717,569	27%		
3.0	REVERSE OSMOSIS	$115,761,000	42%		
4.0	POST-TREATMENT & DISINFECTION	$12,230,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$44,086,000	16%		
6.0	RESIDUALS HANDLING	$5,412,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	1%		
8.0	ELECTRICAL BUILDING	$1,972,000	1%		
9.0	ADMIN/MAINT	$8,535,000	3%		
	SUBTOTAL	**$275,776,569**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$2,757,766	$5,515,531	$5,515,531
	BONDS & INSURANCE		$1,378,883	$2,757,766	$4,136,649
	OVERHEAD & PROFIT		$22,062,126	$33,093,188	$41,366,485
	UN-PRICED ALLOWANCES (CONTINGENCY)		$41,366,485	$55,155,314	$82,732,971
	SUBTOTAL CONSTRUCTION COST		**$343,341,828**	**$372,298,368**	**$409,528,205**
	PROFESSIONAL SERVICES		$51,501,274	$67,013,706	$81,905,641
	TOTAL CAPITAL COST		**$394,843,102**	**$439,312,074**	**$491,433,846**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$16,200,000	$214,430,000	48%	
2.0	CHEMICALS	$5,967,000	$78,980,000	18%	
3.0	MAINTENANCE & MATERIALS	$769,000	$10,180,000	2%	
4.0	LABOR (32 FTE @ $100/hr)	$6,656,000	$88,100,000	20%	
5.0	REPLACEMENT	$4,029,499	$53,335,779	12%	
	TOTAL O&M COST	**$33,621,499**	**$445,025,779**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

WEST BASIN MUNICIPAL WATER DISTRICT
OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 40 MGD
SITE: REDONDO BEACH

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	42" HDPE BURIED SECTION	80	LF	$138	$83	$221	$17,664
	48" HDPE BURIED SECTION	130	LF	$192	$115	$307	$39,936
	24" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	42" 90-DEG BEND	2	EA	$1,500	$900	$2,400	$4,800
	48" 45-DEG BEND	2	EA	$2,500	$1,500	$4,000	$8,000
	48"X42" REDUCER	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X42" TEE	2	EA	$3,500	$2,100	$5,600	$11,200
	48"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 48" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (42" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	8	EA	$1,900	$1,140	$3,040	$24,320
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,547,120**
1.2	**CONVEYANCE PIPES**						
	48" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$192	$115	$307	$632,832
	48" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$192	$115	$307	$632,832
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$1,765,664**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	48" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$192	$58	$250	$124,800
	48" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$192	$58	$250	$124,800
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$24,960	$24,960
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$359,280**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	9	EA	$325,000	$97,500	$422,500	$3,802,500
	WET WELL EXCAVATION	350	CY	$5	$15	$20	$7,000
	WET WELL SLAB	35	CY	$420	$280	$700	$24,500
	WET WELL WALLS	80	CY	$480	$320	$800	$64,000
	WET WELL ELEVATED SLAB	35	CY	$660	$440	$1,100	$38,500
	SEDIMENTATION CHAMBER EXCAVATION	20	CY	$5	$15	$20	$400
	SEDIMENTATION CHAMBER SLAB	3	CY	$420	$280	$700	$2,100
	SEDIMENTATION CHAMBER WALLS	10	CY	$480	$320	$800	$8,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	3	CY	$660	$440	$1,100	$3,300
	RAW WATER PUMP STATION AND BUILDING	4,200	SF	$120	$50	$170	$714,000
	STRUCTURAL PILES	1	25%			$178,500	$178,500
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - RAW WATER PUMP STATION						**$4,915,925**
	SUBTOTAL - INTAKE /DISCHARGE						**$8,587,989**
	PIPING*		7.5%				$368,694
	ELECTRICAL*		10%				$491,593
	INSTRUMENTATION*		7.5%				$368,694
	HVAC, PLUMBING, & ARCHITECTURAL**		3.5%				$172,057
	SITEWORK		12.5%				$1,073,499
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$11,062,526**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	15,046,825	kWh	$0.075	$1,129,000	$14,944,000
	MAINTENANCE & MATERIALS	1	LS	$80,000	$80,000	$1,059,000
	INTAKE SCREENS MAINTENANCE	1	LS	$38,000	$38,000	$503,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	4	EA	$600,000	$180,000	$780,000	$3,120,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	3	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	3	EA				Incl. Above
	DISK FILTER BUILDING	2,100	SF	$140	$60	$200	$420,000
	STRUCTURAL PILES	1	25%			$105,000	$105,000
	SUBTOTAL - DISK FILTERS						**$3,645,000**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	9	EA	$94,000	$28,200	$122,200	$1,099,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	7,200	SF	$120	$50	$170	$1,224,000
	STRUCTURAL PILES	1	25%			$306,000	$306,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$2,629,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$29,000,000	$8,700,000	$37,700,000	$37,700,000
	MF/UF TRAINS **(5)**	24	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	3	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	3	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	20,000	SF	$120	$50	$170	$3,400,000
	STRUCTURAL PILES	1	25%			$850,000	$850,000
	SUBTOTAL - MF/UF SYSTEM						**$41,950,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.2 MG **(7)**	1	EA	$523,122	$156,937	$680,059	$680,059
	TANK COATING	18,290	SF	$8	$3	$11	$201,190
	EQUIPMENT PAD	280	CY	$872	$392	$1,264	$353,920
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$1,235,169**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	9	EA	$500,000	$150,000	$650,000	$5,850,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	2,900	SF	$140	$60	$200	$580,000
	STRUCTURAL PILES	1	25%			$145,000	$145,000
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$6,648,125**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,220	$50,440
	COAGULENT METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,050	$22,100
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	4	EA	$19,400	$5,820	$25,220	$100,880
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 5,500 GAL	1	EA	$8,200	$2,460	$10,660	$10,660
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	100	CY	$260	$78	$338	$33,800
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,050	SF	$4	$1	$5	$10,660
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,550	SF	$100	$30	$130	$201,500
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$528,090**
	SUBTOTAL - PRETREATMENT						**$52,991,184**
	PIPING		7.5%				$3,974,339
	ELECTRICAL		10%				$5,299,118
	INSTRUMENTATION		7.5%				$3,974,339
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,854,691
	SITEWORK		12.5%				$6,623,898
	PROJECT SUBTOTAL - PRETREATMENT						**$74,717,569**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	14,012,564	kWh	$0.075	$1,051,000	$13,911,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	1,097,555	GALS	$1.15	$1,262,000	$16,704,000
	AQ AMMONIA (29.4%)	125,195	GALS	$1.50	$188,000	$2,488,000
	MAINTENANCE & MATERIALS	1	LS	$80,000	$80,000	$1,059,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$54,900,000	$16,470,000	$71,370,000	$71,370,000
	CARTRIDGE FILTERS **(9)**	8	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	8	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	8	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	8	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	4	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	4	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	50,000	SF	$120	$50	$170	$8,500,000
	STRUCTURAL PILES	1	25%			$2,125,000	$2,125,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$81,995,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	11	CY	$260	$78	$338	$3,718
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	233	SF	$4	$1	$5	$1,212
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	108	SF	$100	$30	$130	$14,040
	SUBTOTAL - RO CHEMICAL FACILITIES						**$104,980**
	SUBTOTAL - REVERSE OSMOSIS						**$82,099,980**
	PIPING		7.5%				$6,157,498
	ELECTRICAL		10%				$8,209,998
	INSTRUMENTATION		7.5%				$6,157,498
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,873,499
	SITEWORK		12.5%				$10,262,497
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$115,760,971**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	131,882,957	kWh	$0.075	$9,891,000	$130,921,000
	RO 2ND PASS PUMPS POWER	2,749,132	kWh	$0.075	$206,000	$2,727,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	188,340	LBS	$0.80	$151,000	$1,999,000
	CAUSTIC (25%)	433,985	GALS	$1.90	$825,000	$10,920,000
	MAINTENANCE MATERIALS	1	LS	$365,000	$365,000	$4,831,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	9	EA	$285,000	$85,500	$370,500	$3,334,500
	POST-TREATMENT P.S. BUILDING	1,000	SF	$140	$60	$200	$200,000
	STRUCTURAL PILES	1	25%			$50,000	$50,000
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SUBTOTAL - POST-TREATMENT P.S.						**$3,657,625**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 SYSTEM	1	LS	$735,000	$220,500	$955,500	$955,500
	HYDRATED LIME SLURRY SYSTEM	3	EA	$325,000	$97,500	$422,500	$1,267,500
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	2	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	3	EA	$650,000	$195,000	$845,000	$2,535,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$4,758,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$258,097**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$8,673,722**
	PIPING		7.5%				$650,529
	ELECTRICAL		10%				$867,372
	INSTRUMENTATION		7.5%				$650,529
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$303,580
	SITEWORK		12.5%				$1,084,215
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,229,948**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	2,935,966	kWh	$0.075	$220,000	$2,912,000
	CHEMICAL COSTS					
	CO2	10,293,365	LBS	$0.045	$463,000	$6,128,000
	LIME (>90%)	7,613,170	LBS	$0.084	$640,000	$8,471,000
	SODIUM HYPOCHLORITE (12.5%)	486,545	GALS	$1.15	$560,000	$7,412,000
	AQ AMMONIA (29.4%)	55,480	GALS	$1.50	$83,000	$1,099,000
	MAINTENANCE & MATERIALS	1	LS	$20,000	$20,000	$265,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 10 MG	1	EA	$4,000,000	$1,200,000	$5,200,000	$5,200,000
	SUBTOTAL - CLEARWELL						**$5,200,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	7	EA	$365,000	$109,500	$474,500	$3,321,500
	WET WELL EXCAVATION	400	CY	$5	$15	$20	$8,000
	WET WELL SLAB	40	CY	$420	$280	$700	$28,000
	WET WELL WALLS	100	CY	$480	$320	$800	$80,000
	WET WELL ELEVATED SLAB	40	CY	$660	$440	$1,100	$44,000
	SEDIMENTATION CHAMBER EXCAVATION	20	CY	$5	$15	$20	$400
	SEDIMENTATION CHAMBER SLAB	3	CY	$420	$280	$700	$2,100
	SEDIMENTATION CHAMBER WALLS	12	CY	$480	$320	$800	$9,600
	SEDIMENTATION CHAMBER ELEVATED SLAB	3	CY	$660	$440	$1,100	$3,300
	PRODUCT WATER P.S. BUILDING	8,750	SF	$120	$50	$170	$1,487,500
	STRUCTURAL PILES	1	25%			$371,875	$371,875
	OVERHEAD CRANE SYSTEM	1	LS	$43,750	$13,125	$56,875	$56,875
	SURGE TANK, 35,000 GAL	1	EA	$650,000	$195,000	$845,000	$845,000
	SUBTOTAL - PRODUCT WATER P.S.						**$6,258,150**
5.3	**CONVEYANCE PIPELINE**						
	42" CMLC STEEL PIPE, BACKBONE FEEDER	15,950	LF	$640	$192	$832	$13,270,400
	30" CMLC STEEL PIPE, BACKBONE FEEDER	10,480	LF	$417	$125	$542	$5,681,208
	24" CMLC STEEL PIPE, WEST BASIN FEEDER	1,360	LF	$298	$89	$387	$526,864
	SUBTOTAL - CONVEYANCE PIPELINE						**$19,478,472**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	2	EA	$15,800	$4,740	$21,000	$42,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	67	CY	$260	$78	$338	$22,646
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,329	SF	$4	$1	$5	$6,911
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	958	SF	$100	$30	$130	$124,540
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$330,097**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$31,266,719**
	PIPING		7.5%				$2,345,004
	ELECTRICAL		10%				$3,126,672
	INSTRUMENTATION		7.5%				$2,345,004
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$1,094,335
	SITEWORK		12.5%				$3,908,340
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$44,086,074**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	48,043,077	kWh	$0.075	$3,603,000	$47,690,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	606,265	GALS	$1.90	$1,152,000	$15,248,000
	SODIUM HYPOCHLORITE (12.5%)	486,545	GALS	$1.15	$560,000	$7,412,000
	AQ AMMONIA (29.4%)	55,480	GALS	$1.50	$83,000	$1,099,000
	MAINTENANCE & MATERIALS	1	LS	$20,000	$20,000	$265,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	48" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$228	$114	$342	$632,700
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$632,700**
6.2	**DIFFUSERS**						
	48" HDPE BURIED SECTION	240	LF	$228	$114	$342	$82,080
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	48" 45-DEG BEND	2	EA	$3,000	$1,500	$4,500	$9,000
	48" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 48" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	12	EA	$1,900	$950	$2,850	$34,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$565,380**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$1,800,000	$540,000	$2,340,000	$2,340,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$2,340,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$95,000	$28,500	$124,000	$248,000
	PH ADJUSTMENT	1	LS	$40,000	$12,000	$52,000	$52,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$300,000**
	SUBTOTAL - RESIDUALS HANDLING						**$3,838,080**
	PIPING		7.5%				$287,856
	ELECTRICAL		10%				$383,808
	INSTRUMENTATION		7.5%				$287,856
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$134,333
	SITEWORK		12.5%				$479,760
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$5,411,693**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	8,000	SF	$120	$50	$170	$1,360,000
	STRUCTURAL PILES	1	25%			$340,000	$340,000
	SUBTOTAL - ELECTRICAL BUILDING						**$1,700,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$1,700,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$59,500
	SITEWORK		12.5%				$212,500
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$1,972,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	11,200	SF	$120	$50	$170	$1,904,000
	STRUCTURAL PILES	1	25%			$476,000	$476,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$2,446,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,053,500**
	PIPING		7.5%				$454,013
	ELECTRICAL		10%				$605,350
	INSTRUMENTATION		7.5%				$454,013
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$211,873
	SITEWORK		12.5%				$756,688
	PROJECT SUBTOTAL - ADMIN/MAINT						**$8,535,435**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 60 MGD
SITE: EL SEGUNDO

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$16,207,000	4%		
2.0	PRETREATMENT	$112,882,206	25%		
3.0	REVERSE OSMOSIS	$171,989,000	39%		
4.0	POST-TREATMENT & DISINFECTION	$17,579,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$102,512,000	23%		
6.0	RESIDUALS HANDLING & CONCENTRATE DISCHARGE	$7,654,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	0.5%		
8.0	ELECTRICAL BUILDING	$2,958,000	1%		
9.0	ADMIN/MAINT	$9,734,000	2%		
	SUBTOTAL	**$443,515,206**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$4,435,152	$8,870,304	$8,870,304
	BONDS & INSURANCE		$2,217,576	$4,435,152	$6,652,728
	OVERHEAD & PROFIT		$35,481,216	$53,221,825	$66,527,281
	UN-PRICED ALLOWANCES (CONTINGENCY)		$66,527,281	$88,703,041	$133,054,562
	SUBTOTAL CONSTRUCTION COST		**$552,176,431**	**$598,745,528**	**$658,620,081**
	PROFESSIONAL SERVICES		$82,826,465	$107,774,195	$131,724,016
	TOTAL CAPITAL COST		**$635,002,896**	**$706,519,723**	**$790,344,097**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$23,559,000	$311,830,000	48%	
2.0	CHEMICALS	$8,950,000	$118,470,000	18%	
3.0	MAINTENANCE & MATERIALS	$1,052,000	$13,920,000	2%	
4.0	LABOR (48 FTE @ $100/hr)	$9,984,000	$132,150,000	20%	
5.0	REPLACEMENT	$6,009,298	$79,541,043	12%	
	TOTAL O&M COST	**$49,554,298**	**$655,911,043**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	48" HDPE BURIED SECTION	80	LF	$179	$107	$286	$22,912
	54" HDPE BURIED SECTION	155	LF	$228	$137	$365	$56,544
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	48" 90-DEG BEND	2	EA	$2,000	$1,200	$3,200	$6,400
	54" 45-DEG BEND	4	EA	$3,000	$1,800	$4,800	$19,200
	54"X48" REDUCER	2	EA	$4,000	$2,400	$6,400	$12,800
	54"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	54"X54" TEE	2	EA	$4,000	$2,400	$6,400	$12,800
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 54" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	10	EA	$1,900	$1,140	$3,040	$30,400
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	235	LF	$800	$480	$1,280	$300,800
	SUBTOTAL - SCREENS						**$1,623,056**
1.2	**CONVEYANCE PIPES**						
	54" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,577	LF	$228	$137	$365	$940,090
	54" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,577	LF	$228	$137	$365	$940,090
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,380,179**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	54" HDPE DUAL INTAKE PIPE NO. 1 BURIED	1,200	LF	$228	$68	$296	$355,680
	54" HDPE DUAL INTAKE PIPE NO. 2 BURIED	1,200	LF	$228	$68	$296	$355,680
	MISCELLANROUS VALVES AND FITTINGS	1	LS			$71,136	$71,136
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$867,216**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	14	EA	$325,000	$97,500	$422,500	$5,915,000
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	RAW WATER PUMP STATION BUILDING	6,400	SF	$120	$50	$170	$1,088,000
	STRUCTURAL PILES	1	25%			$272,000	$272,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - RAW WATER PUMP STATION						**$7,608,650**
	SUBTOTAL - INTAKE /DISCHARGE						**$12,479,101**
	PIPING*		7.5%				$570,649
	ELECTRICAL*		10%				$760,865
	INSTRUMENTATION*		7.5%				$570,649
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$266,303
	SITEWORK		12.5%				$1,559,888
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$16,207,454**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	22,570,237	kWh	$0.075	$1,693,000	$22,409,000
	MAINTENANCE & MATERIALS	1	LS	$100,000	$100,000	$1,324,000
	INTAKE SCREENS MAINTENANCE	1	LS	$41,000	$41,000	$543,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	6	EA	$600,000	$180,000	$780,000	$4,680,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	4	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	4	EA				Incl. Above
	DISK FILTER BUILDING	3,125	SF	$140	$60	$200	$625,000
	STRUCTURAL PILES	1	25%			$156,250	$156,250
	SUBTOTAL - DISK FILTERS						**$5,461,250**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	14	EA	$94,000	$28,200	$122,200	$1,710,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	10,800	SF	$120	$50	$170	$1,836,000
	STRUCTURAL PILES	1	25%			$459,000	$459,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$4,005,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$43,500,000	$13,050,000	$56,550,000	$56,550,000
	MF/UF TRAINS **(5)**	35	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	4	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	4	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - MF/UF SYSTEM						**$62,925,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.8 MG **(7)**	1	EA	$793,140	$237,942	$1,031,082	$1,031,082
	TANK COATING	25,130	SF	$8	$3	$11	$276,430
	EXCAVATION	15,000	CY	$5	$15	$20	$300,000
	EQUIPMENT PAD	400	CY	$872	$392	$1,264	$505,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$2,113,112**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	14	EA	$500,000	$150,000	$650,000	$9,100,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$10,338,750**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,220	$75,660
	COAGULENT METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	6	EA	$19,400	$5,820	$25,220	$151,320
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$15,600	$15,600
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	125	CY	$260	$78	$338	$42,250
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,425	SF	$4	$1	$5	$12,610
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,900	SF	$100	$30	$130	$247,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$675,640**
	SUBTOTAL - PRETREATMENT						**$80,058,302**
	PIPING		7.5%				$6,004,373
	ELECTRICAL		10%				$8,005,830
	INSTRUMENTATION		7.5%				$6,004,373
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,802,041
	SITEWORK		12.5%				$10,007,288
	PROJECT SUBTOTAL - PRETREATMENT						**$112,882,206**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	21,018,846	kWh	$0.075	$1,576,000	$20,860,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	1,646,367	GALS	$1.15	$1,893,000	$25,056,000
	AQ AMMONIA (29.4%)	187,706	GALS	$1.50	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$82,300,000	$24,690,000	$106,990,000	$106,990,000
	CARTRIDGE FILTERS **(9)**	12	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	12	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	12	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	12	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	6	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	6	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	70,000	SF	$120	$50	$170	$11,900,000
	STRUCTURAL PILES	1	25%			$2,975,000	$2,975,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$121,865,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	10	CY	$260	$78	$338	$3,380
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	235	SF	$4	$1	$5	$1,222
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	110	SF	$100	$30	$130	$14,300
	SUBTOTAL - RO CHEMICAL FACILITIES						**$112,912**
	SUBTOTAL - REVERSE OSMOSIS						**$121,977,912**
	PIPING		7.5%				$9,148,343
	ELECTRICAL		10%				$12,197,791
	INSTRUMENTATION		7.5%				$9,148,343
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$4,269,227
	SITEWORK		12.5%				$15,247,239
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$171,988,856**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	197,824,435	kWh	$0.075	$14,837,000	$196,387,000
	RO 2ND PASS PUMPS POWER	4,123,697	kWh	$0.075	$309,000	$4,090,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	282,145	LBS	$0.80	$226,000	$2,991,000
	CAUSTIC (25%)	650,795	GALS	$1.90	$1,237,000	$16,373,000
	MAINTENANCE & MATERIALS	1	LS	$565,000	$565,000	$7,479,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	14	EA	$285,000	$85,500	$370,500	$5,187,000
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - POST-TREATMENT P.S.						**$5,675,750**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 STORAGE AND FEED SYSTEM	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	HYDRATED LIME SLURRY SYSTEM	4	EA	$325,000	$97,500	$422,500	$1,690,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	4	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	4	LS				Incl. Above
	SATURATOR	4	EA				Incl. Above
	LIME CONTACT TANK **(17)**	4	EA	$650,000	$195,000	$845,000	$3,380,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$6,500,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$291,946**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,467,696**
	PIPING		7.5%				$935,077
	ELECTRICAL		10%				$1,246,770
	INSTRUMENTATION		7.5%				$935,077
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$436,369
	SITEWORK		12.5%				$1,558,462
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$17,579,451**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	4,403,949	kWh	$0.075	$330,000	$4,368,000
	CHEMICAL COSTS					
	CO2	15,439,778	LBS	$0.045	$695,000	$9,199,000
	LIME (>90%)	11,419,954	LBS	$0.084	$959,000	$12,694,000
	SODIUM HYPOCHLORITE (12.5%)	730,096	GALS	$1.15	$840,000	$11,119,000
	AQ AMMONIA (29.4%)	83,240	GALS	$1.50	$125,000	$1,655,000
	MAINTENANCE & MATERIALS	1	LS	$40,000	$40,000	$529,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 15 MG (BURIED)	1	EA	$5,615,385	$2,559,615	$8,175,000	$8,175,000
	EXCAVATION AND BACKFILL	1	LS			$250,000	$250,000
	SUBTOTAL - CLEARWELL						**$8,425,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	9	EA	$314,023	$94,207	$408,230	$3,674,069
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	PRODUCT WATER P.S. BUILDING	11,250	SF	$120	$50	$170	$1,912,500
	STRUCTURAL PILES	1	25%			$478,125	$478,125
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SURGE TANK, 30,000 GAL	2	EA	$500,000	$150,000	$650,000	$1,300,000
	SUBTOTAL - PRODUCT WATER P.S.						**$7,657,719**
5.3	**CONVEYANCE PIPELINE**						
	54" CMLC STEEL PIPE, SEPULVEDA FEEDER	42,880	LF	$1,009	$303	$1,311	$56,220,611
	SUBTOTAL - CONVEYANCE PIPELINE						**$56,220,611**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,000	$75,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,000	$33,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$399,946**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$72,703,276**
	PIPING		7.5%				$5,452,746
	ELECTRICAL		10%				$7,270,328
	INSTRUMENTATION		7.5%				$5,452,746
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,544,615
	SITEWORK		12.5%				$9,087,910
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$102,511,620**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	62,856,359	kWh	$0.075	$4,714,000	$62,396,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	909,580	GALS	$1.90	$1,728,000	$22,872,000
	SODIUM HYPOCHLORITE (12.5%)	730,096	GALS	$1.15	$840,000	$11,119,000
	AQ AMMONIA (29.4%)	83,240	GALS	$1.50	$125,000	$1,655,000
	MAINTENANCE & MATERIALS	1	LS	$40,000	$40,000	$529,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	54" HDPE DISCHARGE PIPE IN TUNNEL	2,078	LF	$228	$114	$342	$710,676
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$710,676**
6.2	**DIFFUSERS**						
	54" HDPE BURIED SECTION	355	LF	$228	$114	$342	$121,410
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	54" 45-DEG BEND	4	EA	$3,000	$1,500	$4,500	$18,000
	54" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 54" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	17	EA	$1,900	$950	$2,850	$48,450
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	355	LF	$800	$400	$1,200	$426,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$765,960**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$2,700,000	$810,000	$3,510,000	$3,510,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$3,510,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$140,000	$42,000	$182,000	$364,000
	PH ADJUSTMENT	1	LS	$60,000	$18,000	$78,000	$78,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$442,000**
	SUBTOTAL - RESIDUALS HANDLING						**$5,428,636**
	PIPING		7.5%				$407,148
	ELECTRICAL		10%				$542,864
	INSTRUMENTATION		7.5%				$407,148
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$190,002
	SITEWORK		12.5%				$678,580
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$7,654,377**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	12,000	SF	$120	$50	$170	$2,040,000
	STRUCTURAL PILES	1	25%			$510,000	$510,000
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$89,250
	SITEWORK		12.5%				$318,750
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$2,958,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	15,200	SF	$120	$50	$170	$2,584,000
	STRUCTURAL PILES	1	25%			$646,000	$646,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$3,296,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,903,500**
	PIPING		7.5%				$517,763
	ELECTRICAL		10%				$690,350
	INSTRUMENTATION		7.5%				$517,763
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$241,623
	SITEWORK		12.5%				$862,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$9,733,935**

WEST BASIN MUNICIPAL WATER DISTRICT

OCEAN WATER DESALINATION PROJECT PMP
CONCEPTUAL CAPITAL COST ESTIMATE
PREPARED BY: MALCOLM PIRNIE/ARCADIS

CAPACITY: 60 MGD
SITE: REDONDO BEACH

	WORK AREA DESCRIPTION	PROJECT COST	% OF TOTAL		
CAPITAL COST					
1.0	INTAKE	$15,206,000	3%		
2.0	PRETREATMENT	$112,459,206	25%		
3.0	REVERSE OSMOSIS	$171,989,000	38%		
4.0	POST-TREATMENT & DISINFECTION	$17,579,000	4%		
5.0	PRODUCT WATER PUMPING, STORAGE & CONVEYANCE	$108,634,000	24%		
6.0	RESIDUALS HANDLING	$7,262,000	2%		
7.0	POWER SUPPLY (REDUNDANCY SETUP FEE ONLY)	$2,000,000	0.4%		
8.0	ELECTRICAL BUILDING	$2,958,000	1%		
9.0	ADMIN/MAINT	$9,734,000	2%		
	SUBTOTAL	**$447,821,206**	**100%**		
			LOW	**BASE**	**HIGH**
	MOBILIZATION / DEMOBILIZATION		$4,478,212	$8,956,424	$8,956,424
	BONDS & INSURANCE		$2,239,106	$4,478,212	$6,717,318
	OVERHEAD & PROFIT		$35,825,696	$53,738,545	$67,173,181
	UN-PRICED ALLOWANCES (CONTINGENCY)		$67,173,181	$89,564,241	$134,346,362
	SUBTOTAL CONSTRUCTION COST		**$557,537,401**	**$604,558,628**	**$665,014,491**
	PROFESSIONAL SERVICES		$83,630,610	$108,820,553	$133,002,898
	TOTAL CAPITAL COST		**$641,168,011**	**$713,379,181**	**$798,017,389**

	ANNUAL O&M COSTS	ANNUAL COST	PRESENT WORTH	% OF TOTAL	
1.0	POWER (66 KV SERVICE)	$23,634,000	$312,830,000	48%	
2.0	CHEMICALS	$8,950,000	$118,470,000	18%	
3.0	MAINTENANCE & MATERIALS	$1,052,000	$13,920,000	2%	
4.0	LABOR (48 FTE @ $100/hr)	$9,984,000	$132,150,000	20%	
5.0	REPLACEMENT	$6,010,891	$79,562,135	12%	
	TOTAL O&M COST	**$49,630,891**	**$656,932,135**	**100%**	

	TYPICAL RANGE	LOW	BASE	HIGH
MOBILIZATION / DEMOBILIZATION	1 - 2%	1%	2%	2%
BONDS & INSURANCE	0.5 - 1.5%	0.5%	1.0%	1.5%
OVERHEAD & PROFIT	8 - 15%	8%	12%	15%
UN-PRICED ALLOWANCES (CONTINGENCY)	30%	15%	20%	30%
PROFESSIONAL SERVICES	15 - 20%	15%	18%	20%

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
1.0	**INTAKE**						
1.1	**SCREENS**						
	48" HDPE BURIED SECTION	80	LF	$179	$107	$286	$22,912
	54" HDPE BURIED SECTION	130	LF	$228	$137	$365	$47,424
	30" HDPE 4X INTAKE RISER, ONE-SIDED FLANGE	30	LF	$69	$41	$110	$3,312
	48" 90-DEG BEND	2	EA	$2,000	$1,200	$3,200	$6,400
	54" 45-DEG BEND	2	EA	$3,000	$1,800	$4,800	$9,600
	54"X48" REDUCER	2	EA	$4,000	$2,400	$6,400	$12,800
	54"X48" TEE	2	EA	$3,750	$2,250	$6,000	$12,000
	54"X54" TEE	2	EA	$4,000	$2,400	$6,400	$12,800
	RETROFIT STRUCT. AT END OF TUNNEL W/ (2) 54" CORES	1	EA	$50,000	$30,000	$80,000	$80,000
	PREFABRICATED WEDGE WIRE INTAKE SCREENS **(1)**	4	EA	$103,500	$62,100	$165,600	$662,400
	BIOCIDE APPLICATION LINE	2,060	LF	$3	$2	$5	$9,888
	TEMPORARY CONSTRUCTION PLATFORM	1	EA	$200,000	$120,000	$320,000	$320,000
	CORROSION PROTECTION	1	EA	$40,000	$24,000	$64,000	$64,000
	ANCHOR BLOCKS (48" PIPE) TO BALAST BURIED PIPES	4	EA	$1,500	$900	$2,400	$9,600
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	8	EA	$1,900	$1,140	$3,040	$24,320
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	210	LF	$800	$480	$1,280	$268,800
	SUBTOTAL - SCREENS						**$1,566,256**
1.2	**CONVEYANCE PIPES**						
	54" HDPE DUAL INTAKE PIPE NO. 1 IN TUNNEL	2,060	LF	$228	$137	$365	$751,488
	54" HDPE DUAL INTAKE PIPE NO. 2 IN TUNNEL	2,060	LF	$228	$137	$365	$751,488
	ALLOWANCE FOR TUNNEL REPAIRS	1	LS			$500,000	$500,000
	SUBTOTAL - CONVEYANCE PIPES						**$2,002,976**
1.3	**CONNECTION TO RAW WATER PUMP STATION**						
	INTAKE MANHOLE EXCAVATION	726	CY	$5	$15	$20	$14,520
	INTAKE MANHOLE SLAB	15	CY	$420	$280	$700	$10,500
	INTAKE MANHOLE WALLS	54	CY	$480	$320	$800	$43,200
	INTAKE MANHOLE ELEVATED SLAB	15	CY	$660	$440	$1,100	$16,500
	54" HDPE DUAL INTAKE PIPE NO. 1 BURIED	500	LF	$228	$68	$296	$148,200
	54" HDPE DUAL INTAKE PIPE NO. 2 BURIED	500	LF	$228	$68	$296	$148,200
	MISCELLANEOUS VALVES AND FITTINGS	1	LS			$29,640	$29,640
	SUBTOTAL - CONNECTION TO RAW WATER PUMP STATION						**$410,760**
1.4	**RAW WATER PUMP STATION (2)**						
	VERTICAL WET PIT PUMPS, CENTRIFUGAL, 400 HP	14	EA	$325,000	$97,500	$422,500	$5,915,000
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	RAW WATER PUMP STATION AND BUILDING	6,400	SF	$120	$50	$170	$1,088,000
	STRUCTURAL PILES	1	25%			$272,000	$272,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - RAW WATER PUMP STATION						**$7,608,650**
	SUBTOTAL - INTAKE /DISCHARGE						**$11,588,642**
	PIPING*		7.5%				$570,649
	ELECTRICAL*		10%				$760,865
	INSTRUMENTATION*		7.5%				$570,649
	HVAC, PLUMBING, & ARCHITECTURAL*		3.5%				$266,303
	SITEWORK		12.5%				$1,448,580
	PROJECT SUBTOTAL - INTAKE /DISCHARGE						**$15,205,688**

*APPLIED TO 1.4 ONLY

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RAW WATER PUMP POWER	22,570,237	kWh	$0.075	$1,693,000	$22,409,000
	MAINTENANCE & MATERIALS	1	LS	$100,000	$100,000	$1,324,000
	INTAKE SCREENS MAINTENANCE	1	LS	$41,000	$41,000	$543,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
2.0	**PRETREATMENT**						
2.1a	**DISK FILTERS (3)**						
	AUTOMATIC DISK SCREEN FILTERS	6	EA	$600,000	$180,000	$780,000	$4,680,000
	FILTER BACKWASH PUMPS, CENTRIFUGAL, 200 HP	4	EA				Incl. Above
	FILTER SHOCK PUMPS, CENTRIFUGAL, 50 HP	4	EA				Incl. Above
	DISK FILTER BUILDING	3,125	SF	$140	$60	$200	$625,000
	STRUCTURAL PILES	1	25%			$156,250	$156,250
	SUBTOTAL - DISK FILTERS						**$5,461,250**
2.1b	**HIGH RATE GRANULAR MEDIA FILTRATION (4)**						
	HIGH RATE GRANULAR MEDIA FILTERS	14	EA	$94,000	$28,200	$122,200	$1,710,800
	HIGH RATE GRANULAR MEDIA FILTER BUILDING	10,800	SF	$120	$50	$170	$1,836,000
	STRUCTURAL PILES	1	25%			$459,000	$459,000
	SUBTOTAL - HIGH RATE GRANULAR MEDIA FILTRATION						**$4,005,800**
2.1.c	**DISSOLVED AIR FLOATATION**						
	DISSOLVED AIR FLOATATION		LS		$0	$0	$0
	SUBTOTAL - DISSOLVED AIR FLOATATION						**$0**
2.2	**MF/UF SYSTEM**						
	MF/UF SYSTEM	1	LS	$43,500,000	$13,050,000	$56,550,000	$56,550,000
	MF/UF TRAINS **(5)**	35	EA				Incl. Above
	MEMBRANE BACKWASH PUMPS	4	EA				Incl. Above
	CHEMICALLY ENHANCED BACKWASH PUMPS	4	EA				Incl. Above
	FILTER BASINS W/ CRANE SYSTEM	1	LS				Incl. Above
	CIP TANK **(6)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 5 HP	1	EA				Incl. Above
	FILTER BUILDING	30,000	SF	$120	$50	$170	$5,100,000
	STRUCTURAL PILES	1	25%			$1,275,000	$1,275,000
	SUBTOTAL - MF/UF SYSTEM						**$62,925,000**
2.3	**MF/UF FILTRATE STORAGE**						
	FILTRATE TANK, 1.8 MG **(7)**	1	EA	$793,140	$237,942	$1,031,082	$1,031,082
	TANK COATING	25,130	SF	$8	$3	$11	$276,430
	EQUIPMENT PAD	400	CY	$872	$392	$1,264	$505,600
	SUBTOTAL - MF/UF FILTRATE STORAGE						**$1,813,112**
2.4	**MF/UF FILTRATE BOOSTER P.S. (8)**						
	BOOSTER PUMPS, CENTRIFUGAL, 250 HP	14	EA	$500,000	$150,000	$650,000	$9,100,000
	MF/UF FILTRATE BOOSTER P.S. BUILDING	4,500	SF	$140	$60	$200	$900,000
	STRUCTURAL PILES	1	25%			$225,000	$225,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - MF/UF FILTRATE BOOSTER P.S.						**$10,338,750**
2.5	**PRETREATMENT CHEMICAL FACILITIES**						
	COAGULENT STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,220	$75,660
	COAGULENT METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	SODIUM HYPO STORAGE TANKS, 12,000 GAL	6	EA	$19,400	$5,820	$25,220	$151,320
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,050	$33,150
	AQ AMMONIA STORAGE TANKS, 8,000 GAL	1	EA	$12,000	$3,600	$15,600	$15,600
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$6,500	$1,950	$8,450	$16,900
	CHEMICAL HANDLING BUILDING	240	SF	$140	$60	$200	$48,000
	CHEMICAL STORAGE CONTAINMENT AREA	125	CY	$260	$78	$338	$42,250
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	2,425	SF	$4	$1	$5	$12,610
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,900	SF	$100	$30	$130	$247,000
	SUBTOTAL - PRETREATMENT CHEMICAL FACILITIES						**$675,640**
	SUBTOTAL - PRETREATMENT						**$79,758,302**
	PIPING		7.5%				$5,981,873
	ELECTRICAL		10%				$7,975,830
	INSTRUMENTATION		7.5%				$5,981,873
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,791,541
	SITEWORK		12.5%				$9,969,788
	PROJECT SUBTOTAL - PRETREATMENT						**$112,459,206**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MF/UF FILTRATE BOOSTER PUMP POWER	21,018,846	kWh	$0.075	$1,576,000	$20,860,000
	CHEMICAL COSTS					
	SODIUM HYPOCHLORITE (12.5%)	1,646,367	GALS	$1.15	$1,893,000	$25,056,000
	AQ AMMONIA (29.4%)	187,706	GALS	$1.50	$282,000	$3,733,000
	MAINTENANCE & MATERIALS	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
3.0	**REVERSE OSMOSIS**						
3.1	**REVERSE OSMOSIS SYSTEM**						
	REVERSE OSMOSIS SYSTEM	1	LS	$82,300,000	$24,690,000	$106,990,000	$106,990,000
	CARTRIDGE FILTERS **(9)**	12	EA				Incl. Above
	RO FEED PUMPS - 1ST PASS, PD, 3200 HP **(10)**	12	EA				Incl. Above
	RO TRAINS - 1ST PASS **(11)**	12	EA				Incl. Above
	ENERGY RECOVERY SYSTEMS **(12)**	12	EA				Incl. Above
	RO FEED PUMPS - 2ND PASS, CENTRIFUGAL, 150 HP **(1**	6	EA				Incl. Above
	RO TRAINS - 2ND PASS **(14)**	6	EA				Incl. Above
	TRAIN PIPING & VALVES	1	LS				Incl. Above
	CIP TANK **(15)**	1	EA				Incl. Above
	CIP PUMPS, CENTRIFUGAL, 50 HP	1	EA				Incl. Above
	RO PROCESS BUILDING	70,000	SF	$120	$50	$170	$11,900,000
	STRUCTURAL PILES	1	25%			$2,975,000	$2,975,000
	SUBTOTAL - REVERSE OSMOSIS SYSTEM						**$121,865,000**
3.2	**RO CHEMICAL FACILITIES**						
	SCALE INHIBITOR STORAGE TANKS, 1,200 GAL	1	EA	$1,700	$510	$2,210	$2,210
	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$3,900	$7,800
	CAUSTIC STORAGE TANKS, 12,000 GAL	2	EA	$19,400	$5,820	$25,000	$50,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	CHEMICAL HANDLING BUILDING	60	SF	$140	$60	$200	$12,000
	CHEMICAL STORAGE CONTAINMENT AREA	10	CY	$260	$78	$338	$3,380
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	235	SF	$4	$1	$5	$1,222
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	110	SF	$100	$30	$130	$14,300
	SUBTOTAL - RO CHEMICAL FACILITIES						**$112,912**
	SUBTOTAL - REVERSE OSMOSIS						**$121,977,912**
	PIPING		7.5%				$9,148,343
	ELECTRICAL		10%				$12,197,791
	INSTRUMENTATION		7.5%				$9,148,343
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$4,269,227
	SITEWORK		12.5%				$15,247,239
	PROJECT SUBTOTAL - REVERSE OSMOSIS						**$171,988,856**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	RO HP PUMPS POWER (W/ 50% ENERGY RECOVERY FACTOR)	197,824,435	kWh	$0.075	$14,837,000	$196,387,000
	RO 2ND PASS PUMPS POWER	4,123,697	kWh	$0.075	$309,000	$4,090,000
	CHEMICAL COSTS					
	SCALE INHIBITOR (ORGANO-PHOSPHONATE)	282,145	LBS	$0.80	$226,000	$2,991,000
	CAUSTIC (25%)	650,795	GALS	$1.90	$1,237,000	$16,373,000
	MAINTENANCE & MATERIALS	1	LS	$565,000	$565,000	$7,479,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
4.0	**POST-TREATMENT & DISINFECTION**						
4.1	**POST-TREATMENT P.S. (16)**						
	POST-TREATMENT PUMPS, CENTRIFUGAL, 150 HP	14	EA	$285,000	$85,500	$370,500	$5,187,000
	POST-TREATMENT P.S. BUILDING	1,500	SF	$140	$60	$200	$300,000
	STRUCTURAL PILES	1	25%			$75,000	$75,000
	OVERHEAD CRANE SYSTEM	1	LS	$87,500	$26,250	$113,750	$113,750
	SUBTOTAL - POST-TREATMENT P.S.						**$5,675,750**
4.2	**POST-TREATMENT STABILIZATION EQUIPMENT**						
	CO2 SYSTEM	1	LS	$1,100,000	$330,000	$1,430,000	$1,430,000
	HYDRATED LIME SLURRY SYSTEM	4	EA	$325,000	$97,500	$422,500	$1,690,000
	HYDRATED LIME SLURRY STORAGE TANKS W/ MIXERS	3	EA				Incl. Above
	HYDRATED LIME SLURRY METERING PUMPS AND APPU	1	LS				Incl. Above
	SATURATOR	1	EA				Incl. Above
	LIME CONTACT TANK **(17)**	4	EA	$650,000	$195,000	$845,000	$3,380,000
	SUBTOTAL - POST-TREATMENT STABILIZATION EQUIPMENT						**$6,500,000**
4.3	**POST-TREATMENT CHEMICAL FACILITIES**						
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - POST-TREATMENT CHEMICAL FACILITIES						**$291,946**
	SUBTOTAL - POST-TREATMENT & DISINFECTION						**$12,467,696**
	PIPING		7.5%				$935,077
	ELECTRICAL		10%				$1,246,770
	INSTRUMENTATION		7.5%				$935,077
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$436,369
	SITEWORK		12.5%				$1,558,462
	PROJECT SUBTOTAL - POST-TREATMENT & DISINFECTION						**$17,579,451**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	POST-TREATMENT PUMPS POWER	4,403,949	kWh	$0.075	$330,000	$4,368,000
	CHEMICAL COSTS					
	CO2	15,439,778	LBS	$0.045	$695,000	$9,199,000
	LIME (>90%)	11,419,954	LBS	$0.084	$959,000	$12,694,000
	SODIUM HYPOCHLORITE (12.5%)	730,096	GALS	$1.15	$840,000	$11,119,000
	AQ AMMONIA (29.4%)	83,240	GALS	$1.50	$125,000	$1,655,000
	MAINTENANCE & MATERIALS	1	LS	$40,000	$40,000	$529,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
5.0	**PRODUCT WATER PUMPING, STORAGE & CONVEYANCE**						
5.1	**CLEARWELL (18)**						
	CLEARWELL, 15 MG	1	EA	$5,615,385	$1,684,615	$7,300,000	$7,300,000
	SUBTOTAL - CLEARWELL						**$7,300,000**
5.2	**PRODUCT WATER P.S. (19)**						
	PRODUCT WATER PUMPS, VTP	9	EA	$314,023	$94,207	$408,230	$3,674,069
	WET WELL EXCAVATION	510	CY	$5	$15	$20	$10,200
	WET WELL SLAB	50	CY	$420	$280	$700	$35,000
	WET WELL WALLS	125	CY	$480	$320	$800	$100,000
	WET WELL ELEVATED SLAB	50	CY	$660	$440	$1,100	$55,000
	SEDIMENTATION CHAMBER EXCAVATION	25	CY	$5	$15	$20	$500
	SEDIMENTATION CHAMBER SLAB	4	CY	$420	$280	$700	$2,800
	SEDIMENTATION CHAMBER WALLS	15	CY	$480	$320	$800	$12,000
	SEDIMENTATION CHAMBER ELEVATED SLAB	4	CY	$660	$440	$1,100	$4,400
	PRODUCT WATER P.S. BUILDING	11,250	SF	$120	$50	$170	$1,912,500
	STRUCTURAL PILES	1	25%			$478,125	$478,125
	OVERHEAD CRANE SYSTEM	1	LS	$56,250	$16,875	$73,125	$73,125
	SURGE TANK, 30,000 GAL	2	EA	$500,000	$150,000	$650,000	$1,300,000
	SUBTOTAL - PRODUCT WATER P.S.						**$7,657,719**
5.3	**CONVEYANCE PIPELINE**						
	54" CMLC STEEL PIPE, SEPULVEDA FEEDER	47,050	LF	$1,009	$303	$1,311	$61,687,961
	SUBTOTAL - CONVEYANCE PIPELINE						**$61,687,961**
5.4	**RESIDUAL DISINFECTION**						
	CAUSTIC STORAGE TANKS, 12,000 GAL	3	EA	$19,400	$5,820	$25,000	$75,000
	CAUSTIC METERING PUMPS AND APPURTENANCES	3	EA	$8,500	$2,550	$11,000	$33,000
	SODIUM HYPO STORAGE TANKS, 10,000 GAL	3	EA	$15,800	$4,740	$21,000	$63,000
	SODIUM HYPO METERING PUMPS AND APPURTENANCES	2	EA	$8,500	$2,550	$11,000	$22,000
	AQ AMMONIA STORAGE TANKS, 4,000 GAL	1	EA	$5,800	$1,740	$8,000	$8,000
	AQ AMMONIA METERING PUMPS AND APPURTENANCES	2	EA	$3,000	$900	$4,000	$8,000
	CHEMICAL HANDLING BUILDING	120	SF	$140	$60	$200	$24,000
	CHEMICAL STORAGE CONTAINMENT AREA	72	CY	$260	$78	$338	$24,336
	CONCRETE COATING FOR CHEMICAL CONTAINMENT AREA	1,425	SF	$4	$1	$5	$7,410
	CHEMICAL STORAGE CONTAINMENT AREA - ROOF COVER	1,040	SF	$100	$30	$130	$135,200
	SUBTOTAL - PRODUCT WATER CHEMICAL FACILITIES						**$399,946**
	SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$77,045,626**
	PIPING		7.5%				$5,778,422
	ELECTRICAL		10%				$7,704,563
	INSTRUMENTATION		7.5%				$5,778,422
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$2,696,597
	SITEWORK		12.5%				$9,630,703
	PROJECT SUBTOTAL - PRODUCT WATER PUMPING, STORAGE & CONVEYANCE						**$108,634,332**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	PRODUCT WATER PUMPS POWER	63,857,257	kWh	$0.075	$4,789,000	$63,389,000
	CHEMICAL COSTS					
	CAUSTIC (25%)	909,580	GALS	$1.90	$1,728,000	$22,872,000
	SODIUM HYPOCHLORITE (12.5%)	730,096	GALS	$1.15	$840,000	$11,119,000
	AQ AMMONIA (29.4%)	83,240	GALS	$1.50	$125,000	$1,655,000
	MAINTENANCE & MATERIALS	1	LS	$40,000	$40,000	$529,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
6.0	**RESIDUALS HANDLING**						
6.1	**CONCENTRATE CONVEYANCE**						
	54" HDPE DISCHARGE PIPE IN TUNNEL	1,850	LF	$228	$114	$342	$632,700
	SUBTOTAL - CONCENTRATE CONVEYANCE						**$632,700**
6.2	**DIFFUSERS**						
	54" HDPE BURIED SECTION	240	LF	$228	$114	$342	$82,080
	16" HDPE 5X DIFFUSER RISER, ONE-SIDED FLANGE	30	LF	$20	$10	$30	$900
	54" 45-DEG BEND	2	EA	$3,000	$1,500	$4,500	$9,000
	54" BLIND FLANGE	1	EA	$800	$400	$1,200	$1,200
	RETROFIT STRUCT. AT END OF TUNNEL W/ 54" CORE	1	EA	$50,000	$25,000	$75,000	$75,000
	ANCHOR BLOCKS (54" PIPE) TO BALAST BURIED PIPES	12	EA	$1,900	$950	$2,850	$34,200
	EXCAVATE OFFSHORE TRENCH, LAY PIPE & BALAST	240	LF	$800	$400	$1,200	$288,000
	16" DUCK BILL CHECK VALVE DIFFUSER, REINF. RISER	5	EA	$10,000	$5,000	$15,000	$75,000
	SUBTOTAL - DIFFUSERS						**$565,380**
6.3	**BACKWASH HANDLING**						
	BACKWASH HANDLING	1	LS	$2,700,000	$810,000	$3,510,000	$3,510,000
	SOLIDS REMOVAL						Incl. Above
	BOOSTER PUMP						Incl. Above
	MISCELLANEOUS VALVES AND FITTINGS						Incl. Above
	SUBTOTAL -BACKWASH HANDLING						**$3,510,000**
6.4	**CIP NEUTRALIZATION/DISCHARGE**						
	NEUTRALIZATION TANK	2	EA	$140,000	$42,000	$182,000	$364,000
	PH ADJUSTMENT	1	LS	$60,000	$18,000	$78,000	$78,000
	SUBTOTAL - CIP NEUTRALIZATION/DISCHARGE						**$442,000**
	SUBTOTAL - RESIDUALS HANDLING						**$5,150,080**
	PIPING		7.5%				$386,256
	ELECTRICAL		10%				$515,008
	INSTRUMENTATION		7.5%				$386,256
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$180,253
	SITEWORK		12.5%				$643,760
	PROJECT SUBTOTAL - RESIDUALS HANDLING						**$7,261,613**

	ANNUAL O&M COSTS	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	MAINTENANCE & MATERIALS	1	LS	$150,000	$150,000	$1,985,000
	DIFFUSERS MAINTENANCE	1	LS	$16,000	$16,000	$212,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
7.0 POWER SUPPLY							
7.1a	**66 KV REDUNDANCY SETUP FEE**						
	REDUNDANCY SETUP FEE	1	LS			$2,000,000	$2,000,000
	SUBTOTAL - 66 KV REDUNDANCY SETUP FEE						**$2,000,000**
	SUBTOTAL - POWER SUPPLY						**$2,000,000**
	PROJECT SUBTOTAL - POWER SUPPLY						**$2,000,000**

	ANNUAL O&M COSTS (66 KV SERVICE)	QTY.	UNIT	UNIT COST	ANNUAL COST	PRESENT WORTH
	SWITCHYARD LEASE/SERVICE AGREEMENT	1	LS	$100,000	$100,000	$1,324,000

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
8.0 ELECTRICAL BUILDING							
8.1	**ELECTRICAL BUILDING**						
	ELECTRICAL BUILDING	12,000	SF	$120	$50	$170	$2,040,000
	STRUCTURAL PILES	1	25%			$510,000	$510,000
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	SUBTOTAL - ELECTRICAL BUILDING						**$2,550,000**
	PIPING		0%				$0
	ELECTRICAL		0%				$0
	INSTRUMENTATION		0%				$0
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$89,250
	SITEWORK		12.5%				$318,750
	PROJECT SUBTOTAL - ELECTRICAL BUILDING						**$2,958,000**

	DESCRIPTION	QTY.	UNIT	UNIT COST	UNIT LABOR	TOTAL UNIT COST	PROJECT COST
9.0	**ADMIN/MAINT**						
9.1	**MAINTENANCE/OPERATIONS/LAB BUILDING**						
	MAINTENANCE/OPERATIONS/LAB BUILDING	15,200	SF	$120	$50	$170	$2,584,000
	STRUCTURAL PILES	1	25%			$646,000	$646,000
	LAB EQUIPMENT	1	LS			$66,000	$66,000
	SUBTOTAL - MAINTENANCE/OPERATIONS/LAB BUILDING						**$3,296,000**
9.2	**ADMINISTRATION BUILDING**						
	ADMINISTRATION BUILDING	10,700	SF	$135	$50	$185	$1,979,500
	STRUCTURAL PILES	1	25%			$494,875	$494,875
	SUBTOTAL - ADMINISTRATION BUILDING						**$2,474,375**
9.3	**EDUCATION CENTER BUILDING**						
	EDUCATION CENTER BUILDING	4,900	SF	$135	$50	$185	$906,500
	STRUCTURAL PILES	1	25%			$226,625	$226,625
	SUBTOTAL - EDUCATION CENTER BUILDING						**$1,133,125**
	SUBTOTAL - ADMIN/MAINT						**$6,903,500**
	PIPING		7.5%				$517,763
	ELECTRICAL		10%				$690,350
	INSTRUMENTATION		7.5%				$517,763
	HVAC, PLUMBING, & ARCHITECTURAL		3.5%				$241,623
	SITEWORK		12.5%				$862,938
	PROJECT SUBTOTAL - ADMIN/MAINT						**$9,733,935**

Appendix 7:B

Replacement Cost Breakdown

ITEM NO.	EQUIPMENT DESCRIPTION	SUB ITEM COST (% OF TOTAL ITEM COST)	REPLACEMENT PERIOD FOR EQUIPMENT (YRS)	REPLACEMENT COST (% OF INSTALLED COST)
1	INTAKE SCREENS		20	100.0%
2	RAW WATER AND MF/UF BOOSTER PUMPS		5	50.0%
3	POST-TREAT AND PRODUCT WATER PUMPS		10	50.0%
4	HIGH RATE GRANULAR MEDIA FILTERS			
5	MEDIA	5.0%	3	100.0%
6	MISCELLANEOUS VALVES AND FITTINGS	10.0%	20	100.0%
7	MF/UF SYSTEM			
8	MEMBRANES	15.0%	10	100.0%
9	MEMBRANE BACKWASH PUMPS	3.5%	10	50.0%
10	CHEMICALLY ENHANCED BACKWASH PUMPS	2.0%	10	50.0%
11	CIP PUMPS	2.0%	10	50.0%
12	MISCELLANEOUS VALVES AND FITTINGS	10.0%	20	100.0%
13	RO System			
14	CARTRIDGE FILTERS	0.5%	0.25	100.0%
15	RO FEED PUMPS - 1ST PASS	15.0%	7	50.0%
16	ENERGY RECOVERY SYSTEMS	5.0%	10	50.0%
17	RO FEED PUMPS - 2ND PASS	5.0%	10	50.0%
18	TRAIN PIPING & VALVES	10.0%	20	100.0%
19	CIP PUMPS	2.0%	10	50.0%
20	CO2 STORAGE AND FEED SYSTEM		5	3.0%
21	HYDRATED LIME SLURRY SYSTEM		5	5.0%
22	LIME CONTACT TANK		10	100.0%
23	DIFFUSERS		20	100.0%
24	BACKWASH HANDLING			
25	SOLIDS REMOVAL	5.0%	20	100.0%
26	BOOSTER PUMP	15.0%	10	50.0%
27	MISCELLANEOUS VALVES AND FITTINGS	10.0%	20	100.0%
28	PH ADJUSTMENT		5	10.0%
29	CHEMICAL METERING PUMPS		5	50.0%
30	MISCELLANEOUS SITEWORK		1	2.5%

	DESIGN PAYBACK PERIOD (YEARS)	**20**		
	DISCOUNT RATE	**4.3%**		
	REPLACEMENT ANNUALIZATION FACTOR	**0.032549645**		
	REPLACEMENT PRESENT WORTH FACTOR	**13.2363295**		

Assumptions

COST SCENARIO	UNIT COST	ANNUAL COST	PRESENT
ES_10	$39,521,876	$1,286,423	$17,027,519
ES_20	$76,041,574	$2,475,126	$32,761,587
ES_10(40)	$40,721,895	$1,325,483	$17,544,533
ES_40	$123,632,556	$4,024,196	$53,265,583
ES_60	$184,619,449	$6,009,298	$79,541,043
RB_10	$39,418,707	$1,283,065	$16,983,070
RB_20	$76,160,814	$2,479,007	$32,812,960
RB_10(40)	$41,132,106	$1,338,835	$17,721,267
RB_40	$123,795,487	$4,029,499	$53,335,779
RB_60	$184,668,404	$6,010,891	$79,562,135

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$215,040		1	$215,040	$6,999	$92,647
1.2	INTAKE	RAW WATER PUMPS	$1,267,500		4	$2,535,000	$82,513	$1,092,174
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$366,600					
	PRETREAT	MEDIA		$18,330	7	$128,310	$4,176	$55,281
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$36,660	1	$36,660	$1,193	$15,795
2.2	PRETREAT	MF/UF SYSTEM	$11,310,000					
	PRETREAT	MEMBRANES		$1,696,500	2	$3,393,000	$110,441	$1,461,833
	PRETREAT	MEMBRANE BACKWASH PUMPS		$395,850	2	$395,850	$12,885	$170,547
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	CIP PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$1,131,000	1	$1,131,000	$36,814	$487,278
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$1,950,000		4	$3,900,000	$126,944	$1,680,268
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
3.1	RO	RO System	$22,750,000					
	RO	CARTRIDGE FILTERS		$113,750	80	$9,100,000	$296,202	$3,920,624
	RO	RO FEED PUMPS - 1ST PASS		$3,412,500	3	$5,118,750	$166,613	$2,205,351
	RO	ENERGY RECOVERY SYSTEMS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	RO FEED PUMPS - 2ND PASS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	TRAIN PIPING & VALVES		$2,275,000	1	$2,275,000	$74,050	$980,156
	RO	CIP PUMPS		$455,000	2	$455,000	$14,810	$196,031
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,111,500		2	$1,111,500	$36,179	$478,876
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$455,000		4	$54,600	$1,777	$23,524
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$422,500		4	$84,500	$2,750	$36,406
4.4	POST-TREAT	LIME CONTACT TANK	$845,000		2	$1,690,000	$55,009	$728,116
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$468,000		2	$468,000	$15,233	$201,632
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$16,000		4	$32,000	$1,042	$13,787
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$52,500		1	$52,500	$1,709	$22,619
6.2	RESIDUALS	BACKWASH HANDLING	$715,000					
	RESIDUALS	SOLIDS REMOVAL		$35,750	1	$35,750	$1,164	$15,402
	RESIDUALS	BOOSTER PUMP		$107,250	2	$107,250	$3,491	$46,207
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$71,500	1	$71,500	$2,327	$30,805
6.3	RESIDUALS	PH ADJUSTMENT	$20,000		4	$8,000	$260	$3,447
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$8,464,932		20	$4,232,466	$137,765	$1,823,507
		TOTAL EQUIPMENT REPLACEMENT COST				**$39,521,876**	**$1,286,423**	**$17,027,519**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$215,040		1	$215,040	$6,999	$92,647
1.2	INTAKE	RAW WATER PUMPS	$2,112,500		4	$4,225,000	$137,522	$1,820,290
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$611,000					
	PRETREAT	MEDIA		$30,550	7	$213,850	$6,961	$92,135
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$61,100	1	$61,100	$1,989	$26,324
2.2	PRETREAT	MF/UF SYSTEM	$22,620,000					
	PRETREAT	MEMBRANES		$3,393,000	2	$6,786,000	$220,882	$2,923,666
	PRETREAT	MEMBRANE BACKWASH PUMPS		$791,700	2	$791,700	$25,770	$341,094
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$452,400	2	$452,400	$14,725	$194,911
	PRETREAT	CIP PUMPS		$452,400	2	$452,400	$14,725	$194,911
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$2,262,000	1	$2,262,000	$73,627	$974,555
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$3,250,000		4	$6,500,000	$211,573	$2,800,446
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
3.1	RO	RO System	$45,500,000					
	RO	CARTRIDGE FILTERS		$227,500	80	$18,200,000	$592,404	$7,841,249
	RO	RO FEED PUMPS - 1ST PASS		$6,825,000	3	$10,237,500	$333,227	$4,410,702
	RO	ENERGY RECOVERY SYSTEMS		$2,275,000	2	$2,275,000	$74,050	$980,156
	RO	RO FEED PUMPS - 2ND PASS		$2,275,000	2	$2,275,000	$74,050	$980,156
	RO	TRAIN PIPING & VALVES		$4,550,000	1	$4,550,000	$148,101	$1,960,312
	RO	CIP PUMPS		$910,000	2	$910,000	$29,620	$392,062
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,852,500		2	$1,852,500	$60,298	$798,127
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$910,000		4	$109,200	$3,554	$47,047
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$845,000		4	$169,000	$5,501	$72,812
4.4	POST-TREAT	LIME CONTACT TANK	$1,690,000		2	$3,380,000	$110,018	$1,456,232
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$16,000		4	$32,000	$1,042	$13,787
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$1,198,698		2	$1,198,698	$39,017	$516,444
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$52,500		1	$52,500	$1,709	$22,619
6.2	RESIDUALS	BACKWASH HANDLING	$1,430,000					
	RESIDUALS	SOLIDS REMOVAL		$71,500	1	$71,500	$2,327	$30,805
	RESIDUALS	BOOSTER PUMP		$214,500	2	$214,500	$6,982	$92,415
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$143,000	1	$143,000	$4,655	$61,610
6.3	RESIDUALS	PH ADJUSTMENT	$39,000		4	$15,600	$508	$6,721
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$16,333,773		20	$8,166,887	$265,829	$3,518,604
		TOTAL EQUIPMENT REPLACEMENT COST				**$76,041,574**	**$2,475,126**	**$32,761,587**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$1,267,500		4	$2,535,000	$82,513	$1,092,174
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$366,600					
	PRETREAT	MEDIA		$18,330	7	$128,310	$4,176	$55,281
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$36,660	1	$36,660	$1,193	$15,795
2.2	PRETREAT	MF/UF SYSTEM	$11,310,000					
	PRETREAT	MEMBRANES		$1,696,500	2	$3,393,000	$110,441	$1,461,833
	PRETREAT	MEMBRANE BACKWASH PUMPS		$395,850	2	$395,850	$12,885	$170,547
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	CIP PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$1,131,000	1	$1,131,000	$36,814	$487,278
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$1,950,000		4	$3,900,000	$126,944	$1,680,268
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$22,750,000					
	RO	CARTRIDGE FILTERS		$113,750	80	$9,100,000	$296,202	$3,920,624
	RO	RO FEED PUMPS - 1ST PASS		$3,412,500	3	$5,118,750	$166,613	$2,205,351
	RO	ENERGY RECOVERY SYSTEMS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	RO FEED PUMPS - 2ND PASS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	TRAIN PIPING & VALVES		$2,275,000	1	$2,275,000	$74,050	$980,156
	RO	CIP PUMPS		$455,000	2	$455,000	$14,810	$196,031
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,111,500		2	$1,111,500	$36,179	$478,876
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$455,000		4	$54,600	$1,777	$23,524
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$422,500		4	$84,500	$2,750	$36,406
4.4	POST-TREAT	LIME CONTACT TANK	$845,000		2	$1,690,000	$55,009	$728,116
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$468,000		2	$468,000	$15,233	$201,632
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$715,000					
	RESIDUALS	SOLIDS REMOVAL		$35,750	1	$35,750	$1,164	$15,402
	RESIDUALS	BOOSTER PUMP		$107,250	2	$107,250	$3,491	$46,207
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$71,500	1	$71,500	$2,327	$30,805
6.3	RESIDUALS	PH ADJUSTMENT	$20,000		4	$8,000	$260	$3,447
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$9,711,249		20	$4,855,625	$158,049	$2,091,987
		TOTAL EQUIPMENT REPLACEMENT COST				**$40,721,895**	**$1,325,483**	**$17,544,533**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$3,802,500		4	$7,605,000	$247,540	$3,276,522
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$1,099,800					
	PRETREAT	MEDIA		$54,990	7	$384,930	$12,529	$165,842
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$109,980	1	$109,980	$3,580	$47,384
2.2	PRETREAT	MF/UF SYSTEM	$37,700,000					
	PRETREAT	MEMBRANES		$5,655,000	2	$11,310,000	$368,136	$4,872,776
	PRETREAT	MEMBRANE BACKWASH PUMPS		$1,319,500	2	$1,319,500	$42,949	$568,491
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$754,000	2	$754,000	$24,542	$324,852
	PRETREAT	CIP PUMPS		$754,000	2	$754,000	$24,542	$324,852
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$3,770,000	1	$3,770,000	$122,712	$1,624,259
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$5,850,000		4	$11,700,000	$380,831	$5,040,803
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$71,370,000					
	RO	CARTRIDGE FILTERS		$356,850	80	$28,548,000	$929,227	$12,299,558
	RO	RO FEED PUMPS - 1ST PASS		$10,705,500	3	$16,058,250	$522,690	$6,918,502
	RO	ENERGY RECOVERY SYSTEMS		$3,568,500	2	$3,568,500	$116,153	$1,537,445
	RO	RO FEED PUMPS - 2ND PASS		$3,568,500	2	$3,568,500	$116,153	$1,537,445
	RO	TRAIN PIPING & VALVES		$7,137,000	1	$7,137,000	$232,307	$3,074,890
	RO	CIP PUMPS		$1,427,400	2	$1,427,400	$46,461	$614,978
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$3,334,500		2	$3,334,500	$108,537	$1,436,629
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$955,500		4	$114,660	$3,732	$49,400
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$1,267,500		4	$253,500	$8,251	$109,217
4.4	POST-TREAT	LIME CONTACT TANK	$2,535,000		2	$5,070,000	$165,027	$2,184,348
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$3,185,000		2	$3,185,000	$103,671	$1,372,218
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$2,340,000					
	RESIDUALS	SOLIDS REMOVAL		$117,000	1	$117,000	$3,808	$50,408
	RESIDUALS	BOOSTER PUMP		$351,000	2	$351,000	$11,425	$151,224
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$234,000	1	$234,000	$7,617	$100,816
6.3	RESIDUALS	PH ADJUSTMENT	$52,000		4	$20,800	$677	$8,961
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$23,751,473		20	$11,875,736	$386,551	$5,116,517
		TOTAL EQUIPMENT REPLACEMENT COST				**$123,632,556**	**$4,024,196**	**$53,265,583**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$5,915,000		4	$11,830,000	$385,062	$5,096,812
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$1,710,800					
	PRETREAT	MEDIA		$85,540	7	$598,780	$19,490	$257,977
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$171,080	1	$171,080	$5,569	$73,708
2.2	PRETREAT	MF/UF SYSTEM	$56,550,000					
	PRETREAT	MEMBRANES		$8,482,500	2	$16,965,000	$552,205	$7,309,164
	PRETREAT	MEMBRANE BACKWASH PUMPS		$1,979,250	2	$1,979,250	$64,424	$852,736
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$1,131,000	2	$1,131,000	$36,814	$487,278
	PRETREAT	CIP PUMPS		$1,131,000	2	$1,131,000	$36,814	$487,278
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$5,655,000	1	$5,655,000	$184,068	$2,436,388
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$9,100,000		4	$18,200,000	$592,404	$7,841,249
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$106,990,000					
	RO	CARTRIDGE FILTERS		$534,950	80	$42,796,000	$1,392,995	$18,438,136
	RO	RO FEED PUMPS - 1ST PASS		$16,048,500	3	$24,072,750	$783,559	$10,371,451
	RO	ENERGY RECOVERY SYSTEMS		$5,349,500	2	$5,349,500	$174,124	$2,304,767
	RO	RO FEED PUMPS - 2ND PASS		$5,349,500	2	$5,349,500	$174,124	$2,304,767
	RO	TRAIN PIPING & VALVES		$10,699,000	1	$10,699,000	$348,249	$4,609,534
	RO	CIP PUMPS		$2,139,800	2	$2,139,800	$69,650	$921,907
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$5,187,000		2	$5,187,000	$168,835	$2,234,756
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$1,430,000		4	$171,600	$5,586	$73,932
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$1,690,000		4	$338,000	$11,002	$145,623
4.4	POST-TREAT	LIME CONTACT TANK	$3,380,000		2	$6,760,000	$220,036	$2,912,464
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$3,674,069		2	$3,674,069	$119,590	$1,582,928
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$33,000		4	$66,000	$2,148	$28,435
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$3,510,000					
	RESIDUALS	SOLIDS REMOVAL		$175,500	1	$175,500	$5,712	$75,612
	RESIDUALS	BOOSTER PUMP		$526,500	2	$526,500	$17,137	$226,836
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$351,000	1	$351,000	$11,425	$151,224
6.3	RESIDUALS	PH ADJUSTMENT	$78,000		4	$31,200	$1,016	$13,442
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$36,463,041		20	$18,231,520	$593,430	$7,854,829
		TOTAL EQUIPMENT REPLACEMENT COST				**$184,619,449**	**$6,009,298**	**$79,541,043**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$215,040		1	$215,040	$6,999	$92,647
1.2	INTAKE	RAW WATER PUMPS	$1,267,500		4	$2,535,000	$82,513	$1,092,174
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$366,600					
	PRETREAT	MEDIA		$18,330	7	$128,310	$4,176	$55,281
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$36,660	1	$36,660	$1,193	$15,795
2.2	PRETREAT	MF/UF SYSTEM	$11,310,000					
	PRETREAT	MEMBRANES		$1,696,500	2	$3,393,000	$110,441	$1,461,833
	PRETREAT	MEMBRANE BACKWASH PUMPS		$395,850	2	$395,850	$12,885	$170,547
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	CIP PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$1,131,000	1	$1,131,000	$36,814	$487,278
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$1,950,000		4	$3,900,000	$126,944	$1,680,268
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
3.1	RO	RO System	$22,750,000					
	RO	CARTRIDGE FILTERS		$113,750	80	$9,100,000	$296,202	$3,920,624
	RO	RO FEED PUMPS - 1ST PASS		$3,412,500	3	$5,118,750	$166,613	$2,205,351
	RO	ENERGY RECOVERY SYSTEMS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	RO FEED PUMPS - 2ND PASS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	TRAIN PIPING & VALVES		$2,275,000	1	$2,275,000	$74,050	$980,156
	RO	CIP PUMPS		$455,000	2	$455,000	$14,810	$196,031
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,111,500		2	$1,111,500	$36,179	$478,876
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$455,000		4	$54,600	$1,777	$23,524
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$422,500		4	$84,500	$2,750	$36,406
4.4	POST-TREAT	LIME CONTACT TANK	$845,000		2	$1,690,000	$55,009	$728,116
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$526,500		2	$526,500	$17,137	$226,836
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$16,000		4	$32,000	$1,042	$13,787
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$52,500		1	$52,500	$1,709	$22,619
6.2	RESIDUALS	BACKWASH HANDLING	$715,000					
	RESIDUALS	SOLIDS REMOVAL		$35,750	1	$35,750	$1,164	$15,402
	RESIDUALS	BOOSTER PUMP		$107,250	2	$107,250	$3,491	$46,207
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$71,500	1	$71,500	$2,327	$30,805
6.3	RESIDUALS	PH ADJUSTMENT	$20,000		4	$8,000	$260	$3,447
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$8,177,994		20	$4,088,997	$133,095	$1,761,695
		TOTAL EQUIPMENT REPLACEMENT COST				**$39,418,707**	**$1,283,065**	**$16,983,070**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$215,040		1	$215,040	$6,999	$92,647
1.2	INTAKE	RAW WATER PUMPS	$2,112,500		4	$4,225,000	$137,522	$1,820,290
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$611,000					
	PRETREAT	MEDIA		$30,550	7	$213,850	$6,961	$92,135
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$61,100	1	$61,100	$1,989	$26,324
2.2	PRETREAT	MF/UF SYSTEM	$22,620,000					
	PRETREAT	MEMBRANES		$3,393,000	2	$6,786,000	$220,882	$2,923,666
	PRETREAT	MEMBRANE BACKWASH PUMPS		$791,700	2	$791,700	$25,770	$341,094
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$452,400	2	$452,400	$14,725	$194,911
	PRETREAT	CIP PUMPS		$452,400	2	$452,400	$14,725	$194,911
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$2,262,000	1	$2,262,000	$73,627	$974,555
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$3,250,000		4	$6,500,000	$211,573	$2,800,446
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
3.1	RO	RO System	$45,500,000					
	RO	CARTRIDGE FILTERS		$227,500	80	$18,200,000	$592,404	$7,841,249
	RO	RO FEED PUMPS - 1ST PASS		$6,825,000	3	$10,237,500	$333,227	$4,410,702
	RO	ENERGY RECOVERY SYSTEMS		$2,275,000	2	$2,275,000	$74,050	$980,156
	RO	RO FEED PUMPS - 2ND PASS		$2,275,000	2	$2,275,000	$74,050	$980,156
	RO	TRAIN PIPING & VALVES		$4,550,000	1	$4,550,000	$148,101	$1,960,312
	RO	CIP PUMPS		$910,000	2	$910,000	$29,620	$392,062
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,852,500		2	$1,852,500	$60,298	$798,127
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$910,000		4	$109,200	$3,554	$47,047
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$845,000		4	$169,000	$5,501	$72,812
4.4	POST-TREAT	LIME CONTACT TANK	$1,690,000		2	$3,380,000	$110,018	$1,456,232
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$16,000		4	$32,000	$1,042	$13,787
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$1,198,698		2	$1,198,698	$39,017	$516,444
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$52,500		1	$52,500	$1,709	$22,619
6.2	RESIDUALS	BACKWASH HANDLING	$1,430,000					
	RESIDUALS	SOLIDS REMOVAL		$71,500	1	$71,500	$2,327	$30,805
	RESIDUALS	BOOSTER PUMP		$214,500	2	$214,500	$6,982	$92,415
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$143,000	1	$143,000	$4,655	$61,610
6.3	RESIDUALS	PH ADJUSTMENT	$39,000		4	$15,600	$508	$6,721
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$16,572,252		20	$8,286,126	$269,710	$3,569,977
		TOTAL EQUIPMENT REPLACEMENT COST				**$76,160,814**	**$2,479,007**	**$32,812,960**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$1,267,500		4	$2,535,000	$82,513	$1,092,174
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$366,600					
	PRETREAT	MEDIA		$18,330	7	$128,310	$4,176	$55,281
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$36,660	1	$36,660	$1,193	$15,795
2.2	PRETREAT	MF/UF SYSTEM	$11,310,000					
	PRETREAT	MEMBRANES		$1,696,500	2	$3,393,000	$110,441	$1,461,833
	PRETREAT	MEMBRANE BACKWASH PUMPS		$395,850	2	$395,850	$12,885	$170,547
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	CIP PUMPS		$226,200	2	$226,200	$7,363	$97,456
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$1,131,000	1	$1,131,000	$36,814	$487,278
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$1,950,000		4	$3,900,000	$126,944	$1,680,268
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$22,750,000					
	RO	CARTRIDGE FILTERS		$113,750	80	$9,100,000	$296,202	$3,920,624
	RO	RO FEED PUMPS - 1ST PASS		$3,412,500	3	$5,118,750	$166,613	$2,205,351
	RO	ENERGY RECOVERY SYSTEMS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	RO FEED PUMPS - 2ND PASS		$1,137,500	2	$1,137,500	$37,025	$490,078
	RO	TRAIN PIPING & VALVES		$2,275,000	1	$2,275,000	$74,050	$980,156
	RO	CIP PUMPS		$455,000	2	$455,000	$14,810	$196,031
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$1,111,500		2	$1,111,500	$36,179	$478,876
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$455,000		4	$54,600	$1,777	$23,524
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$422,500		4	$84,500	$2,750	$36,406
4.4	POST-TREAT	LIME CONTACT TANK	$845,000		2	$1,690,000	$55,009	$728,116
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$526,500		2	$526,500	$17,137	$226,836
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$715,000					
	RESIDUALS	SOLIDS REMOVAL		$35,750	1	$35,750	$1,164	$15,402
	RESIDUALS	BOOSTER PUMP		$107,250	2	$107,250	$3,491	$46,207
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$71,500	1	$71,500	$2,327	$30,805
6.3	RESIDUALS	PH ADJUSTMENT	$20,000		4	$8,000	$260	$3,447
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$10,414,673		20	$5,207,336	$169,497	$2,243,517
		TOTAL EQUIPMENT REPLACEMENT COST				**$41,132,106**	**$1,338,835**	**$17,721,267**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$3,802,500		4	$7,605,000	$247,540	$3,276,522
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$1,099,800					
	PRETREAT	MEDIA		$54,990	7	$384,930	$12,529	$165,842
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$109,980	1	$109,980	$3,580	$47,384
2.2	PRETREAT	MF/UF SYSTEM	$37,700,000					
	PRETREAT	MEMBRANES		$5,655,000	2	$11,310,000	$368,136	$4,872,776
	PRETREAT	MEMBRANE BACKWASH PUMPS		$1,319,500	2	$1,319,500	$42,949	$568,491
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$754,000	2	$754,000	$24,542	$324,852
	PRETREAT	CIP PUMPS		$754,000	2	$754,000	$24,542	$324,852
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$3,770,000	1	$3,770,000	$122,712	$1,624,259
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$5,850,000		4	$11,700,000	$380,831	$5,040,803
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$22,100		4	$44,200	$1,439	$19,043
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$71,370,000					
	RO	CARTRIDGE FILTERS		$356,850	80	$28,548,000	$929,227	$12,299,558
	RO	RO FEED PUMPS - 1ST PASS		$10,705,500	3	$16,058,250	$522,690	$6,918,502
	RO	ENERGY RECOVERY SYSTEMS		$3,568,500	2	$3,568,500	$116,153	$1,537,445
	RO	RO FEED PUMPS - 2ND PASS		$3,568,500	2	$3,568,500	$116,153	$1,537,445
	RO	TRAIN PIPING & VALVES		$7,137,000	1	$7,137,000	$232,307	$3,074,890
	RO	CIP PUMPS		$1,427,400	2	$1,427,400	$46,461	$614,978
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$3,334,500		2	$3,334,500	$108,537	$1,436,629
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$955,500		4	$114,660	$3,732	$49,400
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$1,267,500		4	$253,500	$8,251	$109,217
4.4	POST-TREAT	LIME CONTACT TANK	$2,535,000		2	$5,070,000	$165,027	$2,184,348
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$3,094,000		2	$3,094,000	$100,709	$1,333,012
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$2,340,000					
	RESIDUALS	SOLIDS REMOVAL		$117,000	1	$117,000	$3,808	$50,408
	RESIDUALS	BOOSTER PUMP		$351,000	2	$351,000	$11,425	$151,224
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$234,000	1	$234,000	$7,617	$100,816
6.3	RESIDUALS	PH ADJUSTMENT	$52,000		4	$20,800	$677	$8,961
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$24,259,334		20	$12,129,667	$394,816	$5,225,919
		TOTAL EQUIPMENT REPLACEMENT COST				**$123,795,487**	**$4,029,499**	**$53,335,779**

REF NO.	PROCESS AREA	EQUIPMENT DESCRIPTION	TOTAL ITEM INSTALLED COST	SUB ITEM INSTALLED COST	NO. OF TIMES TO REPLACE	COST @ PAYBACK PERIOD	REPLACEMENT ANNUAL AMOUNT	REPLACEMENT PRESENT WORTH
1.1	INTAKE	INTAKE SCREENS	$662,400		1	$662,400	$21,561	$285,387
1.2	INTAKE	RAW WATER PUMPS	$5,915,000		4	$11,830,000	$385,062	$5,096,812
2.1	PRETREAT	HIGH RATE GRANULAR MEDIA FILTERS	$1,710,800					
	PRETREAT	MEDIA		$85,540	7	$598,780	$19,490	$257,977
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$171,080	1	$171,080	$5,569	$73,708
2.2	PRETREAT	MF/UF SYSTEM	$56,550,000					
	PRETREAT	MEMBRANES		$8,482,500	2	$16,965,000	$552,205	$7,309,164
	PRETREAT	MEMBRANE BACKWASH PUMPS		$1,979,250	2	$1,979,250	$64,424	$852,736
	PRETREAT	CHEMICALLY ENHANCED BACKWASH PUMPS		$1,131,000	2	$1,131,000	$36,814	$487,278
	PRETREAT	CIP PUMPS		$1,131,000	2	$1,131,000	$36,814	$487,278
	PRETREAT	MISCELLANEOUS VALVES AND FITTINGS		$5,655,000	1	$5,655,000	$184,068	$2,436,388
2.3	PRETREAT	MF/UF FILTRATE BOOSTER PUMPS	$9,100,000		4	$18,200,000	$592,404	$7,841,249
2.4	PRETREAT	COAGULENT METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.5	PRETREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$33,150		4	$66,300	$2,158	$28,565
2.6	PRETREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$16,900		4	$33,800	$1,100	$14,562
3.1	RO	RO System	$106,990,000					
	RO	CARTRIDGE FILTERS		$534,950	80	$42,796,000	$1,392,995	$18,438,136
	RO	RO FEED PUMPS - 1ST PASS		$16,048,500	3	$24,072,750	$783,559	$10,371,451
	RO	ENERGY RECOVERY SYSTEMS		$5,349,500	2	$5,349,500	$174,124	$2,304,767
	RO	RO FEED PUMPS - 2ND PASS		$5,349,500	2	$5,349,500	$174,124	$2,304,767
	RO	TRAIN PIPING & VALVES		$10,699,000	1	$10,699,000	$348,249	$4,609,534
	RO	CIP PUMPS		$2,139,800	2	$2,139,800	$69,650	$921,907
3.2	RO	SCALE INHIBITOR METERING PUMPS AND APPURTENANCES	$7,800		4	$15,600	$508	$6,721
4.1	POST-TREAT	POST TREATMENT PUMPS	$5,187,000		2	$5,187,000	$168,835	$2,234,756
4.2	POST-TREAT	CO2 STORAGE AND FEED SYSTEM	$1,430,000		4	$171,600	$5,586	$73,932
4.3	POST-TREAT	HYDRATED LIME SLURRY SYSTEM	$1,690,000		4	$338,000	$11,002	$145,623
4.4	POST-TREAT	LIME CONTACT TANK	$3,380,000		2	$6,760,000	$220,036	$2,912,464
4.5	POST-TREAT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
4.6	POST-TREAT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
5.1	PRODUCT	PRODUCT WATER PUMPS	$3,674,069		2	$3,674,069	$119,590	$1,582,928
5.2	PRODUCT	CAUSTIC METERING PUMPS AND APPURTENANCES	$33,000		4	$66,000	$2,148	$28,435
5.3	PRODUCT	SODIUM HYPO METERING PUMPS AND APPURTENANCES	$22,000		4	$44,000	$1,432	$18,957
5.4	PRODUCT	AQ AMMONIA METERING PUMPS AND APPURTENANCES	$8,000		4	$16,000	$521	$6,893
6.1	RESIDUALS	DIFFUSERS	$75,000		1	$75,000	$2,441	$32,313
6.2	RESIDUALS	BACKWASH HANDLING	$3,510,000					
	RESIDUALS	SOLIDS REMOVAL		$175,500	1	$175,500	$5,712	$75,612
	RESIDUALS	BOOSTER PUMP		$526,500	2	$526,500	$17,137	$226,836
	RESIDUALS	MISCELLANEOUS VALVES AND FITTINGS		$351,000	1	$351,000	$11,425	$151,224
6.3	RESIDUALS	PH ADJUSTMENT	$78,000		4	$31,200	$1,016	$13,442
7.1	SITEWORK	MISCELLANEOUS SITEWORK	$36,560,949		20	$18,280,475	$595,023	$7,875,920
		TOTAL EQUIPMENT REPLACEMENT COST				**$184,668,404**	**$6,010,891**	**$79,562,135**

Appendix 8:A

Project Schedules

APPENDIX A-1
Design Bid Build - Typical Project Schedule

ACTIVITY	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Full Scale Project EIR/EIS						
NEPA Lead Agency Agreement						
Baseline Monitoring - Agency Scoping and Field Work						
DEIR/DEIS Preparation						
DEIR/DEIS Circulation and Response to Comments						
Board Approval						
Permitting and Approvals						
Agency Meetings						
Permit Application Supporting Technical Data						
Permit Applications Preparation and Submittals						
Permit Processing and Approvals						
Design Team Activities and Procurement						
Prepare Design RFP						
Receive/Review/Select Proposals						
Approval						
Design						
Contractor Bidding/Award						
Construction/Start-Up/Acceptance Test						

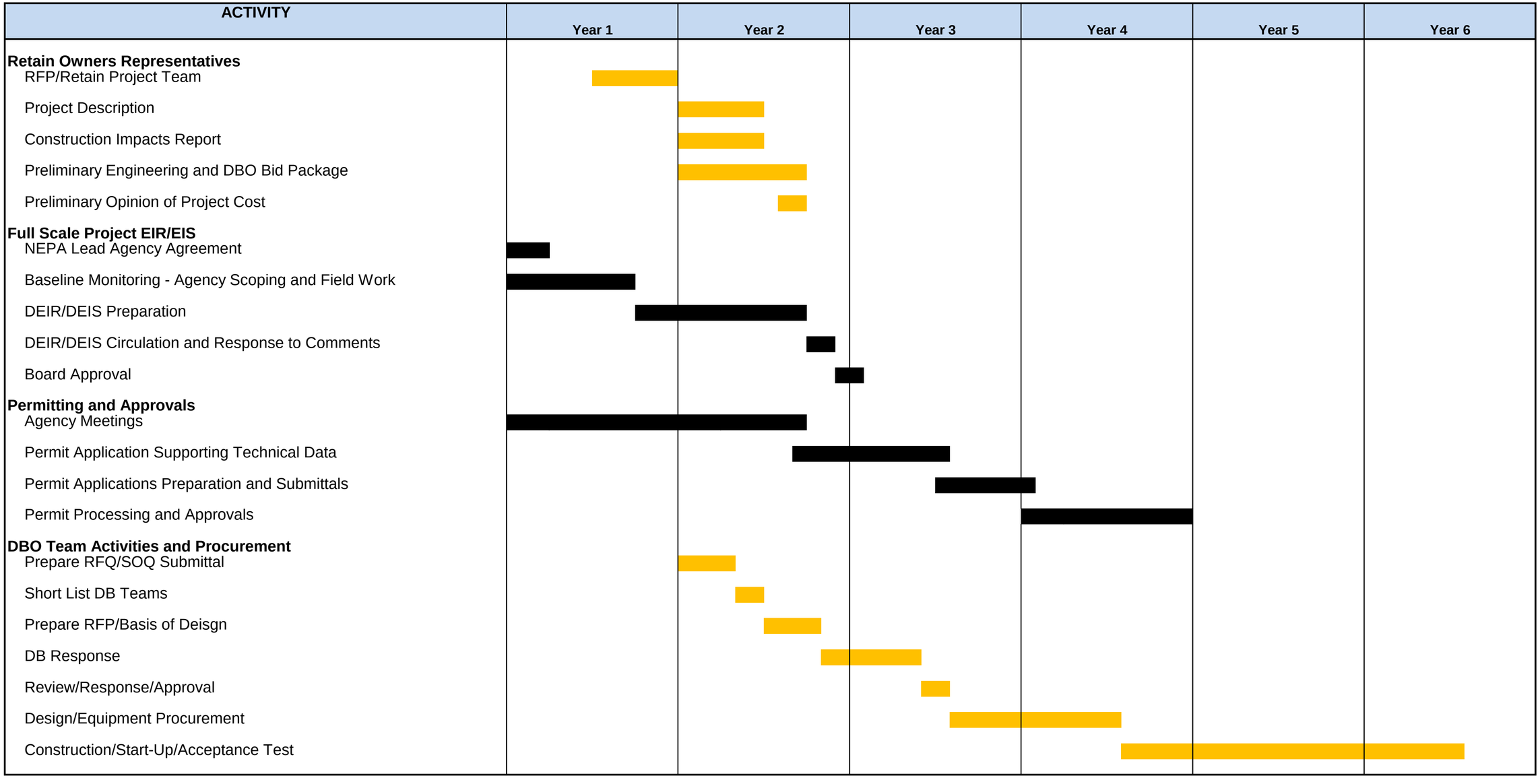
Notes:
1. Black bars and symbols define activities that are required for all three Project Delivery methods
2. Blue bars and symbols define activities that are specific to Design Bid Build Delivery Method

APPENDIX A-2
Design Build - Typical Project Schedule

ACTIVITY	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Retain Owners Representatives						
RFP/Retain Project Team						
Project Description						
Construction Impacts Report						
Preliminary Engineering and DB Bid Package						
Preliminary Opinion of Project Cost						
Full Scale Project EIR/EIS						
NEPA Lead Agency Agreement						
Baseline Monitoring - Agency Scoping and Field Work						
DEIR/DEIS Preparation						
DEIR/DEIS Circulation and Response to Comments						
Board Approval						
Permitting and Approvals						
Agency Meetings						
Permit Application Supporting Technical Data						
Permit Applications Preparation and Submittals						
Permit Processing and Approvals						
DB Team Activities and Procurement						
Prepare RFQ/SOQ Submittal						
Short List DB Teams						
Prepare RFP/Basis of Deisgn						
DB Response						
Review/Response/Approval						
Design/Equipment Procurement						
Construction/Start-Up/Acceptance Test						

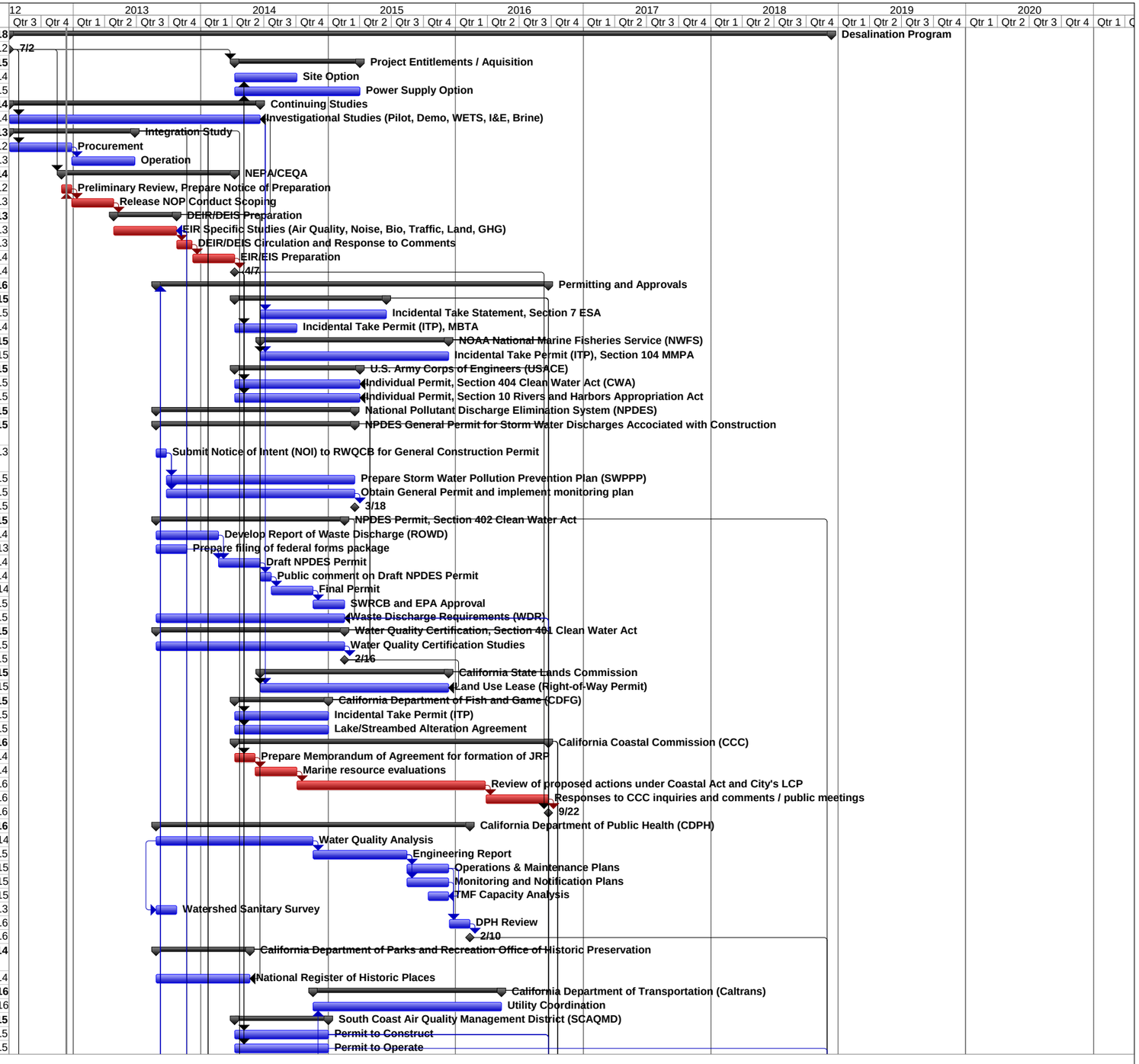
Notes:
1. Black bars and symbols define activities that are required for all three Project Delivery methods.
2. Green bars and symbols define activities that are specific to Design Build Delivery Method
3. The Project Schedule presented herein is intended as an estimate of the overall project delivery schedule, and to provide a relative comparison with the schedule developed for Design Bid Build method. More detailed project schedules will be developed during subsequent phases of the project.

APPENDIX A-3
Design Build Operate - Typical Project Schedule



Notes:
1. Black bars and symbols define activities that are required for all three Project Delivery methods.
2. Orange bars and symbols define activities that are specific to Design Build Operate Delivery Method
3. The Project Schedule presented herein is intended as an estimate of the overall project delivery schedule, and to provide a relative comparison with the schedule developed for Design Bid Build method. More detailed project schedules will be developed during subsequent phases of the project.

ID	Task Name	Duration	Start	Finish
1	**Desalination Program**	**2355 days**	**Mon 7/2/12**	**Wed 12/12/18**
2	Notice to Proceed	0 days	Mon 7/2/12	Mon 7/2/12
3	**Project Entitlements / Aquisition**	**360 days**	**Mon 4/7/14**	**Wed 4/1/15**
4	Site Option	180 days	Mon 4/7/14	Fri 10/3/14
5	Power Supply Option	360 days	Mon 4/7/14	Wed 4/1/15
6	**Continuing Studies**	**720 days**	**Mon 7/2/12**	**Fri 6/20/14**
7	Investigational Studies (Pilot, Demo, WETS, I&E, Brine)	720 days	Mon 7/2/12	Fri 6/20/14
8	**Integration Study**	**360 days**	**Mon 7/2/12**	**Wed 6/26/13**
9	Procurement	180 days	Mon 7/2/12	Thu 12/27/12
10	Operation	180 days	Thu 12/27/12	Wed 6/26/13
11	**NEPA/CEQA**	**495 days**	**Wed 11/28/12**	**Mon 4/7/14**
12	Preliminary Review, Prepare Notice of Preparation	30 days	Wed 11/28/12	Thu 12/27/12
13	Release NOP Conduct Scoping	120 days	Thu 12/27/12	Fri 4/26/13
14	**DEIR/DEIS Preparation**	**180 days**	**Fri 4/26/13**	**Wed 10/23/13**
15	EIR Specific Studies (Air Quality, Noise, Bio, Traffic, Land, GHG)	180 days	Fri 4/26/13	Wed 10/23/13
16	DEIR/DEIS Circulation and Response to Comments	45 days	Wed 10/23/13	Fri 12/6/13
17	EIR/EIS Preparation	120 days	Mon 12/9/13	Mon 4/7/14
18	Board Approval	0 days	Mon 4/7/14	Mon 4/7/14
19	**Permitting and Approvals**	**1125 days**	**Mon 8/26/13**	**Thu 9/22/16**
20	**U.S. Fish and Wildlife Service (USFWS)**	**435 days**	**Mon 4/7/14**	**Tue 6/16/15**
21	Incidental Take Statement, Section 7 ESA	360 days	Fri 6/20/14	Tue 6/16/15
22	Incidental Take Permit (ITP), MBTA	180 days	Mon 4/7/14	Fri 10/3/14
23	**NOAA National Marine Fisheries Service (NWFS)**	**540 days**	**Fri 6/20/14**	**Fri 12/11/15**
24	Incidental Take Permit (ITP), Section 104 MMPA	540 days	Fri 6/20/14	Fri 12/11/15
25	**U.S. Army Corps of Engineers (USACE)**	**360 days**	**Mon 4/7/14**	**Wed 4/1/15**
26	Individual Permit, Section 404 Clean Water Act (CWA)	360 days	Mon 4/7/14	Wed 4/1/15
27	Individual Permit, Section 10 Rivers and Harbors Appropriation Act	360 days	Mon 4/7/14	Wed 4/1/15
28	**National Pollutant Discharge Elimination System (NPDES)**	**570 days**	**Mon 8/26/13**	**Wed 3/18/15**
29	**NPDES General Permit for Storm Water Discharges Accociated with Construction**	**570 days**	**Mon 8/26/13**	**Wed 3/18/15**
30	Submit Notice of Intent (NOI) to RWQCB for General Construction Permit	30 days	Mon 8/26/13	Tue 9/24/13
31	Prepare Storm Water Pollution Prevention Plan (SWPPP)	540 days	Tue 9/24/13	Wed 3/18/15
32	Obtain General Permit and implement monitoring plan	540 days	Tue 9/24/13	Wed 3/18/15
33	Submit Notice of Termination to RWQCB	0 days	Wed 3/18/15	Wed 3/18/15
34	**NPDES Permit, Section 402 Clean Water Act**	**540 days**	**Mon 8/26/13**	**Mon 2/16/15**
35	Develop Report of Waste Discharge (ROWD)	180 days	Mon 8/26/13	Thu 2/20/14
36	Prepare filing of federal forms package	90 days	Mon 8/26/13	Fri 11/22/13
37	Draft NPDES Permit	120 days	Thu 2/20/14	Fri 6/20/14
38	Public comment on Draft NPDES Permit	30 days	Fri 6/20/14	Mon 7/21/14
39	Final Permit	120 days	Mon 7/21/14	Tue 11/18/14
40	SWRCB and EPA Approval	90 days	Tue 11/18/14	Mon 2/16/15
41	Waste Discharge Requirements (WDR)	540 days	Mon 8/26/13	Mon 2/16/15
42	**Water Quality Certification, Section 401 Clean Water Act**	**540 days**	**Mon 8/26/13**	**Mon 2/16/15**
43	Water Quality Certification Studies	540 days	Mon 8/26/13	Mon 2/16/15
44	Board Approval	0 days	Mon 2/16/15	Mon 2/16/15
45	**California State Lands Commission**	**540 days**	**Fri 6/20/14**	**Fri 12/11/15**
46	Land Use Lease (Right-of-Way Permit)	540 days	Fri 6/20/14	Fri 12/11/15
47	**California Department of Fish and Game (CDFG)**	**270 days**	**Mon 4/7/14**	**Thu 1/1/15**
48	Incidental Take Permit (ITP)	270 days	Mon 4/7/14	Thu 1/1/15
49	Lake/Streambed Alteration Agreement	270 days	Mon 4/7/14	Thu 1/1/15
50	**California Coastal Commission (CCC)**	**900 days**	**Mon 4/7/14**	**Thu 9/22/16**
51	Prepare Memorandum of Agreement for formation of JRP	60 days	Mon 4/7/14	Thu 6/5/14
52	Marine resource evaluations	120 days	Thu 6/5/14	Fri 10/3/14
53	Review of proposed actions under Coastal Act and City's LCP	540 days	Fri 10/3/14	Fri 3/25/16
54	Responses to CCC inquiries and comments / public meetings	180 days	Mon 3/28/16	Thu 9/22/16
55	Coastal Development Permit approval	0 days	Thu 9/22/16	Thu 9/22/16
56	**California Department of Public Health (CDPH)**	**900 days**	**Mon 8/26/13**	**Wed 2/10/16**
57	Water Quality Analysis	450 days	Mon 8/26/13	Tue 11/18/14
58	Engineering Report	270 days	Tue 11/18/14	Fri 8/14/15
59	Operations & Maintenance Plans	120 days	Fri 8/14/15	Fri 12/11/15
60	Monitoring and Notification Plans	120 days	Fri 8/14/15	Fri 12/11/15
61	TMF Capacity Analysis	60 days	Wed 10/14/15	Fri 12/11/15
62	Watershed Sanitary Survey	60 days	Mon 8/26/13	Wed 10/23/13
63	DPH Review	60 days	Mon 12/14/15	Wed 2/10/16
64	Permit to Operate a Public Water System approval	0 days	Wed 2/10/16	Wed 2/10/16
65	**California Department of Parks and Recreation Office of Historic Preservation**	**270 days**	**Mon 8/26/13**	**Wed 5/21/14**
66	National Register of Historic Places	270 days	Mon 8/26/13	Wed 5/21/14
67	**California Department of Transportation (Caltrans)**	**540 days**	**Tue 11/18/14**	**Wed 5/11/16**
68	Utility Coordination	540 days	Tue 11/18/14	Wed 5/11/16
69	**South Coast Air Quality Management District (SCAQMD)**	**270 days**	**Mon 4/7/14**	**Thu 1/1/15**
70	Permit to Construct	270 days	Mon 4/7/14	Thu 1/1/15
71	Permit to Operate	270 days	Mon 4/7/14	Thu 1/1/15



Project: West Basin OWDPMP
Date: January 2013

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Critical | Critical Split | Progress | Deadline

ID	Task Name	Duration	Start	Finish
72	**Metropolitan Water District of Southern California**	**90 days**	**Tue 11/18/14**	**Mon 2/16/15**
73	Utility Coordination	90 days	Tue 11/18/14	Mon 2/16/15
74	**City of X**	**120 days**	**Tue 11/18/14**	**Wed 3/18/15**
75	Utility Coordination	120 days	Tue 11/18/14	Wed 3/18/15
76	**Financing**	**240 days**	**Mon 7/21/14**	**Wed 3/18/15**
77	Financing Plan and Funding	180 days	Mon 7/21/14	Fri 1/16/15
78	Bond Sale	180 days	Thu 9/18/14	Wed 3/18/15
79	**Project Delivery Team**	**2355 days**	**Mon 7/2/12**	**Wed 12/12/18**
80	Retain Owner's Representative	150 days	Mon 7/2/12	Wed 11/28/12
81	Procure Environmental Consultant	150 days	Mon 7/2/12	Wed 11/28/12
82	Onshore Program Wide Studies (Geotech, Survey)	270 days	Wed 11/28/12	Fri 8/23/13
83	Offshore Program Wide Studies (Bathymetry, Struct Evaluation of Tunnel)	270 days	Wed 11/28/12	Fri 8/23/13
84	**Procurement/Development**	**510 days**	**Wed 11/28/12**	**Tue 4/22/14**
85	**Intake/Discharge Structure (DB)**	**420 days**	**Wed 11/28/12**	**Wed 1/22/14**
86	**Technical**	**270 days**	**Wed 11/28/12**	**Fri 8/23/13**
87	Preliminary Design	270 days	Wed 11/28/12	Fri 8/23/13
88	**Procurement**	**420 days**	**Wed 11/28/12**	**Wed 1/22/14**
89	RFQ	90 days	Wed 11/28/12	Tue 2/26/13
90	RFP	90 days	Mon 8/26/13	Fri 11/22/13
91	DB Team Selection	60 days	Fri 11/22/13	Wed 1/22/14
92	**Desalination Plant (DB)**	**420 days**	**Wed 11/28/12**	**Wed 1/22/14**
93	**Technical**	**270 days**	**Wed 11/28/12**	**Fri 8/23/13**
94	Prelimary Design	270 days	Wed 11/28/12	Fri 8/23/13
95	**Procurement**	**420 days**	**Wed 11/28/12**	**Wed 1/22/14**
96	RFQ	90 days	Wed 11/28/12	Tue 2/26/13
97	RFP	90 days	Mon 8/26/13	Fri 11/22/13
98	DB Team Selection	60 days	Fri 11/22/13	Wed 1/22/14
99	**Conveyance System (DBB)**	**360 days**	**Wed 11/28/12**	**Fri 11/22/13**
100	**Technical**	**270 days**	**Wed 11/28/12**	**Fri 8/23/13**
101	Concept Design and Routing Study	270 days	Wed 11/28/12	Fri 8/23/13
102	**Procurement**	**360 days**	**Wed 11/28/12**	**Fri 11/22/13**
103	RFP	90 days	Wed 11/28/12	Tue 2/26/13
104	Select Design Engineer	90 days	Mon 8/26/13	Fri 11/22/13
105	Power Supply	510 days	Wed 11/28/12	Tue 4/22/14
106	**Design and Construction**	**1845 days**	**Fri 11/22/13**	**Wed 12/12/18**
107	**Intake/Discharge Structure (DB)**	**1515 days**	**Wed 1/22/14**	**Fri 3/16/18**
108	Design/Equipment Procurement	270 days	Wed 1/22/14	Fri 10/17/14
109	Construction/Start-Up/Acceptance Test	540 days	Thu 9/22/16	Fri 3/16/18
110	**Desalination Plant (DB)**	**1785 days**	**Wed 1/22/14**	**Wed 12/12/18**
111	Design/Equipment Procurement	360 days	Wed 1/22/14	Fri 1/16/15
112	Construction/Start-Up/Acceptance Test	810 days	Thu 9/22/16	Wed 12/12/18
113	**Conveyance System (DBB)**	**1755 days**	**Fri 11/22/13**	**Wed 9/12/18**
114	Design/Pre-Purchase Equipment	360 days	Fri 11/22/13	Tue 11/18/14
115	Contractor Bidding/Award	120 days	Tue 11/18/14	Wed 3/18/15
116	Construction/Start-Up/Acceptance Test	720 days	Thu 9/22/16	Wed 9/12/18
117	Power Supply (DB)	1080 days	Tue 4/22/14	Wed 4/5/17
118	**Operations**	**1935 days**	**Mon 8/26/13**	**Wed 12/12/18**
119	Prepare RFQ	90 days	Mon 8/26/13	Fri 11/22/13
120	SOQ Submittals	90 days	Fri 11/22/13	Thu 2/20/14
121	Operations Team Selection	60 days	Thu 2/20/14	Tue 4/22/14
122	Operations Team Consultation	360 days	Wed 1/22/14	Fri 1/16/15
123	Operation Plan Development	90 days	Fri 1/16/15	Thu 4/16/15
124	Negotiate Operations Contract	180 days	Thu 6/14/18	Wed 12/12/18
125	Start Operation	0 days	Wed 12/12/18	Wed 12/12/18

Project: West Basin OWDPMP
Date: January 2013

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only	Progress
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Critical	Deadline
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Critical Split	