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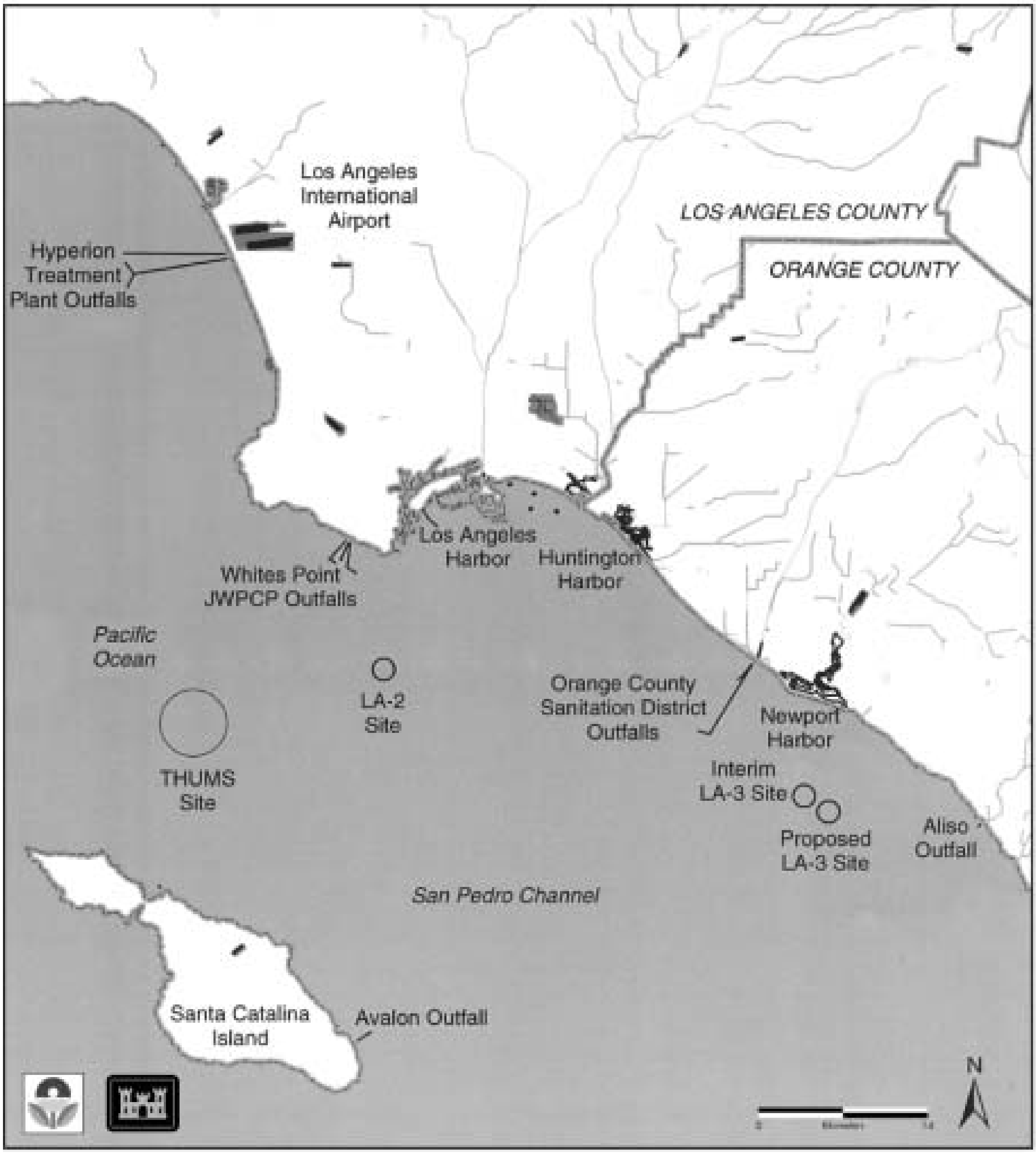
Environmental Impact Statement Proposed Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California

Prepared for the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers, Los Angeles District



December 2004

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ENVIRONMENTAL IMPACT STATEMENT
Proposed Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California

Abstract: This Environmental Impact Statement (EIS) covers the proposed designation of the LA-3 site as a permanent site for the ocean disposal of dredged material. The site will be used in conjunction with the LA-2 site for the disposal of dredged material originating from projects located within Los Angeles and Orange Counties. The interim LA-3 site has been used for the ocean disposal of dredged material from projects in the Orange County area (primarily Newport Bay and Harbor) since the 1970s.

Except for air quality issues, continued use of the LA-3 ocean dredged material disposal site (ODMDS) is not anticipated to cause significant long-term adverse environmental impacts beyond the site boundaries. As indicated the site has been used for the ocean disposal of dredged sediments since the 1970s and the benthic communities and sediments within the site have been altered by those previous disposal activities. Benthos within the site will continue to be smothered by sediment disposal but the environmental effects are not anticipated to extend beyond the site boundaries. Water quality impacts will be localized, short-term and negligible. Under worst-case conditions air quality impacts due to the dredged material hauling activities could be significant, but could be mitigated through the individual dredging project permitting process. The few identified potentially adverse impacts are not anticipated to be irreversible or to involve any irretrievable commitment of resources. As part of the site designation process, the USACE and EPA have developed a Site Monitoring and Management Plan (SMMP) included in an appendix to this EIS that will ensure that environmental impacts remain insignificant.

In conjunction with the permanent designation of LA-3 as an ODMDS, the existing permanently designated LA-2 site has been reevaluated in this EIS to increase the maximum annual volume of dredged sediment to be disposed of at the site. As with the LA-3 site, although substantial impacts will continue within the LA-2 site boundaries, no significant impacts to sediments or benthos are anticipated to extend beyond the site boundaries.

The alternatives considered in this EIS are: 1) No Action, 2) Maximize Use of LA-2, 3) Local Use of LA-3 and LA-2, and 4) Maximize Use of LA-3. The Preferred Alternative identified in this EIS is Alternative 3, the continued use of LA-3 as a permanent ODMDS and the continued use of the LA-2 ODMDS with a new specified maximum annual disposal volume. This decision is based on the absence of significant long-term environmental impacts beyond the LA-3 and LA-2 site boundaries, the potential for adverse environmental impacts (particularly air quality) associated with the other alternatives, and the demonstrated need for continued availability of an ocean disposal site for dredged material.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AD	adjacent disposal area
AHF	Allan Hancock Foundation, University of Southern California
ANOVA	Analysis of Variance
ASBS	Area of Special Biological Significance
BCOC	bioaccumulative compound of concern
BHC	benzene hexachloride
°C	degrees Celsius
CalCOFI	California Cooperative Oceanic Fisheries Investigations
CDFG	California Department of Fish and Game
CDIP	Coastal Data Information Program
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cm/sec	centimeter per second
cm/yr	centimeter per year
CO	carbon monoxide
CO_2	carbon dioxide
COE	See USACE
CSCC	California State Coastal Conservancy
CSDOC	County Sanitation Districts of Orange County
CSLC	California State Lands Commission
CWA	Clean Water Act
cy	cubic yard
CZMA	Coastal Zone Management Act
DAMOS	Disposal Area Monitoring System
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEIS	Draft Environmental Impact Statement
DO	dissolved oxygen
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (U.S.)
ERL	Effects Range-Low
ERM	Effects Range-Median
ESA	Endangered Species Act
°F	degrees Fahrenheit
FEIS	Final Environmental Impact Statement
FR	Federal Register
ft	foot
ft/sec	foot per second
HC	hydrocarbon

GLOSSARY OF ABBREVIATIONS AND ACRONYMS
(CONTINUED)

HD	historical disposal area
hp	horsepower
hr	hour
H_s	significant wave height
IEC	Interstate Electronics Corporation
JWPCP	Joint Water Pollution Control Plant
km	kilometer
kn	knot
kW	Kilowatt
LA	Los Angeles
LACOSAN	Los Angeles County Sanitation Districts
LACSD	Los Angeles County Sanitation Districts (also Sanitation Districts of Los Angeles County)
lb	pound
LC	London Convention
LPC	Limited Permissible Concentrations
m	meter
m^3	cubic meter
MBC	Marine Biological Consultants
MBTA	Migratory Bird Treaty Act
MDM	marine disposal mound
Mg	megagram
mgd	million gallons per day
mg/kg	milligram/kilogram
mg/l	milligram per liter
MHHW	mean higher high water
µg/kg	microgram per kilogram
µg/l	microgram per liter
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MP	million pounds
MPA	Marine Protected Area
MPRSA	Marine Protection, Research and Sanctuaries Act
MSA	Magnuson-Stevens Fisheries Conservation and Management Act
MSL	mean sea level
N	north (latitude)
NEPA	National Environmental Policy Act
ng/l	nanogram per liter
NMFS	National Marine Fisheries Service
nmi	nautical mile

GLOSSARY OF ABBREVIATIONS AND ACRONYMS
(CONTINUED)

NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOS	National Ocean Service
NO_x	nitrogen oxide (oxide of nitrogen)
NO_2	nitrogen dioxide
OCS	Outer Continental Shelf
OCSD	Orange County Sanitation District
ODMDS	ocean dredged material disposal site
PAH	polynuclear aromatic hydrocarbon
PAR	port access route
PCB	polychlorinated biphenyl
%	percent
PM	particulate matter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
POCS	Pacific Outer Continental Shelf
ppb	parts per billion
ppt	parts per trillion
R	reference location
RD	recent disposal area
RNA	Regulated Navigation Area
ROC	reactive organic compound
RWQCB	Regional Water Quality Control Board
S	disposal site
SAIC	Science Applications International Corporation
SCAB	South Coast Air Basin
SCAMIT	Southern California Association of Marine Invertebrate Taxonomists
SCAQMD	South Coast Air Quality Management District
SCB	southern California bight
SCBPP	Southern California Bight Pilot Project
SCCWRP	Southern California Coastal Water Research Project
SERRA	South East Regional Reclamation Authority
SHPO	State Historic Preservation Officer
SMMP	Site Management and Monitoring Plan
SOCWA	South Orange County Wastewater Authority
SO_x	sulfur oxide (oxideof sulfur)
SO_2	sulfur dioxide
SPI	sediment profile imagery
SVPS	sediment vertical profiling system
SWQCB	State Water Quality Control Board

GLOSSARY OF ABBREVIATIONS AND ACRONYMS
(CONTINUED)

SWRCB	State Water Resources Control Board
THUMS	Texaco, Humble, Union, Mobil, and Shell
TOC	total organic carbon
TVS	total volatile solids
TSS	Traffic Separation Scheme
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VTS	Vessel Traffic Service
W	west (longitude)
WRDA	Water Resources Development Act
yd	yard
yd^3	cubic yard
yr	year
ZID	zone of initial dilution
ZSF	Zone of Siting Feasibility

UNIT CONVERSIONS (METRIC SYSTEM WITH U.S. EQUIVALENTS)

Metric Unit	U.S. Equivalent(s)
	Length/Depth
millimeter (mm)	0.039 inches (in)
centimeter (cm)	0.39 inches (in)
	39.37 inches (in)
meter (m)	3.28 feet (ft)
	0.55 fathoms (fm)
kilometer (km)	0.62 statute miles (mi)
	0.54 nautical miles (nmi)
	Area
square centimeter (cm^2)	0.155 square inches (in^2)
square meter (m^2)	1.196 square yards (yd^2)
square kilometer (km^2)	0.3861 square statute miles (mi^2)
	0.292 square nautical miles (nmi^2)
hectare (ha) = 10,000 m^2	2.471 acres
	Volume
cubic centimeter (cm^3)	0.061 cubic inches (in^3)
milliliter (ml)	
cubic meter (cm^3)	1.31 cubic yards (yd^3)
liter (l)	61.02 cubic inches (in^3)
	Mass
gram (g)	0.035 ounces (oz)
1,000 milligrams (mg)	
kilogram (kg)	2.2046 pounds (lb)
metric ton (MT)	1.1 tons
	2,205 pounds
	Speed
centimeter per second (cm/sec)	0.02 knots (kn)*
meter per second (m/sec)	1.94 knots (kn)
	2.24 statute miles per hour (mi/hr)
kilometer per hour (km/h)	0.54 knots (kn)
	Temperature
Degree Celsius (°C)	Degree Fahrenheit (°F) = (1.8 x °C) + 32
0°C	32°F (freezing point of water)
100°C	212°F (boiling point of water)

* 1 knot (1 nautical mile per hour) equals 1.15 statute (land) miles per hour.

EXECUTIVE SUMMARY

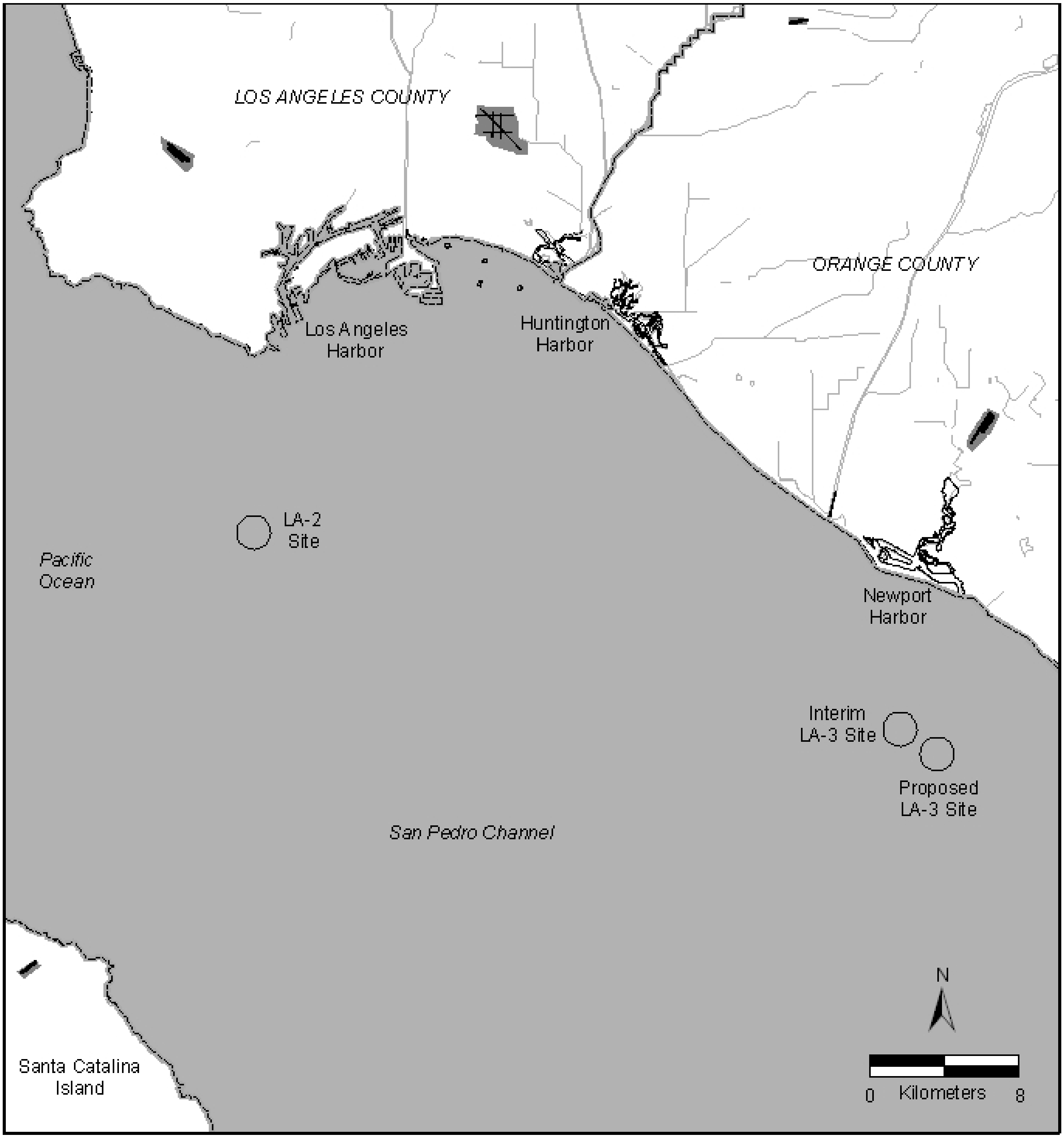
ES.1 Introduction

This Environmental Impact Statement (EIS) has been prepared by the U.S. Army Corps of Engineers (USACE), Los Angeles District, and the U.S. Environmental Protection Agency, Region 9 (EPA) to evaluate the final designation of an ocean dredged material disposal site (ODMDS) located offshore of Newport Beach, California (known as LA-3), and to re-evaluate the management of the existing LA-2 ODMDS located offshore of the Los Angeles/Long Beach Harbor complex in California (Figure ES-1). These sites have been and will continue to be utilized for the disposal of clean dredged material originating in the Los Angeles and Orange County region. This EIS is issued in accordance with Title I of the Marine Protection, Research, and Sanctuaries Act (MPRSA), and as required by EPA's national policy on the designation of ocean disposal sites (39 FR 37119, October 21, 1974).

This document has been prepared in compliance with EPA's site designation criteria (40 CFR 228) and it evaluates a number of alternatives for the disposal of dredged material generated in the region. The objective of this action is to provide for the economically feasible management of dredged material ocean disposal for the Los Angeles/Orange County region in a manner that will not cause unreasonable degradation of the ocean with respect to the marine environment and human health.

The USACE and EPA have identified as the preferred alternative the final designation of the LA-3 ODMDS managed at a maximum annual dredged material disposal quantity of 2,500,000 yd^3 (1,911,000 m^3) and the management of LA-2 at an increased maximum annual dredged material disposal quantity of 1,000,000 yd^3 (765,000 m^3) for the ocean disposal of dredged material from the Los Angeles and Orange County region.

The LA-3 ODMDS was an interim disposal site and has been used historically for the disposal of material dredged primarily from Newport Harbor and Bay. As discussed in Chapters 1 and 2 of this EIS, during the 1998 U.S. Geological Survey review a substantial amount of dredged material was noted outside the interim site boundaries. The proposed action would shift the center of the LA-3 site approximately 2.4 km (1.3 nmi) to the southeast of the interim LA-3 site as shown on Figure ES-1. The circular boundary of the permanently designated LA-3 site would be centered at 33º31'00" N and 117º53'30" W and would have a 915-meter (3,000-foot) radius. By shifting the center of



Locations of LA-2 and LA-3 ODMDSs

the LA-3 site, the permanent site would not only encompass a region that is already disturbed by dredged material, but also would be located on a flat, depositional plain that will be more amenable to monitoring via precision bathymetry.

The LA-2 site is a permanently designated ODMDS that has been historically managed at an annual disposal quantity of 200,000 yd^3 (153,000 m^3) for the disposal of material dredged primarily from the Los Angeles/Long Beach Harbor complex.

The availability of suitable ocean disposal sites to support ongoing maintenance and capital improvement projects is essential for the continued use and economic growth of the vital commercial and recreational areas in the region. Dredged material will not be allowed to be disposed of in the ocean unless the material meets strict environmental criteria established by the EPA and USACE.

ES.2 Alternatives

A number of alternatives were considered in the EIS to determine the alternative that best meets the goals and objectives of the proposed action while minimizing the potential for environmental effects. The alternatives originally considered include:

- Local Use of LA-3 and LA-2 (Preferred Alternative [Alternative 3])
- No Action (Alternative 1)
- Maximize Use of LA-2 (Alternative 2)
- Maximize Use of LA-3 (Alternative 4)
- Upland disposal at a sanitary landfill
- Beach replenishment
- Ocean disposal at a site at a similar depth to LA-3
- Ocean disposal at a shallow water site
- Ocean disposal at a deep water site

Upland disposal and beach replenishment are considered on a case-by-case basis prior to the issuance of permits for ocean disposal. Nevertheless, preliminary analysis indicated that these two options are not sufficient for handling the quantities of dredged material that are anticipated to be generated in the region. Additionally, preliminary analysis indicated that ocean disposal at a shallow water site, deep water site, or at a site with a depth similar to that of LA-3 was either inadequate, not feasible, or would be more environmentally damaging than the remaining alternatives. Consequently, these five alternatives were eliminated from further consideration in the EIS. The remaining four alternatives are evaluated in detail.

ES.3 Affected Environment

The following sections summarize the physical, biological, and socioeconomic environments of the preferred and other alternatives.

ES.3.1 Physical Environment

The LA-2 and LA-3 ocean disposal sites are located in the offshore waters of southern California, between Palos Verdes Point and Dana Point.

The proposed LA-3 site is located on the slope of Newport Canyon centered at a depth of approximately 490 m (1,600 ft), approximately 8.5 km (4.5 nmi) southwest of the entrance to Newport Harbor (33°31'00" N and 117°53'30" W). The bottom topography is gently sloping from approximately 460 to 510 m (1,500 to 1,675 ft). Situated at the foot of a submarine canyon, this area would be expected to receive sedimentation from erosion and nearshore transport into the canyon.

The LA-2 site is located approximately 9.3 km (5 nmi) southwest of the breakwater at San Pedro and 38 km (20.5 nmi) from the Newport Harbor entrance (33°37'06" N and 118°17'24" W). The site is near the top edge of the continental slope in approximately 110 to 340 m (360 to 1,115 ft) of water. The LA-2 site is located just south of the San Pedro Valley submarine canyon.

The climate of southern California coastal and offshore areas is classified as Mediterranean coastal, with warm dry summers and relatively wet, mild winters. Extreme variations in yearly temperature are uncommon. Although the air quality offshore and near the coast is generally good, the air quality inland in the South Coast Air Basin is generally considered poor with some of the worst air quality in the nation. This is in part because the predominant westerly winds carry pollutants inland. Occasionally, strong easterly Santa Ana winds carry pollutants from the inland areas offshore. Under these circumstances, air quality and visibility in the offshore areas may be significantly reduced.

The primary ocean current in the study area is the California Current, a diffuse and meandering water mass that generally flows to the southeast at a maximum speed of about 10 to 15 centimeters per second (cm/sec; 0.19 to 0.29 kn). Most of the equatorward (toward the equator) transport of the California Current occurs 200 to 500 km (108 to 270 nmi) from shore, with maximum speeds occurring about 300 km (162 nmi) offshore. South of Point Conception, the California Current diverges and the offshore component continues to flow southeast while another component flows shoreward (toward the coast) and upcoast (parallel to shore and northerly), resulting in a counterclockwise, nearshore gyre known as the Southern California Countercurrent. During spring, however, the countercurrent can be altered such that flow enters the Southern California Bight (SCB), but transport is equatorward rather than poleward (toward the North Pole).

Shoreward of and below the California Current is the poleward-flowing California Undercurrent, the flow of which is concentrated over the continental slope. In the SCB, the California Undercurrent flows nearshore over the continental slope rather than offshore, spatially separating it from the California Current. The Undercurrent is comparatively narrow, with the high-speed core centered over the continental slope. The California Current, Countercurrent, and Undercurrent all have seasonal speed maxima in late summer.

Near-bottom currents at LA-3 are low (usually less than 6 cm per second [cm/sec]; [0.2 feet per second {ft/sec}] and always less than 16 cm/sec [0.53 ft/sec]) compared with those at LA-2 (usually less than 12 cm/sec [0.4 ft/sec] and always less than 40 cm/sec [1.3 ft/sec]). The potential for erosion of disposed sediments is therefore greater at LA-2 than at LA-3. Essentially no erosion is predicted for the LA-3 site.

Sediments within the LA-3 site generally show a larger percentage of sand and gravel and a lower percentage of silt compared with sediments at stations surrounding the site and at reference sites. Conversely, sediments in the LA-2 site and surrounding areas are composed primarily of silt and sand, lesser amounts of clay, and relatively small gravel fractions. Sediments within and adjacent to the LA-2 site boundary differ from those at reference areas in that the reference area sediments are composed of smaller amounts of fines and larger fractions of sand. Differences in sediment composition between the disposal sites and reference areas may be attributed to disposal activities. Both sites show varying degrees of chemical contamination.

ES.3.2 Biological Environment

The marine organisms found at the LA-2 and proposed LA-3 sites are typical of those found throughout the Southern California Bight. Plankton distributions tend to be patchy, and individual stations sampled more than once at the disposal sites exhibit great variation. In general, greatest concentrations of plankton are found in the SCB in early fall and spring months, and abundances are lowest in the late fall and winter months.

Benthic invertebrates are small organisms, or fauna, that live within the sediments on the sea floor. These infaunal organisms are highly dependent on the sediments in which they live for food and protection. At the LA-2 study area, density per sampled station ranged from 743 to 3,363 individuals/m^2, species richness ranged from 48 to 167 species, and Shannon-Wiener species diversity ranged from 2.69 to 4.23. At the LA-3 study area, density per sampled station ranged from 193 to 623 indivuduals/m^2, species richness ranged from 22 to 52 species, and species diversity from 2.43 to 3.46.

The epibenthic and pelagic invertebrate species compositions at the LA-3 study area are typical of those seen on the slope of the Southern California Bight at the LA-3 depth. The five most abundant species at all LA-3 sites surveyed in 2000-2001 were a complex of the Pacific heart urchin *(Brissopsis pacifica*) and the California heart urchin (*Spatangus californicus*), the northern heart urchin (*Brisaster latifrons*), the fragile sea urchin *(Allocentrotus fragilis*), and the sea star *Zoroaster evermanni*. Likewise, the species composition at the LA-2 site is typical of that seen on the outer shelf - upper slope at the LA-2 depth. The five most abundant species at all LA-2 sites surveyed in 2000-2001 were the fragile sea urchin, northern heart urchin, Pacific heart urchin, California heart urchin, and the Pacific/California heart urchin complex.

The fish species composition at the LA-3 study area is typical of that seen in demersal fish communities on the slope at the LA-3 depth. During 2000-2001 surveys, the most abundant species taken were longspine thornyhead (*Sebastolobus altivelis*), dogface witch-eel (*Facciolella gilberti*), Dover sole, and shortspine thornyhead (*Sebastolobus alascanus*). The fish species composition at the LA-2 site is also typical of that seen in demersal fish communities on the slope at the LA-2 depth. Because of the shallower depth at LA-2, a different species assemblage is seen compared to that at the LA-3 study area, with only seven species occurring at both locations. During the surveys the most abundant species taken at LA-2 were Pacific sanddab (*Citharichthys sordidus*), slender sole (*Lyopsetta exilis*), and shortspine combfish (*Zaniolepis frenata*). Fishes found throughout the SCB, including the LA-2 and LA-3 study areas, exhibit varying degrees of tissue bioaccumulation of contaminants. There is no evidence that tissue bioaccumulation found in fish within the disposal site areas differs from that of the region as a whole.

Seabirds and marine mammals found at the LA-2 and LA-3 study areas are typical of those found throughout the SCB and include Western gull (*Larus occidentalis*), sooty shearwater (*Puffinus griseus*), elegant tern (*Sterna elegans*), common dolphin (*Delphinus delphis*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), bottlenose dolphin (*Tursiops truncatus*), and California sea lion (*Zalophus californianus*). Only one species occurs, or has a high potential to occur, in the LA-2 and LA-3 study areas that is listed by the federal government as threatened or endangered: California brown pelican (*Pelecanus occidentalis californicus*). In addition, elegant tern (*Sterna elegans*) is a state and federal species of concern and was observed at LA-3 in summer 2000.

There are twenty-two Marine Protected Areas (MPAs) in the general vicinity of the LA-2 and proposed LA-3 sites.

ES.3.3 Socioeconomic Environment

The LA-2 and proposed LA-3 disposal sites are located in the Los Angeles commercial fishing area. There are currently no known registered mariculture operations on the southern California coast between Palos Verdes Point and Dana Point. There are, however, a variety of commercial fisheries in the LA-2 and LA-3 study areas. Commercial fishing in the San Pedro region consists predominantly of purse-seining, crab and lobster trapping, and set-netting. The principal market species in this region include Pacific sardine (*Sardinops sagax*), market squid (*Loligo opalescens*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), northern anchovy (*Engraulis mordax*), red urchin (*Strongylocentrotus franciscanus*), California halibut (*Paralichthys californicus*), California barracuda (*Sphyraena argentea*), California spiny lobster (*Panulirus interruptus*), and swordfish (*Xiphias gladius*).

A setline dory fishery off Newport Beach has existed since 1891, one of the few traditional dory fisheries remaining on the West Coast. Principle species landed in this localized fishery include sablefish (*Anoplopoma fimbria*), thornyhead (*Sebastolobus* spp.), and rockfish (*Sebastes* spp.). While dory landings of these species pale in comparison to overall commercial landings, they represent a fishery that has changed little in over 110 years.

The Ports of Los Angeles and Long Beach comprise one of the most important shipping complexes in the nation. In 2002 the Port of Long Beach ranked 8^{th} in the nation in terms of total tonnage handled (61.6 million metric tons [67.9 million short tons]) while the Port of Los Angeles ranked 12^{th} in the nation with 47.4 million metric tons (52.2 million short tons) handled. The harbors handle all types of commercial cargo including coal, petroleum and petroleum products, crude materials (inedible materials not including fuels), primary manufactured goods, food and farm products, manufactured equipment, machinery and products, and other miscellaneous cargos.

Vessel traffic within the San Pedro Channel traveling to and from the harbors must follow a system of traffic separation schemes (TSS) and port access routes (PAR). The TSS consists of a northbound coastwise traffic lane and a southbound coastwise traffic lane with an intermediate separation zone. Additionally, the area directly outside of the Ports of Los Angeles and Long Beach is designated a Regulated Navigation Area (RNA). Vessels within the RNA are subject to strict navigation regulations designed to ensure safe vessel separations and operating conditions. The proposed LA-3 site is approximately 20 km (10.8 nmi) east of the northbound coastwise traffic lane of the southern TSS and approximately 24 km (13 nmi) southeast of the RNA. The LA-2 site is located within the separation zone between the northbound and southbound coastwise traffic lanes of the northern TSS and is partially contained within the designated RNA. Additionally, powered vessels over a certain size including tugboats transporting disposal barges are required to participate in the Los Angeles-Long Beach Vessel Traffic Service (VTS). LA-2 and the proposed LA-3 sites lie within the VTS monitoring area.

The coastal waters between San Diego and the Los Angeles Harbor are heavily utilized by the military. Marine Corps Base Camp Pendleton, located approximately 32 km (17 nmi) southeast of the proposed LA-3 site, is home to the largest amphibious marine training base on the west coast. Many of the base activities require unencumbered maneuvering space for surface vessels, submarines, and aircraft. These exercises are conducted throughout the year. In addition to the exercises at Camp Pendleton, the Navy maintains a weapons station at Seal Beach (NAVWPNSTA Seal Beach). Munitions are loaded into cruisers, destroyers, frigates, and medium-sized amphibious ships from the facility's 305-meter-long (1,000-foot-long) wharf located in Anaheim Bay. Anaheim Bay is approximately 22 km (11.9 nmi) northeast of LA-2 and approximately 30 km (16.2 nmi) northwest of the proposed LA-3 site.

In the vicinity of LA-2 and LA-3 there are currently 12 oil and gas lease tracts within the jurisdiction of the State of California. Of these twelve tracts, ten are producing, one is used for water injection, and one is not producing. Currently, four artificial islands and three platforms associated with these lease tracts are located within State waters and all of the facilities in State waters are within 3.3 km (1.8 nmi) of the coast. In addition to the tracts under State jurisdiction, there are 4 lease tracts located in federal waters in the vicinity of LA-2 and LA-3. There are four platforms located within three of these tracts; however, all four tracts have been developed. These platforms lie approximately 14 to 17 km (7.5 to 9 nmi) to the east of the LA-2 site. The distance from the proposed LA-3 site to these platforms ranges from approximately 22 to 25 km (12 to 13.5 nmi). No new oil or gas development has been proposed in the immediate vicinity of the LA-2 or proposed LA-3 sites.

Recreational activities in the vicinity of the LA-2 and proposed LA-3 sites include sportfishing, recreational boating including whale watching, sailing, and fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing, and picnicking. Due to the depth and location of the proposed LA-3 and LA-2 ODMDSs, partyboat fishing is the type of sportfishing most likely to occur in the vicinity of both sites. Partyboat fishing off Los Angeles and Orange Counties usually occurs in relatively shallow waters (less than 100 m [328 ft]) at reefs (natural or articifical) and kelp beds, areas where fish aggregate. During the summer, additional fishing occurs further offshore for coastal pelagic species such as yellowtail and tunas.

Offshore islands are one of the major attractants to ocean going recreational boating. Santa Catalina Island is approximately 35 to 50 km (18.9 to 27 nmi) from the major harbors. Because of the island's relative proximity to the mainland and its relatively unrestricted and major anchorages, most pleasure boat traffic to the offshore islands travels between the mainland harbors and the harbors on Santa Catalina Island. The boats generally follow a straight path between the island and mainland, and these routes often come near to the LA-2 and LA-3 sites. In addition to privately owned pleasure boats, regular ferry service operates between Santa Catalina Island and the Harbors at Los Angeles, Long Beach, Newport Beach, and Dana Point.

All other recreational activities in the vicinity of LA-2 and LA-3 occur away from the disposal sites.

The southern California coast has had a long period of human occupation, both prehistoric and historic. As a result the coast of the mainland and Channel Islands contain numerous archaeological, historical, and cultural resources. The offshore regions are also thought to contain a number of these resources. However, there are no documented shipwrecks or other cultural resources within 5 km (2.7 nmi) of either the proposed LA-3 or LA-2 sites.

ES.4 Environmental Consequences

Potential environmental consequences associated with the ocean disposal of dredged material corresponding to the alternatives evaluated in this EIS are summarized in Table 4.1-1 (Chapter 4). The impact category (level of impact) as well as the spatial and temporal extents of the potential impacts for each of the analyzed environmental conditions are identified in this table.

Potential effects resulting from dredged material ocean disposal on air quality, water quality parameters (e.g., suspended particle concentrations), and sea floor conditions (bottom deposit thicknesses) were evaluated using computer models to simulate the disposal activities under each of the alternatives. Additional information from monitoring and research activities at and in the vicinity of the LA-2 and LA-3 disposal sites was also used in the evaluation of potential impacts.

ES.4.1 Physical Environment

Impacts resulting from the ocean disposal operations on air quality are potentially significant for all of the alternatives under worst-case conditions. However, assuming more realistic average annual disposal activities, air quality emissions are not anticipated to be significant for the Preferred Alternative (local use of LA-2 and LA-3) and the No Action Alternative. Even assuming average annual conditions, air quality emissions are estimated to be potentially significant for Alternatives 2 (maximize use of LA-2) and 4 (maximize use of LA-3).

Impacts from dredged material disposal operations on water quality and geology are considered insignificant regardless which alternative is chosen. Based on sediment deposition modeling, deposits thicknesses greater than 30 cm (1 ft) will be confined within the LA-2 and proposed LA-3 site boundaries for all alternatives considered. Changes in sediment particle size distribution at LA-2 and LA-3 will likely continue as a result of dredged material disposal. These effects are considered locally not significant. Significant impacts on sediment quality at either of the sites are not expected given that the dredged material proposed for ocean disposal must be tested and determined suitable according to EPA and USACE testing criteria that include specific tests for water column impacts.

ES.4.2 Biological Environment

Impacts to infauna, epifauna, and fishes are anticipated to be temporary and limited to the areas within the boundaries of the disposal sites. Impacts to the benthic community are anticipated to be greatest as a result of smothering of some organisms and alteration of sediment characteristics. However, these impacts are expected to only occur in areas with annual deposition thicknesses equal to or exceeding 30 cm (1 ft). Areas with depositional thicknesses less than 30 cm (1 ft) are not expected to incur significant changes in abundance or diversity of infauna, epifauna, or demersal fishes. As indicated above, deposition thicknesses of 30 cm (1 ft) or more are anticipated to be confined within the LA-2 and proposed LA-3 site boundaries for all alternatives. Consequently, impacts to these organisms are not anticipated to be significant.

Impacts on water column organisms such as plankton, pelagic fishes, and marine mammals are expected to be minimal, temporary, and limited to the area within the site boundaries. No significant impacts to seabirds are anticipated for any of the alternatives. Furthermore, the exposure of marine organisms and other fauna to dredged material is not expected to result in significant adverse effects given that the dredged material proposed for ocean disposal must be tested and determined suitable according to EPA and USACE testing criteria.

ES.4.3 Socioeconomic Environment

Dredged material disposal activities have occurred at the LA-2 and LA-3 sites since the late 1970s. The continued use of these sites is unlikely to interfere with other ocean uses such as shipping, fishing, and recreation. Effects on commercial and recreational fishing in the vicinity of the LA-2 and LA-3 sites will be temporary and insignificant. Additionally, most disposal impacts will be at the sea bottom and no significant demersal fisheries exist within the LA-2 or proposed LA-3 site boundaries.

Potential hazards to commercial, military, and recreational navigation resulting from the transport and disposal of dredged material at the sites are also expected to be insignificant. Vessel traffic in the region is highly regulated and conflicts with disposal barges are anticipated to be minimal. There have been no impacts to commercial, military, or recreational vessel traffic due to the past use and operation of the LA-2 or interim LA-3 sites. As such, no significant impacts to navigation are anticipated with the continued use of these sites. There are no existing or planned oil developments within the LA-2 or proposed LA-3 site boundaries. Consequently, the continued use of these sites for the ocean disposal of dredged material is not anticipated to have an adverse impact on development of these resources.

There are no known cultural or historical resources within the LA-2 or LA-3 site boundaries. As such, continued disposal operations at these sites will not adversely impact cultural or historical resources. Potential impacts to human safety would be very small as the number of disposal barge trips, even under worst-case conditions, is small compared to the overall vessel traffic in the region. The Preferred Alternative would minimize the coastwise disposal barge traffic that could potentially come in contact with existing developed oil facilities. However, such potential conflicts are considered insignificant for all of the alternatives. As stated in the MPRSA, the disposal of materials that are considered hazardous is prohibited at an ODMDS. Furthermore, as mentioned previously, dredged material proposed for ocean disposal will be subject to strict testing requirements established by the EPA and USACE. Material found not to be suitable for ocean disposal will be prohibited from disposal at either LA-2 or LA-3. Therefore, the potential for human health and safety hazards is minimal and not significant for all of the alternatives.

ES.5 Comparison of the Alternative Ocean Disposal Sites with the 5 General and 11 Specific Site Selection Criteria

The Preferred Alternative (Alternative 3) and remaining alternatives are compared to the 5 general criteria listed at 40 CFR 228.5 and the 11 specific site selection criteria listed at 40 CFR 228.6(a). A summary of the 11 site selection criteria is also contained in Table 2.2-1 (Chapter 2).

ES.5.1 General Selection Criteria

1. **The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.**

Dredged material disposal activities have occurred at the LA-2 and LA-3 sites since the late 1970s. Historical disposal at the interim LA-3 site has not interfered with commercial or recreational navigation, commercial fishing, or sportfishing activities. Disposal at the LA-2 site, while located within the U.S. Coast Guard Traffic Separation Scheme, has not interfered with these activities. The continued use of these sites would not change these conditions.

2. **Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.**

The LA-2 and LA-3 sites are sufficiently removed from shore and limited fishery resources to allow water quality perturbations caused by dispersion of disposal material to be reduced to ambient conditions before reaching environmentally sensitive areas.

3. **If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.**

Evaluation of the LA-2 and LA-3 sites indicates that they presently do and would continue to comply with these criteria. Additionally, compliance will continue to be evaluated through implementation of the Site Monitoring and Management Plan.

4. **The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.**

The LA-2 and proposed LA-3 disposal sites consist of circular areas with a 915-m (3,000-ft) radius. The size of the sites has been determined by computer modeling to limit environmental impacts to the surrounding area and facilitate surveillance and monitoring operations. The designation of the size, configuration, and location of sites was determined as part of this evaluation study.

5. **EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.**

The proposed LA-3 site is located beyond the continental shelf, near a canyon on the continental slope. This site has also been used historically for the disposal of dredged material. LA-3 is the only site that fully meets the above criteria.

The LA-2 site, which has been permanently designated for the ocean disposal of dredged material, is located near the edge of the continental shelf at the 183 m (600 ft) contour. The LA-2 site has been used for the ocean disposal of dredged material since 1977.

ES.5.2 Specific Selection Criteria

1. Geographical position, depth of water, bottom topography, and distance from the coast.

Centered at 33°31'00" N, 117°53'30" W, the LA-3 bottom topography is gently sloping from approximately 460 to 510 m (1,500 to 1,675 ft). Situated near the slope of a submarine canyon, the site center is approximately 8.5 km (4.5 nmi) from the mouth of Newport Harbor.

The LA-2 site is at the top edge of the continental slope in approximately 110 to 340 m (360 to 1,115 ft) of water. Centered at 33°37'06" N and 118°17'24" W, the LA-2 site is located just south of the San Pedro Valley submarine canyon approximately 11 km (5.9 nmi) from the entrance to Los Angeles Harbor

2. Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.

The LA-2 and LA-3 sites are located in areas that are utilized for feeding and breeding of resident species. The LA-3 site is located in the gray whale migration route area, while the LA-2 site is located near the migration route. The California gray whale population was severely reduced in the 1800s and 1900s due to international whaling. However, protection from commercial whaling was initiated in the 1940s that has allowed the population to recover. There is no indication that disposal activities at LA-2 or LA-3 have adversely affected the gray whale.

There are no known special breeding or nursery areas in the vicinity of the two disposal sites.

3. Location in relation to beaches and other amenity areas.

The proposed LA-3 site boundary is located over 6.5 km (3.5 nmi) offshore of the nearest coast in the Newport Beach and Harbor area; the LA-2 site boundary is located over 8.5 km (4.6 nmi) offshore of the nearest coast in the Palos Verdes area. Other beach areas are more distant.

4. Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.

Dredged material to be disposed of will be predominantly clays and silts primarily originating from the Los Angeles/Long Beach Harbor area and from Newport Bay and Harbor. Worst-case annual disposal volumes at LA-3 range from 0 to approximately 3.20 million yd^3 (0 to 2.45 million m^3) depending on the alternative chosen. Average annual disposal volumes at LA-3 range from 0 to approximately 322,000 yd^3 (0 to 246,000 m^3). Worst-case annual disposal volumes at LA-2 range from 439,000 yd^3 to approximately 3.64 million yd^3 (336,000 to 2.78 million m^3) depending on the alternative chosen. Average annual disposal volumes at LA-2 range from 68,000 yd^3 to approximately 390,000 yd^3 (52,000 to 298,000 m^3).

Dredged material is expected to be released from split hull barges. No dumping of toxic materials or industrial or municipal waste would be allowed. Dredged material proposed for ocean disposal is subject to strict testing requirements established by the EPA and USACE.

5. Feasibility of surveillance and monitoring.

The EPA (and USACE for federal projects in consultation with EPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal sites is feasible but somewhat complicated by topography. At LA-3 this complication is reduced by relocation of the proposed permanent LA-3 site away from underwater canyons.

6. Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.

Currents and vertical mixing will disperse fine sediments. Prevailing currents are primarily parallel to shore and flow along constant depth contours. Situated near the slope of a submarine canyon, the LA-3 area would be expected to receive sedimentation from erosion and nearshore transport into the canyon. At LA-2, some sediment transport offshore occurs due to slumping. Overall, sediments at both sites are expected to settle offshore (as opposed to onshore).

Chapter 4 of this EIS includes a discussion of the sediment deposition modeling along with the anticipated sediment accumulations resulting from the proposed disposal activities.

7. Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).

Localized physical impacts have occurred to sediments and benthic biota due to past disposal operations. These effects have not created a significant adverse impact on the environment. No interactions with other discharges are anticipated due to the distances from the discharge points.

8. Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.

Continued use of the LA-2 and proposed LA-3 sites would result in minor interferences with commercial and fishing vessels due to disposal barge traffic. Sites are not located within active oil or natural gas tracts. Continued disposal operations are not anticipated to adversely impact existing nearby oil and gas development facilities or tracts, or other socioeconomic resources.

9. Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.

Water quality in the two disposal areas is good, but temporary, localized physical impacts have occurred to sediments and benthic ecology due to past disposal operations. Additionally, dredged material deposited at the two disposal areas in the past was chemically screened prior to disposal and no known dredged material was disposed of for which chemical concentrations exceeded EPA toxic concentration limits.

10. Potentiality for the development or recruitment of nuisance species in the disposal site.

Unknown, but the potential is low due to depth differences between the disposal sites and the likely sources of dredged material.

11. Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

No known shipwrecks or other cultural resources occur within 5 km (2.7 nmi) of either the LA-2 or proposed LA-3 disposal sites.

ES.6 Conclusion

The No Action Alternative does not meet the goals and objectives for the availability of an ocean site for the continued disposal of dredged material anticipated to be generated in the Orange County region. Impacts resulting from disposal of dredged material under the Preferred Alternative (local use of LA-2 and LA-3) are expected to minimal for the following reasons:

- The availability of two disposal sites provides more flexibility in managing the dredged material disposal needs for the region;

- Air quality emissions are anticipated to be potentially significant for the Preferred Alternative under worst-case yearly disposal assumptions but not for anticipated average annual disposal assumptions. These potentially significant air quality impacts can be avoided through the dredged material disposal permitting process. In contrast, air quality emissions associated with Alternative 2 (maximize use of LA-2) and Alternative 4 (maximize use of LA-3) are anticipated to be potentially significant under both worst-case and average annual disposal assumptions. As such, the potentially significant air quality impacts cannot be avoided for these two alternatives;

- Computer simulations in conjunction with bathymetric and sediment surveys indicate that the LA-2 and proposed LA-3 sites are located in depositional areas that are likely to retain dredged material which reaches the ocean floor. Chapter 4 of this EIS includes a discussion of the sediment deposition modeling along with the anticipated sediment accumulations resulting from the proposed disposal activities;

- No significant impacts to other resources or amenity areas (e.g., marine sanctuaries, beaches, etc.) are expected to result regardless which of the alternatives is selected;

- Existing and potential fisheries resources within the LA-2 and proposed LA-3 sites are minimal;

- Potential impacts to benthic infauna and epifauna are anticipated to be localized and limited to the area within the LA-2 and proposed LA-3 site boundaries and thus not significant;

- Potential impacts to fishes, marine mammals, seabirds, and other midwater organisms are expected to be insignificant regardless which of the alternatives is selected; and

- Dredged material disposal has occurred historically at the permanent LA-2 and interim LA-3 sites since the 1970s.

CHAPTER 1.0 INTRODUCTION

1.1 General Introduction

This Environmental Impact Statement (EIS) evaluates the proposed designation of the LA-3 Ocean Dredged Material Disposal Site (ODMDS) as a permanent site for the ocean disposal of dredged material. The EIS also evaluates the joint ocean disposal at both LA-2 and LA-3 on an overall regional basis so that the cumulative environmental impacts of disposal within Los Angeles and Orange Counties can be minimized.

Ocean disposal of dredged materials is regulated under Title I of the Marine Protection, Research and Sanctuaries Act (MPRSA; 33 U.S.C. 1401 et seq.). The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) share responsibility for the management of ocean disposal of dredged material. Under Section 102 of MPRSA, EPA has the responsibility for designating an acceptable location for the ODMDS. With concurrence from EPA, the USACE issues permits under MPRSA Section 103 for ocean disposal of dredged material deemed suitable according to EPA criteria in MPRSA Section 102 and EPA regulations in Title 40 of the Code of Federal Regulations Part 227 (40 CFR 227).

It is EPA's policy to publish an EIS for all ODMDS designations (*Federal Register, Volume 39, Page 37119* [39 FR 37119], October 21, 1974). A site designation EIS is a formal evaluation of alternative sites in which the potential environmental impacts associated with disposal of dredged material at various locations are examined. The EIS must first demonstrate the need for the proposed ODMDS designation action (40 CFR 6.203(a) and 40 CFR 1502.13) by describing available or potential aquatic and non-aquatic (i.e., land-based) alternatives and the consequences of not designating a site—the No Action Alternative. Once the need for an ocean disposal site is established, potential sites are screened for feasibility through the Zone of Siting Feasibility (ZSF) process. Remaining alternative sites are evaluated using EPA's ocean disposal criteria at 40 CFR Part 228 (Table 1.1-1) and compared in the EIS. Of the sites which satisfy these criteria, the site which best complies with them is selected as the preferred alternative for formal designation through rulemaking published in the *Federal Register* (FR).

TABLE 1.1-1
FIVE GENERAL AND ELEVEN SPECIFIC SITE SELECTION CRITERIA

General Site Selection Criteria – 40 CFR 228.5

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(c) If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

(d) The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

Specific Site Selection Criteria – 40 CFR 228.6(a)

(1) Geographical position, depth of water, bottom topography, and distance from the coast.

(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.

(3) Location in relation to beaches and other amenity areas.

(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.

(5) Feasibility of surveillance and monitoring.

(6) Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.

(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).

(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.

(9) Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.

(10) Potentiality for the development or recruitment of nuisance species in the disposal site.

(11) Existence at, or in close proximity to, the site of any significant natural or cultural features of historical importance.

Formal designation of an ODMDS in the *Federal Register* does not constitute approval of dredged material for ocean disposal. Designation of an ODMDS provides an ocean disposal alternative for consideration in the review of each proposed dredging project. Ocean disposal is only allowed when EPA and USACE determine that the proposed activity is environmentally acceptable according to the criteria at 40 CFR Part 227. Decisions to allow ocean disposal are made on a case-by-case basis through the MPRSA Section 103 permitting process or its equivalent process for Corps' Civil Works projects.

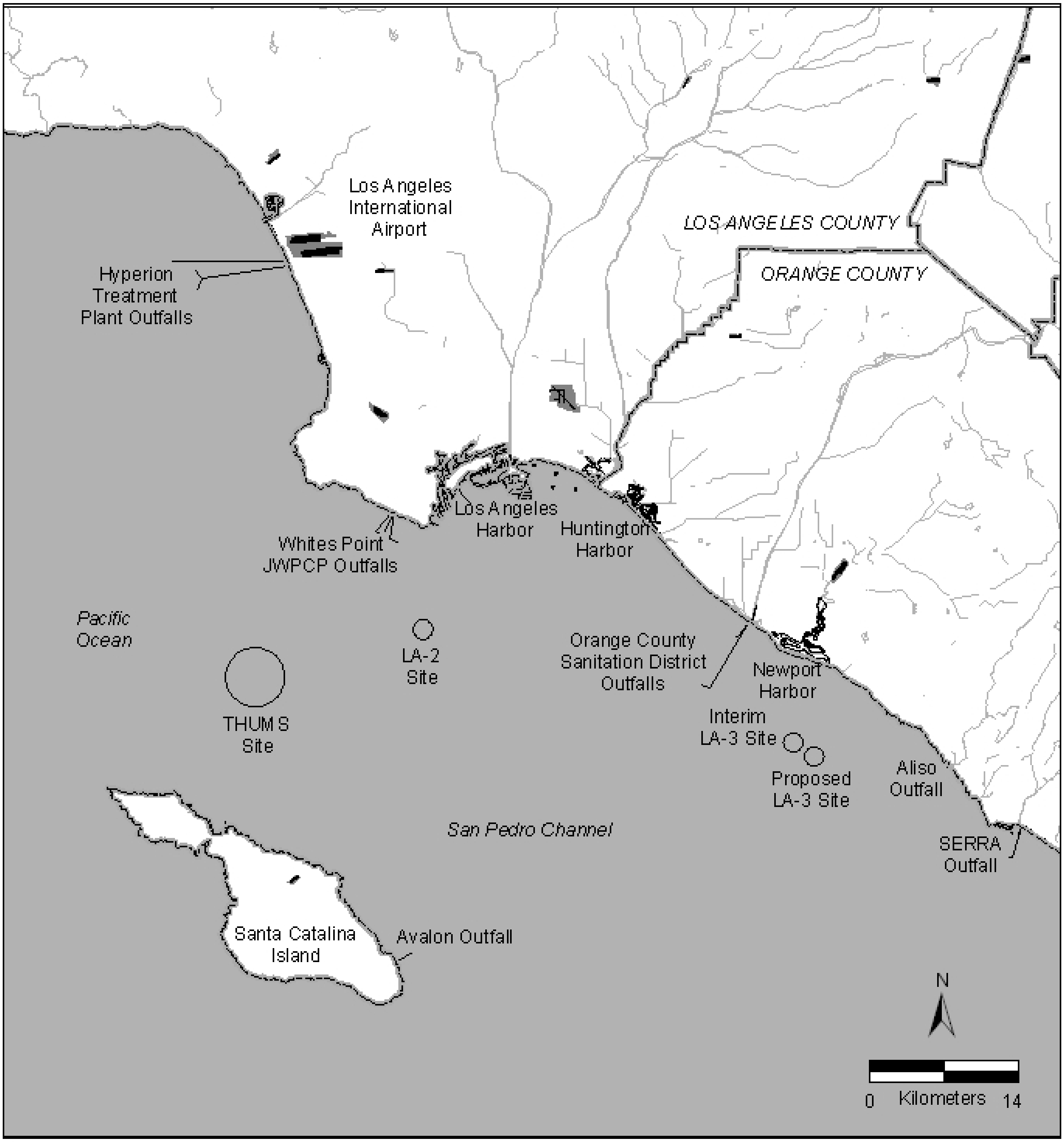
Material proposed for disposal at a designated ODMDS must conform to EPA's permitting criteria for acceptable quality (40 CFR Parts 225 and 227), as determined from physical, chemical, and bioassay/bioaccumulation testing (EPA and USACE 1991). Only clean dredged material is acceptable for ocean disposal. An outline of the dredged material screening process is provided below in Section 1.6.2.1, Marine Protection, Research and Sanctuaries Act of 1972.

The interim LA-3 site is located on the continental slope of Newport Submarine Canyon at a depth of about 450 meters (m; 1,475 feet [ft]), approximately 8 kilometers (km; 4.3 nautical miles [nmi]) southwest of the entrance of Newport Harbor, as shown in Figures 1.1-1 and 1.1-2. This region is characterized by a relatively smooth continental slope (approximately two-degree slope) incised by a complicated pattern of superimposed, meandering broad submarine canyons that can be up to 30 m (98 ft) deep and 200-800 m (656-2,625 ft) wide (Figure 1.1-2). The circular interim site boundary centered at 33º31'42" N and 117º54'48" W covers a 915-meter (3,000-foot) radius.

As discussed more fully in Chapter 2 of this EIS, the proposed action would shift the center of the LA-3 site approximately 2.4 km (1.3 nmi) to the southeast of the interim LA-3 site as shown on Figures 1.1-1 and 1.1-2. The circular boundary of the permanently designated LA-3 site would be centered at 33º31'00" N and 117º53'30" W and would have a 915-meter (3,000-foot) radius. At this location the depth of the center of the site would be approximately 490 m (1,600 ft) and would move the site boundary away from the submarine canyons that run through the interim site thus simplifying surveillance and monitoring activities.

The present LA-3 site has been used for disposing sediment dredged from harbors and flood channels within the County of Orange since 1976. Table 1.1-2 presents the history of dredged material disposed of at LA-3.

Prior to 1992, LA-3 was permitted by the USACE as a designated ocean disposal site for specific projects only. In 1992, the EPA approved LA-3 as an interim disposal site; this interim status expired January 1, 1997 (Water Resources Development Act [WRDA]



Regional Location

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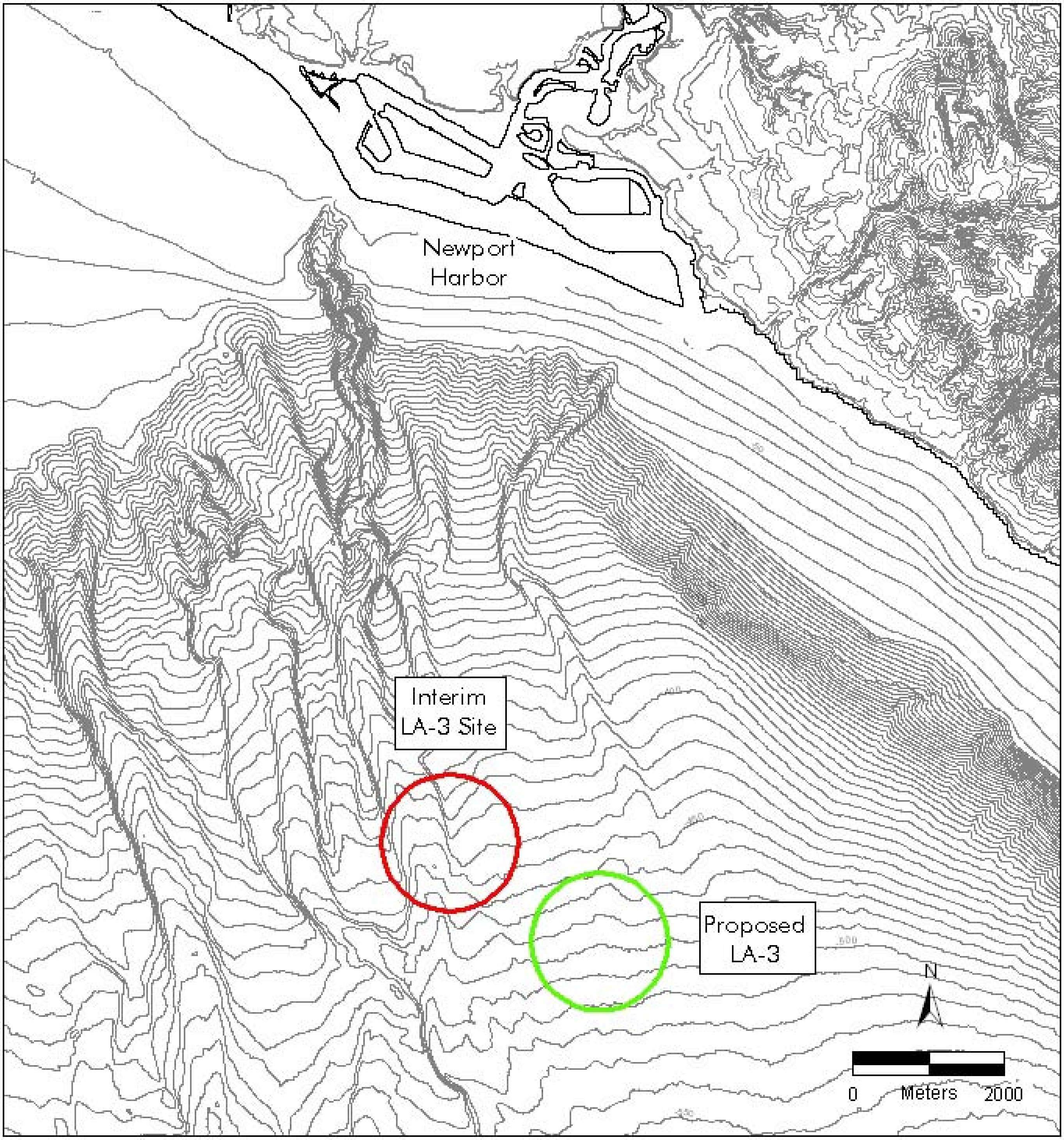
Figure 1.1-1



LA-3 Bathymetry

TABLE 1.1-2
HISTORY OF DREDGED MATERIAL DISPOSED OF AT LA-3

Year	Disposal Quantity yd^3 (m^3)	Dredge Material Source
1976	5,689 (4,350)	Newport Harbor/Bay
1977	1,742 (1,332)	Newport Harbor/Bay
1978	975 (745)	Newport Harbor/Bay
1979	925 (707)	Newport Harbor/Bay
1980	2,960 (2,263)	Newport Harbor/Bay
1981	2,545 (1,946)	Newport Harbor/Bay
1982	20,737 (15,855)	Newport Harbor/Bay
1983	27,055 (20,685)	Newport Harbor/Bay
1984	86,269 (65,957)	Newport Harbor/Bay
1984	13,150 (10,054)	Dana Point Harbor
1985	166,866 (127,578)	Newport Harbor/Bay
1986	34,176 (26,129)	Newport Harbor/Bay
1986	17,445 (13,338)	Dana Point Harbor
1987	1,180,744 (902,744)	Newport Harbor/Bay
1987	22,000 (16,820)	Dana Point Harbor
1988	1,200 (917)	Newport Harbor/Bay
1989	4,022 (3,075)	Newport Harbor/Bay
1989	33,148 (25,343)	Dana Point Harbor
1990	7,764 (5,936)	Newport Harbor/Bay
1991	13,543 (10,354)	Newport Harbor/Bay
1992	11,516 (8,805)	Newport Harbor/Bay
1993	650 (497)	Newport Harbor/Bay
1994	1,551 (1,186)	Newport Harbor/Bay
1995	1,722 (1,317)	Newport Harbor/Bay
1996	2,508 (1,918)	Newport Harbor/Bay
1997	164,000 (125,387)	Newport Harbor/Bay
1998	907 (693)	Newport Harbor/Bay
1999	273,480 (209,090)	Newport Harbor/Bay
1999	3,048 (2,330)	Dana Point Harbor
2000	860,135 (657,621)	Newport Harbor/Bay
2001	2,063 (1,577)	Newport Harbor/Bay

SOURCE: USACE 2003

m^3 = cubic meters; yd^3 = cubic yards

1992). The expiration date was extended to January 1, 2000, through the 1996 WRDA (1996). In 1999, this interim status was extended for another three years and expired December 31, 2002. Due to ongoing dredging activities, either to preserve the wetland habitat within the Upper Newport Bay or to maintain navigation channels at Newport and Dana Point Harbors, the County of Orange is actively pursuing the conversion of this interim dredged material disposal site into a permanent one.

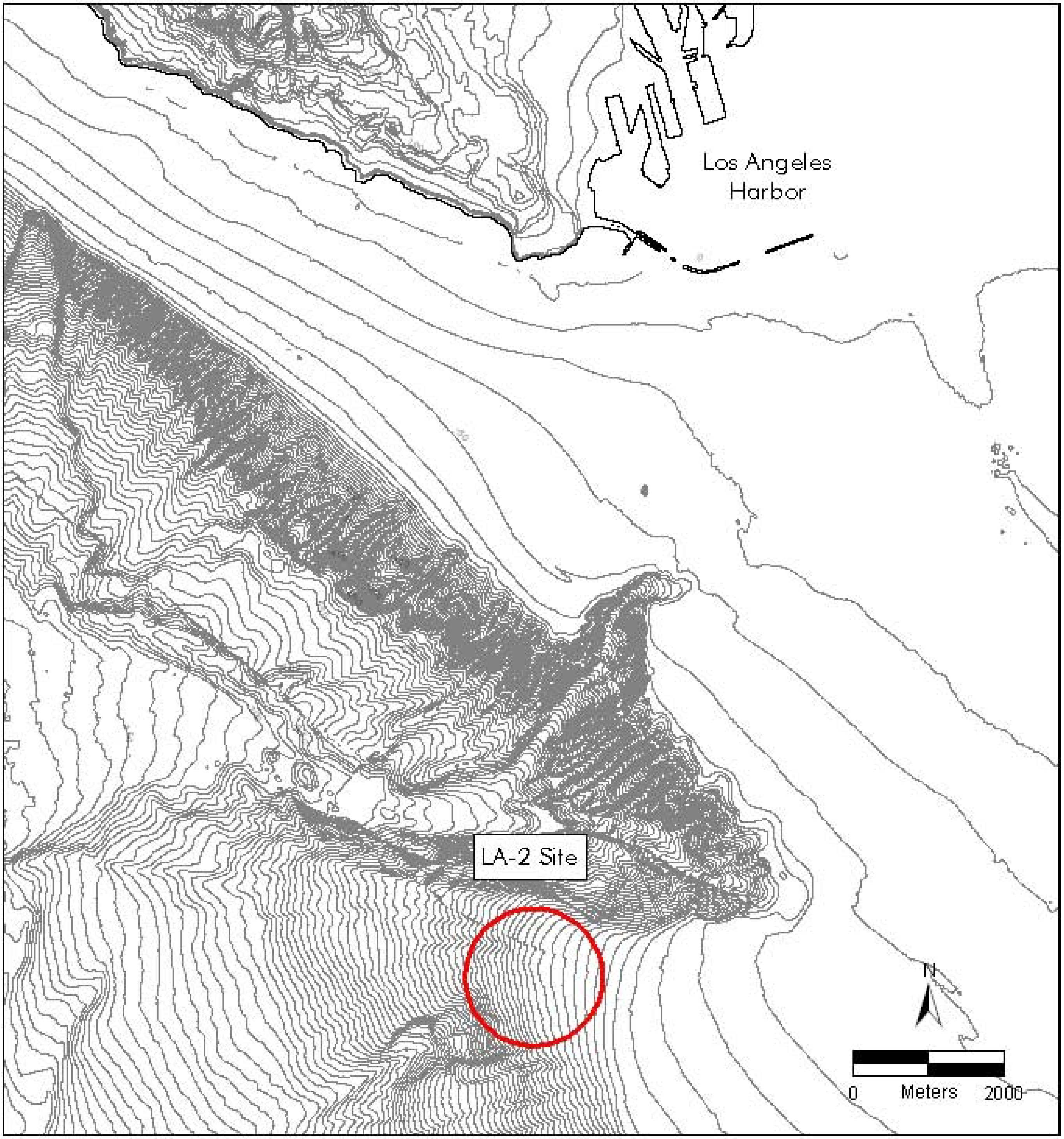
In addition to the LA-3 ODMDS site, the LA-2 ODMDS site has previously been permanently designated for the ocean disposal of dredged material. The existing LA-2 ODMDS is located on the outer continental shelf, margin, and upper southern wall of the San Pedro Sea Valley at depths from approximately 110 to 340 m (360 to 1,115 ft), about 11 km (5.9 nmi) south-southwest of the entrance to Los Angeles Harbor, as shown in Figures 1.1-1 and 1.1-3. The relatively flat continental shelf occurs in water depths to about 125 m (410 ft) with a regional slope of 0.8 degree. Then the slope becomes steep at about 7 degrees seaward to the shelf break. The southern wall of the San Pedro Sea Valley drops away with slopes steeper than 9 degrees. The site boundary is centered at 33º37'6" N and 118º17'24" W with a radius of 915 meters (3,000 ft).

The LA-2 ODMDS was designated as a permanent disposal site on February 15, 1991. There was no annual disposal volume limit placed on the use of this site, although the EIS evaluated potential impacts based on a historical annual average of 200,000 cubic yards (yd^3; 153,000 cubic meters [m^3]). Since 1991, the disposal quantity has occasionally exceeded the pre-designation historical annual average because of capital projects from both the ports of Los Angeles and Long Beach (see Table 1.1-3).

It is necessary to evaluate whether these occasional higher volumes at LA-2 can be accommodated or whether the excess volume of dredged material should be placed at a permanently designated LA-3 site. Consequently, ocean disposal at both LA-2 and LA-3 are considered on an overall regional basis so that the cumulative environmental impacts of disposal within Los Angeles and Orange Counties can be assessed.

1.2 Purpose of and Need for Action

The purpose of the proposed action is to ensure that adequate, environmentally acceptable ocean disposal site capacity is available for suitable dredged material generated in the greater Los Angeles County-Orange County area in conjunction with other management options including upland disposal and beneficial reuse.



LA-2 Bathymetry

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Figure 1.1-3

TABLE 1.1-3
HISTORY OF DREDGED MATERIAL DISPOSED OF AT LA-2

Year	Disposal Quantity yd^3 (m^3)	Dredge Material Source
1976	48,500 (37,081)	Long Beach Harbor
1977	18,333 (14,017)	Long Beach Harbor
1978	194,000 (148,324)	Los Angeles Harbor
1979	12,425 (9,500)	Los Angeles Harbor
1979	355,000 (271,417)	Los Angeles River
1980	60,000 (45,873)	Long Beach Harbor
1981	1,005,000 (768,378)	Long Beach Harbor
1982	333,000 (254,597)	Los Angeles Harbor
1982	580,000 (443,442)	Long Beach Harbor
1983	64,300 (49,161)	Los Angeles Harbor
1983	15,000 (11,468)	Long Beach Harbor
1984	107,600 (82,266)	Los Angeles Harbor
1984	20,000 (15,291)	Long Beach Harbor
1985	146,935 (112,340)	Los Angeles Harbor
1985	220,000 (168,202)	Long Beach Harbor
1986	114,600 (87,618)	Los Angeles Harbor
1986	185,000 (141,443)	Long Beach Harbor
1987	232,600 (177,835)	Los Angeles Harbor
1987	46,500 (35,552)	Long Beach Harbor
1988	179,300 (137,085)	Los Angeles Harbor
1988	132,000 (100,921)	Sunset/Huntington Harbor
1989	100,000 (76,455)	Los Angeles Harbor
1989	108,250 (82,763)	Anaheim Bay
1990	100,000 (76,455)	Los Angeles Harbor
1991	30,000 (22,937)	Los Angeles Harbor
1992	21,500 (16,438)	Marina del Rey
1992	737,400 (563,783)	Long Beach Harbor

TABLE 1.1-3
HISTORY OF DREDGED MATERIAL DISPOSED AT LA-2
(continued)

Year	Disposal Quantity yd^3 (m^3)	Dredge Material Source
1993	7,000 (5,352)	Los Angeles Harbor
1994	0 (0)	--
1995	47,022 (35,951)	Los Angeles Harbor
1996	30,000 (22,937)	Los Angeles Harbor
1996	700,000 (535,188)	Long Beach Harbor
1997	499,633 (381,997)	Los Angeles Harbor
1998	51,951 (39,719)	Marina del Rey
1998	622,563 (475,984)	Los Angeles Harbor
1999	499,633 (381,997)	Los Angeles Harbor
1999	38,363 (29,331)	Los Angeles River
1999	121,600 (92,970)	Long Beach Harbor
1999	143,880 (110,004)	Anaheim Bay
2000	0 (0)	--
2001	106,400 (81,349)	Sunset/Huntington Harbor

SOURCE: USACE 2003
m^3 = cubic meters; yd^3 = cubic yards

The need for ongoing ocean disposal capacity is based on historical dredging volumes from the local port districts, marinas and harbors, and federal navigational channels, as well as on estimates of future average annual dredging (USACE 2003a). An overall average of approximately 390,000 yd^3 (298,000 m^3) per year of dredged material requiring ocean disposal is expected to be generated in the area (USACE 2003a).

Upland disposal at a sanitary landfill is an alternative for dredged material generated from individual dredging projects. There are four Class III landfills in Orange County: Santiago Canyon (no longer accepting waste with final closure anticipated during 2004), Prima Deshecha, Olinda Alpha, and Frank R. Bowerman. These facilities can accept nonhazardous solid waste including dredged material. However, the material must be dewatered and be relatively clean with low concentrations of certain chemicals, heavy metals, and salt. Also, the material must conform to Regional Water Quality Control Board (RWQCB) criteria for waste disposal. While dredged material suitable for ocean disposal would be free of chemical contamination, the RWQCB considers the presence of salts in dredged sediment to be a contaminant that often precludes upland disposal as an option.

USACE also encourages the use of dredged material for beach replenishment in areas degraded by erosion. The grain size distribution of dredged material must be compatible with the receiving beach, and biological and water quality impacts must be considered prior to permitting of beach disposal. The USACE evaluates the selection of appropriate disposal methods on a case-by-case basis for each permit. If suitable, the material could be used for beach replenishment.

Additionally, the opportunity periodically arises to use dredged material for marine landfilling projects, also referred to as the creation of "fastlands." When the need arises, the use of dredged material for the creation of fastlands is considered a viable alternative to ocean disposal. Other potential beneficial uses of dredged material include construction fill, use as cap material in aquatic remediation projects, wetland creation, wetland restoration, landfill daily cover, and recycling into commercial products such as construction aggregate, ceramic tiles, or other building materials. Each of these disposal management options is evaluated when permits are issued for individual dredging projects.

As indicated above, after consideration of upland disposal and other beneficial uses an average of approximately 390,000 yd^3 (298,000 m^3) per year of dredged material will require ocean disposal (USACE 2003a). This material is proposed for ocean disposal by project proponents because it is not of an appropriate physical quality (e.g., it is predominantly fine-grained material) for reuse or because a reuse opportunity cannot be found that coincides with the timing of the dredging projects.

The LA-2 ODMDS is located in approximately 110-340 m (360-1,115 ft) of water, approximately 11 km (5.9 nmi) offshore from the entrance to the Port of Los Angeles and approximately 15.5 km (8.4 nmi) from the entrance to the Port of Long Beach (see Figure 1.1-1). The majority of suitable dredged material from USACE and port dredging projects in the Los Angeles County area that could not be beneficially reused has traditionally been disposed of at this site. When EPA originally designated LA-2 as a permanent disposal site in 1991, it evaluated the past history of disposal at the site up to that time and determined that significant adverse environmental impacts were unlikely to occur, if similar levels of disposal continued there in the future.

Most dredging projects from the Orange County area have not used the LA-2 site because of the extra costs and increased environmental impacts (such as increased air emissions) associated with transporting their dredged material the 38-km (20.5-nmi) distance to this site. Instead, they have traditionally used the LA-3 interim ODMDS, located approximately 8 km (4.3 nmi) offshore from Newport Bay and in approximately 410-480 m (1,345-1,575 ft) of water.

The LA-3 interim disposal site was originally scheduled to close down on January 1, 1997, but was extended by Congress until January 1, 2000, in order to allow a major Newport Bay dredging project to be completed (the approximately 1,000,000 yd^3 [765,000 m^3] project to restore depth to a sediment basin located in Upper Newport Bay). LA-3 was the only interim ODMDS in the nation specifically extended in this manner. Most recently, via the WRDA of 1999, Congress extended the status of LA-3 as an interim ODMDS for another three years (until December 31, 2002) in order to allow time for site designation studies and ultimately this site designation EIS to be completed. A major goal of this EIS is thus to determine whether LA-3 should be designated as a permanent ocean dredged material disposal site and, if so, how it should be managed.

In recent years dredging in the Los Angeles County area has resulted in ocean disposal at LA-2 that at times has substantially exceeded the volumes evaluated in EPA's 1988 Final EIS (see Table 1.1-3; EPA 1988). Thus, another important goal of the present evaluation is to determine whether these higher disposal volumes at LA-2 should be allowed to continue, especially in light of the possible permanent designation of the LA-3 site approximately 38.5 km (20.8 nmi) to the southeast.

These goals, considering permanent designation of the LA-3 disposal site and reevaluating management at the existing LA-2 disposal site, are directly related. Some dredging projects from the Los Angeles County area could practicably use the LA-3 disposal site, and it is also possible that at least some projects from the Orange County area could practicably use the LA-2 disposal site. Therefore the two questions, whether to designate LA-3 as a second permanent disposal site for the greater Los Angeles–Orange County area and how to manage it in conjunction with the existing LA-2 site, must be evaluated comprehensively.

Factors to be considered in the LA-3 site designation include (1) the practicability for Orange County area projects to use the existing LA-2 site; (2) the potential for adverse environmental impacts from the current and estimated future volumes of disposal of dredged materials at LA-2 and LA-3; and (3) the relative environmental impacts of disposal at LA-3 versus LA-2, including cumulative effects.

Similarly, the volume of material that can appropriately be disposed of and managed at LA-2 would be considered in light of (1) the overall regional dredging and ocean disposal demand; (2) the practicability of Los Angeles County area projects using LA-3 instead of LA-2; and (3) the relative environmental impacts of disposal at LA-2 versus LA-3, including cumulative effects.

To address these goals, this EIS will:

- evaluate the overall long-term need for ocean disposal of dredged material for the greater Los Angeles–Orange County region in light of availability of other options including beneficial reuse;

- evaluate the need for a second permanent ocean dredged material disposal site in the region based on the practicability for dredging projects from the Los Angeles and Orange County areas to use either or both sites;

- evaluate whether a greater disposal volume than was originally considered may occur at the existing LA-2 disposal site without causing any significant adverse environmental impacts; and

- evaluate how to optimally manage two permanent disposal sites in order to minimize environmental impacts (including cumulative effects) for the region as a whole.

1.3 Proposed Action

The proposed action is to designate the LA-3 ODMDS as a permanent site, to evaluate whether any modifications to the management of the existing LA-2 ODMDS are necessary, and to coordinate operations of these two regional ODMDSs in order to minimize potential environmental impacts, including cumulative effects, to the region as a whole.

1.4 Areas of Controversy

The disposal of dredged material in the ocean is generally considered a controversial issue. Discharge and disposal of waste products such as sewage effluent, radioactive and toxic wastes, explosives, and garbage are not permitted at an ODMDS. Dredged material proposed for ocean disposal is subjected to stringent bioassay and chemical tests. Disposal of dredged material is not expected to produce significant long-term environmental effects. Rather, because of the stringent pre-disposal testing requirements used to evaluate the suitability of dredged material for ocean disposal, the disposal of suitable dredged material is only expected to result in temporary, localized physical impacts.

Some areas of controversy do exist with the ocean disposal of dredged material. One of these concerns is the potential impact to commercial fishing. Commercial fishermen depend on ocean resources for their livelihood and are concerned with any activity that has the potential to impair this environment. The potential effects to commercial fishing are discussed in Section 4.2.3, Effects on the Socioeconomic Environment.

1.5 Issues to Be Resolved

The site determination analysis for this EIS examined previous reports relating to the environmental effects of dredged material disposal. Additionally, field surveys evaluating sediment characteristics, abundance and diversity of biota, and contaminant concentrations in sediment and animal tissues were conducted at and around the LA-3 and LA-2 disposal sites, at an alternate LA-3 site, and at reference sites. Any significant differences between the disposal and reference sites are assumed to be potentially related to past disposal activities. However, determining the exact causes for environmental variations at a disposal site are extremely difficult.

One of the issues to be resolved concerns determining the mechanisms for and extent of environmental variation at the designated disposal sites. This determination will be resolved through a site management program designed and administered jointly by the USACE and EPA. This program will involve detailed monitoring and analysis of disposal activities and effects, including laboratory and field studies, and sampling along distance gradients to examine cumulative effects. The site management program is discussed further in Section 4.5, Management of the Disposal Site(s).

Potential impacts to marine birds, mammals, and fisheries resources have been evaluated based on existing information and from computer model predictions of the dispersion of dredged material at the disposal sites (see Chapter 4 of this EIS). A Site Management and Monitoring Plan (SMMP) has been developed that contains approaches for monitoring impacts to marine organisms, as well as verification of model predictions. Development of this SMMP was based on a review of other SMMPs prepared for similar ocean disposal sites, and the SMMP will undergo final public review as part of the proposed rule package required by the National Environmental Policy Act (NEPA).

1.6 Regulatory Framework

An international treaty and several laws, regulations, and orders apply to ocean disposal of dredged material and to the designation of an ODMDS. The relevance of these statutes to the proposed action and to related compliance requirements is described below. Compliance of the proposed action to these requirements is summarized in Table 1.6-1.

1.6.1 London Convention

The principal international agreement governing ocean disposal is the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (26 UST 2403: TIAS 8165), also known as the London Convention (LC). This agreement became effective on August 30, 1975, after ratification by the participating countries, including the United States. Ocean disposal criteria incorporated into MPRSA have been adapted from the provisions of the LC. Thus, material considered acceptable for ocean disposal under MPRSA also is acceptable for ocean disposal under the LC.

1.6.2 Federal Laws and Regulations

1.6.2.1 Marine Protection, Research and Sanctuaries Act of 1972, as amended (33 U.S.C. 1401 et seq.)

The Marine Protection, Research and Sanctuaries Act (MPRSA) regulates the transportation and ultimate disposal of material in the ocean, prohibits ocean disposal of certain wastes without a permit, and prohibits the disposal of certain materials entirely. Prohibited materials include those that contain radiological, chemical, or biological warfare agents, high-level radiological wastes, and industrial waste. MPRSA has jurisdiction over all United States ocean waters in and beyond the territorial sea, vessels flying the United States flag, and vessels leaving United States ports. The territorial sea is defined as waters extending 22 km (12 nmi) seaward of the nearest shoreline. For bays or estuaries, the 22-km (12-nmi) territorial sea begins at a baseline drawn across the opening of the water body.

Section 102 of the MPRSA authorizes the EPA to promulgate environmental criteria for evaluation of all disposal permit actions, to retain review authority over USACE MPRSA Section 103 permits, and to designate ocean disposal sites for dredged material disposal. Additionally, as provided in Section 102(c) of MPRSA:

TABLE 1.6-1
SUMMARY OF COMPLIANCE OF THE PROPOSED PROJECT WITH ENVIRONMENTAL STATUTES AND REGULATIONS

Statute	Level of Compliance	Status of Compliance
Marine Protection, Research and Sanctuaries Act of 1972, as amended (33 U.S.C. 1401 et seq.)	Full	In compliance with Section 103 of the MPRSA, a site management and monitoring plan (SMMP) has been developed in support of the proposed ODMDS final designation. The SMMP is included as Appendix A to this DEIS. USACE will issue ocean disposal permits for future dredge material through regulations promulgated under Section 103 of the MPRSA. USEPA is responsible for MPRSA compliance of all ocean disposal activities.
National Environmental Policy Act of 1969 (42 U.S.C. 4341 et seq.)	Full	This draft EIS was prepared for public review pursuant to NEPA with the USEPA as the lead agency.
Clean Water Act of 1972 (33 U.S.C. 1251 et seq.)	N/A[1]	Not Applicable; see Footnote 1
Clean Air Act, as amended (42 U.S.C. 1451 et seq.)	Full	The proposed action (the designation of an ODMDS) does not permit the actual disposal of dredged material and, as such, would not of itself generate air emissions. However, because the CAA is applicable to the proposed action, a basic air quality evaluation of the potential impacts to air quality resulting from future use of the disposal sites is presented in the DEIS. Subsequent projects that would generate material to be disposed of at an ODMDS would be subject to further individual environmental review by the USEPA.
Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.)	Full	Formal consultation with the U.S. Fish and Wildlife Serviceand the National marine Fisheries Service was initiated on December 3, 2001 (see Chapter 5 of this DEIS). The DEIS concludes that the proposed action would not adversely impact fish or wildlife.
Magnuson-Stevens Fisheries Conservation and Management Act (16 U.S.C. 1801 et seq.)	Full	Formal consultation with the National Marine Fisheries Service was initiated on December 3, 2001 (see Chapter 5 of this DEIS). The DEIS concludes that the proposed action will not result in any significant, adverse impacts to any species on the Fishery Management Plan or their habitat.
Coastal Zone Management Act of 1972 (16 U.S.C. 1456 et seq.)	Full	As part of the site designation process, EPA will prepare a coastal consistency determination and will seek approval from the California Coastal Commission.

TABLE 1.6-1
SUMMARY OF COMPLIANCE OF THE PROPOSED PROJECT WITH ENVIRONMENTAL STATUTES AND REGULATIONS

Statute	Level of Compliance	Status of Compliance
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)	Full	Formal consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service was initiated on December 3, 2001 (see Chapter 5 of this DEIS). The DEIS concludes that the proposed action would not adversely impact endangered species.
National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.)	Full	Per 36 CFR 800.3(a)(1) the proposed action is not anticipated to cause effects. Nevertheless, the EPA is coordinating the proposed ODMDS designation with the State Historic Preservation Officer (SHPO).
Executive Order 11593, Protection and Enhancement of the Cultural Environment (36 FR 8921, May 15, 1971)	Full	Per 36 CFR 800.3(a)(1) the proposed action is not anticipated to cause effects. Nevertheless, the EPA is coordinating the proposed ODMDS designation with the SHPO.
Executive Order 12372, Intergovernmental Review of Federal Programs (47 FR 30959, July 16, 1982)	Full	For this EIS, the EPA is coordinating with the Resources Agency of California, the California Environmental Protection Agency, and the appropriate state agencies, boards, and departments on the proposed action.
California Coastal Act of 1976 (Public Resources Code Section 30000 et seq.)	Full	As part of the site designation process, EPA will prepare a coastal consistency determination and will seek approval from the California Coastal Commission.
California Environmental Quality Act, June 1986 (Public Resources Code Section 21000 et seq.)	N/A[2]	Not Applicable; see Footnote 2
California Clean Air Act of 1988 (Health and Safety Code Section 39000 et seq.)	N/A[2]	Not Applicable; see Footnote 2
South Coast Air Quality Management District Air Quality Management Plan	N/A[3]	Not Applicable; see Footnote 3

[1]N/A = not applicable; disposal sites are outside of jurisdiction of Clean Water Act.

[2]N/A = not applicable; proposed action is a federal action outside state boundaries.

[3]N/A = not applicable; proposed action is a federal action outside state boundaries. However, the project air emission significance thresholds implemented by the South Coast Air Quality Management District are used to assess the proposed action's potential effect on the district's ability to achieve federal ambient air quality standards.

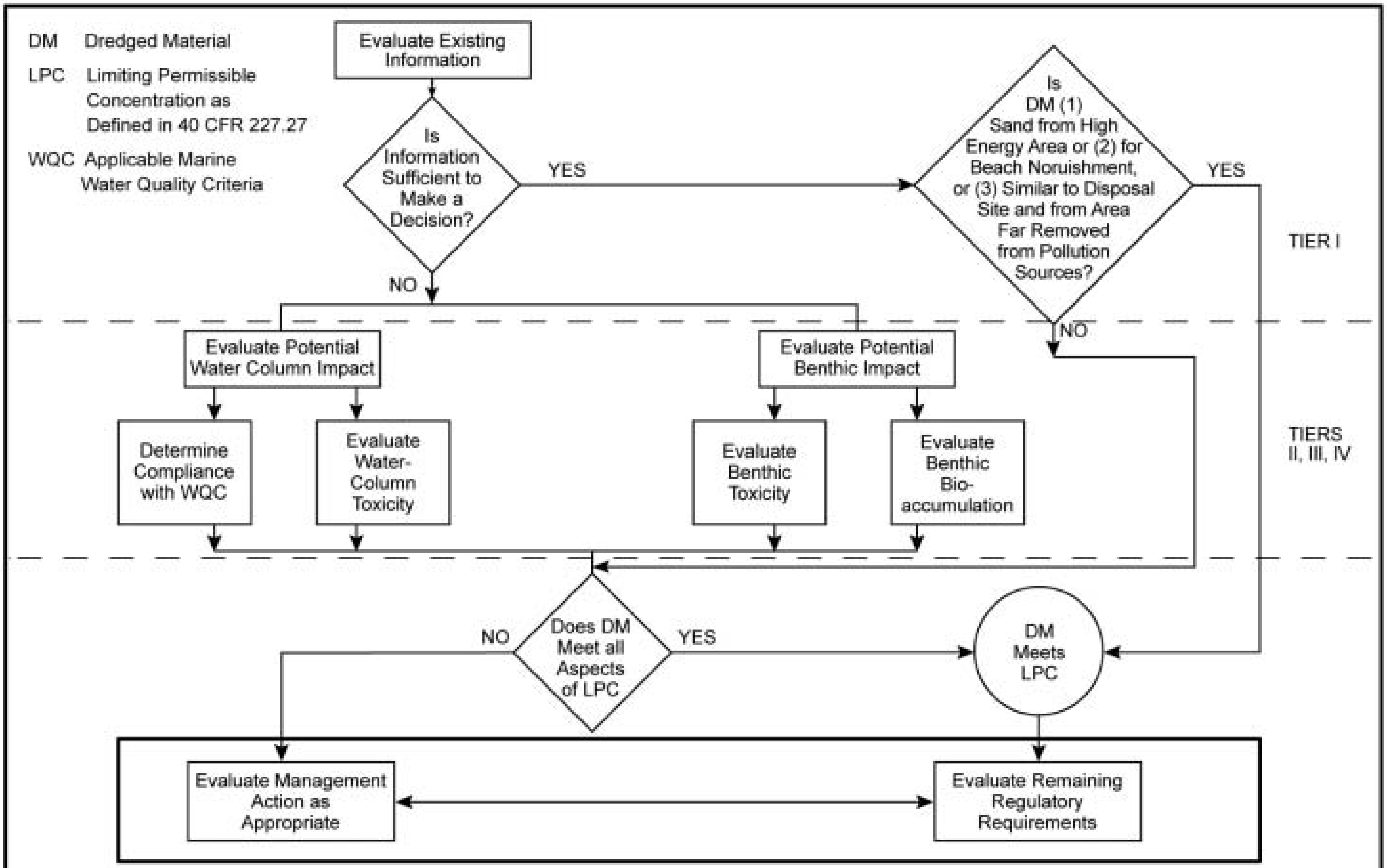
> After January 1, 1995, no site [ODMDS] shall receive a final designation unless a management plan has been developed pursuant to this section. Beginning on January 1, 1997, no permit for dumping pursuant to this Act or authorization for dumping under section 103(e) of this Act shall be issued for a site unless such site has received a final designation pursuant to this subsection or an alternative site has been selected pursuant to section 103(b).

EPA's regulations for ocean disposal are published at 40 CFR Parts 220-229. As described in 40 CFR 228(e)(1), designation of an ocean disposal site is to be based on environmental studies of the proposed site, regions adjacent to the proposed site, and on historical knowledge of the impact of dredged material disposal on areas similar to the proposed site. Impacts to be considered include those on the physical, chemical, and biological characteristics of the site. All studies and evaluations prepared for the proposed site must be conducted in accordance with the general and specific site selection criteria specified in 40 CFR 228.5 and 40 CFR 228.6, respectively (see Table 1.1-1). Considerations addressed by these site selection criteria include physical location, prior use, currents, feasibility of surveillance and monitoring, and proximity to sensitive resources.

Under the authority of Section 103 of the MPRSA, USACE may issue ocean disposal permits for dredged material if EPA concurs with the decision. If EPA does not agree with a USACE permit decision, a waiver process under Section 103 allows further action to be taken. The permitting regulations promulgated by the USACE, under the MPRSA, appear at 33 CFR Parts 320 to 330 and 335 to 338. Both EPA and USACE may prohibit or restrict disposal of material that does not meet the regulatory criteria specified in 40 CFR Part 227. An equivalent process is used for Corps' Civil Works projects that include disposal at an ODMDS.

Dredged material proposed for ocean disposal undergoes an extensive four-tiered evaluation to demonstrate compliance with the requirements of 40 CFR 227. Figure 1.6-1 illustrates an overview of the tiered evaluation process. Tiers I and II use existing information and relatively simple, rapid procedures for determining the potential environmental impacts of dredged material proposed for ocean disposal. If it is readily apparent that the dredged material proposed for ocean disposal has the potential to cause substantial environmental impacts (or lack thereof), the information collected in Tiers I and II may be sufficient for making a decision as to the suitability of the material for ocean disposal.

However, where the potential environmental impacts are not clear or where sufficient information is lacking, more extensive evaluation through Tiers III and IV may be



Overview of Tiered Approach to Evaluating Potential Impact of Ocean Disposal of Dredged Material

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Figure 1.6-1

needed. Each successive tier incorporates more intensive procedures that provide increasingly detailed information for assessing the potential environmental impacts of the dredged material. The intent of this tiered approach is to ensure the suitability of dredged material proposed for ocean disposal while using resources efficiently. This is achieved by testing the proposed material only as intensely as is necessary to provide sufficient information for making the disposal suitability decision (EPA and USACE 1991). The application of this tiered process will ensure that only cleaned dredged material will be disposed of at an ODMDS.

The EPA and USACE also may determine that ocean disposal is inappropriate, because of ODMDS management restrictions or because options for beneficial use(s) exist. Site management guidance is provided in 40 CFR 228.7-228.11.

1.6.2.2 National Environmental Policy Act of 1969 (42 U.S.C. 4341 et seq.)

NEPA was established to ensure that the environmental consequences of federal actions were incorporated into agency decision-making processes. It establishes a process whereby the parties most affected by the impact of a proposed action are identified and their opinions are solicited. The proposed action and several alternatives are evaluated in relation to their environmental impacts, and a tentative selection of the most appropriate alternative is made. A draft EIS (DEIS) is developed which presents sufficient information to evaluate the suitability of the proposed and alternative actions. A Notice of Availability, announcing that the DEIS can be obtained for comment, is published in the *Federal Register.* After the DEIS comment period, the comments are addressed, revisions are made to the DEIS, and the document is published as a Final EIS (FEIS). A proposed rule is published after the FEIS. For ODMDS designations, publication of a Final Rule in the *Federal Register* is equivalent to a NEPA Record of Decision.

The Council on Environmental Quality has published regulations at 40 CFR Parts 1500 to 1508 for implementing NEPA. EPA NEPA regulations are published at 40 CFR Part 6. The USACE regulations for implementing NEPA are published at 33 CFR Part 220.

1.6.2.3 Clean Water Act of 1972 (33 U.S.C. 1251 et seq.)

The Clean Water Act (CWA) was passed to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Specific sections of the Act control the discharge of pollutants and wastes into aquatic and marine environments.

Section 404 of the CWA establishes a program to regulate the discharge of dredge and fill material into navigable waters of the United States. The CWA and MPRSA overlap for discharges to the territorial sea. CWA supersedes MPRSA if dredged material is placed in the ocean for beach restoration or some other beneficial use. MPRSA supersedes CWA if dredged material is transported and disposed of in the territorial sea. The territorial sea is the area of the ocean generally extending 22 km (12 nmi) out from the coast. As such, disposal actions at both LA-3 and LA-2 lie outside the jurisdiction of the CWA and are governed by the MPRSA.

1.6.2.4 Clean Air Act, as amended (42 U.S.C. 1451 et seq.)

The Clean Air Act (CAA) is intended to protect the nation's air quality by regulating emissions of air pollutants. The Act is applicable to permits and planning procedures related to dredged material disposal within the territorial sea. The proposed action (the designation of an ODMDS) does not permit the actual disposal of dredged material. However, because the CAA is applicable to the proposed action, a basic air quality evaluation of the potential impacts to air quality resulting from future use of the disposal sites is presented in Chapter 4 of this EIS. Subsequent projects that would generate material to be disposed of at an ODMDS would be subject to further individual environmental review.

1.6.2.5 Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.)

The Fish and Wildlife Coordination Act requires that water resource development programs consider wildlife conservation. Whenever any body of water is proposed or authorized to be impounded, diverted, or otherwise controlled or modified, the United States Fish and Wildlife Service (USFWS) and the state agency responsible for fish and wildlife must be consulted. Section 662(b) of the Act requires federal agencies to consider recommendations based on USFWS investigations. The recommendations may address wildlife conservation and development, any damage to wildlife attributable to the project, and measures proposed for mitigating or compensating for these damages.

1.6.2.6 Magnuson-Stevens Fisheries Conservation and Management Act (16 U.S.C. 1801 et seq.)

The Magnuson-Stevens Fisheries Conservation and Management Act (MSA) was authorized in 1996 and charges the National Marine Fisheries Service (NMFS) with identifying, conserving, and enhancing essential fish habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires:

- Federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that have the potential to adversely affect EFH;

- NMFS to provide conservation recommendations for any federal or state action that would adversely affect EFH; and

- Federal agencies to provide a detailed response in writing to NMFS within 30 days of receiving the EFH conservation recommendations.

The LA-2 and proposed LA-3 disposal sites are located within the jurisdiction of the MSA.

1.6.2.7 Coastal Zone Management Act of 1972 (16 U.S.C. 1456 et seq.)

Under the Coastal Zone Management Act (CZMA), any federal agency conducting or supporting activities directly affecting the coastal zone must proceed in a manner consistent with approved state coastal zone management programs to the maximum extent practicable. If a proposed activity affects water use in the coastal zone (i.e., the territorial sea and inland), the applicant may need to demonstrate compliance with a state's approved CZMA program.

The Coastal Zone Reauthorization Amendments of 1990 (Section 6208) state that any federal activity, regardless of its location, is subject to the CZMA requirement for consistency, if it will affect any natural resources, land uses, or water uses in the coastal zone. No federal agency activities are categorically exempt from this requirement. As part of the site designation process, EPA will prepare a coastal consistency determination and will seek approval from the California Coastal Commission. The coastal consistency determination will address potential effects of dredged material disposal at the ODMDS(s) on marine organisms, including threatened and endangered species. It will also describe provisions for sediment testing, to ensure that contaminated material is not discharged at the ODMDS, and other aspects of the SMMP. The California Coastal Commission will continue to review permit applications for dredging projects and federal determinations of consistency for federal dredging projects, including the transport of dredged material through the coastal zone, for consistency with the California Coastal Zone Management Plan.

1.6.2.8 Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)

The Endangered Species Act protects threatened and endangered species by prohibiting federal actions that would jeopardize the continued existence of such species or that would result in the destruction or adverse modification of any critical habitat of such species. Section 7 of the Act requires that consultation regarding protection of such species be conducted with the USFWS and/or the NMFS prior to project implementation. During the site designation process, the USFWS and the NMFS evaluate potential impacts of ocean disposal on threatened or endangered species. These agencies are asked to certify or concur with the sponsoring agency's findings that the proposed activity will not adversely affect endangered or threatened species. Documentation of the consultation process on the proposed ODMDS designation is included in Chapter 5.0.

1.6.2.9 National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.)

The purpose of the National Historic Preservation Act is to preserve and protect historic and prehistoric resources that may be damaged, destroyed, or made less available by a project or action. Under this Act, federal agencies are required to identify cultural or historical resources that may be affected by a proposed action and to coordinate project activities with the State Historic Preservation Officer (SHPO). EPA is coordinating the proposed ODMDS designation with the SHPO.

1.6.3 Executive Orders

1.6.3.1 Executive Order 11593, Protection and Enhancement of the Cultural Environment (36 FR 8921, May 15, 1971)

This executive order requires federal agencies to direct their policies, plans, and programs so that federally owned sites, structures, and objects of historical, architectural, or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the public. Compliance with this order is coordinated with the SHPO.

1.6.3.2 Executive Order 12372, Intergovernmental Review of Federal Programs (47 FR 30959, July 16, 1982)

This order requires federal agencies to consult with elected officials of state and local governments that may be directly affected by proposed federal financial assistance or direct federal development. In providing for this consultation, existing state procedures must be accommodated to the maximum extent practicable. For this EIS, the EPA is coordinating with the Resources Agency of California, the California Environmental Protection Agency, and the appropriate state agencies, boards, and departments on the proposed action.

1.6.4 State of California

1.6.4.1 California Coastal Act of 1976, Public Resources Code Section 30000 et seq.

This act establishes the Coastal Zone Management Plan, which has been approved by the U.S. Department of Commerce. All federal actions that affect the coastal zone must be determined to be as consistent as practicable with this plan (see CZMA above).

1.6.4.2 California Environmental Quality Act, June 1986, Public Resources Code Section 21000 et seq.

The California Environmental Quality Act (CEQA) establishes requirements similar to those of NEPA for consideration of environmental impacts and alternatives and for preparation of an environmental impact report prior to implementation of applicable projects. However, this proposed action is a federal action involving site designation outside state boundaries and, therefore, does not fall under the purview of CEQA.

1.6.4.3 California Clean Air Act of 1988, Health and Safety Code Section 39000 et seq.

The California Clean Air Act (CCAA), also known as the Sher Bill or Assembly Bill (AB) 2595, was signed into law on September 30, 1988 and became effective on January 1, 1989. It established a legal mandate to achieve health-based state air quality standards at the earliest practicable date. The CCAA requires that districts implement regulations to reduce emissions from mobile sources through the adoption and enforcement of transportation control measures. However, this proposed action is a federal action involving site designation outside state boundaries and, therefore, does not fall under the purview of CEQA.

1.6.5 South Coast Air Quality Management District

1.6.5.1 Air Quality Management Plan

The South Coast Air Quality Management District (SCAQMD) is the agency that regulates air quality in the South Coast Air Basin and is responsible for achieving attainment of the federal and state ambient air quality standards. In 1989, the SCAQMD and the Southern California Association of Governments (SCAG) established an air quality management plan (AQMP) that is revised routinely in compliance with the requirements of the federal Clean Air Act and the California Clean Air Act. Additionally, the SCAQMD implements a set of rules and regulations that were initially adopted in January 1976. The South Coast Air Quality Management District also establishes air emission significance thresholds for evaluating projects occurring within the South Coast Air Basin (SCAB).

Although the proposed action (the designation of an ODMDS) is outside of the jurisdiction of the SCAQMD, the project air emission significance thresholds implemented by the SCAQMD are used to provide a point of comparison for assessing the proposed action's potential effect on the District's ability to achieve federal ambient air quality standards resulting from future use of the disposal sites.

1.7 Relation to Previous NEPA Actions and Other Major Facilities in the Vicinity of the Proposed Project Sites

Several NEPA actions and other facilities in the general project vicinity could potentially be affected by the continued disposal of dredged material at LA-3 and/or LA-2. Disposal of dredged material could interact with other projects potentially causing cumulative impacts to the quality of water, sediments, and the marine biological environment. Potentially interacting projects are discussed below.

1.7.1 THUMS Disposal Site

The EPA designated the THUMS site (named for the original shareholders: Texaco, Humble, Union, Mobile, and Shell) for the disposal of drilling muds and cuttings from oil and gas drilling islands in Long Beach Harbor. This site is a circular area with a radius of 2.8 km (1.5 nmi), centered at 33º34'30" N and 118º27'30" W, southwest of the Los Angeles/Long Beach Harbor complex in 890 m (2,920 ft) of water. Disposal of approximately 100,000 yd^3 (76,000 m^3) of muds and cuttings are authorized per year. The proposed LA-3 project site is about 50 km (27 nmi) from the THUMS disposal site. The LA-2 site lies approximately 18.5 km (10 nmi) east-northeast of the THUMS disposal site (see Figure 1.1-1).

1.7.2 Orange County Sanitation District Outfall

The Orange County Sanitation District (OCSD) discharges a mix of primary and secondary treated wastewater through an outfall upcoast of Newport Beach. Approximately 50 percent of the effluent receives advanced secondary treatment while the remaining 50 percent of the effluent receives advanced primary treatment (OCSD 2002; SCCWRP 2004). It is one of the few facilities in the U.S. that still operates under a CWA Section 301(h) waiver. Recently, the OCSD agreed to upgrade its facility to full secondary treatment, but these upgrades will not be complete until at least 2012.

In 1987, an average of approximately 920 million liters per day (243 million gallons per day [mgd]) of effluent was discharged from this outfall. An average of 890 million liters per day (235 mgd) of effluent was discharged in 2003 (OCSD 2004). The outfall, located in approximately 60 m (200 ft) of water, is approximately 13 km (7 nmi) from the proposed LA-3 project site and approximately 26 km (14 nmi) from the LA-2 site (see Figure 1.1-1).

Concern has been expressed that material deposited at the LA-3 site could impact nearshore water quality, particularly in conjunction with discharges from the OCSD outfall. Figure 1.7-1 shows the location of a cross-section drawn between the OCSD outfall and the interim and proposed LA-3 sites. The profile corresponding to this cross-section is shown in Figure 1.7-2. As seen in Figure 1.7-2 the depths of the LA-3 sites are well below that of the OCSD outfall. As such, dredged material deposited at LA-3 is expected to remain at depth and is not expected to impact the shallower, nearshore environment in the vicinity of the OCSD outfall. Water quality impacts during dredged material disposal operations at the LA-3 site will be temporary and localized in the vicinity of the LA-3 site and are not expected to extend to the shallower, nearshore area. Consequently, any water quality impacts that are detected in the shallow nearshore water area would likely be due to discharges from the OCSD outfall or some other source.

1.7.3 White's Point Outfalls

The Los Angeles County Sanitation District's Joint Water Pollution Control Project (JWPCP) discharges an average of approximately 1.2 billion liters per day (320 mgd) of secondary treated effluent through a network of outfalls at White's Point on the Palos Verdes Peninsula (Los Angeles County Sanitation District [LACSD] 2004). These outfalls are located approximately 45 km (24 nmi) from the proposed LA-3 project area and approximately 8.5 km (4.6 nmi) from LA-2 (see Figure 1.1-1).

1.7.4 Avalon Outfall

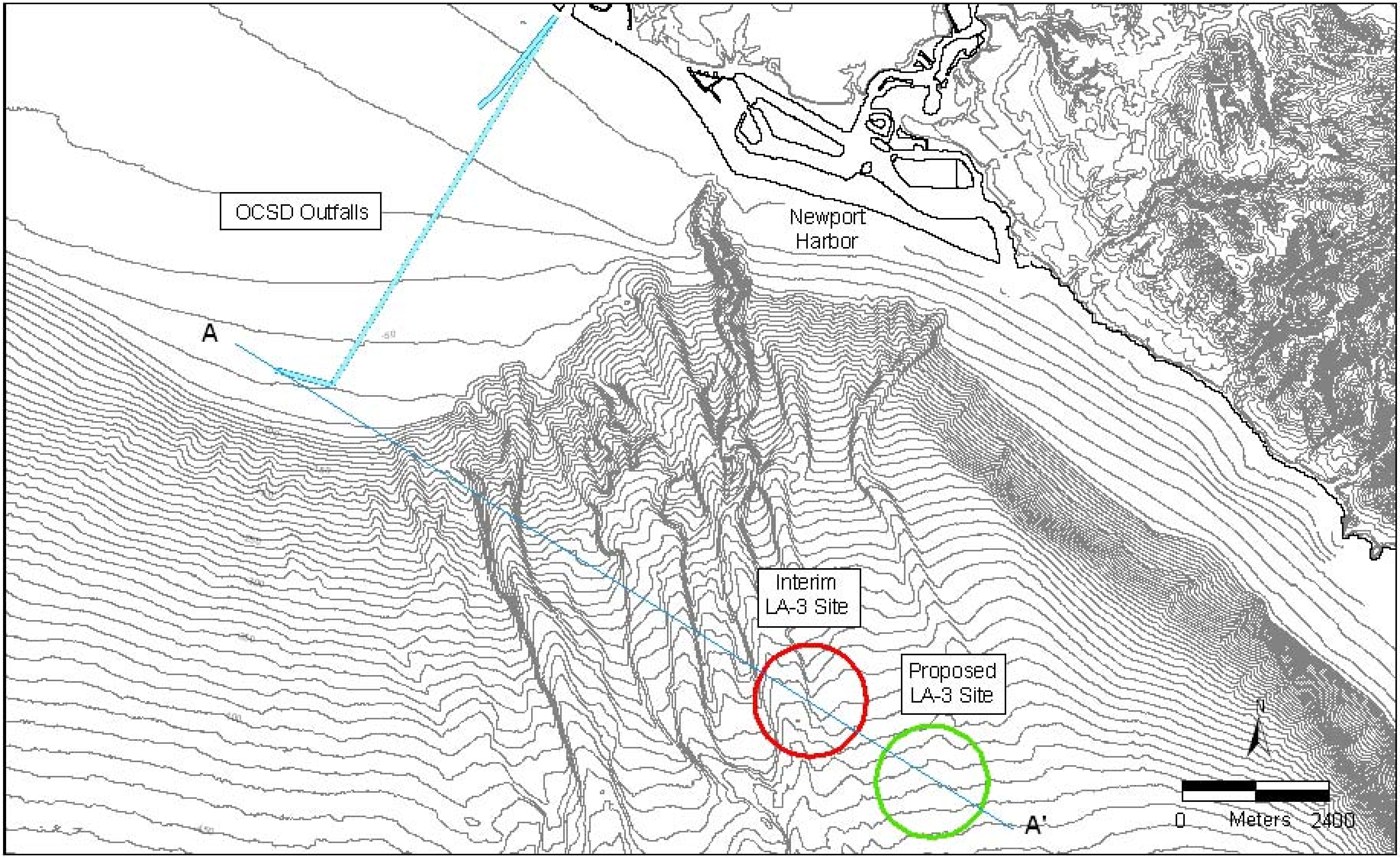
The City of Avalon on Santa Catalina Island discharges an average of 2.4 million liters per day (0.63 mgd) of secondary treated effluent through an offshore outfall. This outfall is located approximately 42 km (22.5 nmi) from the proposed LA-3 project site and approximately 30 km (16 nmi) from the LA-2 site (see Figure 1.1-1).

1.7.5 Aliso Outfall

Treated wastewater is discharged from the Aliso outfall, offshore of Aliso Creek in Orange County. Approximately 79.5 million liters per day (21 mgd) of secondary treated are currently discharged from this facility (South Orange County Wastewater Authority [SOCWA] 2004). The Aliso outfall is located approximately 12 km (6.5 nmi) from the proposed LA-3 project site and approximately 51 km (27.5 nmi) from LA-2 (see Figure 1.1-1).

1.7.6 SERRA Outfall

The South East Regional Reclamation Authority (SERRA) outfall (San Juan Creek outfall), located offshore of San Juan Creek just south of Dana Point, discharges approximately 72.3 million liters per day (19.1 mgd) of secondary treated effluent



Location of Cross-Section Between the LA-3 Sites and the OCSD Outfall

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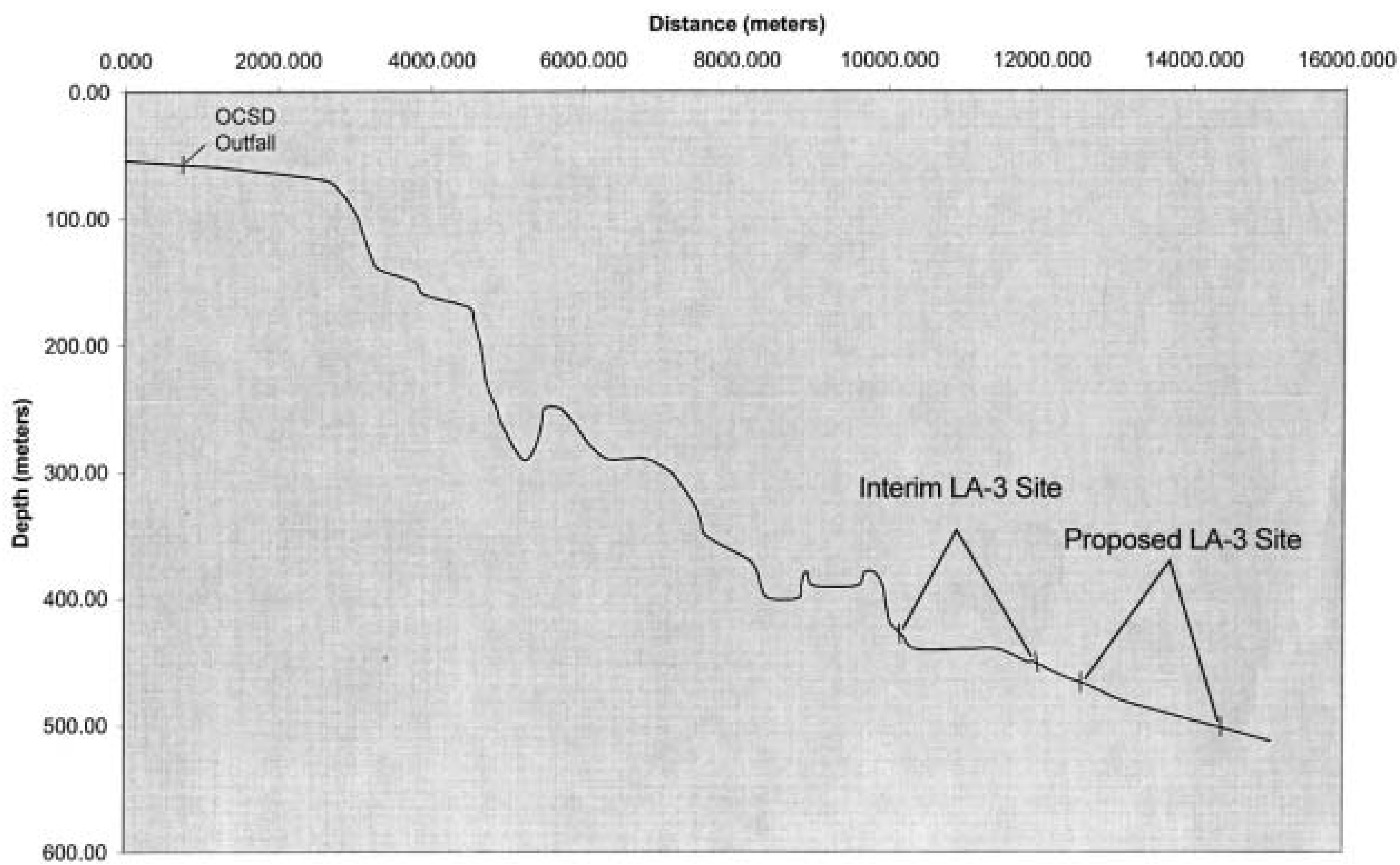
Figure 1.7-1



Cross Section Profile - OCSD Outfall to LA-3 Sites (Vertical Scale Exaggerated)

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Figure 1.7-2

(SOCWA 2004). This wastewater discharge is located 20 km (11 nmi) from the proposed LA-3 project site and approximately 59 km (32 nmi) from LA-2 (see Figure 1.1-1).

1.7.7 Terminal Island Treatment Plant Outfall

The Terminal Island Treatment Plant (TITP) outfall, located on Terminal Island in the Los Angeles Harbor, discharges approximately 60.6 million liters per day (16 mgd) into Los Angeles Harbor (ICF Consulting 2003). The plant has capacity for advanced treatment options including reverse osmosis and tertiary treatment. This wastewater discharge is located approximately 12.9 km (7.0 nmi) from LA-2 and approximately 40 km (21.6 nmi) from the proposed LA-3 site (see Figure 1.1-1).

1.7.8 Commercial Port Development

The Ports of Los Angeles and Long Beach propose the dredging of harbor entrances and channels and the corresponding creation of a landfill in the outer harbor. This ongoing process is designed to expand the commercial shipping capacity of the ports to meet projected future demands.

CHAPTER 2.0

ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter discusses four general alternatives for the disposal of dredged material from Los Angeles and Orange Counties. Each of the alternative ocean disposal sites is evaluated on the basis of the five general and eleven specific site selection criteria listed at 40 CFR Parts 228.5 and 228.6(a), respectively (see Table 1.1-1). Disposal alternatives are described in Section 2.1 and discussed in Section 2.2.

The proposed action is to designate the LA-3 Ocean Dredged Material Disposal Site as a permanent site and to evaluate whether any modifications to the management of the existing LA-2 ODMDS are necessary to coordinate operations of these two regional ODMDSs in order to minimize potential environmental impacts, including cumulative effects, to the region as a whole.

2.1 Alternatives to Be Considered

A number of alternatives are considered in this EIS to determine the disposal scenario that is most practicable and least damaging to the environment. The Zone of Siting Feasibility Study prepared for the proposed action (USACE 2003a) defined the radii within which the disposal of dredged material generated in Los Angeles and Orange Counties is considered feasible. The potentially feasible disposal radii were mainly determined as a result of economic considerations and, to a lesser extent, operational and regulatory limitations. The economic considerations included dredging projects that are revenue (e.g., dredging of harbors for navigational purposes) and non-revenue (e.g., habitat restoration and maintenance) generating. Also included in the ZSF study are forecasts of potential future dredging projects and the resulting need for ocean disposal of dredged material. As such, the ZSF study also evaluated appropriate annual disposal quantities for both the proposed permanent LA-3 site and for the permanently designated LA-2 disposal site.

The results of the ZSF were used as the basis for developing the ocean disposal alternatives considered in this EIS. These alternatives include: No Action and several alternatives involving the existing LA-2 and proposed LA-3 site, a shallow-water site, a deep-water site, and a site at a depth similar to the proposed LA-3 site. The alternatives selected for the LA-2 and proposed LA-3 sites to be considered in this EIS are:

No Action (Alternative 1): Do not designate LA-3 as a permanent ODMDS, and continue to manage the existing LA-2 ODMDS at historical levels evaluated in the site designation EIS.

Alternative 2 (Maximize Use of LA-2): Do not designate LA-3 as a permanent ODMDS, but establish a maximum annual disposal volume limit for the LA-2 site adequate to meet the ocean disposal needs of all Los Angeles–Orange County region projects.

Alternative 3 (Local Use of LA-3 and LA-2): Designate LA-3 as a permanent ODMDS primarily for Orange County projects, and establish a higher maximum annual disposal volume limit for LA-2 to accommodate most Los Angeles County area projects.

Alternative 4 (Maximize Use of LA-3): Designate LA-3 as a permanent ODMDS with a maximum annual disposal limit to meet the ocean disposal needs of all Los Angeles–Orange County region projects to the extent feasible, and establish an annual disposal volume limit for LA-2 to accommodate only those projects that could not feasibly use LA-3.

2.1.1 No Action Alternative (Alternative 1)

The No Action Alternative would mean that EPA would not designate an appropriate ODMDS for disposal of suitable dredged material from the Newport Harbor area. The interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. LA-2 would remain available for disposal of suitable dredged material and managed at historical levels evaluated in the original site designation EIS (an average of 200,000 yd^3 [153,000 m^3] per year).

Pleasure and commercial operations in the Los Angeles/Newport Harbor area provide approximately $120 billion a year to the local economy. Many of these maritime operations are dependent on the continued maintenance of the harbors and on future dredging projects.

Each year existing channels and boat slips are dredged to maintain navigation access for these users. While some of the material dredged from the harbor areas is suitable for replenishment for local beaches, the remainder is unsuitable for beach replenishment and other management options are needed, such as ocean disposal.

By not permanently designating LA-3, the No Action Alternative could limit future maintenance and improvement projects in the LA/Newport area by limiting the amount of dredged material that could be deposited at a designated ocean disposal site. This in turn could result in a negative impact on future maritime operations in the area.

Additionally, Upper Newport Bay is an estuary and ecological reserve. The continued health of the estuary is dependent upon ongoing restoration and dredging projects. It is anticipated that if dredging activities within the reserve were eliminated, the bay eventually would fill with sediment from San Diego Creek and ultimately would become upland habitat (Newport Bay Naturalists and Friends 2004). Although the reserve is not revenue generating as is the harbor area, it represents the vast majority of the Newport Bay dredging need (approximately 1,000,000 yd^3 [765,000 m^3] in 1998-99). Most of this material, if not all, is too fine to be suitable for beach replenishment.

Therefore, unless and until other management options become feasible, ocean disposal of dredged material from the bay is expected to remain the most practicable option. Even if money were available to transport all the Newport material to LA-2, there may be potential significant environmental impacts to air quality and the marine environment. The combined Los Angeles/Orange County area material would represent a substantial increase over historic disposal volumes at LA-2.

The ZSF Study evaluated for each potential dredging project whether disposal at the existing LA-2 or proposed LA-3 ODMDSs would be economically feasible (USACE 2003a). Based on this assessment, the total worst-case yearly and average yearly disposal volumes at LA-2 for the No Action alternative were estimated. These volumes are shown in Table 2.1-1.

It is possible that during any given single dredging cycle for the projects listed that the potential total dredged volume for that project's cycle could be higher than the average volumes shown in Table 2.1-1. Therefore, for computing the worst-case yearly volumes, the average project cycle dredging volumes were increased by a factor of 50 percent (USACE 2003a). As such the total worst-case yearly volume shown in Table 2.1-1 1,451,000 yd^3 (1,109,000 m^3) assumes that all projects occur simultaneously and includes this 50 percent conservatism factor. The total average yearly volume of 152,000 yd^3 (116,000 m^3) assumes that the dredging projects are spread out over their anticipated dredging cycles and that the total dredged volume per cycle for each project is equal to the average volume per cycle.

As seen in Table 2.1-1, under the No Action Alternative disposal of dredged material from projects at Newport Bay and Dana Point Harbor are assumed to not be economically

TABLE 2.1-1
ALTERNATIVE 1 (NO ACTION) FORECASTED WORST-CASE YEARLY AND AVERAGE YEARLY DISPOSAL VOLUMES

Harbor/Facility	Disposal Economically Feasible* LA-2	Disposal Economically Feasible* LA-3	County of Origin	Average Volume per cycle (cubic yards)	Maintenance Dredging Time Period for Each Cycle (years)	Alt. 1 - No Action: Forecasted Worst-Case Year LA-2 (cubic yards)	Alt. 1 - No Action: Forecasted Worst-Case Year LA-3 (cubic yards)	Alt. 1 - No Action: Forecasted Annual Average LA-2 (cubic yards)	Alt. 1 - No Action: Forecasted Annual Average LA-3 (cubic yards)
Regular Maintenance									
Los Angeles River Estuary	Yes	**No**	LA	75,000	4 – 5**	113,000	NA	19,000	NA
Los Angeles Harbor	Yes	Yes	LA	10,000	1	15,000	NA	10,000	NA
Long Beach Harbor	Yes	Yes	LA	38,000	1	57,000	NA	38,000	NA
Marina del Rey	Yes	**No**	LA	67,000	2	101,000	NA	34,000	NA
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	150,000	NA	10,000	NA
Newport Harbor	**No**	Yes	Orange	250,000	25	-	NA	-	NA
Dana Point Harbor	**No**	Yes	Orange	50,000	8	-	NA	-	NA
Upper Newport Bay	**No**	Yes	Orange	100,000	10	-	NA	-	NA
Anaheim Bay	Yes	**No**	Orange	150,000	10	225,000	NA	15,000	NA
						661,000	NA	126,000	NA
Capital Improvement									
Los Angeles Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	NA	13,000	NA
Long Beach Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	NA	13,000	NA
Upper Newport Bay‡	**No**	Yes	Orange	2,120,000	2‡	-	NA	-	NA
						790,000	NA	26,000	NA
TOTAL (Forecasted)						**1,451,000**	**NA**	**152,000**	**NA**
HISTORICAL VOLUMES FOR PERIOD 1992 – 2001						**803,000**	**860,000**	**363,000**	**132,000**

*USACE 2003a
**For worst-case annual average, assume a four-year cycle.
†For worst-case annual average, assume a 20-year cycle.
‡Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).
NA: not applicable

feasible and, consequently, ocean disposal may not be an option for projects in these areas. As such, disposal at LA-2 for projects from these areas is not assumed for the No Action Alternative. Also as seen in Table 2.1-1, although the average annual disposal volume is less than the previously analyzed volume of 200,000 yd^3 (153,000 m^3), this volume could be substantially exceeded in a worst-case year.

As indicated, under this alternative LA-3 would not be designated as a permanent ODMDS and LA-2 would continue to be managed for an average annual disposal volume of 200,000 yd^3 (153,000 m^3). Consequently, the availability of adequate disposal capacity would be limited and would not meet the anticipated need for ocean disposal of dredged material identified in the ZSF study.

2.1.2 Maximize Use of LA-2 (Alternative 2)

As with the No Action Alternative, under this alternative the EPA would not permanently designate an ODMDS appropriate for disposal of suitable dredged material from the Newport Harbor and Bay area. The interim status designation of LA-3 would remain expired, prohibiting future disposal at this site.

This alternative would increase the maximum analyzed annual dredged material quantity that could be managed and placed at the LA-2 site. However, this increase in maximum annual disposal capacity would primarily be to account for the greater than anticipated dredged material quantities currently being generated in Los Angeles County. Although it may be feasible for some projects to transport limited quantities of dredged material from the Newport area to the LA-2 site, transportation of all dredged material from the Newport area to LA-2 is not considered practical. Additionally, the added transportation distance for disposal at LA-2 would result in other potentially significant environmental impacts as mentioned in the No Action Alternative discussion.

Although it may not be feasible at this time for some projects in the Newport Bay and Dana Point Harbor areas to transport their dredged material to LA-2, for the purposes of establishing a maximum analyzed annual dredged material quantity that could be placed at LA-2, it was assumed that all projects identified in the ZSF Study (USACE 2003a) would utilize LA-2. Based on this assumption, the total worst-case yearly and average yearly disposal volumes at LA-2 for Alternative 2 were estimated. These volumes are shown in Table 2.1-2.

As with the No-Action Alternative, the total worst-case yearly volume shown in Table 2.1-2 (3,641,000 yd^3 [2,784,000 m^3]) assumes that all projects occur simultaneously and include the 50 percent conservatism factor. The total average yearly volume (390,000 yd^3 [298,000 m^3]) assumes that the dredging projects are spread out over their anticipated

TABLE 2.1-2
ALTERNATIVE 2 FORECASTED WORST-CASE YEARLY AND AVERAGE YEARLY DISPOSAL VOLUMES

Harbor/Facility	Disposal Economically Feasible* LA-2	Disposal Economically Feasible* LA-3	County of Origin	Average Volume per Cycle (cubic yards)	Maintenance Dredging Time Period for Each Cycle (years)	Alternative 2 Forecasted Worst-Case Year LA-2 (cubic yards)	Alternative 2 Forecasted Worst-Case Year LA-3 (cubic yards)	Alternative 2 Forecasted Annual Average LA-2 (cubic yards)	Alternative 2 Forecasted Annual Average LA-3 (cubic yards)
Regular Maintenance									
Los Angeles River Estuary	Yes	**No**	LA	75,000	4 – 5*	113,000	NA	19,000	NA
Los Angeles Harbor	Yes	Yes	LA	10,000	1	15,000	NA	10,000	NA
Long Beach Harbor	Yes	Yes	LA	38,000	1	57,000	NA	38,000	NA
Marina del Rey	Yes	**No**	LA	67,000	2	101,000	NA	34,000	NA
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	150,000	NA	10,000	NA
Newport Harbor	**No**	Yes	Orange	250,000	25	375,000	NA	10,000	NA
Dana Point Harbor	**No**	Yes	Orange	50,000	8	75,000	NA	6,000	NA
Upper Newport Bay	**No**	Yes	Orange	100,000	10	150,000	NA	10,000	NA
Anaheim Bay	Yes	**No**	Orange	150,000	10	225,000	NA	15,000	NA
						1,261,000	NA	152,000	NA
Capital Improvement									
Los Angeles Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	NA	13,000	NA
Long Beach Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	NA	13,000	NA
Upper Newport Bay‡	**No**	Yes	Orange	2,120,000	2‡	1,590,000	NA	212,000	NA
						2,380,000	NA	238,000	NA
TOTAL (Forecasted)						**3,641,000**	**NA**	**390,000**	**NA**
HISTORICAL VOLUMES FOR PERIOD 1992 – 2001						**803,000**	**860,000**	**363,000**	**132,000**

*USACE 2003a
**For worst-case annual average, assume a four-year cycle.
†For worst-case annual average, assume a 20-year cycle.
‡Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).
NA: not applicable

dredging cycles and that the total dredged volume per cycle for each project is equal to the average volume per cycle.

As indicated, under this alternative LA-3 would not be designated as a permanent ODMDS. Based on the projected dredging volumes from the ZSF study as well as site management considerations, under this alternative the LA-2 site would be designated for an annual maximum of 3,500,000 yd^3 (2,676,000 m^3). This maximum volume designation would accommodate the projected average annual volume requirements as well as provide for substantial annual volume fluctuations.

It is anticipated that the same concerns discussed above for the No Action Alternative regarding continued maritime operations in the Newport Harbor area and the ongoing maintenance and restoration activities at Upper Newport Bay would also occur with Alternative 2.

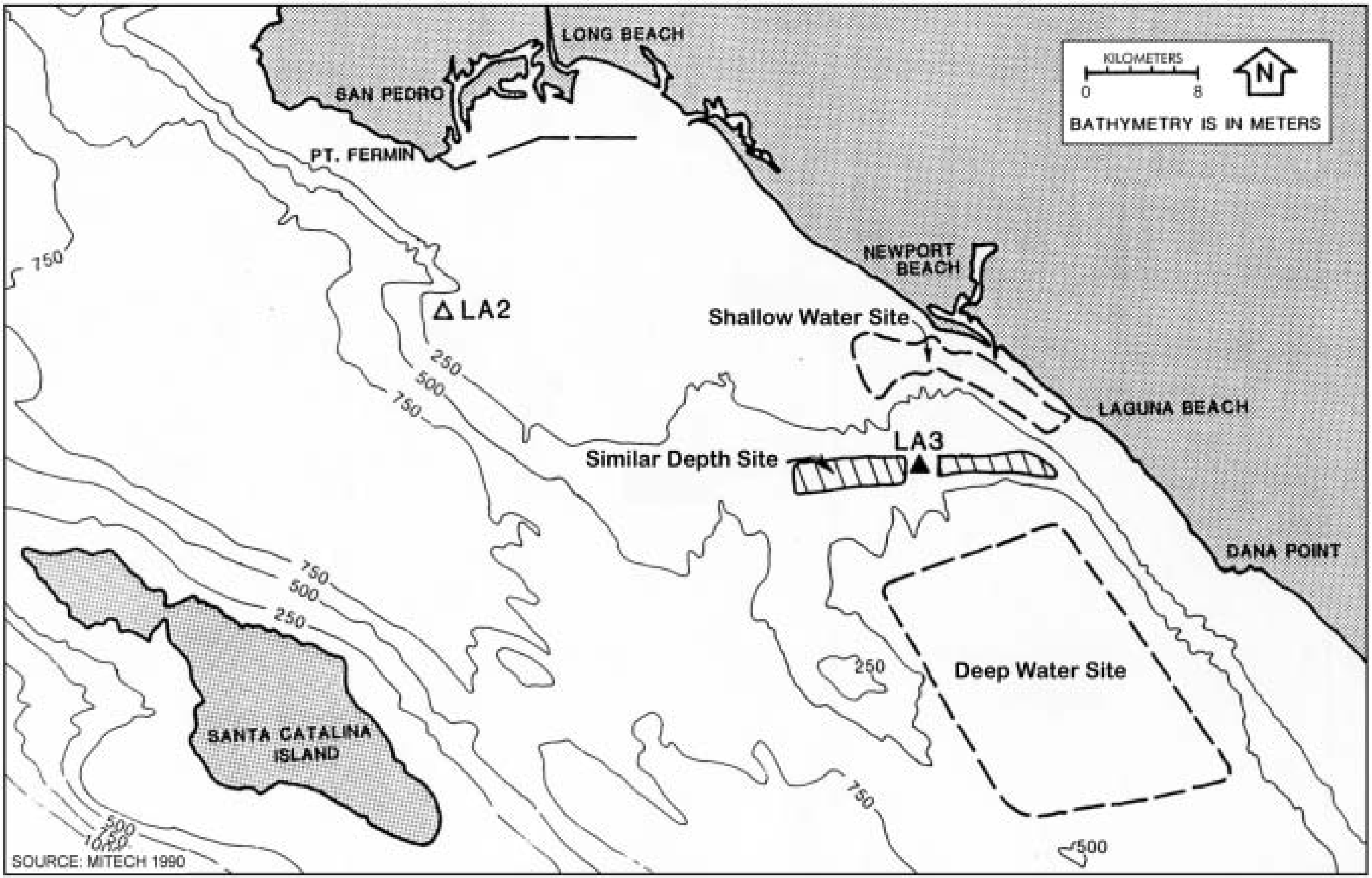
As discussed in Section 1.2, the USACE considers it essential that an acceptable disposal site be designated for dredged material from Newport Bay and Harbor. Selection of Alternative 2 would eliminate an ocean disposal site within reasonable distance of Newport Harbor.

2.1.3 Alternatives for Permanent Designation of LA-3 (Alternatives 3 and 4)

Under Alternatives 3 and 4, the EPA would permanently designate an LA-3 ODMDS to accommodate disposal of dredged material originating from the Newport Bay area. These two alternatives offer different management options that may yield different overall cumulative environmental impacts from the disposal of dredged material generated from the Los Angeles-Orange County region.

The location of the interim LA-3 site is 33°31'42" N and 117°54'48" W, approximately 8.5 km (4.5 nmi) southwest of the entrance channel to Newport Harbor (Figure 2.1-1). The interim site is a circular area with a radius of 915 m (3,000 ft) and a water depth at the center of approximately 450 m (1,475 ft). LA-3 is positioned on the continental slope within Newport Canyon. At the site, the seafloor slopes from the northwest to the southeast from water depths of 410 to 480 m (1,345 to 1,575 ft).

During the 1998 U.S. Geological Survey review, a substantial amount of dredged material outside the interim site boundaries was noted, both to the north and to the northeast and southeast of the site. This may be attributed to disposal short of the targeted disposal site, errors in disposal generally resulting from inaccurate navigation, and/or dispersion of disposed material. Approximately 786,000 yd^3 (601,000 m^3) of sediment dredged from the Upper Newport Bay was recently disposed in the southeast



Locations of LA-3 and LA-2 and Other Alternative Sites

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Figure 2.1-1

quadrant of the interim site boundary. In addition, the interim location may preclude the effective use of bathymetry or other acoustic techniques during site monitoring due to the presence of complex submarine canyon features located within the site boundary. Consequently, the proposed permanent site boundary would be centered at about 2.4 km (1.3 nmi) southeast of the interim site center with a boundary radius of 915 m (3,000 ft) that reflects the results of the modeling runs that predicted the size of the anticipated dredged material footprint (Figure 2.1-2).

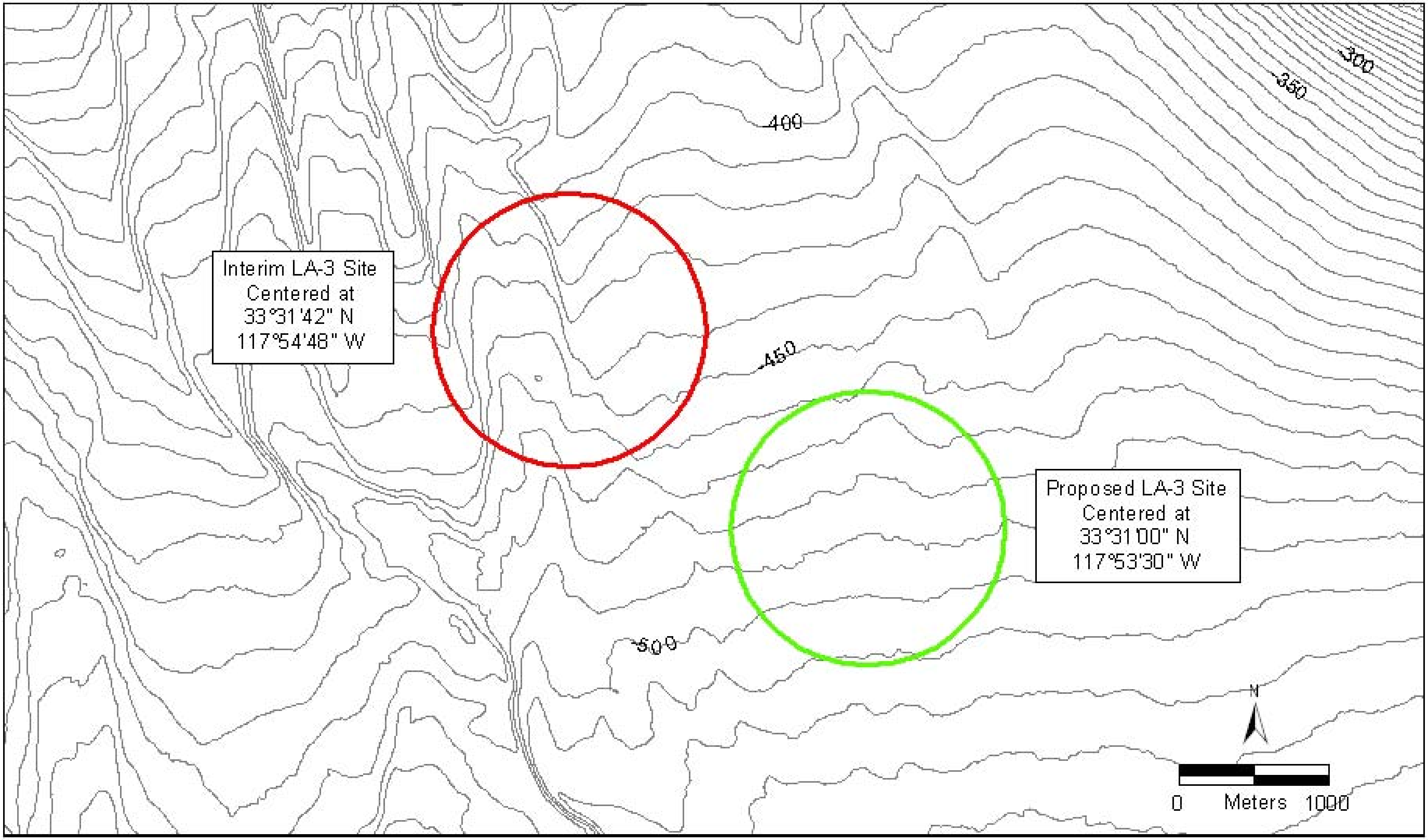
The center of the proposed LA-3 site is at 33°31'00" N and 117°53'30" W, approximately 8.5 km (4.5 nmi) southwest of the entrance channel to Newport Harbor (Figure 2.1-1). As discussed in Chapter 3 of this EIS, based on the results of the modeling runs, the boundary of the proposed site would remain at a radius of 915 m (3,000 ft). By doing so, the permanent site would not only encompass the region that is already disturbed by dredged material, but also would be located on a flat, depositional plain that will be more amenable to monitoring via precision bathymetry.

Designating the center of the permanent LA-3 site to the southeast of the interim site within the LA-3 study area as indicated would not significantly change the transportation distance from the Newport area. Locating the permanent site boundaries at this location would not be anticipated to change the environmental impacts associated with the interim LA-3 site and would redirect the disposal of material to an area historically used for disposal. Focusing the permanent disposal area away from the submarine canyon that exists at the interim site would simplify monitoring of the disposal activities.

2.1.3.1 Alternative 3 – Local Use of LA-3 and LA-2

Under Alternative 3, EPA would permanently designate the LA-3 ODMDS with an annual quantity adequate to manage disposal of dredged material generated locally from the Newport Beach and general Orange County area. The existing LA-2 site would be evaluated for a higher maximum annual quantity to manage disposal of dredged material generated primarily from the Los Angeles County region.

The ZSF Study evaluated for each potential dredge project whether disposal at the existing LA-2 or proposed LA-3 ODMDS would be economically feasible (USACE 2003a). For the purposes of establishing the maximum analyzed annual dredged material quantities that could be placed at LA-2 or LA-3, it was assumed that the Los Angeles County projects identified in the ZSF Study (USACE 2003a) would utilize LA-2. Likewise, it was assumed that the Orange County projects identified in the ZSF Study (USACE 2003a) would utilize LA-3. The exception to this are dredging projects in Anaheim Bay for which disposal at LA-3 is not considered economically feasible (USACE 2003a). Consequently, for this alternative it is assumed that disposal of dredged material from Anaheim Bay would occur at the LA-2 site.



Location of Interim and Proposed Permanent LA-3 Disposal Sites

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Figure 2.1-2

Using these assumptions, the total worst-case yearly and average yearly disposal volumes at LA-2 and LA-3 for Alternative 3 were estimated. These volumes are shown in Table 2.1-3. As with the No-Action Alternative, the total worst-case yearly volumes shown in Table 2.1-3 (1,301,000 yd^3 [995,000 m^3] for LA-2; 2,340,000 yd^3 [1,789,000 m^3] for LA-3) assume that all projects occur simultaneously and include the 50 percent conservatism factor. The total average yearly volumes (142,000 yd^3 [109,000 m^3] for LA-2; 248,000 yd^3 [190,000 m^3] for LA-3) assume that the dredging projects are spread out over their anticipated dredging cycles and that the total dredged volume per cycle for each project is equal to the average volume per cycle.

Accordingly, based on the projected dredging volumes from the ZSF study as well as site management considerations, under this alternative the LA-2 site would be designated for an annual maximum of 1,000,000 yd^3 (765,000 m^3) and the LA-3 site would be designated for an annual maximum of 2,500,000 yd^3 (1,911,000 m^3). These maximum volume designations would accommodate the projected average annual volume requirements as well as provide for substantial annual volume fluctuations.

2.1.3.2 Alternative 4 – Maximize Use of LA-3

Under Alternative 4, EPA would permanently designate the LA-3 site for a maximum annual disposal quantity adequate to meet the ocean disposal needs of all Los Angeles/Orange County region projects to the extent feasible, and would establish an annual disposal quantity limit for LA-2 to accommodate only those projects that could not feasibly use LA-3.

The ZSF Study evaluated for each potential dredge project whether disposal at the exiting LA-2 or proposed LA-3 ODMDSs would be economically feasible (USACE 2003a). For the purposes of establishing the maximum analyzed annual dredged material quantities that could be placed at LA-2 or LA-3, it was assumed for this alternative that all projects identified in the ZSF Study (USACE 2003a), for which disposal at LA-3 would be economically feasible, would utilize LA-3. Those projects for which disposal at LA-3 is not economically feasible would continue to utilize LA-2.

Using these assumptions, the total worst-case yearly and average yearly disposal volumes at LA-2 and LA-3 for Alternative 4 were estimated. These volumes are shown in Table 2.1-4. As with the No-Action Alternative, the total worst-case yearly volumes shown in Table 2.1-4 (439,000 yd^3 [336,000 m^3] for LA-2; 3,202,000 yd^3 [2,448,000 m^3] for LA-3) assume that all projects occur simultaneously and include the 50 percent conservatism factor. The total average yearly volumes (68,000 yd^3 [52,000 m^3] for LA-2; 322,000 yd^3 [246,000 m^3] for LA-3) assume that the dredging projects are spread out over their anticipated dredging cycles and that the total dredged volume per cycle for each project is equal to the average volume per cycle.

TABLE 2.1-3
ALTERNATIVE 3 FORECASTED WORST-CASE YEARLY AND AVERAGE YEARLY DISPOSAL VOLUMES

Harbor/Facility	Disposal Economically Feasible*		County of Origin	Average Volume per Cycle (cubic yards)	Maintenance Dredging Time Period for Each Cycle (years)	Alternative 3		Alternative 3	
	LA-2	LA-3				Forecasted Worst-Case Year LA-2 (cubic yards)	Forecasted Worst-Case Year LA-3 (cubic yards)	Forecasted Annual Average LA-2 (cubic yards)	Forecasted Annual Average LA-3 (cubic yards)
Regular Maintenance									
Los Angeles River Estuary	Yes	**No**	LA	75,000	4 – 5*	113,000	-	19,000	-
Los Angeles Harbor	Yes	Yes	LA	10,000	1	15,000	-	10,000	-
Long Beach Harbor	Yes	Yes	LA	38,000	1	57,000	-	38,000	-
Marina del Rey	Yes	**No**	LA	67,000	2	101,000	-	34,000	-
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	-	150,000	-	10,000
Newport Harbor	**No**	Yes	Orange	250,000	25	-	375,000	-	10,000
Dana Point Harbor	**No**	Yes	Orange	50,000	8	-	75,000	-	6,000
Upper Newport Bay	**No**	Yes	Orange	100,000	10	-	150,000	-	10,000
Anaheim Bay	Yes	**No**	Orange	150,000	10	225,000		15,000	-
						511,000	750,000	116,000	36,000
Capital Improvement									
Los Angeles Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	-	13,000	-
Long Beach Harbor	Yes	Yes	LA	263,000	20 – 25†	395,000	-	13,000	-
Upper Newport Bay‡	**No**	Yes	Orange	2,120,000	2‡	-	1,590,000	-	212,000
						790,000	1,590,000	26,000	212,000
TOTAL (Forecasted)						**1,301,000**	**2,340,000**	**142,000**	**248,000**
HISTORICAL VOLUMES FOR PERIOD 1992 – 2001						**803,000**	**860,000**	**363,000**	**132,000**

*USACE 2003a
**For worst-case annual average, assume a four-year cycle.
†For worst-case annual average, assume a 20-year cycle.
‡Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).

TABLE 2.1-4
ALTERNATIVE 4 FORECASTED WORST-CASE YEARLY AND AVERAGE YEARLY DISPOSAL VOLUMES

Harbor/Facility	Disposal Economically Feasible* LA-2	Disposal Economically Feasible* LA-3	County of Origin	Average Volume per Cycle (cubic yards)	Maintenance Dredging Time Period for Each Cycle (years)	Alternative 4 Forecasted Worst-Case Year LA-2 (cubic yards)	Alternative 4 Forecasted Worst-Case Year LA-3 (cubic yards)	Alternative 4 Forecasted Annual Average LA-2 (cubic yards)	Alternative 4 Forecasted Annual Average LA-3 (cubic yards)
Regular Maintenance									
Los Angeles River Estuary	Yes	**No**	LA	75,000	4 – 5**	113,000	-	19,000	-
Los Angeles Harbor	Yes	Yes	LA	10,000	1	-	15,000	-	10,000
Long Beach Harbor	Yes	Yes	LA	38,000	1	-	57,000	-	38,000
Marina del Rey	Yes	**No**	LA	67,000	2	101,000	-	34,000	-
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	-	150,000	-	10,000
Newport Harbor	**No**	Yes	Orange	250,000	25	-	375,000	-	10,000
Dana Point Harbor	**No**	Yes	Orange	50,000	8	-	75,000	-	6,000
Upper Newport Bay	**No**	Yes	Orange	100,000	10	-	150,000	-	10,000
Anaheim Bay	Yes	**No**	Orange	150,000	10	225,000	-	15,000	-
						439,000	822,000	68,000	84,000
Capital Improvement									
Los Angeles Harbor	Yes	Yes	LA	263,000	20 – 25†	-	395,000	-	13,000
Long Beach Harbor	Yes	Yes	LA	263,000	20 – 25†	-	395,000	-	13,000
Upper Newport Bay‡	**No**	Yes	Orange	2,120,000	2‡	-	1,590,000	-	212,000
						-	2,380,000	-	238,000
TOTAL (Forecasted)						**439,000**	**3,202,000**	**68,000**	**322,000**
HISTORICAL VOLUMES FOR PERIOD 1992 – 2001						**803,000**	**860,000**	**363,000**	**132,000**

*USACE 2003a
**For worst-case annual average, assume a four-year cycle.
†For worst-case annual average, assume a 20-year cycle.
‡Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).

Accordingly, based on the projected dredging volumes from the ZSF study as well as site management considerations, under this alternative the LA-2 site would be designated for an annual maximum of 500,000 yd^3 (382,000 m^3) and the LA-3 site would be designated for an annual maximum of 3,500,000 yd^3 (2,676,000 m^3). These maximum volume designations would accommodate the projected average annual volume requirements as well as provide for substantial annual volume fluctuations. As also seen in Table 2.1-4, it is noted that although the worst-case yearly disposal volume at LA-2 is estimated to be 439,000 yd^3 (336,000 m^3), the average annual disposal volume (68,000 yd^3 [52,000 m^3]) is much less than the previously analyzed volume of 200,000 yd^3 (153,000 m^3).

2.2 Discussion of Alternatives

2.2.1 Alternative LA-3 Disposal Sites Considered but Eliminated from Detailed Study

Ocean disposal sites considered as alternatives to the proposed LA-3 site include a shallow-water site, a deep-water site, and a site at a depth similar to the proposed LA-3 site. The alternative sites represent generic regions, principally determined by water depth. These areas were chosen to consider the environmental advantages/disadvantages of designating a disposal site at an oceanic area other than the interim or proposed LA-3 sites.

The shallow-water site is located offshore of Newport Beach, 9.3 km (5.8 miles) upcoast and downcoast from the entrance to Newport Harbor (see Figure 2.1-1). Water depth in this area ranges from 18.3 to 183 m (60 to 600 ft). The area is adjacent to the OCSD outfall, which discharges in 60 m (197 ft) of water. This site was selected to keep the shallow-water site within an economical distance of the harbor entrance.

Evaluation of this site involves considering the proximity of boating and fishing areas, nearshore biological resources, recreational beach and harbor use, and synergistic effects of the OCSD sewage outfall. Changing the disposal site from the LA-3 interim site to the shallow-water site would not decrease the amount of disposal impacts and would expose a relatively undisturbed area to new environmental impacts. A shallow-water site would be expected to be more dispersive than a deepwater site. Consequently, a shallow-water site would have the greatest potential to impact Areas of Special Biological Significance, particularly the Marine Protected Areas to the south of Newport Harbor, as well as other nearshore resources. Likewise, the shallow-water (nearshore) site would result in the greatest potential conflicts with sportfishing activity as there is more recreational use of this area relative to those areas farther offshore. This site was eliminated from further study for these reasons and because it is a relatively undisturbed area, thus not satisfying the site selection criteria.

The deep-water site considered is located southeast of the LA-3 interim site approximately 17.6 to 31.5 km (10.9 to 19.6 miles) from the entrance to Newport Harbor (see Figure 2.1-1). The site is located on the lower portion of the continental slope at water depths of 640 to 732 m (2,100 to 2,400 ft).

Factors considered during preliminary evaluation of this site relative to other alternatives include: the distance from shore which may result in potential significant impacts to air quality; the increased dispersion of sediments throughout the water column and over a larger area of the sea floor; the abundance and composition of benthic fauna; and the location of the site off the continental shelf. Additionally, the site must be evaluated relative to the general and specific site selection criteria outlined in Chapter 1, particularly as related to past disturbance. Site selection should focus on areas of historical use and avoid creating new impacts.

As with the shallow-water site, designation of an ODMDS in the deep-water area would subject an undisturbed area to new environmental impacts. Because of the greater water depth at the deep-water site, the area of deposition will be larger even though the thickness of deposited material will be less than at the other sites. This site was eliminated from further study for these reasons and because it is an undisturbed area, thus not satisfying the site selection criteria.

Another alternative for ocean disposal is a site at a similar depth to the LA-3 interim and proposed sites. The location considered for this alternative is an area extending 9.3 km (5.8 miles) east and west of the LA-3 interim site along the 457 m (1,500 ft) contour (see Figure 2.1-1). Environmental and physical characteristics of this site would be similar to the LA-3 interim and proposed sites, with the exception that this site would be a relatively undisturbed habitat. Selection of this alternative for final designation as an ODMDS would not reduce the impacts from those expected for the proposed LA-3 site and would subject a previously undisturbed habitat to new environmental stress. Furthermore, as with the shallow-water site, those areas located closer to the shore have a greater potential to adversely impact Marine Protected Areas and other nearshore resources and to conflict with recreational fishing activities. This site was eliminated from further studies for these reasons and because it is an undisturbed area, thus not satisfying the site selection criteria.

Upland disposal at a sanitary landfill is always evaluated as an alternative to ocean disposal for dredged material generated from an individual dredging project. There are four Class III landfills in Orange County: Santiago Canyon (no longer accepting waste with final closure anticipated during 2004), Prima Deshecha, Olinda Alpha, and Frank R. Bowerman. These facilities can accept nonhazardous solid waste including dredged material. However, the material must be dewatered and relatively clean with low concentrations of certain chemicals, heavy metals, and salt. Also, the material must conform to RWQCB criteria for waste disposal. The RWQCB considers the presence of salts in dredged sediment to be a contaminant. Consequently, due to salinity considerations upland disposal outside the immediate vicinity of the Los Angeles/Long Beach harbors is generally not an option. Further, Newport Harbor does not have sufficient area for spreading and drying dredged material prior to landfill disposal.

The use of dredged material for beach nourishment is encouraged in areas suffering from erosion, but only if the material is compatible with the grain size distribution of the receiving beach. Impacts on biological communities and water quality must also be considered before beach nourishment is permitted. This method of dredged material disposal is evaluated by the USACE on a case-by-case basis for each disposal permit but is not a feasible alternative for disposal of all dredged materials. Therefore, beach disposal is not considered as a feasible alternative to designation of LA-3 as an ODMDS.

2.2.2 Compliance of the Alternatives with General Criteria for the Selection of Sites (40 CFR 228)

This section presents an assessment of the LA-2 and proposed LA-3 sites with the five general site selection criteria.

2.2.2.1 General Criteria 40 CFR 228.5(a)

> The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

Historical disposal at the LA-3 site has not interfered with commercial or recreational navigation, commercial fishing, or sportfishing activities. Disposal at the LA-2 site, while located within the U.S. Coast Guard Traffic Separation Schemes, has not interfered with these activities. The continued use of these sites would not change these conditions.

2.2.2.2 General Site Selection Criteria 40 CFR 228.5(b)

> Locations and boundaries of disposal sites will be so chosen that temporary perturbances in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

The LA-2 and LA-3 sites are sufficiently removed from shore and limited fishery resources to allow water quality perturbations caused by dispersion of disposal material to be reduced to ambient conditions before reaching environmentally sensitive areas.

2.2.2.3 General Site Selection Criteria 40 CFR 228.5(c)

> If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

Evaluation of the LA-2 and LA-3 sites indicates that they presently do and would continue to comply with these criteria.

2.2.2.4 General Site Selection Criteria 40 CFR 228.5(d)

> The sizes of the ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

The LA-2 and LA-3 disposal sites consist of circular areas with a 915-m (3,000-ft) radius. The size of the sites has been determined by computer modeling to limit environmental impacts to the surrounding area and facilitate surveillance and monitoring operations. The designation of the size, configuration, and location of sites was determined as part of this evaluation study.

2.2.2.5 General Site Selection Criteria 40 CFR 228.5(e)

> EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

The LA-3 site is located beyond the continental shelf, in a canyon on the continental slope. This site has also been used historically for the disposal of dredged material. LA-3 is the only site that fully meets the above criteria.

The LA-2 site, which has been permanently designated for the ocean disposal of dredged material, is located near the edge of the continental shelf at the 183 m (600 ft) contour. The LA-2 site has been used for the ocean disposal of dredged material since 1977.

2.2.3 Comparison of the Alternatives to EPA's 11 Specific Criteria for Site Selection [40 CFR 228.6(a)]

Discussions of the proposed alternatives relative to the eleven specific criteria for site selection specified in 40 CFR 228.6(a) are provided in Chapter 3, Affected Environment, and in Chapter 4, Environmental Consequences. The proposed action and alternatives relate to the continued use or cessation of use of existing ODMDSs, LA-2 and LA-3. As such, Table 2.2-1 provides a summary of comparisons between the LA-2 and LA-3 sites to support the decision process in evaluating the selection of the preferred alternative over the other viable alternatives.

2.2.4 Selection of the Preferred Alternative

The disposal of dredged material at the LA-2 and LA-3 sites will continue to alter conditions within the site boundaries. These temporary, localized, physical impacts would only occur during disposal operations. Between disposal operations, the sites would recover to more ambient conditions. Both the LA-2 and LA-3 sites have been used for the disposal of dredged material since the late 1970s. To date, impacts resulting from this disposal have not caused unreasonable or significant impacts to the marine environment nor have they significantly impacted commercial and recreational users in the area.

With the No Action Alternative, the interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. As such the No Action Alternative would result in no impacts to the LA-3 site. Disposal at LA-2 would continue and be managed at pre-1991 historical levels evaluated in the original site designation EIS. Future dredging projects exceeding historical levels of disposal would have to be evaluated separately for approval.

The elimination of disposal at LA-3 would allow for a shift from the benthic community currently at the site to one that more resembles the community that was present prior to the initiation of disposal activities. Because of the increased hauling distances between Newport Harbor and the LA-2 site, there are a number of proposed dredging projects in Newport Bay for which ocean disposal of dredged material would not be economically feasible. Consequently, unless other viable disposal options become available, these projects may not go forward. As such the No Action Alternative does not meet the goals and objectives of the proposed action, because it does not provide a viable means of ocean disposal of dredged material for all Orange County projects. Air quality emissions would also be the lowest for the No Action Alternative. However, this is primarily due to the reduction in the total volume of dredged material that could feasibly be disposed of at

TABLE 2.2-1

COMPARISON OF LA-3 AND LA-2 SITES BASED ON THE 11 SPECIFIC CRITERIA AT 40 CFR 228.6(a)

40 CFR 228.6(a) Criteria	LA-3	LA-2
Geographical position, depth of water, bottom topography, and distance from the coast.	Centered at 33°31'00" N, 117°53'30" W The bottom topography is gently sloping from approximately 460 to 510 m (1,500 to 1,675 ft). Situated near the slope of a submarine canyon, the site center is approximately 8.5 km (4.5 nmi) from the mouth of Newport Harbor (see Figure 2.1-1).	Centered at 33°37'06" N and 118°17'24" W The site is at the top edge of the continental slope in approximately 110 to 340 m (360 to 1,115 ft) of water. The LA-2 site is located just south of the San Pedro Valley submarine canyon centered approximately 11 km (5.9 nmi) from the entrance to Los Angeles Harbor (see Figure 2.1-1).
Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases.	Located in an area for feeding and breeding of resident species. Located in gray whale migration route area. No known special breeding or nursery areas.	Located in an area for feeding and breeding of resident species. Located near the gray whale migration route. No known special breeding or nursery areas.
Location in relation to beaches and other amenity areas.	The proposed site boundary is located over 6.5 km (3.5 nmi) offshore of the nearest coast in the Newport Beach and Harbor area. Other beach areas are more distant.	The site boundary is located over 8.5 km (4.6 nmi) offshore of the nearest coast in the Palos Verdes area. Other beach areas are more distant.
Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packaging the waste, if any.	Dredged material to be disposed will be predominantly clays and silts primarily originating from the Los Angeles/Long Beach Harbor area and from Newport Bay and Harbor. Worst-case annual disposal volumes range from 0 to approximately 3.20 million yd^3 (0 to 2.45 million m^3). Average annual disposal volumes range from 0 to approximately 322,000 yd^3 (0 to 246,000 m^3). Dredge material is expected to be released from split hull barges.	Dredged material to be disposed will be predominantly clays and silts primarily originating from the Los Angeles/Long Beach Harbor area and from Newport Bay and Harbor. Worst-case annual disposal volumes range from 439,000 yd^3 to approximately 3.64 million yd^3 (336,000 to 2.78 million m^3). Average annual disposal volumes range from 68,000 yd^3 to approximately 390,000 yd^3 (52,000 to 298,000 m^3). Dredge material is expected to be released from split hull barges.

TABLE 2.2-1

COMPARISON OF LA-3 AND LA-2 SITES BASED ON THE 11 SPECIFIC CRITERIA AT 40 CFR 228.6(a)

(continued)

40 CFR 228.6(a) Criteria	LA-3	LA-2
Feasibility of surveillance and monitoring.	EPA (and USACE for federal projects in consultation with EPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal site is feasible but somewhat complicated by topography. This complication is improved by relocation of permanent LA-3 site away from underwater canyons.	EPA (and USACE for federal projects in consultation with EPA) is responsible for site and compliance monitoring. USCG is responsible for vessel traffic-related monitoring. Monitoring of the disposal site is feasible but somewhat complicated by topography.
Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any.	Currents and vertical mixing will disperse fine sediments. Prevailing currents are primarily parallel to shore and flow along constant depth contours. Situated near the slope of a submarine canyon, this area would be expected to receive sedimentation from erosion and nearshore transport into the canyon from an offshore direction. Overall, sediments are expected to settle offshore (as opposed to onshore).	Currents and vertical mixing will disperse fine sediments. Prevailing currents are primarily parallel to shore and flow along constant depth contours. Some sediment transport offshore due to slumping. Overall, sediments are expected to settle offshore (as opposed to onshore).
Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).	Localized physical impacts have occurred to sediments and benthic biota due to past disposal operations. No anticipated interactions with other discharges due to distance from discharge points.	Localized physical impacts have occurred to sediments and benthic biota due to past disposal operations. No anticipated interactions with other discharges due to distance from discharge points.
Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean.	Minor interferences with commercial and fishing vessels due to disposal barge traffic. Site is not located within active oil or natural gas tracts. Continued disposal operations not anticipated to adversely impact existing nearby oil and gas development facilities or tracts.	Minor interferences with commercial and fishing vessels due to disposal barge traffic. Site is not located within active oil or natural gas tracts. Continued disposal operations not anticipated to adversely impact existing nearby oil and gas development facilities or tracts.

TABLE 2.2-1

COMPARISON OF LA-3 AND LA-2 SITES BASED ON THE 11 SPECIFIC CRITERIA AT 40 CFR 228.6(a)

(continued)

40 CFR 228.6(a) Criteria	LA-3	LA-2
Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.	Water quality is good but temporary, localized physical impacts have occurred to sediments and benthic ecology due to past disposal operations.	Water quality is good but temporary, localized physical impacts have occurred to sediments and benthic ecology due to past disposal operations.
Potentiality for the development or recruitment of nuisance species in the disposal site.	Unknown, but due to depth differences between the disposal site and the likely sources of dredged material, the potential is low.	Unknown, but due to depth differences between the disposal site and the likely sources of dredged material the potential is low.
Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.	No known shipwrecks or resources within 5 km (2.7 nmi) of the disposal site.	No known shipwrecks or resources within 5 km (2.7 nmi) of the disposal site.

the LA-2 site under the No Action Alternative resulting from those dredging projects that would not go forward.

Under Alternative 2, the interim status designation of the LA-3 site also would remain expired, prohibiting future disposal at this site. As such Alternative 2 would result in no impacts to the LA-3 site. The volume for LA-2 would be maximized to accommodate dredged material suitable for ocean disposal that is generated throughout the Los Angeles and Orange Counties region irrespective of the disposal cost.

The elimination of disposal at LA-3 would allow for a shift from the benthic community currently at the site to one that more resembles the community that was present prior to the initiation of disposal activities. However, because of the increased hauling distance for dredged material originating in Orange County, this alternative results in the greatest projected air emissions for the hauling activities. Alternative 2 would result in the disposal of the greatest volume of dredged material at the LA-2 site of the four alternatives and, consequently, impacts to the LA-2 site would be greatest for this alternative. Additionally, although the LA-2 site would be reevaluated to accommodate the increased volume of dredged material projected for ocean disposal in the Los Angeles/Orange County region, the high cost of hauling the material to LA-2 could preclude certain Orange County dredging projects from moving forward.

Under Alternative 3, the EPA would permanently designate the LA-3 ODMDS with an annual quantity adequate to manage disposal of dredged material generated locally from the Newport Beach and general Orange County area. The existing LA-2 site would be evaluated for a higher maximum annual quantity to manage disposal of sediments generated primarily from the Los Angeles County region. With this alternative the ocean disposal of dredged material would continue at both the LA-2 and LA-3 sites, which have been accepting dredged material since the late 1970s. LA-2 would primarily be used by dredging projects in Los Angeles County while LA-3 would primarily be used by dredging projects in Orange County. As such, dredged material hauling activities would be optimized under this alternative. Ocean disposal would be economically feasible for all of the identified dredging projects requiring ocean disposal in the region.

Because more material would be disposed of under Alternative 3 than under the No Action Alternative, this alternative would result in greater air emissions than the No Action Alternative. However, air emissions resulting from implementation of Alternative 3 would be less than those projected for Alternatives 2 or 4. Impacts to benthic organism would be confined to within the LA-2 and LA-3 site boundaries. Alternative 3 would result in the continued use of areas previously disturbed by disposal activities and would allow dredging projects in the region to continue as in the past, although the maximum annual disposal volumes for the individual sites would be reevaluated.

Under Alternative 4 the LA-3 site would be permanently designated for a maximum annual disposal quantity adequate to meet the ocean disposal needs of all Los Angeles-Orange County region projects to the extent feasible, and would establish an increased annual disposal quantity for LA-2 to accommodate only those project that could not feasibly use LA-3. The ocean disposal of dredged material would continue at both the LA-2 and LA-3 sites under this alternative.

The volume of dredged material disposed of at LA-2 would be minimized under this alternative and, correspondingly, impacts at LA-2 would be minimized. The potential for impacts between disposal barges traveling between the harbors and LA-2 and commercial vessels would also be minimized under this alternative. With Alternative 4 the volume of dredged material disposed of at LA-3 would be maximized. Therefore, impacts to the LA-3 site would be greatest under this alternative. Additionally, this alternative also results in the second highest air emissions to the basin of the four alternatives, primarily due to the increased hauling distance of dredged material originating in the Los Angeles area.

As discussed, implementation of the No Action Alternative or Alternative 2 potentially could preclude certain projects within Orange County from going forward. No other adverse impacts to the socioeconomic resources of the region are anticipated for these or the other alternatives. Where adverse benthic impacts are anticipated, those impacts would be limited to the area within the disposal site boundaries.

Although not considered significant, the No Action Alternative and Alternative 2 could result in greater disposal barge traffic crossing commercial shipping lanes than would occur under Alternatives 3 and 4. Not permanently designating LA-3 as an ODMDS (No Action Alternative and Alternative 2) could free up the LA-3 site area to the development of oil and gas resources. However, there are no current plans for future oil or gas development in the vicinity of the LA-3 site.

Based on the forgoing discussion and rational, the USACE and EPA have determined that Alternative 3 is the Preferred Alternative. In concert with the implementation of this action a detailed Site Management and Monitoring Plan (SMMP) has been developed by the EPA and USACE and is included as Appendix A of this EIS. The purpose of the SMMP is to monitor biological and other physical resources within and surrounding the disposal sites, and to track all disposal activities in the region. This program is discussed in more detail in Section 4.5 of this EIS.

CHAPTER 3.0
AFFECTED ENVIRONMENT

The following sections describe the affected environment and existing conditions within the LA-3 and LA-2 study areas. The LA-2 study area includes the permanently designated LA-2 ODMDS and surrounding environs. The LA-3 study area was initially defined to evaluate the conditions at the interim LA-3 disposal site. As discussed in Chapter 2 of this EIS, a substantial amount of dredged material was noted outside the interim LA-3 site boundaries during recent bathymetric surveys. Consequently, the LA-3 study area was expanded to include areas of disposal that have occurred outside of the interim boundary. The LA-3 site proposed for permanent designation located 2.4 km (1.3 nmi) to the southeast of the interim site accounts for these disposal areas. Given the proximity of the interim and proposed permanent LA-3 sites, the LA-3 study area data are applicable to both sites.

3.1 Ocean Disposal Site Characteristics

3.1.1 Historical Use of the Study Region [40 CFR 228.5(e)]

The proposed LA-3 site is located on the slope of Newport Canyon centered at a depth of approximately 490 m (1,600 ft), approximately 8.5 km (4.5 nmi) southwest of the entrance to Newport Harbor (33°31'00" N and 117°53'30" W; see Figures 1.1-2 and 2.1-2). The bottom topography is gently sloping from approximately 460 to 510 m (1,500 to 1,675 ft). Situated at the foot of a submarine canyon, this area would be expected to receive sedimentation from erosion and nearshore transport into the canyon.

The LA-2 site is located approximately 9.3 km (5 nmi) southwest of the breakwater at San Pedro and 38 km (20.5 nmi) from the Newport Harbor entrance (33°37'06" N and 118°17'24" W; see Figure 1.1-3). The site is near the top edge of the continental slope in approximately 110 to 340 m (360 to 1,115 ft) of water. The LA-2 site is located just south of the San Pedro Valley submarine canyon.

Historically, the LA-3 site has been used for the disposal of dredged material primarily from sources in Newport Bay and Newport Harbor. Table 1.1-2 lists the disposal amounts and dredged material sources for LA-3 from 1976 through 2001. Material disposed of at the LA-3 site was evaluated according to the environmental criteria established by the EPA and USACE (40 CFR 227).

The LA-2 site has historically been used for the disposal of dredged material from sources primarily located in Los Angeles County (particularly Los Angeles and Long Beach Harbors). Table 1.1-3 lists the disposal amounts and dredged material sources for LA-2 from 1976 through 2001. As with LA-3, material disposed of at the LA-2 site was evaluated according to the environmental criteria established by the EPA and USACE (40 CFR 227).

A site designated for dredged material disposal will only be used for the disposal of dredged material that has undergone environmental evaluation according to permitting criteria established by the EPA and USACE. A site management program will monitor compliance of disposal operations and monitor site conditions. Should monitoring reveal unexpected adverse environmental impacts, management actions would include modification of site use and/or disposal procedures, additional site monitoring and evaluation, or closing the site.

The amount, frequency, and methods of dredged material disposal are expected to remain comparable to historical dredging operations. The sources of dredged material are anticipated to remain the same and include: Los Angeles Harbor, Long Beach Harbor, the Los Angeles River Estuary, Marina del Rey, Anaheim Bay, Sunset/Huntington Harbor, Dana Point, Newport Harbor, Newport Bay, Upper Newport Bay and the immediate surrounding areas.

3.1.2 Feasibility of Surveillance and Monitoring [40 CFR 228.5(d) and 228.6(a)(5)]

The EPA (and USACE for federal projects in consultation with EPA) conducts surveillance, monitoring, and site management at ocean dredged material disposal sites. The U.S. Coast Guard (USCG) is responsible for vessel traffic-related tracking and monitoring. In general, these surveillance and monitoring efforts are complicated by distance from shore and bottom topography of the disposal site. The difficulty of monitoring varies for the LA-2 and LA-3 sites; however, accurate sampling is possible at both sites.

The major hindrance to monitoring at LA-2 is the bottom topography. There is a wide range in bottom depths at the site because it is located at the top edge of a relatively steep slope. This complicates benthic sampling of the area, although monitoring is still feasible.

Although the proposed LA-3 site is nearer to shore than the LA-2 site, the LA-3 site is located in deeper water. Consequently, deployment and retrieval of sampling equipment is fairly time consuming at the LA-3 site. Once equipment is deployed, benthic sampling is fairly easy considering the gently sloping bottom and soft sediments that characterize the area.

The OCSD outfall is located approximately 13 km (7 nmi) northwest of the proposed LA-3 site (see Figure 1.1-1). As discussed in Chapter 1 of this EIS, the depth of the LA-3 site is well below that of the OCSD outfall. As such, dredged material deposited at LA-3 is expected to remain at depth and is not expected to impact the shallower, nearshore environment in the vicinity of the OCSD outfall. Water quality impacts during dredged material disposal operations at the LA-3 site will be temporary and localized in the vicinity of the LA-3 site and are not expected to extend to the shallower, nearshore area. Consequently, any water quality impacts that are detected in the shallow nearshore water area would likely be due to discharges from the OCSD outfall or some other source.

The other municipal waste outfalls in the region surrounding the LA-2 and LA-3 study areas include the Joint Water Pollution Control Plant (White's Point) outfall, the Avalon outfall, the Aliso outfall, and the South East Regional Reclamation Authority (SERRA) outfall (see Figure 1.1-1). These outfalls are significantly removed from the permanent LA-2 and proposed LA-3 sites or have sufficiently low outflows to preclude potential significant interactions or cumulative impacts.

3.2 Physical Environment

3.2.1 Meteorology and Air Quality

3.2.1.1 Meteorology

The climate of southern California coastal and offshore areas is classified as Mediterranean coastal, with warm dry summers and relatively wet, mild winters. Extreme variations in yearly temperature are uncommon. The mean air temperature ranges from 12 to 15 degrees Celsius (°C; 54 to 59 degrees Fahrenheit [°F]) in January and from 14 to 22 °C (57 to 72 °F) in August. Average annual precipitation in the coastal region ranges between 25 and 38 cm (10 and 15 inches). Precipitation tends to decrease as the distance offshore increases. Most precipitation occurs during the months of October through April.

The dominant wind pattern for southern California is northwest winds offshore. During the summer months, the seabreeze or stratus regime predominates. It is associated with coastal fog, stratus clouds, and persistent westerly to northwesterly winds averaging 15 km/hr (8 knots [kn]). Locally the Santa Catalina eddy causes these northwesterly winds to shift and blow southeasterly to southwesterly along the shore of the southern California bight, especially during night and early morning hours. The eddy is caused by the orientation of the peninsular mountains which trend north to south but abruptly change east to west, north of the Santa Monica Mountains.

The winter months experience more variable wind patterns, with a land-sea orientation. It is characterized by northeast winds during the afternoon and evening with westerly winds after sunset. The northeast wind orientation is associated with high pressure over the western U.S. and referred to as Santa Ana winds.

During the spring when strong northwest winds prevail, the maximum intensity of upwelling occurs. The net direction of surface waters shows a tendancy to a westerly bend due to the Coriolis Effect. Vertical flows of water are extensive in the area.

3.2.1.2 Air Quality

Air quality in a particular area depends upon prevailing wind conditions, local onshore topography, and pollutant emissions. Pollutants that frequently exceed air quality standards in the region include ozone, suspended particulates, nitrogen oxides, and carbon monoxide.

3.2.1.3 Regulatory Setting

Federal, state, and regional agencies have established standards and regulations addressing air pollutant emissions that are pertinent to the study area. A sampling of rules and regulations pertinent to the study area are discussed below.

a. Federal Regulations

The Clean Air Act (CAA) is intended to protect the nation's air quality by regulating emissions of air pollutants. The Act is applicable to permits and planning procedures related to dredged material disposal within the territorial sea. The proposed action (the designation of an ODMDS) does not permit the actual disposal of dredged material. However, because the CAA is applicable to the proposed action, a basic air quality evaluation of the potential impacts to air quality resulting from future use of the disposal sites is presented in Chapter 4 of this EIS. Subsequent projects that would generate material to be disposed of at an ODMDS would be subject to further individual environmental review and specific conformity determinations during the permitting process.

However, because the site(s) chosen for ocean disposal of dredged material will ultimately affect the emissions resulting from hauling the material to that site(s) due to the varying haul distances resulting from each alternative, for the purposes of assessing the alternatives presented in this analysis the guidance and Conformity Demonstration thresholds specified in the CAA will be used.

The federal CAA was enacted in 1970 and amended in 1977 and 1990 [42 U.S.C. 7506(c)] for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity. In 1971, in order to achieve the purposes of Section 109 of the act, the EPA developed primary and secondary national ambient air quality standards (NAAQS). Six pollutants of primary concern were designated: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and suspended particulates (PM_{10}). The primary NAAQS must "protect the public health with an adequate margin of safety" and the secondary standards must "protect the public welfare from known or anticipated adverse effects (aesthetics, crops, architecture, etc.)" (Federal Clean Air Act 1990: Section 109). The primary standards were established, with a margin of safety, considering long-term exposures for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties). Table 3.2-1 summarizes the current federal ambient air quality standards.

The South Coast Air Basin (SCAB), which consists of all of Los Angeles and Orange Counties and the nondesert portions of San Bernardino and Riverside Counties, is currently the smoggiest area in the nation. If an air basin is not in federal attainment for a particular pollutant, the basin is classified as marginal, moderate, serious, severe, or extreme. The SCAB is currently designated as an extreme nonattainment area for the one-hour ozone standard and as a serious nonattainment area for both PM_{10} and CO.

In 1997, the EPA established new federal air quality standards for 8-hour ozone. Until recently, the EPA had been unable to implement and enforce the eight-hour ozone standard established in 1997 as a result of several legal challenges culminating with the U.S. Supreme Court. The Supreme Court issued its opinion on February 27, 2001 upholding the new ozone standard. However, the Court said EPA must reconsider its implementation plan for moving from the 1-hour standard to the revised standard. The Court instructed EPA to develop an implementation plan (including a timetable) consistent with the Court's opinion. While the case was pending before the Supreme Court, the ozone and fine particle standards remained in effect as a legal matter, because the D.C. Circuit Court had not vacated the standards.

Consequently, although enforcement of the standard had been delayed by the litigation, the EPA directed air districts to begin collecting eight-hour ozone data to be used in determining the attainment status of the districts relative to the new standard. The resolution of litigation regarding the new eight-hour ozone standard has allowed the EPA to move forward with implementation of the standard.

The EPA requested States to provide designation recommendations to the Regional Administrator by July 15, 2003. The California Air Resources Board (CARB) supplied

TABLE 3.2-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1] Concentration[3]	California Standards[1] Method[4]	Federal Standards[2] Primary[3,5]	Federal Standards[2] Secondary[3,6]	Federal Standards[2] Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	0.12 ppm (235 µg/m^3)[8]	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	--		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM_{10})	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		50 µg/m^3		
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		65 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	Non-dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		--	--	--
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	Gas Phase Chemilumine-scence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m^3)		--		
Lead	30 days average	1.5 µg/m^3	AIHL Method 54 (12/74) Atomic Absorption	--	--	High Volume Sampler and Atomic Absorption
	Calendar Quarter	--		1.5 µg/m^3	Same as Primary Standard	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	Fluorescence	0.030 ppm (80 µg/m^3)	--	Pararosoaniline
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	--	
	3 Hour	--		--	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (665 µg/m^3)		--	--	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer –visibility of 10 miles or more (0.07 – 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chroma-tography*	No Federal Standards		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence	No Federal Standards		
Vinyl Chloride[9]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chroma-tography	No Federal Standards		

See also footnotes on next page.

TABLE 3.2-1
AMBIENT AIR QUALITY STANDARDS
(continued)

ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

[1]California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2]National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

[3]Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25º C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25º C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4]Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[5]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7]Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8]New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. Contact U.S. EPA for further clarification and current federal policies.

[9]The ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

monitoring data for the years 2000 through 2002 to the EPA on July 15, 2003 and recommended that the SCAB be designated as nonattainment for the federal eight-hour ozone standard (Witherspoon 2003). The EPA reviewed the designation recommendations and on April 30, 2004 listed the final designations in the Federal Register (EPA 2004a). These designations became effective June 15, 2004.

The SCAB, including the coastal areas near the LA-2 and proposed LA-3 sites, has been designated a non-attainment area for the eight-hour ozone standard under Subpart 2 of Part D of the Clean Air Act, and classified as a "Severe 17" type non-attainment area (EPA 2004a). For areas subject to Subpart 2, consistent with Section 181(a) of the CAA, under the Severe 17 classification the period of attainment will be no more than seventeen years from the effective date of designation (EPA 2004b). Consequently, the SCAB must demonstrate attainment of the eight-hour ozone standard by June 15, 2021.

A new federal fine particles standard was also established in 1997, targeting $PM_{2.5}$ or inhalable particles that are 2.5 microns or less in diameter. Despite the new $PM_{2.5}$ standard, the existing federal standard for particles that are 10 microns or less in diameter (PM_{10}) has been retained. In compliance with federal regulation, installation of $PM_{2.5}$ monitors began in 1998 and most have been in operation since early 1999. Currently, there are eighty-one 24-hour mass monitors for $PM_{2.5}$ operating throughout the state (State of California 2003).

A list of recommended designations was due to the EPA by February 15, 2004. The CARB supplied monitoring data for the years 2000 through 2002 to the EPA on February 11, 2004 and recommended that the SCAB be designated as nonattainment for the federal $PM_{2.5}$ standard (Witherspoon 2004). The EPA must issue final $PM_{2.5}$ designations for all areas by December 2004. Attainment of the $PM_{2.5}$ standards must be achieved five years after the designation date (a five year extension is possible with adequate demonstration).

b. Clean Air Act Conformity

The 1990 amendments to Federal Clean Air Act Section 176 required the EPA to promulgate rules to ensure that federal actions conform to the appropriate SIP. The rules, collectively known as the *General Conformity Rule* (40 CFR §§ 51.850-860 and 40 CFR §§ 93.150-160), require any federal agency responsible for an action in a nonattainment area to determine that the action is either exempt from the General Conformity Rule's requirements or positively determine that the action conforms to the applicable SIP. In addition to the roughly 30 presumptive exemptions established and available in the General Conformity Rule, an agency may establish that rates would be less than the specified emission rate thresholds, known as *de minimis* limits. An action is exempt from a conformity determination if an applicability analysis shows that the total direct and indirect emissions from the project will be below the applicable *de minimis* thresholds and will not be regionally significant, which is defined as representing 10 percent or more of an area's emissions inventory or budget.

These *de minimis* limits vary based on the attainment status and pollutant. The *de minimis* levels applicable in the SCAB are presented in Table 3.2-2.

If an action is not exempt, the federal agency must demonstrate that the total of direct and indirect emissions from the proposed action that would be presumed to conform would not:

- Cause or contribute to any new violation of any standard in any area;
- Interfere with provisions in the applicable SIP for maintenance of any standard;
- Increase the frequency or severity of any existing violation of any standard in any area; or
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area including, where applicable, emission levels specified in the applicable SIP for the purposes of demonstration of reasonable further progress, a demonstration of attainment, or a maintenance plan.

c. State Regulations

The EPA allows states the option to develop different (stricter) air quality standards. The state of California generally has set more stringent limits on the six pollutants of national concern (see Table 3.2-1). In addition to the federally listed six criteria pollutants, California has also established ambient air quality standards for sulfates, vinyl chloride, hydrogen sulfide, and visibility reducing particles.

The California Clean Air Act (CCAA), also known as the Sher Bill or Assembly Bill (AB) 2595, was signed into law on September 30, 1988 and became effective on January 1, 1989. It established a legal mandate to achieve health-based state air quality standards at the earliest practicable date. The CCAA requires that districts implement regulations to reduce emissions from mobile sources through the adoption and enforcement of transportation control measures. The South Coast Air Basin is classified as a nonattainment area for PM_{10} and the western portion of the Basin is classified as a nonattainment area for carbon monoxide. As a state extreme nonattainment area for ozone, the South Coast Air Basin is subject to various requirements including (SCAQMD 2002):

TABLE 3.2-2
***DE MINIMIS* EMISSION THRESHOLDS IN THE SOUTH COAST AIR BASIN FOR GENERAL CONFORMITY APPLICABILITY**

	CO	VOC[1]	NO_x[1]	NO_2	SO_2	PM_{10}
Attainment status	Nonattainment (all NAAs)	Nonattainment (extreme)	Nonattainment (extreme)	Maintenance	Attainment	Nonattainment (serious)
De minimis emissions (metric tons/year)	90.7	9.1	9.1	90.7	NA	63.5
De minimis emissions (tons/year)	100	10	10	100	NA	70

CO = carbon monoxide
VOC = volatile organic compounds
NO_x = nitrogen oxides
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter 10 microns or less in diameter
[1]Attainment status is for ozone; *de minimis* limits apply to precursor pollutants volatile organic compounds (VOC) and oxides of nitrogen (NO_x).
NAA – nonattainment area.

- A five percent annual reduction in hydrocarbons and oxides of nitrogen emissions from 1987 until standards are attained. If this reduction cannot be obtained, all feasible measures must be implemented.

- An air quality permitting program requiring: (1) an indirect and area source control program, (2) best available retrofit control technology (BARCT) for existing sources, (3) a program to mitigate all emissions from new and modified sources, (4) assessment of relative upwind emissions contributions from new and modified permitted sources, and (5) significant use of low-emission vehicles by fleet operators.

d. South Coast Air Quality Management District/Air Quality Management Plan

The South Coast Air Quality Management District (SCAQMD) is the agency that regulates air quality in the South Coast Air Basin. In 1989, the SCAQMD and the Southern California Association of Governments (SCAG) established an Air Quality Management Plan (AQMP). Every three years, the SCAQMD and SCAG prepare an updated plan to address overall air quality improvement. Each iteration of the plan is an update of the previous plan and includes a 20-year horizon. The original 1989 AQMP was a three-tiered emissions control program addressing CCAA requirements. Tier I measures used known, available control technologies. Tier II measures were based on control technologies focusing around the year 2000. Tier III measures required the advancement of technologies after 2000. In July 1991, the SCAQMD and SCAG revised the 1989 AQMP by adopting a 1991 AQMP which continued an aggressive emission control program and proposed a comprehensive set of control measures that included the use of advanced technologies for stationary and mobile sources. One of the most significant advancements in the 1991 AQMP was the movement of the on-road mobile source control strategy from Tier III to Tier I through the state's adoption of the Low Emissions Vehicle (LEV) program.

In order to satisfy the SIP requirements under Title I of the federal Clean Air Act and the CCAA, the AQMP was revised again in 1994, 1997, and most recently in 2003 (the 1997 AQMP was amended in 1999). The AQMP revisions and amendments strive to set forth the steps needed to accomplish attainment of state and federal ambient air quality standards. The SCAQMD has also established a set of rules and regulations that were initially adopted in January 1976. The rules and regulations define requirements regarding stationary sources of air pollutants and are periodically reviewed and updated. These rules, including their adoption or amendment dates, are available for review on the Agency's website (www.aqmd.gov).

The South Coast Air Quality Management District also establishes air emission significance thresholds for evaluating projects occurring within the South Coast Air Basin (SCAB). The SCAQMD thresholds are shown in Table 3.2-3. Although the

TABLE 3.2-3
SCAQMD EMISSION SIGNIFICANCE THRESHOLDS

Pollutant	Threshold (kg/day)	Threshold (lbs/day)
ROC	24.9	55
NOx	24.9	55
CO	249.5	550
PM_{10}	68.0	150
SOx	68.0	150

SOURCE: SCAQMD 1993

proposed action (the designation of an ODMDS) is outside of the jurisdiction of the SCAQMD, the project air emission significance thresholds implemented by the SCAQMD are used to provide a point of comparison for assessing the proposed action's potential effect on the District's ability to achieve federal ambient air quality standards resulting from future use of the disposal sites. Subsequent projects that would generate material to be disposed of at an ODMDS would be subject to individual environmental review and permitting as discussed above.

3.2.1.4 Current Air Quality

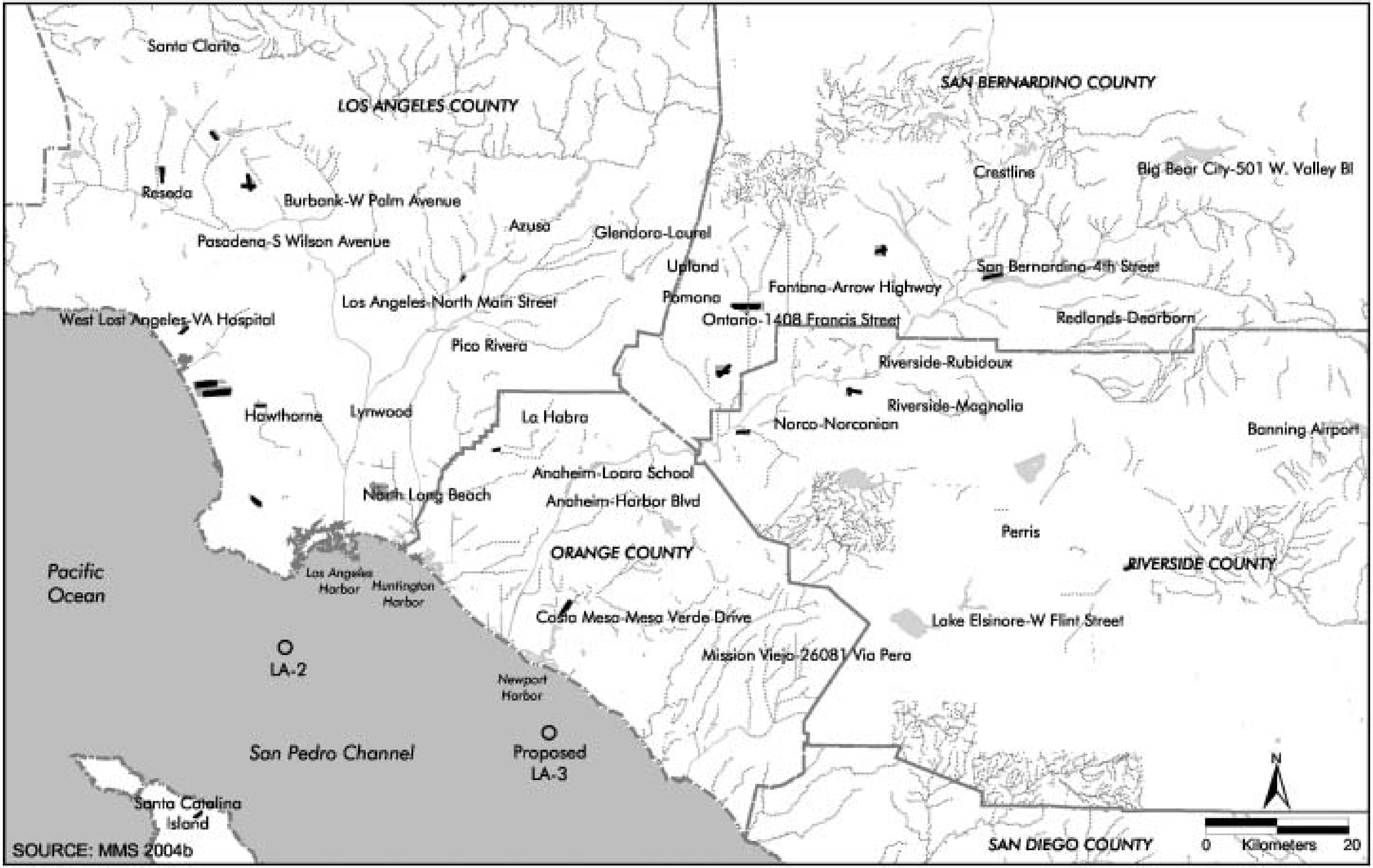
The air quality in the South Coast Air Basin generally is considered poor. Table 3.2-1 shows the federal and California ambient air quality standards. Air quality is commonly expressed as the number of days in which air pollution levels exceed state standards set by the CARB or federal standards set by the EPA. The SCAQMD maintains a number of air quality monitoring stations located throughout the SCAB. Figure 3.2-1 shows the air monitoring stations that were active in 2003. Air pollutant concentrations and meteorological information are continuously recorded at these stations. The measurements are then used by scientists to help forecast daily air pollution levels as well as to provide data for assessing the attainment status of the basin.

Table 3.2-4 summarizes the number of days per year during which state and federal standards were exceeded in the SCAB overall during the years 1999 to 2003 for ozone, carbon monoxide, nitrogen dioxide, and PM_{10} (the only criteria pollutants for which data is reported). The SCAB is the only extreme federal nonattainment area for the one-hour ozone standard in the country. The SCAB is also designated nonattainment for carbon monoxide, PM_{10}, and the eight-hour ozone standard. Table 3.2-5 provides the 2003 area designations for the SCAB.

As seen from Figure 3.2-1, the coastal air monitoring stations closest to the LA-2 and LA-3 areas are the North Long Beach, Costa Mesa – Mesa Verde Drive, and Mission Viejo – 26081 Via Pera monitoring stations. Not all stations monitor for all criteria pollutants. Tables 3.2-6 through 3.2-8 provide the monitoring data for those criteria pollutants monitored at each site for the years 1999 through 2003 for these three monitoring stations, respectively. Comparison of the data in these tables with that in Table 3.2-4 indicates that the air quality at these locations near the coast is generally much better than that found throughout the basin overall.

3.2.2 Physical Oceanography [40 CFR 228.6(a)(6)]

The study area is located in the southern California bight (SCB), the body of water between Point Conception and the U.S./Mexico international border. Within the SCB is a unique basin-and-range submarine topography, featuring 32 submarine canyons (13 of which are relatively large and named) and 7 islands.



APCD Monitoring Stations

2003 AIR MONITORING STATIONS IN THE SOUTH COAST AIR BASIN

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Figure 3.2-1

TABLE 3.2-4
AMBIENT AIR QUALITY SUMMARY – SOUTH COAST AIR BASIN

Pollutant	Average Time	California Ambient Air Quality Standards[a]	Attainment Status	National Ambient Air Quality Standards[b]	Attainment Status[c]	Maximum Concentration[d]					Number of Days Exceeding State Standard or Annual Average Concentration[d]					Number of Days Exceeding National Standard Of Annual Average Concentration[d]				
						1999	2000	2001	2002	2003	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
O_3	1 hour	0.09 ppm	N	0.12 ppm	N	0.17	0.18	0.19	0.17	0.19	111	115	121	116	125	39	33	36	45	64
O_3	8 hours	N/A	N/A	0.08 ppm	N	0.14	0.15	0.14	0.14	0.15	N/A	N/A	N/A	N/A	N/A	93	94	92	96	109
CO	8 hours	9.0 ppm	N; A**	9 ppm	N	11.2	10.1	7.6	10.1	7.3	11	6	0	1	0	7	3	0	1	0
NO_2	1 hour	0.25 ppm	A	N/A	N/A	.307	.214	.251	.262	.158	1	0	0	1	0	N/A	N/A	N/A	N/A	N/A
NO_2	Annual	N/A	N/A	0.053 ppm	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.034	.031	.030	.029	Na
PM_{10}	24 hours	50 $\mu g/m^3$	N	150 $\mu g/m^3$	N	183	139	219	130	164	261*	248*	240*	251*	Na	6*	0*	5*	0*	Na
PM_{10}	Annual	30 $\mu g/m^3$	N	50 $\mu g/m^3$	N	N/A	N/A	N/A	N/A	N/A	72.2	60.1	62.9	58.4	Na	72.2	59.1	63.3	58.1	Na

SOURCE: State of California 2004.

ppm-parts per million, $\mu g/m^3$-micrograms per cubic meter.

[a]California standards for ozone, carbon monoxide (except at Lake Tahoe), nitrogen dioxide, and PM_{10} are values that are not to be exceeded. Some measurements gathered for pollutants with air quality standards that are based upon 1-hour, 8-hour, or 24-hour averages, may be excluded if the CARB determines they would occur less than once per year on average.

[b]National standards other than for ozone and particulates, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one.

[c]A-attainment; N-non-attainment; N/A-not applicable.

[d]N/A – not applicable; Na – data not available.

*Calculated days – Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

**LA County is non-attainment for carbon monoxide; the rest of the SCAB is attainment for carbon monoxide.

TABLE 3.2-5
SOUTH COAST AIR BASIN AREA DESIGNATIONS

Pollutant	Federal Status	State Status
1-hour Ozone	N [extreme] (1)	N
8-hour Ozone	N [severe 17]	- -
Carbon Monoxide	N	NT [SCAB portion of LA Co.] A [remainder of SCAB]
Nitrogen Dioxide	U/A	A
Sulfur Dioxide	A (1)	A
PM_{10}	N [serious]	N
$PM_{2.5}$	TBD	N (1)
Lead	A	A
Sulfates	- -	A
Vinyl Chloride	--	(2)
Hydrogen Sulfide	- -	U
Visibility Reducing Particles	- -	U

SOURCE: State of California 2004b; SCAQMD 2003.

PM_{10}: Particulate matter 10 micron or less in diameter
$PM_{2.5}$: Particulate matter 2.5 micron or less in diameter
A: Attainment
N: Nonattainment
NT: Nonattainment-Transitional
SCAB: South Coast Air Basin
TBD: To be determined
U: Unclassified
(1) South Coast Air Basin portion of Los Angeles County includes San Clemente and Santa Catalina Islands.
(2) Vinyl Chloride is regulated as a toxic air contaminant

TABLE 3.2-6
SUMMARY OF AIR QUALITY MEASUREMENTS RECORDED AT THE NORTH LONG BEACH MONITORING STATION

Pollutant/Standard	1999	2000	2001	2002	2003
Ozone					
Days State 1-hour Standard Exceeded (0.09 ppm)	3	3	0	0	1
Days Federal 1-hour Standard Exceeded (0.12 ppm)	1	0	0	0	0
Max. 1-hr (ppm)	0.131	0.118	0.091	0.084	0.099
Days Federal 8-hour Standard Exceeded (0.08 ppm)	0	0	0	0	0
Max. 8-hr (ppm)	0.081	0.081	0.070	0.064	0.068
Carbon Monoxide					
Days State 8-hour Standard Exceeded (9.0 ppm)	0	0	0	0	0
Days Federal 8-hour Standard Exceeded (9 ppm)	0	0	0	0	0
Max. 8-hr (ppm)	5.49	5.73	4.74	4.56	4.66
Nitrogen Dioxide					
Days State 1-hour Standard Exceeded (0.25 ppm)	0	0	0	0	0
Max. 1-hr (ppm)	0.151	0.140	0.122	0.130	0.135
Federal Annual Average (0.053 ppm)	0.034	0.032	0.030	0.029	0.029
Sulfur Dioxide					
Annual arithmetic mean (0.03 ppm, 80 μg/m^3)	0.003	0.002	0.002	0.002	0.002
State 24-hour standard (0.04 ppm, 105 μg/m^3)	0	0	0	0	0
Federal 24-hour standard (0.14 ppm, 365 μg/m^3)	0	0	0	0	0
PM_{10}					
Days State 24-hour Standard Exceeded (50 μg/m^3)*	79.8	Na	61.7	32.6	Na
Days Federal 24-hour Standard Exceeded (150 μg/m^3)*	0	0	0	0	0
Max. Daily (μg/m^3)	79.0	105.0	91.0	74.0	63.0
State Annual Average (μg/m^3)	38.8	Na	37.4	36.0	Na
Federal Annual Average (μg/m^3)	38.8	37.7	37.2	36.0	Na
$PM_{2.5}$					
Days Federal 24-hour Standard Exceeded (65 μg/m^3)	1	4	1	0	0
Max. Daily (μg/m^3)	66.9	81.5	72.9	62.7	46.5
Annual Average (μg/m^3)	20.7	19.6	21.2	19.5	Na

SOURCE: State of California 2004a.

*Calculated days – Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day (measurements are usually collected every six days). The number of days above the standard is not necessarily the number of violations of the standard for the year.

Na – data not available

TABLE 3.2-7
SUMMARY OF AIR QUALITY MEASUREMENTS RECORDED
AT THE COSTA MESA – MESA VERDE DRIVE MONITORING STATION

Pollutant/Standard	1999	2000	2001	2002	2003
Ozone					
Days State 1-hour Standard Exceeded (0.09 ppm)	1	1	1	0	4
Days Federal 1-hour Standard Exceeded (0.12 ppm)	0	0	0	0	0
Max. 1-hr (ppm)	0.098	0.102	0.098	0.087	0.107
Days Federal 8-hour Standard Exceeded (0.08 ppm)	0	1	0	0	1
Max. 8-hr (ppm)	0.075	0.086	0.073	0.070	0.088
Carbon Monoxide					
Days State 8-hour Standard Exceeded (9.0 ppm)	0	0	0	0	0
Days Federal 8-hour Standard Exceeded (9 ppm)	0	0	0	0	0
Max. 8-hr (ppm)	6.41	6.29	4.64	4.29	5.90
Nitrogen Dioxide					
Days State 1-hour Standard Exceeded (0.25 ppm)	0	0	0	0	0
Max. 1-hr (ppm)	0.123	0.107	0.082	0.106	0.107
Federal Annual Average (0.053 ppm)	0.020	0.020	0.017	0.018	0.018
Sulfur Dioxide					
Annual arithmetic mean (0.03 ppm, 80 $\mu g/m^3$)	0.002	0.002	0.001	0.002	0.001
State 24-hour standard (0.04 ppm, 105 $\mu g/m^3$)	0	0	0	0	0
Federal 24-hour standard (0.14 ppm, 365 $\mu g/m^3$)	0	0	0	0	0

SOURCE: State of California 2004a.

TABLE 3.2-8
SUMMARY OF AIR QUALITY MEASUREMENTS RECORDED
AT THE MISSION VIEJO – 26081 VIA PERA MONITORING STATION

Pollutant/Standard	1999	2000	2001	2002	2003
Ozone					
Days State 1-hour Standard Exceeded (0.09 ppm)	NA	5	10	9	16
Days Federal 1-hour Standard Exceeded (0.12 ppm)	NA	0	1	2	4
Max. 1-hr (ppm)	NA	0.119	0.125	0.136	0.153
Days Federal 8-hour Standard Exceeded (0.08 ppm)	NA	2	2	1	8
Max. 8-hr (ppm)	NA	0.087	0.097	0.093	0.105
Carbon Monoxide					
Days State 8-hour Standard Exceeded (9.0 ppm)	NA	0	0	0	0
Days Federal 8-hour Standard Exceeded (9 ppm)	NA	0	0	0	0
Max. 8-hr (ppm)	NA	3.13	2.36	1.88	1.64
PM_{10}					
Days State 24-hour Standard Exceeded (50 $\mu g/m^3$)*	Na	12.3	18.1	31.1	Na
Days Federal 24-hour Standard Exceeded (150 $\mu g/m^3$)*	0	0	0	0	0
Max. Daily ($\mu g/m^3$)	56.0	98.0	60.0	80.0	53.0
State Annual Average ($\mu g/m^3$)	Na	27.8	26.4	31.3	Na
Federal Annual Average ($\mu g/m^3$)	Na	27.7	26.5	30.9	Na
$PM_{2.5}$					
Days Federal 24-hour Standard Exceeded (65 $\mu g/m^3$)	0	1	0	0	0
Max. Daily ($\mu g/m^3$)	56.6	94.7	53.4	58.5	37.6
Annual Average ($\mu g/m^3$)	Na	14.7	15.8	15.5	Na

SOURCE: State of California 2004a

* Calculated days – Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day (measurements are usually collected every six days). The number of days above the standard is not necessarily the number of violations of the standard for the year.

NA – data not collected in 1999.

Na – data not available.

3.2.2.1 Bathymetry

Bathymetric surveys at LA-2 and LA-3 were conducted in March 1998 using a high-resolution multibeam mapping system (Gardner et al. 1998a, 1998b). These surveys allowed the accurate determination of areawide bathymetry and the estimation of the area and volume of allochthonous (foreign material) marine disposal mounds (MDMs), indicative of past disposal activities at each of the sites.

a. LA-3

The proposed LA-3 ODMDS is located on the continental slope south of Newport Harbor. The study area is bounded on the north by the 33°33'00" N latitude, on the south by the 33°31'00" N latitude, on the east by the easternmost canyon of the Newport Canyon system, and on the west by one of the main canyons of the Newport Canyon system (Gardner et al. 1998b; refer to Figure 1.1-2 for the location of the proposed LA-3 site). The proposed site is situated over a relatively smooth continental slope incised by several canyons, where the regional slope gradient is approximately two to three degrees. Water depth at the proposed LA-3 ODMDS ranges from approximately 460 to 510 m (1,500 to 1,675 ft), with the site centered at approximately 490 m (1,600 ft).

b. LA-2

The LA-2 ODMDS is located on the outer continental shelf, margin, and upper southern wall of the San Pedro Sea Valley, southwest of Long Beach, California. The region is bounded to the north by the 33°41'00" N latitude, on the south by the San Pedro Basin, on the east by the broad San Pedro Shelf, and on the west by the 118°25'00" W latitude (Gardner et al. 1998a; refer to Figure 1.1-3 for the location of the LA-2 site). The site is situated over the shelf, slope, and deeply incised sea valley in approximately 110 to 340 m (360 to 1,115 ft) of water. At a depth of about 125 m (410 ft), the shelf is relatively flat with a regional slope of about 0.8°. However, the slope drops from the shelf at about 7°, and the steep southern wall of the San Pedro Sea Valley drops with slopes greater than 9°. The slope is cut by several channels incised from 4 to 24 m (13.1 to 78.7 ft) deep and up to 100 m (328 ft) wide (Gardner 1998a).

3.2.2.2 Waves

The wave climate in the SCB consists of swell generated from distant areas and locally generated seas. To some degree, nearly the entire southern California coast is protected from swell generated from outside the coastal area by the Channel Islands. Off Los Angeles and Orange Counties, the shadowing effect from Santa Catalina Island is quite dramatic. For example, spectral amplitudes measured at Sunset Beach, California, can be one order of magnitude smaller than those measured at Begg Rock off San Nicolas Island (Hickey 1993). Significant waves over the shelf are primarily locally derived, with the restricted fetches allowing only the development of short period waves (State Water

Quality Control Board [SWQCB] 1965). It is only when gale winds (greater than about 63 km/hr [34 kn]) blow from the west that high waves are formed in the local region over the shelf. Waves as high as 7.6 m (24.9 ft) have been recorded in the San Pedro Channel (SWQCB 1965).

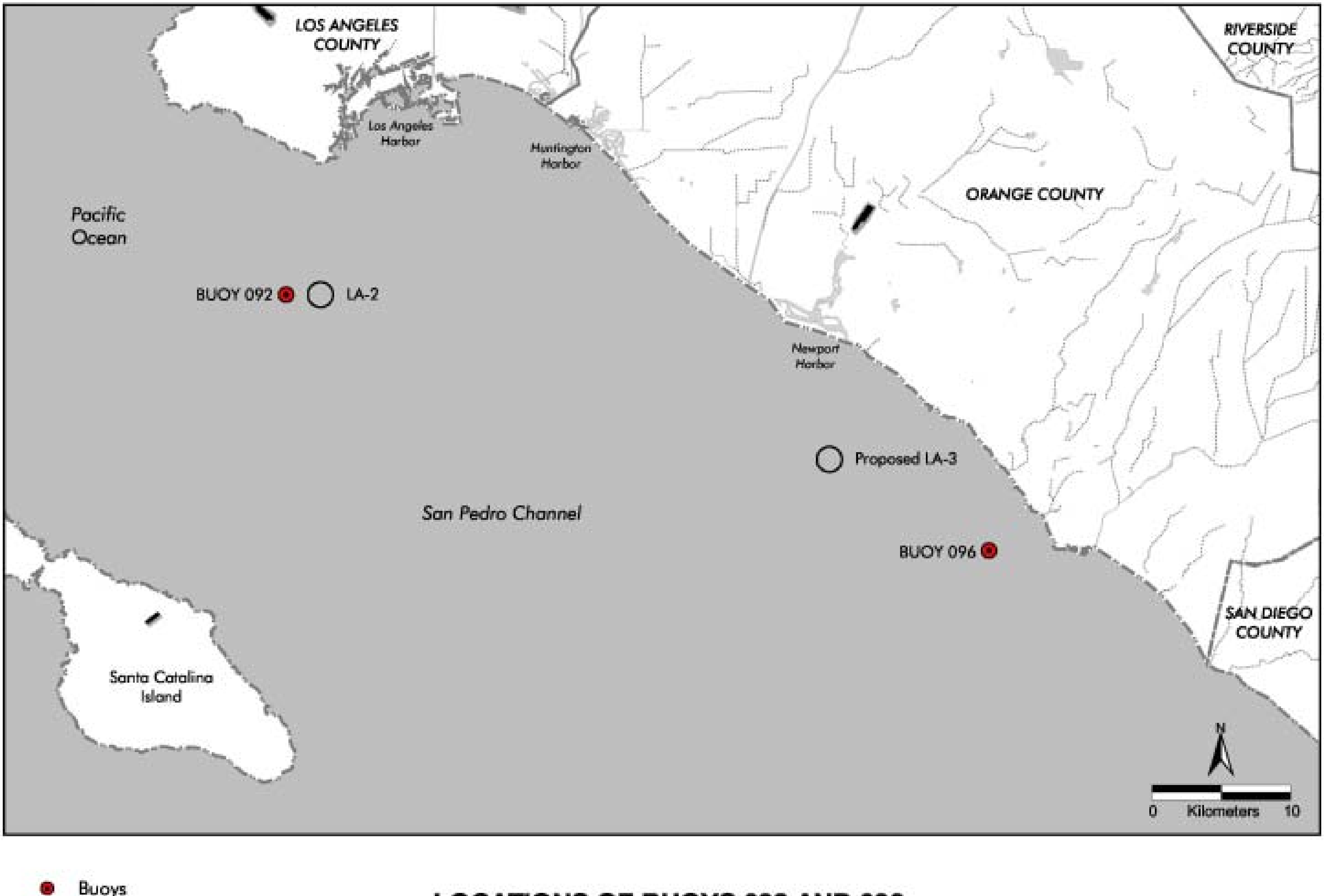
Recent data from Coastal Data Information Program (CDIP) Dana Point Buoy 096 (see Figure 3.2-2), located approximately 13.3 km (7.2 nmi) east-southeast of the proposed LA-3 site, and from CDIP San Pedro Buoy 092 (Figure 3.2-2), located approximately 2.5 km (1.3 nmi) west of the LA-2 site, indicate two slightly different wave climates at the two sites. Off Dana Point, most waves are from the west (260 to 280°) and south (180 to 200°), while further north off San Pedro, most waves arrive from the west (CDIP 2002). This illustrates the shadowing effect of Santa Catalina and San Clemente Islands from southerly waves near LA-2. Also, it is not uncommon for wave trains from different directions to arrive simultaneously off southern California. From mid-July 2000 through mid-March 2002, the dominant wave period at Dana Point was 12 to 16 seconds, indicative of more distant swell. At San Pedro from January 2000 to January 2002, however, wave period was between 5 to 9 seconds, indicative of locally derived wind waves. Significant wave height (H_s) at Dana Point was less than 1.0 m (3.3 ft) 72 percent of the time, while at San Pedro H_s was less than 1.0 m (3.3 ft) 79 percent of the time. At both locations, maximum H_s never exceeded 3.0 m (9.8 ft).

Internal waves are gravity waves moving through the density structure of the ocean. Compared with surface waves, however, internal waves are relatively slow, moving at only a few knots at most (Southern California Coastal Water Research Project [SCCWRP] 1973). Similar to surface waves, they exhibit the same orbital motion and likely break when they enter shallow water. Internal waves are associated with short-period fluctuations in current speed and direction, especially in regions with high bathymetric relief.

3.2.2.3 Tides

Astronomical tides in southern California are classified as mixed, semi-diurnal, with two unequal high tides (high water and higher high water) and two unequal low tides (low water and lower low water) each lunar day (approximately 24.5 hr).

Water level extremes in Los Angeles Outer Harbor from 1997 to 2002 have ranged from -0.60 m (1.97 ft) to +2.35 m (7.71 ft) above Mean Lower Low Water (MLLW), a difference of 2.95 m (9.68 ft). Analysis of water level data since 1923 indicates that off Los Angeles, mean sea level (MSL) is increasing at a rate of 0.84 millimeter (mm; 0.033 inches) per year (NOS 2002). Water level extremes from 1997 to 2002 have ranged from -0.52 m (1.71 ft) to +2.41 m (7.91 ft) above MLLW at La Jolla. Analysis of water level data since 1924 reveals mean sea level is increasing at a rate 2.22 mm (0.087 inches) per year (NOS 2002).



LOCATIONS OF BUOYS 092 AND 096

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Figure 3.2-2

3.2.2.4 Currents

Water in the northern Pacific Ocean is driven eastward by prevailing westerly winds until it impinges on the western coast of North America, where it divides to flow both north and south. The southern component is the California Current, a diffuse and meandering water mass that generally flows to the southeast at a maximum speed of about 10 to 15 centimeters per second (cm/sec; 0.19 to 0.29 kn) (Dailey et al. 1993). Most of the equatorward (toward the equator) transport of the California Current occurs 200 to 500 km (108 to 270 nmi) from shore, with maximum speeds occurring about 300 km (162 nmi) offshore. South of Point Conception the California Current diverges and the offshore component continues to flow southeast while another component flows shoreward (toward the coast) and upcoast (parallel to shore and northerly), resulting in a counterclockwise, nearshore gyre known as the Southern California Countercurrent (Jones 1969). During spring, however, the countercurrent can be altered such that flow enters the southern California bight, but transport is equatorward rather than poleward (toward the north pole) (Figure 3.2-3).

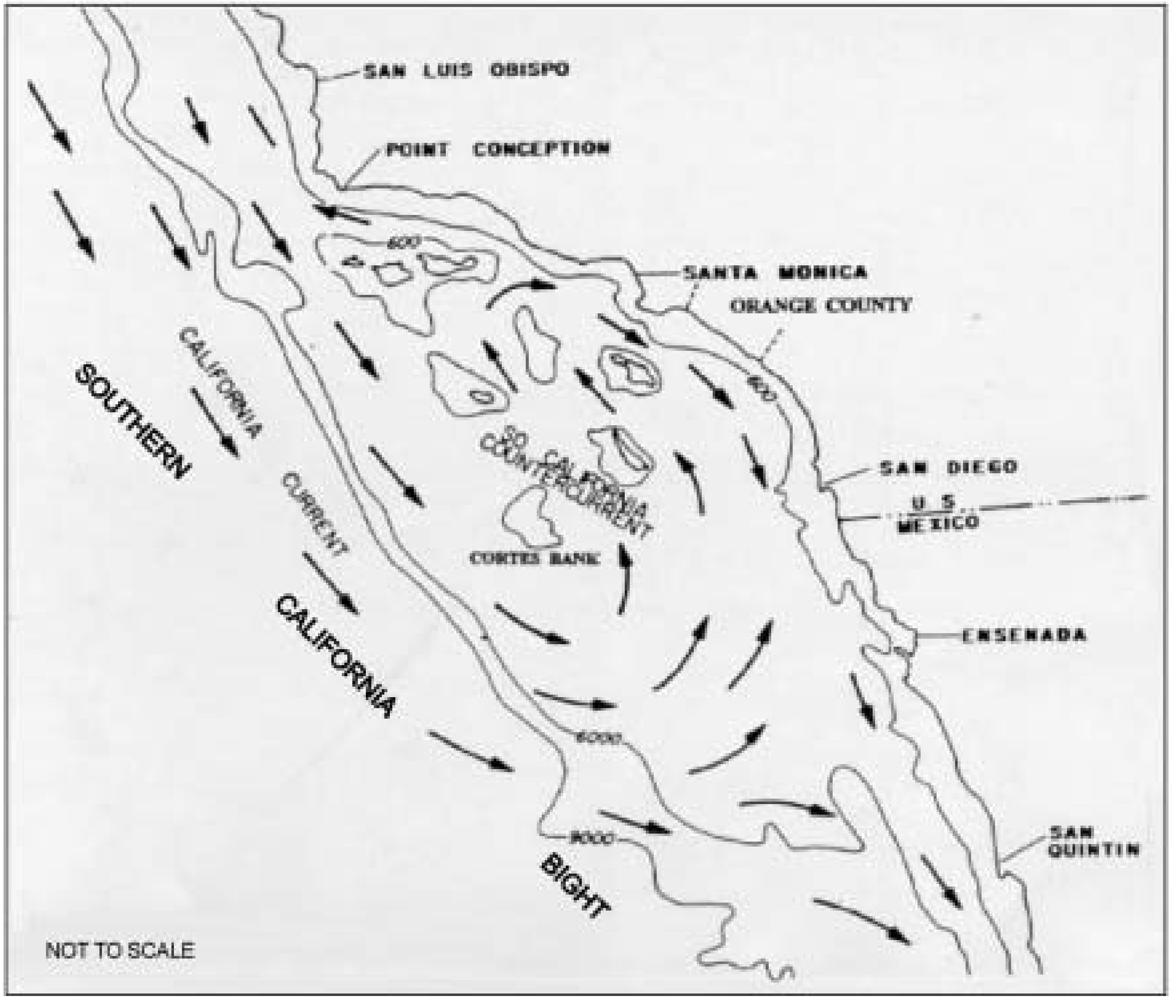
Shoreward of and below the California Current is the poleward-flowing California Undercurrent, the flow of which is concentrated over the continental slope (Dailey et al. 1993). In the SCB, the California Undercurrent flows nearshore over the continental slope rather than offshore, spatially separating it from the California Current. The Undercurrent is comparatively narrow, with the high-speed core centered over the continental slope (Dailey et al. 1993). The California Current, Countercurrent, and Undercurrent all have seasonal speed maxima in late summer.

Upwelling usually occurs when nearshore, equatorward winds drive warmer surface waters offshore and they are replaced by deeper, colder water. (Upwelling may also be induced by tidal currents in areas with irregular sea floor topography.) These colder bottom waters generally have a higher nutrient concentration. In the SCB, dramatic upwelling events occur in winter and early spring (Dailey et al. 1993), though the most intense events usually occur in April, May, and June (SCCWRP 1973).

Site-specific current patterns in southern California have been studied by numerous agencies. Currents off Newport Beach have been evaluated from moored current meter data from the SCCWRP and the OCSD, and from wastewater plume-tracking studies initiated by the OCSD. Currents off Palos Verdes have been evaluated from moored current meter data from the Southern California Coastal Water Research Project (SCCWRP) and Science Applications International Corporation (SAIC).

a. LA-3

Shelf Currents. Current studies have concluded that the net flow off Newport Beach is upcoast, though there can be strong fluctuations on a variety of time scales (County Sanitation District of Orange County [CSDOC, now OCSD] 1988; Hendricks 1992;



Source: Environmental Quality Analysis Inc.&
Marine Biological Consultants, 1973

COMPONENTS OF MEAN SURFACE CIRCULATION

SAIC 2001). CSDOC (1988) determined surface to mid-depth currents over the shelf near the OCSD outfall (located a depth of about 60 m [197 ft]) were relatively weak (less than 5 cm/sec [0.1 kn]) and were almost always directed upcoast (poleward), while deeper currents at about 75 m (246 ft) depth were stronger, yet still less than 10 cm/sec (0.19 kn). Shallow currents reversed on occasion to downcoast (equatorward and southerly) flow, with the strongest reversals in summer and spring. Peak current velocity was 62 cm/sec (1.2 kn), but long-term mean currents were 10 to 15 cm/sec (0.19 to 0.29 kn). Near-bottom flow was primarily aligned with bottom contours.

Hendricks (1992) determined the direction of net flow near the OCSD's 8-km (4.3-nmi) ocean outfall varied with depth, and current speeds between 11 and 54 m (36 and 177 ft) depth ranged roughly between 0 and 51 cm/sec (0 to 1 kn). Current speeds exceeded 9 to 11 cm/sec (0.17 to 0.21 kn) only about 50 percent of the time. At 11 m (36 ft) deep, annual net flow was downcoast at 2.1 cm/sec (0.04 kn). Below the seasonal thermocline at 36 m (118 ft) depth, net flow was upcoast at 4.4 cm/sec (0.09 kn). Just above bottom at 55 m (180 ft) depth net flow was upcoast and offshore at 2.8 cm/sec (0.05 kn). Superimposed on these net flows were strong fluctuations on a variety of time scales (e.g., minutes, tidal periods, days, weeks, seasons, and years).

Longshore (along the shoreline) flow direction near the OCSD's 8-km (4.3-nmi) outfall varied with depth; however, the most probable current direction was approximately upcoast and downcoast, parallel to contours of constant depth (Hendricks 1992). At 11 m (36 ft) deep the principal axis of flow for long-period fluctuations was 102 to 282° Magnetic, while at 36 and 54 m (118 and 177 ft) depths it was 85 to 265° Magnetic. Onshore (toward the shoreline) and offshore (away from the shoreline) flows occurred only about one quarter as frequently as longshore movements. Downcoast flows occurred about one third as frequently as upcoast flows. From early summer through early winter, monthly net flows at 36 m (118 ft) were upcoast at their high velocities (up to 20 cm/sec [0.39 kn]). In winter, however, water temperatures declined and transport weakened at 36 m (118 ft), while currents at 11 m (36 ft) were strong and downcoast.

SAIC (2001) also found predominant currents to be longshore, though upcoast currents were more prevalent below about 25 m (82 ft) depth and downcoast currents prevailed above 25 m (82 ft). Barotropic tidal currents (which are driven by pressure differentials) in the region were relatively weak as compared to the background, lower frequency fluctuations. Strong, periodic current fluctuations at exactly 24 hours (with a weaker but probably linked response at 12 hours) in the study area likely resulted from the diurnal sea-breeze system in the study area. Currents driven by local sea breezes forced a strong sheared flow in the upper third of the water column over the outer shelf, with strongest winds and strongest currents recorded in summer.

Newport Canyon Currents. CSDOC (1988) maintained a current meter mooring at the head of Newport Canyon at a depth of about 65 m (213 ft) for approximately one year.

Mean current speed at that mooring never exceeded 2 cm/sec (0.04 kn), suggesting short duration currents with no dominant direction. This could possibly result from circular current motion over the canyon in response to topography; however, this could not be verified. Surface currents were much stronger than bottom currents, and did not seem to be affected by canyon topography. Rather, surface flow was alongshore. Deep currents were much weaker than surface currents, and there was appreciable up- and down-canyon flow at tidal periods. Overall, current flow in the canyon was about one tenth that over the shelf.

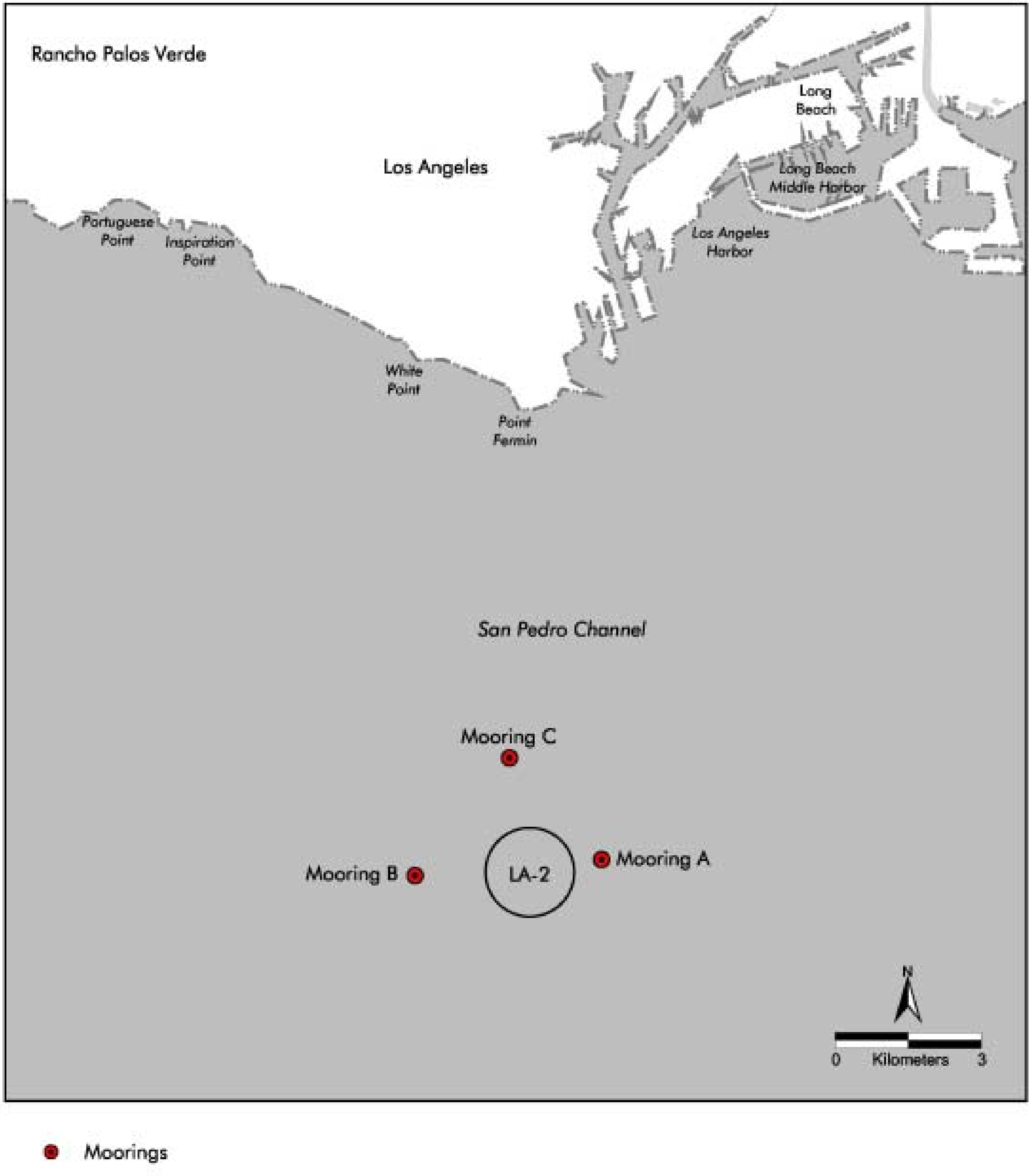
Slope Currents. A current meter array was moored in the LA-3 study area in August 1988 and January 1989 (MITECH 1990). Flows were strongest near the surface (18 m [59 ft] depth) in summer. At 18 m (59 ft), flow velocity was 3.5 to 69.8 cm/sec (0.07 to 1.36 kn) 80 percent of the time, and flow was predominantly downcoast. In winter, however, 80 percent flow velocity at 18 m (59 ft) was between 5.5 and 14.3 cm/sec (0.11 and 0.28 kn), with net flow toward shore. At deeper depths (290 and 427 m [950 and 1,400 ft]), the 80 percent range current velocities in summer were between 1.9 and 8.4 cm/sec (0.04 and 0.16 kn), with net upcoast flow. In winter, 80 percent range current velocities were between 2.6 and 7.2 cm/sec (0.05 and 0.14 kn), with upcoast flow at 290 m (950 ft) and upcoast/inshore flow at 427 m (1,400 ft).

b. LA-2

SAIC (1992) deployed three current meters in the vicinity of the LA-2 site in 1991. Mooring A was deployed in 90 m (295 ft) of water just east of the LA-2 boundary, Mooring B was deployed in 450 m (1,476 ft) of water just west of LA-2, and Mooring C was deployed in 540 m (1,772 ft) of water north-northwest of LA-2 in the San Pedro Sea Valley (Figure 3.2-4).

Shelf Currents. Surface currents over the outer shelf at Mooring A were directed alongshore (within ±30°) 58 percent of the time, split almost equally between upcoast and downcoast (SAIC 1992). The overall mean speed was about 15 cm/sec (0.29 kn). At mid-depth, 54 percent of the current was directed north-northwest to east-northeast, with average currents directed upcoast at 4.72 cm/sec (0.09 kn). There was also a weak onshore flow at mid-depth (0.24 cm/sec [0.005 kn]). Near the bottom, current directions were oriented approximately 30° clockwise from the alongshore alignment (30° to 180° True) with the overall mean velocity downcoast at 0.4 cm/sec (0.008 kn) and offshore at 0.17 cm/sec (0.003 kn).

SCCWRP deployed a current meter in 53 m (175 ft) of water off Palos Verdes in 1987 (Hendricks 1987). This location is approximately 13 km (7 nmi) north-northwest of the LA-2 site. Near-bottom currents at this mooring generally flowed upcoast and offshore (Hendricks 1987). Average net near-bottom current speed in summer 1987 was 2.5 cm/sec (0.048 kn), with a net offshore component of 0.83 cm/sec (0.016 kn). Maximum



LOCATIONS OF MOORINGS A, B, AND C

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Figure 3.2-4

current speed two meters above the bottom was 25 cm/sec (0.49 kn), but occurred only 0.1 percent of the time. While the overall distribution of near-bottom current speeds was comparable to that observed near the OCSD outfall (see LA-3 currents), the offshore component near the OCSD outfall was approximately 60 percent stronger (1.3 cm/sec [0.025 kn]) than off Palos Verdes. Results from Hendricks (1987) agree with those of Jones et al. (1990), who recorded nearshore currents over the Palos Verdes shelf to flow predominantly alongshore. Near surface currents were also strongly sheared, possibly indicative of wind forcing.

Average mid-water flow off Palos Verdes in summer 1987 was upcoast and onshore (about 280° Magnetic) at 4.8 cm/sec (0.09 kn; Hendricks 1987). Near the bottom, net current movement was upcoast and offshore (251° Magnetic) at 2.4 cm/sec (0.047 kn). The net upshore movement recorded in 1987 was consistent with effluent distribution from the Los Angeles County Sanitation Districts' (LACOSAN) outfall and from previous current measurements (Hendricks 1980). However, currents measured in spring-summer 1981 displayed net downcoast or only weak upcoast movement (Hendricks 1987).

Slope Currents. Surface currents over the continental slope at Mooring B were directed alongshore (within ±30°) 56 percent of the time (SAIC 1992). The strongest mean speed of 20.4 cm/sec (0.40 kn) was recorded just clockwise from directly downcoast, with an overall mean current velocity 14.5 cm/sec (0.28 kn). Average cross-isobath velocity was 0.98 cm/sec (0.019 kn), while the mean alongshore velocity was only 0.14 cm/sec (0.003 kn). Alongshore flow was divided almost equally between upcoast and downcoast directions. Mid-depth currents differed from surface currents in both magnitude and direction. The most common mid-depth current directions were centered on a line approximately 30° clockwise to local isobaths, with currents most often directed toward the San Pedro Sea Valley. Overall mean current velocity was 10 cm/sec (0.19 kn), lower than the average surface velocity of 14.5 cm/sec (0.28 kn). Near-bottom currents were directed toward the San Pedro Sea Valley or the downcoast slope 73 percent of the time. Currents were relatively weak near the bottom, with a mean velocity of only 2.62 cm/sec (0.05 kn).

At Mooring C, located in the San Pedro Sea Valley, current measurements were only made at 400 and 530 m (1,312 and 1,739 ft; SAIC 1992). At 400 m (1,312 ft), mean speed only ranged from 1.58 to 3.2 cm/sec (0.03 to 0.06 kn), with flows oriented ±30° of upcoast and also downcoast at about 150°. Upcoast flows at 400 m (1,312 ft) paralleled the north wall of the San Pedro Sea Valley; however, downcoast flows were not aligned with the Valley wall or the San Pedro Channel axis. At 530 m (1,739 ft), flow direction centered on 120° and 270°, which is similar to the orientation of the San Pedro Sea Valley. Currents at that depth were relatively weak, with flow velocities of 5 cm/sec (0.10 kn) or less 81 percent of the time. Overall mean current velocities were 2.54 cm/sec (0.049 kn) at 400 m (1,312 ft) and 2.98 cm/sec (0.058 kn) at 530 m (1,739 ft).

Results of the SAIC mooring study indicated near-surface current flow was generally ±30° from the alongshore direction, parallel to regional isobaths (SAIC 1992). At mid-depth, outer shelf currents were similar in direction and magnitude to near-surface currents, while near-bottom currents were aligned more with local isobaths, and current magnitudes decreased with depth (e.g. greatest mean velocities were almost always near the water surface and lowest mean velocities were almost always near the seafloor). The dominant tidal constituents were the primary contributors to high-frequency currents, and the mechanism(s) driving the low-frequency currents are unknown, though wind-forcing likely accounted for some portion of the flow in the upper water column.

3.2.3 Water Column Characteristics [40 CFR 228.6(a)(9)]

Water quality within the SCB has been studied for decades. Water quality parameters such as temperature, dissolved oxygen, nutrients, and contaminants fluctuate in response to both regional and local oceanography and climate, as well as to human-induced influences. Nearshore waters in the SCB are more affected by anthropogenic effects, while waters further from shore more closely resemble open ocean waters. Due to circulation patterns within the SCB, water column parameters at the LA-2 and LA-3 disposal sites are affected by surface runoff, outflow from local bays and harbors, and other regulated and unregulated discharges.

3.2.3.1 Water Column Characteristics LA-3

Water column data from the vicinity of LA-3 are presented in the following text. Orange County Sanitation District (OCSD, formerly CSDOC) has historically monitored the marine environment inshore of the LA-3 disposal site, allowing analysis of water column characteristics of the LA-3 area.

a. Temperature

Long-term water temperatures from monitoring in the area range from approximately 12-24°C (54-75 °F) at the surface to 10-13°C (50-55 °F) at a depth of approximately 60 m (197 ft; CSDOC 1996, 1998). In 1994, temperatures at depths of about 200 m (656 ft) in the area approached 9°C (48 °F; SCCWRP 2002). Seasonal temperature structures in the LA-3 area are typical of the SCB. In winter, the water column is unstratified or weakly stratified, with temperature difference of less than 2°C (3.6 °F) between the surface and 60 m (197 ft) depth (MITECH 1990). In spring, seasonal upwelling leads to increasing stratification of the water column, and a thermocline forms. Strong layering occurs in summer, with a surface-mixing zone that ranges from 5 to 40 m (16.4 to 131 ft) deep, and a temperature difference of up to 11°C (19.8 °F) in the upper 60 m (197 ft). In fall, the thermocline diminishes, and is more evident in shallower water.

b. Salinity

Salinities over the Orange County Slope over a ten-year period ranged from 33-34 parts per trillion (ppt) at the surface to 33.2-34 ppt to a depth of 100 m (328 ft; CSDOC 1996). Salinity increased gradually with depth, with salinities of slightly more than 34 ppt found at depths of about 200 m (656 ft) in 1994. Seasonal changes in surface salinity can be pronounced, with salinity reductions of up to 4 to 5 ppt noted in the upper 10 m (32.8 ft) of the water column due to freshwater runoff during winter (CSDOC 1996). Evaporation can cause slight salinity increases in surface waters, but below the thermocline, water column salinities remain stable.

c. Density

Water temperature is the major factor influencing density stratification in southern California since salinity is relatively uniform. The result is layering of water of different densities, each with unique characteristics. Density gradients in the area of LA-3 are most pronounced in spring through fall, when thermoclines are present and may extend down to a depth of 40 m (131 ft; CSDOC 1996).

d. Dissolved Oxygen

Seasonal patterns of dissolved oxygen (DO) concentrations in the LA-3 area are typical of the SCB. Generally, higher concentrations are found in surface waters due to atmospheric mixing, with a decrease in DO concentrations with depth (CSDOC 1996, 1998). During winter, the DO reduction with depth is gradual, with typical reductions of about 2 mg/l between the surface and 60 m (197 ft; CSDOC 1998). Lowest concentrations in the area tend to occur at depth in spring, when colder, oxygen-depleted water is upwelled into the area (SCCWRP 1983). Developing in spring, and most evident during the summer, DO levels are characterized by a subsurface DO maximum near the bottom of the surface-mixed layer, usually in the upper 10 to 40 m (32.8 to 131 ft), a rapid decline through the thermocline, then a more gradual reduction with depth below the thermocline. In fall, as water column stratification decreases, differences in DO concentrations throughout the water column are reduced and the DO maximum may be found slightly deeper than in summer. The long-term range of DO concentrations in the LA-3 area is approximately 6-11 mg/l at the surface and 3-7 mg/l at a depth of 90 m (295 ft; CSDOC 1996).

e. Hydrogen Ion Concentration

Hydrogen ion concentrations tend to be related to depth in the water column, with pH levels generally decreasing with depth. Subsurface maxima, related to atmospheric and biological processes, are most evident in summer. Measurements of pH in the area range from about 7.7-8.7 in surface waters to 7.5-8.4 at a depth of 60 m (197 ft; CSDOC 1996).

f. Transparency

Natural patterns of reduced water transparency in the area are caused by surface runoff and sediment loading during the winter, plankton and suspended particles in spring and summer, and sediment resuspension near the bottom (CSDOC 1996, 1998). Anthropogenic sources such as wastewater and industrial discharges and turbidity plumes from disposal activities may also temporarily reduce local water transparency. Water transparency can change rapidly, with most reductions caused by short-term events. Typical transmissivity in the area is in the upper 80 percent range (CSDOC 1998).

g. Nutrients

Ammonia-nitrogen, an effective indicator of a wastewater discharge plume, is routinely monitored inshore of the LA-3 area. Levels of ammonia in the LA-3 area are expected to be low or undetected. Other nutrients are not commonly monitored in the area.

h. Hydrocarbons

Hydrocarbon (oil and grease) concentrations in the water column inshore of the LA-3 area have been found to be consistently low, with a typical range of 0.4-0.6 parts per billion (ppb; CSDOC 1996, 1998).

3.2.3.2 Water Column Characteristics LA-2

Water column data from the vicinity of LA-2 are presented in the following text. Los Angeles County Sanitation Districts (LACSD) has historically monitored the marine environment inshore of the LA-2 disposal site, allowing analysis of water column characteristics of LA-2 area.

a. Temperature

Seasonality in the area of LA-2 is similar to that throughout the SCB, with temperature structures changing throughout the year. Water quality results from the LACSD monitoring inshore and upcoast of LA-2 showed limited vertical temperature stratification in February 2000 with a temperature difference of about 3°C (5.4 °F) from the surface to 100 m (328 ft; LACSD 2000). During winter, limited stratification or isothermal conditions are typical in the area. In May 2000, upwelling processes brought cold water closer to the surface and further inshore than during other times of the year. At the same time, surface waters became warmer, forming a shallow thermocline (LACSD 2000). By August, a strong thermocline had formed in the area, with temperatures mostly above 18°C (64 °F) in the upper 10 to 20 m (32.8 to 65.6 ft) of the water column, and peak surface temperatures over 21°C (70 °F). In November, a strong thermocline was still present. Surface water temperatures were lower than their summer highs, but the depth of the thermocline had increased, suggesting that heat energy was stored deeper in the water column. The temperature structures observed in 2000 were similar to long-term seasonal stratification patterns of the outer portion of the Palos Verdes shelf (SAIC 1992). Similar water column characteristics are found at and near LA-2 (IEC 1982; Tetra Tech and MBC 1985; MBC 1986a, 1986b; SCCWRP 2002). Water temperatures recorded at LA-2 during current meter studies in 1991-1992 were considered non-representative of the area; near-surface cooling events in summer 1992 were atypical based on comparison with other long-term data (SAIC 1992). However, monthly mean temperatures ranged between 11°C and 17°C (52 and 63 °F) at 20 m (65.6 ft) depth, between 9°C and 11°C (48 and 52 °F) at 150 m (492 ft) depth, and between 7°C and 8°C (45 and 46 °F) at 400 m (1,312 ft) depth.

b. Salinity

Salinity in the LA-2 area is relatively stable, with a range between 31.5 and 34.7 ppt among seasons and throughout the water column. Reduced surface salinities in the area are attributable to freshwater runoff from the Los Angeles/Long Beach Harbor complex and the San Gabriel River (LACSD 2000). This feature is apparent inshore of LA-2 throughout the year, but most notable in the winter months. Highest salinities are found at depth in spring, when seasonal upwelling brings deeper water onto the Palos Verdes shelf. During the summer and fall, evaporation tends to increase the salinity of the surface waters in the area of LA-2, leading to salinity minimums below the thermocline.

c. Density

Water temperature is the major factor influencing density stratification in southern California since salinity is relatively uniform. Highest densities in the area are found when upwelling brings cold saline water onto the shelf (LACSD 2000). Density gradients in the area of LA-2 were most pronounced when thermoclines were present (SCCWRP 2002).

d. Dissolved Oxygen

Dissolved oxygen distributions in the area are primarily determined by vertical stratification (LACSD 2000). Water in the upper 30 m (98 ft) of the water column tends to be at or close to saturation year-round, with values as high as 12.3 mg/l recorded. Dissolved oxygen levels tend to be lowest below 30 m (98 ft) when upwelling brings oxygen-depleted deep water up onto the shelf. At 100 m (328 ft) depth, DO levels are about one-half that of surface waters. Dissolved oxygen concentrations as low as 1.5 mg/l have been found near LA-2 at a depth of 380 m (1,247 ft; IEC 1982).

e. Hydrogen Ion Concentration

Hydrogen ion concentrations tend to be related to depth in the water column, with pH levels generally decreasing with depth. Measurements of pH in the area range from about 8.4 in surface waters to 7.7 at a depth of 380 m (1,247 ft).

f. Transparency

In 2000, the majority of deep and offshore water throughout the southern California coastal region was very clear, with high levels of light transmittance (LACSD 2000). Similarly high values have been found in the LA-2 area. Inshore of LA-2, areas of increased surface turbidity have been associated with the harbor complex, and stormwater run-off. Other sources of turbidity in the area include resuspension of bottom sediments, surface and mid-water phytoplankton blooms, and turbidity plumes from disposal activities. These sources tend to be short-term events, and local water transparency can change rapidly.

g. Nutrients

Ammonia-nitrogen, an effective indicator of a wastewater plume, is routinely monitored in the LA-2 area. In 2000, levels of ammonia inshore of LA-2 were low, usually below the detection limit of 20 µg/l, and even when detected were well below receiving water objective limits (LACSD 2000). Other nutrients are not commonly monitored in the area.

h. Metals

Mercury, cadmium, and lead concentrations measured in April 1980, mid-depth at a station within the LA-2 boundary and at a reference station north of LA-2 were similar to levels found elsewhere in the SCB (IEC 1982; Chan 1974). Between August 1983 and May 1984, four stations (two inside the LA-2 boundary and two at a reference site south east of LA-2) were sampled four times to determine the levels of seven trace metals. All metals were undetected in the water column (Tetra Tech and MBC 1985). Monitoring at the THUMS drilling mud disposal site, 14.3 km (7.7 nmi) west of LA-2, in 1985 and 1986 found that trace metal concentrations in the water column were generally below detection limits, or, when detected, not significantly elevated above background levels (EPA 1988).

i. Hydrocarbons

Hydrocarbon (oil and grease) concentrations in the water column near LA-2 have been found to be consistently below the detection limit of 0.1 mg/l (Tetra Tech and MBC 1985; MBC 1986b; EPA 1988).

3.2.4 Regional Geology

The mainland shore of southern California is bordered by a narrow continental shelf, followed by a narrow slope region (SCCWRP 1973). Beyond this is a wide, complex series of basins, troughs, and ridges that form the offshore islands. Both LA-2 and LA-3 are in the submerged northwestern portion of the Peninsular Ranges geologic province, which consists of northwest-trending faults and ridges (CSLC 1982). This Peninsular

Ranges province extends from the Los Angeles Basin southeastward to the Mexican border, and beyond into Baja California (Dennis 1974). The islands of Santa Barbara, Santa Catalina, San Nicolas, and San Clemente are included in this province.

3.2.4.1 Topography

Both the LA-2 and LA-3 study areas are located on the San Pedro Shelf, which is characterized by fairly flat, featureless topography out to a water depth of about 60 m (197 ft). Two prominent features offshore of Orange County are the Newport and San Gabriel submarine canyons, which incise the shelf and terminate in relatively shallow water. The LA-3 study area is situated over the slope of Newport Canyon. The Newport-Inglewood fault, located in the vicinity of the LA-3 site, is a narrow zone of deformation characterized by a northwest-trending chain of low hills and fault scarps (Dennis 1974). The fault extends over 60 km (32.4 nmi) from just offshore Dana Point northwesterly through Newport Beach to just north of Culver City in Los Angeles County (CSDOC and EPA 1977).

3.2.4.2 Sediment Transport

Sediments can be transported by a variety of pathways, including (1) over the seawater by the wind, (2) on top of the seawater, usually in a freshwater lens as an "epithalassis" after rainfall, (3) through the seawater by currents, and (4) at the seafloor by turbidity currents (Emery 1960; Gorsline et al. 1984). The following discussion of sediment transport is limited to movement by currents through seawater and by turbidity currents.

a. LA-3

Off Seal Beach, to the northwest of LA-3, it has been determined that appreciable amounts of sediments are transported across the shelf to the basin beyond (Dailey et al. 1974). At Huntington Beach and Newport Beach, the Santa Ana River contributes a large supply of suspended silt to the nearshore waters, with most of the material restricted to within a few kilometers (miles) from shore and traveling longshoreward (Dailey et al. 1974). Sands are deposited directly off the river mouth, whereas finer sediments are transported by southeasterly currents toward the head of Newport Canyon (SAIC 2000). Most of the suspended material brought to the seafloor arrives by gravity-driven turbidity flow. Within Newport Canyon, frequency and magnitude of sediment movement is hypothesized to be minimal (SAIC 2000).

b. LA-2

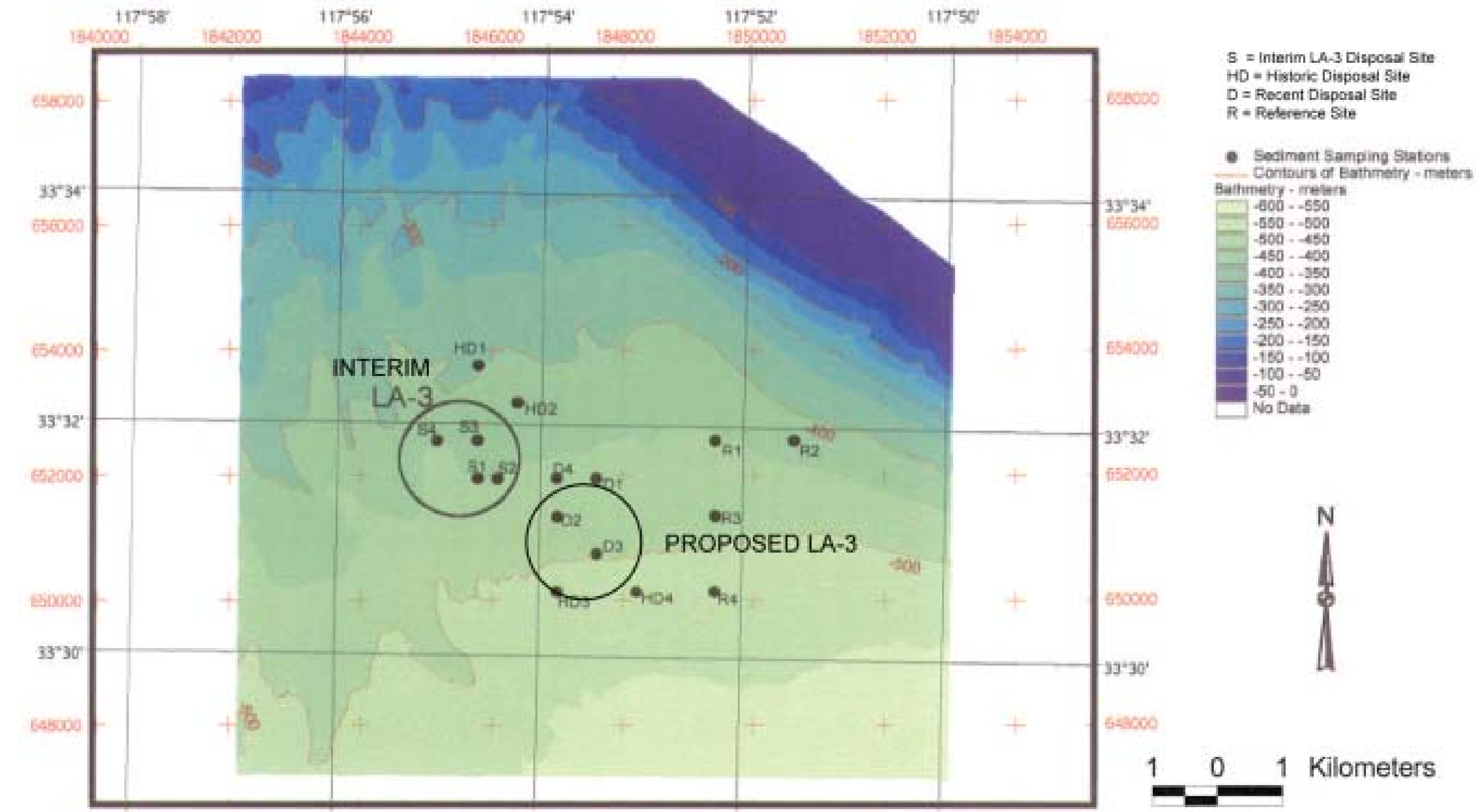
Current measurements off Palos Verdes in 60 m (197 ft) of water indicate that if sediments are in suspension for one-half day or longer, they are likely to be carried offshore of the shelf and into deeper water (Hendricks 1987). Sedimentary and physiographic evidence indicates turbidity current deposits occur in all basins off the southern California coast, but this process is far more important in the nearshore Santa Monica and San Pedro Basins, and in the San Diego Trough, than elsewhere (Gorsline and Emery 1959; Emery 1960). Rice et al. (1976) hypothesized that longshore drift off Palos Verdes may eddy north in some areas, potentially halting southerly drift near barriers. Reported sediment accumulation rates on the Palos Verdes Shelf range from 0.03 to 4.9 cm/yr (0.01 to 1.93 inches/yr; LACSD 1981).

3.2.5 Sediment Characteristics

Sediment characteristics examined for this ODMDS designation include mineralogy, grain size, organic content, and sediment concentrations of metals, hydrocarbons, and other constituents. In general, sediments in the SCB are increasingly finer with increasing water depth, and the distribution of contaminants is often related to the proportion of fine-grained material in the sediments.

Sediments were collected from the LA-2 and LA-3 study areas in summer 2000 for analysis of sediment characteristics (Figures 3.2-5 and 3.2-6) (Chambers Group 2001). The sampling program at LA-3 targeted four specific strata to determine possible spatial differences in sediment characteristics; the four strata were (1) within the interim LA-3 site boundary [sampling locations identified as “S” in the sampling reports and on Figure 3.2-5], (2) areas of historical dredged material disposal outside the current site boundary [sampling locations identified as “HD” in the sampling reports and on Figure 3.2-5], (3) areas outside the site boundary where dredged material had been disposed of recently (from the 1999 Newport Bay dredging project [sampling locations identified as “RD” in the sampling reports and “D” on Figure 3.2-5]), and (4) a reference area unaffected by disposal activities located approximately 2 to 3 km (1.1 to 1.6 nmi) east and east-southeast of the interim site [sampling locations identified as “R” in the sampling reports and on Figure 3.2-5].

The sampling program at LA-2 targeted three specific strata to determine possible spatial differences in sediment characteristics; the three strata were (1) within the LA-2 site boundary [sampling locations identified as “S” in the sampling reports and on Figure 3.2-6], (2) areas adjacent to the site boundary where dredged material had been disposed of [sampling locations identified as “AD” in the sampling reports and “D” on Figure 3.2-6], and (3) a reference area, unaffected by disposal activities, located approximately 12 to 14 km (6.5 to 7.6 nmi) southeast of the LA-2 site boundary [sampling locations identified as “R” in the sampling reports on Figure 3.2-6]. Depths at the reference areas were similar to those at the disposal site areas. The sediment constituent analyses in the following sections assume the reference sites were unaffected by ocean dredged material disposal activities.



SEDIMENT SAMPLING LOCATIONS AT LA-3

Source: USACE, 2003b

Figure 3.2-5

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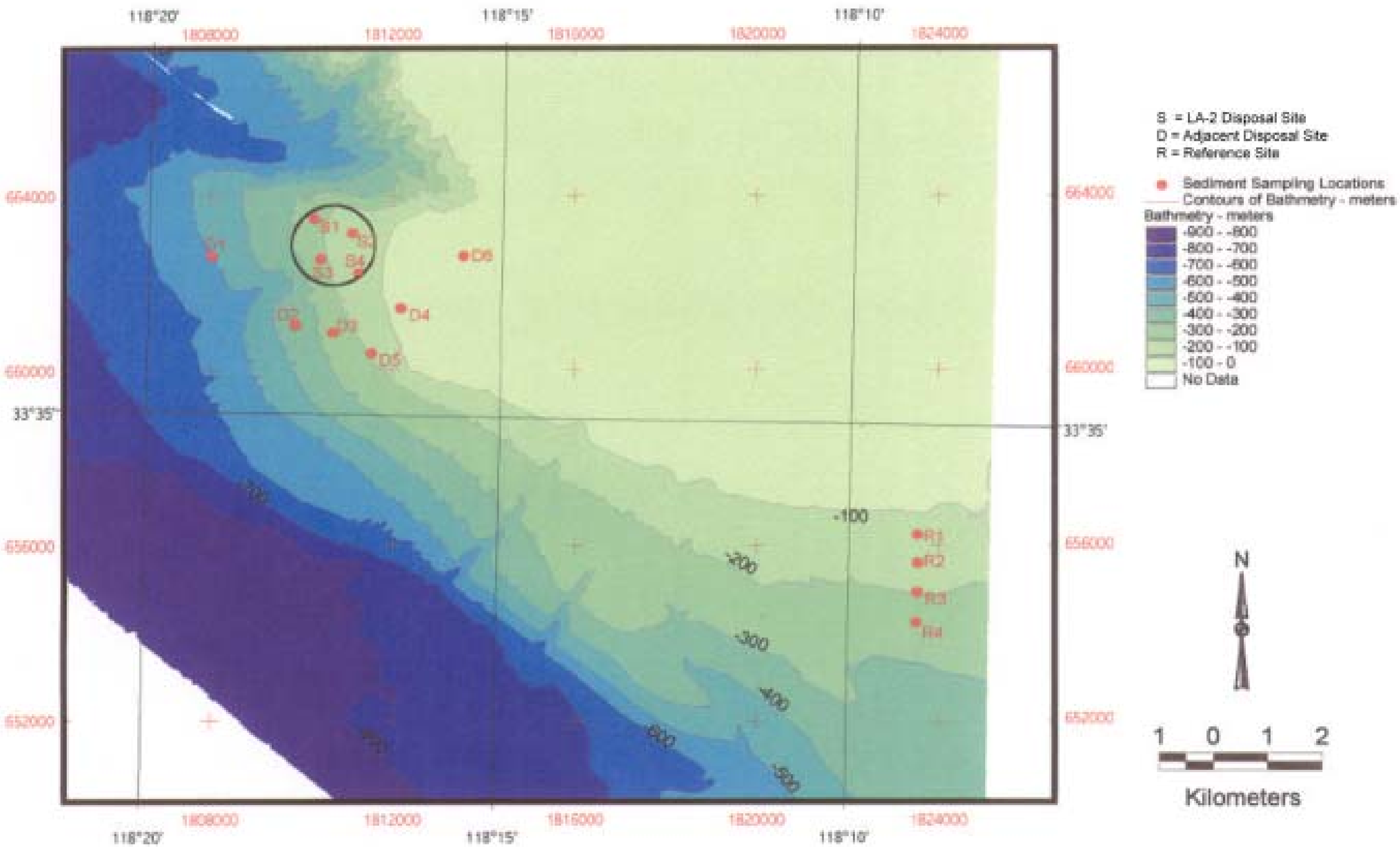


SEDIMENT SAMPLING LOCATIONS AT LA-2

Source: USACE, 2003b

Figure 3.2-6

Sediment profile imagery (SPI) surveys were performed in summer 2000 at both the LA-2 and interim LA-3 sites, as well as surrounding areas of the two sites (USACE 2002). At LA-3, evidence of recently and historically disposed sediments was found inside the interim site boundaries, and to the east, south, and north of the site. The recently deposited sediments were likely from the 1998-1999 Upper Newport Bay dredging project and/or the 1999 Lower Newport Harbor dredging project. At stations south of the site boundary, sediments in areas of historical disposal activities were reworked by benthic organisms to the point where the oxygenated surface layer and sediment texture were similar to those found on the ambient seafloor.

At LA-2, evidence of recent deposition was generally limited to within the confines of the site boundary (USACE 2002). While some stations sampled outside the site boundary showed signs of historic deposition, results of the SPI survey differed from the results of a seafloor-mapping survey conducted at LA-2 in 1998 (Gardner et al. 1998b). The seafloor-mapping survey recorded more disposal mounds outside the site than within. However, the SPI survey results indicate that if dredged material was present at the stations outside the boundaries of LA-2 two years prior, the material had been reworked and recolonized such that it resembled the ambient seafloor.

3.2.5.1 Grain Size Distribution

Off southern California, sediments generally become increasingly finer with increasing water depth (SCCWRP 1983; SCBPP Steering Committee 1998; LACSD 2000; OCSD 2000). Though several mechanisms affect the introduction, suspension, transport, and deposition of sediments, the trend of decreasing grain size with increasing distance from shore and increasing depth is primarily attributed to increased wave action and water motion in nearshore waters, which limits the deposition of fine material. Grain size distribution at the stations within each of the regions surveyed at LA-2 and LA-3 is illustrated in Figure 3.2-7.

a. LA-3

In summer 2000, sediments within the LA-3 interim site boundary had a larger proportion of sand and gravel and a lower proportion of silt compared with sediments at stations surrounding the site and at the reference site (Chambers Group 2001). The smaller silt fraction within the site boundary was determined to be statistically significant at the 0.01 level, suggesting a less than one percent probability the difference was due to chance. Differences in sediment composition between disposal sites and the reference area may be attributed to disposal activities (Chambers Group 2001). Compared with sediments collected in summer 1988, sediments within and proximate to the interim LA-3 site were much finer in 2000 than in 1988 (MITECH 1990). Sediments at LA-3 were composed of substantially higher percentages of clay in 2000 (14 to 52 percent) than in 1988 (2 to 5 percent). Likewise, the amount of sand in sediments at LA-3 in 2000 (9 to 60 percent) was substantially less than that recorded in 1988 (27 to 87 percent). Reason(s) for the differences in sediment composition between 1988 and 2000 are unknown, but could have resulted from deposition of fine material from storm-related runoff prior to 2000 or sediment redistribution offshore of Newport Beach (Chambers Group 2001). The percentages of fines (silt and clay combined) in sediments at LA-3 in 2000 (37 to 94 percent) were similar to, but in general slightly lower than, the percentages of fines in sediments from Newport Canyon in 1999 (46 to 98 percent) and in Newport Canyon from 1985 through 1989 (66 to 97 percent) (Maurer et al. 1994; SAIC 2000) This is expected, as Newport Canyon serves as a sediment trap, accumulating fine-grained sediments (Maurer et al. 1994; SAIC 2000).

b. LA-2

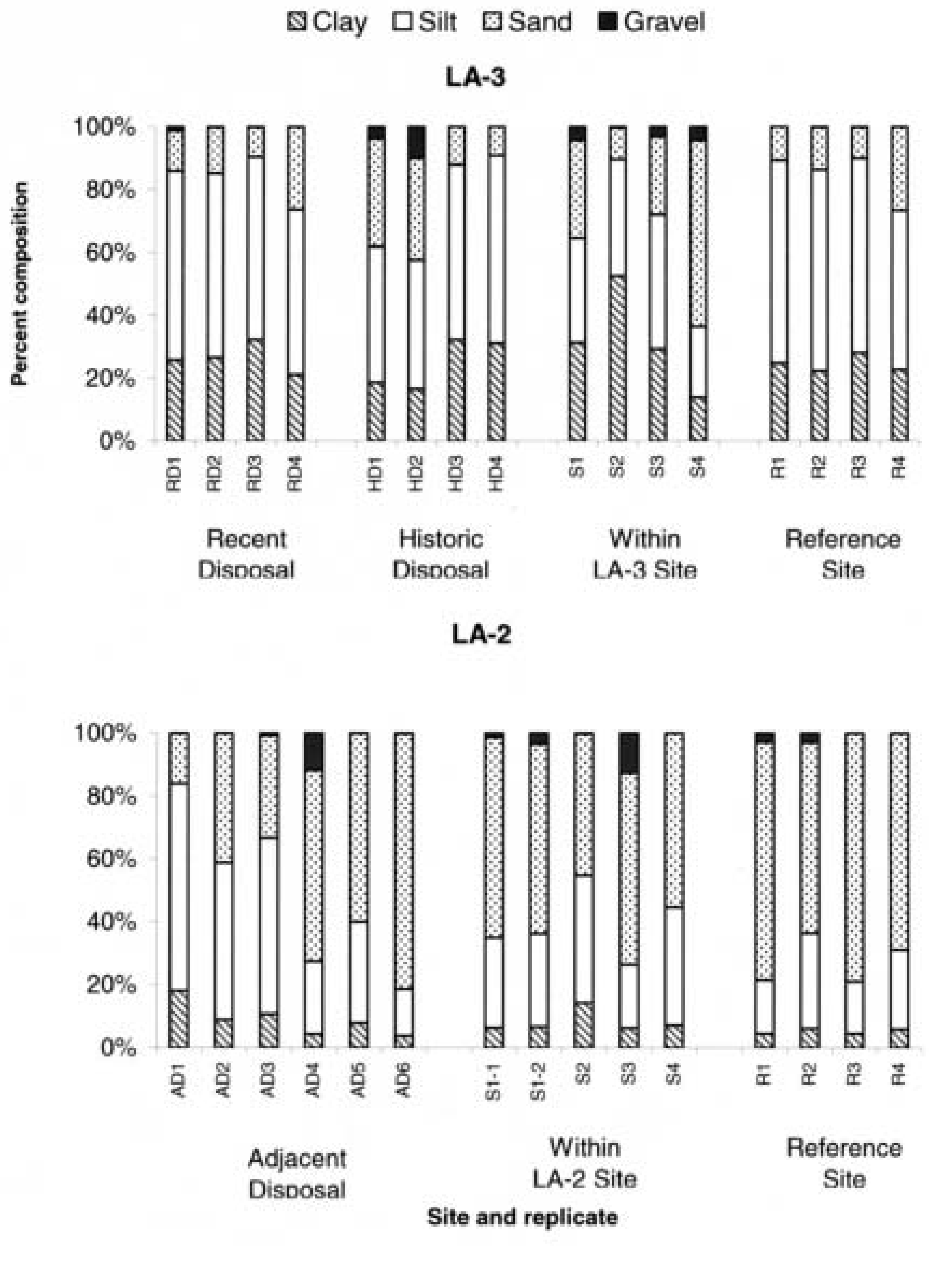
Sediments in the LA-2 site and surrounding areas in summer 2000 were composed primarily of silt and sand, lesser amounts of clay, and relatively small gravel fractions (Figure 3.2-7) (Chambers Group 2001). Sediments within and adjacent to the LA-2 site boundary differed from those collected at the reference area in that the reference area sediments were composed of smaller amounts of fines and larger fractions of sand.

Differences in sediment composition between disposal sites and the reference area may be attributed to disposal activities (Chambers Group 2001).

Overall, sediment characteristics at LA-2 in summer 2000 were similar to those recorded in 1983 and 1984 (Tetra Tech and MBC 1985). In 1983 and 1984, LA-2 disposal site stations contained higher percentages of clay than reference areas, and were more poorly sorted (indicating a grain size distribution composed of multiple size intervals) than reference areas. In summer 2000 and in 1983 and 1984 sediment composition within and in the vicinity of the disposal site boundary was highly variable, with less variability exhibited at reference stations (the reference sediments analyzed in 1983-1984 and in 2000 were collected from the same area). Sediment composition at the disposal and reference areas in 2000 was less variable than in 1983 and 1984, however. Long-term surface sediment sampling on the slope off Palos Verdes revealed that in the latter half of the 1990s, percent sand on the slope decreased while percent silt, and to a lesser degree percent clay, increased (LACSD 2000).

3.2.5.2 Mineralogy

Basement rock throughout the SCB is mostly Mesozoic or pre-Cambrian schist, while overlying sediments are composed of medium gray sandstone, dark to white porcellaneous shales, dark olive-green limestone, and friable sandstone (Stevenson et al. 1959). From Point Fermin to Newport Beach the San Pedro Shelf is characterized by a central area of Miocene shales and sandstones with smaller outcrops of Pliocene shales near the western shore and along the edge of the outer shelf (Emery 1952). Off



SEDIMENT GRAIN SIZE DISTRIBUTION (by weight) AT LA-2 AND LA-3 SAMPLING SITES, SUMMER 2000.

Data from Chambers Group (2001) and COE (2002)

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Figure 3.2-7

Huntington Beach, sedimentary deposits up to 3,800 m (12,470 ft) thick overlie the basement schist (CSLC 1982). The coarser sediments on the San Pedro Shelf (sands and gravels) in the vicinity of both the LA-2 and LA-3 study areas are composed of rock fragment sand nearshore and grade into quartz feldspar sand offshore (Stevenson et al. 1959). Rock fragment sands are essentially preexisting rocks, while quartz-feldspar sands are detrital sediments. On the San Pedro Shelf in the vicinity of LA-2, bottom sediments are generally fine to very fine olive-green sand that grades into silty sand at the basin slope (Stevenson et al. 1959; LACSD 2000).

3.2.5.3 Sediment Organic Content

Off southern California, higher concentrations of organic matter are usually associated with fine-grained sediments in depositional areas, while lower concentrations are usually found in areas with coarser sediments and in erosional areas (Emery 1960). Chemical indicators of sediment organic content include total organic carbon (TOC), total volatile solids (TVS), and total sulfides. Total volatile solids (as a percent of total solids) represent the total amount of organic material in sediments.

a. LA-3

TOC values at the LA-3 recent and historical disposal sites (1.2 to 4.3 percent) were similar to TOC values at the LA-2 adjacent disposal area (0.4 to 2.1 percent), though a few values were higher at LA-3 (e.g. 3.5 percent at RD3 and 4.3 percent at HD4) (Chambers Group 2001). Aside from these two relatively higher values, all other TOC concentrations were similar to or less than those found at the reference site (2.1 to 2.5 percent). Volatile solids were noticeably higher at recent and historical disposal sites at LA-3 compared with concentrations measured within the interim site boundary, though mean values were similar to or less than reference area percentages. Overall, TVS in sediments ranged from 3.54 to 9.98 percent, while total sulfides ranged from 2.2 to 57.3 milligrams per kilogram (mg/kg) (dry weight) at the LA-3 study area.

Mean sulfide concentrations were higher at the historic disposal area (32.8 mg/kg) and within the interim site boundary (29.7 mg/kg) than the reference area (14.9 mg/kg), while the mean concentration at the recent disposal area (16.2 mg/kg) was similar to the reference area value (14.9 mg/kg). Overall, TOC, TVS, and total sulfide concentrations measured at the interim LA-3 site and surrounding areas were slightly higher than concentrations measured off Orange County in slightly shallower water and in coarser sediments (Maurer et al. 1994; CSDOC 1998; OCSD 2000). TOC was slightly higher at LA-3 than throughout the shelf of the SCB (mean = 0.75%, maximum = 5.1%) (Schiff and Gossett 1998).

b. LA-2

TOC values at the LA-2 study area ranged from 0.4 to 6.0 percent, with the highest value (6.01%) recorded at a reference site (Chambers Group 2001). TOC percentages within the LA-2 site boundary (0.9 to 1.5%) were similar to values recorded at the adjacent disposal site (0.4 to 2.1%). Volatile solids in sediments ranged from 2.22 to 8.39 percent at LA-2. The highest TVS concentration was reported from a station in the adjacent disposal area; all other concentrations at the adjacent disposal area and site boundary stations resembled those from the reference area.

Total sulfides ranged from 0.8 to 278.0 mg/kg at LA-2, though 14 of 15 samples had relatively similar concentrations (0.8 to 6.1 mg/kg). One anomalously high sulfide concentration (278 mg/kg) was reported from a station within the LA-2 site boundary (Station S2). TOC concentrations in sediments off Palos Verdes in 2000 were similar to those measured historically inshore of the disposal site (LACSD 2000).

3.2.5.4 Metals

Measurement of sediment metals in the SCB has been extensive, particularly around wastewater outfalls. Throughout the mainland shelf of the SCB, elevated levels of sediment metals have been found in approximately one-half of the sediments (Schiff and Gossett 1998). Metal levels are often higher in fine-grained sediments due to the greater surface area available (Ackermann 1980; de Groot et al. 1982). As a result, under conditions of equal supply, fine sediments often contain more metals per gram of sediment than coarse sediments. Highest sediment metal concentrations in the SCB are also generally detected in fine-grained sediments near areas of known input, particularly wastewater outfalls (Bascom 1982; Brown et al. 1986). In Santa Monica Bay, a heavily monitored portion of the SCB, concentrations of metals in sediments rose sharply after the 1900 time stratum and reached maximum values in the 1970s and/or 1980s (Zeng et al. 2001). Conversely, from 1971 to 1996, the combined mass emissions of trace metals by the four largest wastewater dischargers in southern California decreased 95 percent (Raco-Rands 1999). This is attributed to improvements in wastewater treatment and disposal practices. However, other significant sources of trace metals in southern California still exist, including urban runoff and atmospheric deposition.

a. LA-3

In general, distribution of sediment metals in 2000 was similar among the reference, recent disposal, historical disposal, and interim LA-3 boundary sites (Chambers Group 2001). Highest mean concentrations of arsenic, cadmium, lead, and zinc were recorded within the site boundaries. Sediment metals from one station within the interim site boundary (Station S2) were particularly high, while concentrations from the other three stations more closely resembled levels at the other sites. Sediments at Station S2 were composed of a higher percentage of clay than sediments from the other stations within the interim LA-3 site, likely resulting in the higher metal levels at that station. Strongest correlations (for all stations combined) between percent fines (silt and clay combined) and metal concentrations were recorded for chromium (R^2=0.73) and nickel (R^2=0.72). Highest levels of chromium, copper, nickel, and selenium were detected at areas of recent disposal. Highest silver concentration was recorded at the area of historic disposal, while mean mercury concentrations were similar among all sites. Comparisons of metal concentrations among station groups were highly insignificant, indicating that differences were likely due to random variability, though sediment grain size did account for some differences in sediment metal concentrations. Trends of increasing metal concentrations with increasing fines fractions were reported for seven of the ten metals analyzed.

Overall, sediment metal concentrations at all LA-3 sampling sites ranged as follows, with all concentrations reported as dry weight: arsenic (4.6 to 13.7 mg/kg); cadmium (0.41 to 1.08 mg/kg); chromium (20.0 to 47.9 mg/kg); copper (17.4 to 26.0 mg/kg); lead (8.97 to 19.9 mg/kg); mercury (0.04 to 0.13 mg/kg); nickel (11.4 to 26.1 mg/kg); selenium (<0.50 to 1.43 mg/kg); silver (0.11 to 1.16 mg/kg); and zinc (57.2 to 101 mg/kg). Of the metals analyzed, only mercury has been shown to biomagnify through the food web (Anderson et al. 1993). Overall, sediment metal levels at LA-3 in summer 2000 were comparable to concentrations detected in other studies in the same area, with many differences likely attributed to relative grain sizes (SCCWRP 1983; MITECH 1990; Maurer et al. 1994; SAIC, MEC, and CRG 2001 cited in Chambers Group 2001).

b. LA-2

The range of sediment metal concentrations in 2000 at LA-2 was similar to that recorded at LA-3, with variability within and among the three sampling strata (Chambers Group 2001). Highest mean concentrations of cadmium, copper, lead, nickel, selenium, and zinc were recorded within the site boundary. Mean arsenic concentration was highest at the reference area, while mean chromium, mercury, and silver concentrations were highest at the adjacent disposal area. Variability of sediment metal concentrations within the sites is illustrated in the relatively higher values at Station AD1 at the adjacent disposal area and at Station R2 at the reference area. Sediments at Station AD1 were the finest of all the stations sampled, likely accounting for the higher values there. However, sediments at Station R2 were composed of a similar percentage of silt and clay compared to other stations. Strongest correlations between percent fines and metal concentrations were recorded for mercury (R^2=0.80), lead (R^2=0.69), silver (R^2=0.67), and zinc (R^2=0.65)

Overall, sediment metal concentrations at the LA-2 sampling sites ranged as follows, with all concentrations reported as dry weight: arsenic (3.3 to 12.6 mg/kg); cadmium (0.11 to 1.29 mg/kg); chromium (20.1 to 69.4 mg/kg); copper (7.58 to 38.3 mg/kg); lead (6.5 to 31.6 mg/kg); mercury (0.03 to 0.22 mg/kg); nickel (7.95 to 30.2 mg/kg); selenium (<0.47 to 1.1 mg/kg); silver (0.08 to 0.94 mg/kg); and zinc (31.1 to 87.3 mg/kg). Of the metals analyzed, only mercury has been shown to biomagnify through the food web

(Anderson et al. 1993). Comparatively, mercury values at LA-2 were much lower than values detected on the Palos Verdes Shelf in the 1970s and 1980s (NOAA 1991). Overall, sediment metal levels at LA-2 in summer 2000 were comparable to concentrations detected in other studies in the same area (Tetra Tech and MBC 1985; LACSD 2000; Chambers Group 2001) and on the mainland shelf of the SCB (Schiff and Gossett 1998). Most metal concentrations recorded in summer 2000 were similar to values recorded off Palos Verdes in another study (LACSD 2000), with lower concentrations in sediments in and around LA-2 than further inshore near the Joint Water Pollution Control Plant (JWPCP) wastewater discharge. Metal concentrations within the LA-2 site boundary appear to have decreased since 1984, but are still slightly elevated in comparison to other sediments offshore of southern California (Chambers Group 2001).

3.2.5.5 Organic Contaminants of Concern

Hydrocarbons detected in sediments off southern California include polynuclear aromatic hydrocarbons (PAHs), chlorinated pesticides, polychlorinated biphenyls (PCBs), and oil and grease. Many hydrocarbons are produced naturally (from oil seeps, for example) while others are anthropogenic in nature. Aromatic hydrocarbons are one of several groups of hydrocarbons found in fossil fuels and their refined and combusted products, and many are potent carcinogens or mutagens. Documented sources of PAHs to the SCB include wastewater discharge, stormwater run-off, and oil spills, while suspected but little studied sources include aerial fallout, drilling fluid discharges, hydrothermal seeps, and petroleum refinery wastes (NOAA 1991).

Unlike PAHs, chlorinated pesticides and PCBs are solely anthropogenic in nature. A variety of chlorinated pesticides have been used in southern California for many years, though dichlorodiphenyltrichloroethane (DDT) is probably the most familiar of the organochlorine pesticides. Acutely toxic and resistant to degradation, the toxic effects of this pesticide to animals and humans are well documented (NOAA 1991). Elevated levels of DDT are found in sediments and animal tissues throughout the SCB; total DDT (i.e., the sum of all DDT isomers and metabolites [e.g., DDDs, DDEs, and DDTs]) was detected in 82 percent of sampled sediments from throughout the Bight in 1994 (Schiff and Gossett 1998). The major source of DDT contamination in the SCB was the Montrose Chemical Company, which manufactured DDT from 1947 to 1982, producing two-thirds of the chemical sold worldwide in 1970. Monitoring in 1970 indicated that about 290 kg (640 lb) of DDT compounds were entering the Los Angeles County waste system on a daily basis. These compounds were subsequently discharged onto the Palos Verdes Shelf. In addition, Montrose dumped DDT wastes into the San Pedro Channel between Los Angeles and Santa Catalina Island (NOAA 1991). In 1983, the EPA issued Cleanup and Abatement Orders to Montrose, and the company began site cleanup and source control measures.

As a class of compounds, PCBs include 209 synthetically halogenated aromatic hydrocarbons. PCBs were manufactured in the U.S. from 1929 to 1977 by Monsanto Industrial Chemicals Company under the trade name Aroclor. They are among the most stable chemicals known, and degradation rates of PCBs are thought to be low (NOAA 1991). Oil and grease in sediments are derived from a variety of sources, including petrochemical waste and household cooking fats.

a. LA-3

Total polycyclic aromatic hydrocarbon (PAH) concentrations were relatively similar among stations within the interim LA-3 boundary, areas with recent disposal mounds, and the reference area (Chambers Group 2001). Higher total PAH concentrations at the historical disposal mound area resulted from comparatively high levels of benzo(a)pyrene and pyrene at one station within that area (HD1). Benzo(a)pyrene is found in coal tar, cigarette smoke, and is a product of incomplete combustion, while pyrene is derived from coal tar; both are carcinogens. There were no statistically significant differences ($p<0.05$) among total PAH values between the different sampling stations.

Concentrations of most pesticides in sediments were undetectable at most locations at the LA-3 study area (Chambers Group 2001). Mean levels of all pesticides except 2,4'-dichlorodiphenyldichloroethane (2,4'-DDD; a DDT congener), 2,4'-DDT and toxaphene were elevated at the recent disposal mound stations due to anomalously high values at one station within that area (Station RD4). Pesticide concentrations at the other sampling sites were comparatively low, though concentration of 4,4'-dichlorodiphenyl-dichloroethylene (4,4'-DDE; a DDT congener) ranged from 3 to 43 µg/kg (dry weight) at the historical disposal site, interim disposal site, and reference areas. There were no statistically significant differences ($p<0.05$) among 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT values between the different sampling stations.

Highest mean total PCB values were recorded at the recent disposal and historic disposal areas. Mean total PCB concentrations were slightly higher at the reference area than within the interim LA-3 disposal site. There were no statistically significant differences ($p<0.05$) among total PCB values between the different sampling stations.

Oil and grease measured at LA-3 ranged from <50 mg/kg (dry weight) to 250 mg/kg, with highest values measured within the interim site boundary. Concentrations measured at the recent and historical disposal sites and at the reference area were relatively low (<50 mg/kg to 90 mg/kg).

In general, hydrocarbon concentrations at the interim LA-3 site and surrounding areas in summer 2000 were comparable to those measured in previous surveys at LA-3 and off Orange County (SCCWRP 1983; MITECH 1990; Schiff and Gossett 1998; OCSD 2000; SAIC, MEC, and CRG 2001 cited in Chambers Group 2001). Percent fines in sediments did not correlate strongly with hydrocarbon concentrations. Measurement of PAHs in southern California marine sediments has been limited compared to other hydrocarbons. Most PAH concentrations from the 2000 sampling at LA-3 were relatively low, though sediments from one of the historical disposal stations had relatively high values that exceeded values measured in the zone of initial dilution (ZID) of the OCSD wastewater discharge in recent years (OCSD 2000).

The low DDT values recorded during the 1988 surveys (MITECH 1990) likely resulted from the coarseness of the sediments. Total PCB concentrations in 2000 were similar to or lower than values recorded off Orange County in separate surveys (SCCWRP 1983; OCSD 2000) and throughout the shelf of the SCB (Schiff and Gossett 1998).

b. LA-2

Individual sediment PAH compound concentrations differed among locations at the LA-2 study area, though total PAH concentrations were relatively similar among the three LA-2 sampling areas (Chambers Group 2001). Highest mean total PAH concentrations were recorded at the stations adjacent to the LA-2 disposal site, and mean values were slightly higher at the reference site than within the disposal site. Two stations had particularly high total PAH values: one adjacent disposal station and one reference station. At adjacent disposal station AD3, the relatively high total PAH value resulted largely from a high pyrene concentration. At reference station R3, the high total PAH value resulted from high pyrene, benzo(a)pyrene, and acenaphthene concentrations. Acenaphthene is found in fungicides, insecticides, and plastics. There were no statistically significant differences ($p<0.05$) among total PAH values between the different sampling stations.

Pesticides were detected at all stations at LA-2, and the DDT congeners were most commonly detected (Chambers Group 2001). Highest DDT levels were found at the adjacent disposal stations, with particularly high values at one of the six stations (AD1-1). Station AD1 was the deepest station in the area (water depth was approximately 500 m [1,640 ft]), and sediments at this station were the finest in the study area. This could partially explain the relatively high DDT values at that station. Except for the detection of beta-benzene hexachloride (beta-BHC) at one adjacent disposal station (AD4), concentrations of all other pesticides were undetected at the disposal and adjacent disposal sites. At the reference area, however, several pesticides other than DDT and DDT congeners were detected at Station R3. These included aldrin; alpha-, beta-, delta-, and gamma-BHC (also known as lindane); heptachlor; and heptachlor epoxide.

Sediment PCB concentrations at LA-2 were variable among station groups and highest at the adjacent disposal sites (Chambers Group 2001). In general, PCB concentrations were lowest at the reference site, with higher values recorded at the disposal and adjacent disposal sites. Mean total PCB values were 3.0 μg/kg at the reference sites, 13.9 μg/kg within the disposal site, and 22.6 μg/kg at the adjacent disposal area. Oil and grease concentrations ranged from <50 mg/kg (dry weight) to 580 mg/kg, with values measured within the site boundary and at the adjacent disposal area noticeably higher than values recorded at the reference area (Chambers Group 2001). The highest mean value (322 mg/kg) was recorded within the LA-2 site boundary; however, the highest single value (580 mg/kg) was recorded at the adjacent disposal site.

In 2000, correlations between grain size and hydrocarbon concentrations were relatively weak, with the strongest between total PCBs and grain size (R^2=0.66). There were some noticeable differences among hydrocarbon concentrations within and surrounding LA-2 in summer 2000 and those measured in previous surveys at LA-2, surrounding areas, and throughout the SCB (Tetra Tech and MBC 1985; Schiff and Gossett 1998; MEC 1998 cited in Chambers Group 2001; LACSD 2000). Total PAH concentrations from the 2000 sampling at LA-2 were very high compared with samples collected approximately 11.3 km (6.1 nmi) southeast of LA-2 in 1997 (Chambers Group 2001).

DDT concentrations within the LA-2 disposal site were similar to values reported at LA-2 in 1983-1984 (EPA 1985) and throughout the SCB in 1994 (Schiff and Gossett 1998). DDT values at LA-2 were much lower than those recorded further inshore near the JWPCP wastewater discharge in 2000, where sediment concentrations exceeded 32,000 μg/kg (LACSD 2000). Total PCBs in 2000 were lower than those recorded in 1983-1984 (EPA 1985) and further inshore in 2000 (LACSD 2000) and similar to those recorded on the mainland shelf of the SCB (Schiff and Gossett 1998).

3.2.5.6 Ammonia-Nitrogen

Concentrations of ammonia (also known as ammonia-N) were variable among the sampling sites at LA-2 and LA-3, but similar between the two study areas (Chambers Group 2001). At the LA-3 study area, mean ammonia-N concentration was highest at the recent disposal area (19.1 mg/kg dry weight) and historic disposal area (16.6 mg/kg), and the mean concentration within the site boundary (14.3 mg/kg) was slightly less than the mean value from the reference area (14.9 mg/kg). At LA-2, ammonia-N was highest at the adjacent disposal area (mean of 20.0 mg/kg), and the mean value within the site boundary (15.3 mg/kg) was less than that at the reference area (18.3 mg/kg). Ammonia-N values were not strongly correlated with sediment particle size.

3.2.5.7 Summary of Sediment Parameters at LA-2 and LA-3

Sediments at the interim LA-3 disposal site and surrounding areas were finer than those at the LA-2 site and surrounding areas in 2000. The LA-3 study area is located in deeper water than LA-2, a primary reason for the difference in grain sizes. Concentrations of many sediment constituents were similar among regions sampled at LA-2 and LA-3, with two general differences being 1) slightly higher mean concentrations of most sediment metals at LA-3, and 2) higher mean PCB concentrations in sediments at LA-2. Higher total DDT concentrations at LA-2 resulted from high concentrations of DDT congeners in sediments at one station adjacent to the site boundary.

3.3 Biological Environment

3.3.1 Plankton

Plankton refers to organisms that drift passively with ocean currents or are only weakly motile. Phytoplankton are tiny unicellular or colonial algae species such as diatoms and dinoflagellates. These plants convert inorganic carbon and nutrients, through the process of photosynthesis, into cellular material and form the base of the marine food web. Zooplankton are slightly motile animals. Holoplankton are those animals that spend their entire lives in the plankton and include small crustaceans, cheatognaths (arrowworms), salps, and larger forms such as swimming mollusks and jellyfish. Meroplankton are those animals that generally spend larval or juvenile phases in the plankton, including many invertebrate and fish species, and are generally most abundant in nearshore waters. Ichthyoplankton refers to the planktonic stages of fish species, including drifting eggs and larval stages. Plankton distributions tend to be patchy, and individual stations sampled more than once exhibit great variation. In general, greatest concentrations of plankton are found in the SCB in early fall and spring months, and abundances are lowest in late fall and winter months (AHF1959).

3.3.1.1 Phytoplankton

The phytoplankton of the SCB consists of a great variety of species covering a wide size range. Surveys conducted for the State Water Resources Control Board (SWRCB) during the late 1950s at 800 stations from Point Conception to San Diego identified at least 81 phytoplankton taxa (species; AHF 1959). Of the individuals counted, 54 percent were diatoms and 41 percent were dinoflagellates, with ciliates and miscellaneous forms accounting for the remainder (AHF 1965). The abundance of phytoplankton in the SCB varies. Populations are more abundant in spring and, to a lesser degree, fall months (Hardy 1993). Phytoplankton are restricted to the upper photic (light-penetrating) zone of the water column. In general, abundances are greatest subsurface, near the bottom of the surface-mixed layer, corresponding to depths with a favorable balance of light energy and nutrients to promote growth. Phytoplankton abundance tends to decrease below the thermocline and with distance from shore. Chlorophyll-a, an indicator of phytoplankton productivity (measured indirectly as fluorescence), is regularly determined in situ in local marine monitoring programs.

The success of phytoplankton species depends on water currents, zooplankton grazing, competition, and available light and nutrient levels (Hardy 1993). In the SCB, productivity is intermediate when compared to other areas of the world's oceans, with more productivity than central gyres, but less than estuarine or nutrient-rich upwelling areas. However, abundant grows, or blooms, dominated by dinoflagellates, occur frequently. Red tide blooms are associated with stable water conditions and warm temperatures and may significantly reduce dissolved oxygen levels in an area.

a. LA-3

Surveys in the Newport Coast area, north of the LA-3 disposal area, in the late 1950s found elevated phytoplankton abundances in association with the Newport Harbor entrance, but concentrations were generally low in the waters between the entrance and Newport Canyon (AHF 1959). More recently, Orange County Sanitation District's monitoring of the marine environment provides data on phytoplankton levels inshore of the LA-3 disposal area. Phytoplankton concentrations in the area are highest in spring and summer, particularly at the depth of the thermocline (CSDOC 1998; OCSD 2000). In summer, high chlorophyll-a levels are associated with DO maxima, indicating that the phytoplankton standing crop can produce significant levels of excess oxygen. Relatively high levels of chlorophyll-a in the area have been associated with upwelling near Newport Canyon and freshwater runoff, as well as anthropogenic nutrient sources such as ammonium from wastewater discharges. In the 1997 monitoring year, background concentration of chlorophyll-a in the area were approximately 0.1 µg/l, with the highest values north of LA-3 ranging from 0.2 to 0.5 µg/l (CSDOC 1998). During the 1999-2000 monitoring, typical chlorophyll-a ranges were 2 to 10 µg/l, with peaks of 20 to 40 µg/l during the summer (OCSD 2000).

b. LA-2

In 2000, low to moderate levels of phytoplankton (as inferred from chlorophyll-a concentrations) were present throughout the LACSD marine monitoring area, inshore and upcoast of LA-2 (LACSD 2000). Phytoplankton were distributed in a 10-to-20-m (33-to-66-ft) thick layer near the base of the thermocline over much of the area in all sampling quarters. In summer, this layer is associated with DO maxima depths. In 2000, high levels of chlorophyll-a were found south of the LA/Long Beach Harbor complex during each quarter.

3.3.1.2 Zooplankton

The zooplankton of the SCB consists of a large and diverse group of organisms. The SCB is a transition zone between subarctic, central and equatorial species assemblages, and zooplankton assemblages and ecology are related to oceanic variability (Dawson and Pieper 1993). Zooplankton abundances tend to be patchy and highly variable (Thrailkill 1956; Dawson and Pieper 1993). Zooplankton in the near shore waters of the SCB show seasonal trends, with highest abundances occurring from April to June, and lowest abundances from December to February. Peak abundances may be found seasonally inshore to mid-depths, but generally decrease with distance from shore. Unlike phytoplankton, zooplankton are found throughout the water column, but are generally most abundant in the euphotic zone (the light-penetrating zone where photosynthesis occurs), which in the Southern California Bight is the upper 30 to 40 m (98 to 131 ft) of water. Zooplankton tend to be strongly diurnal, with vertical migrations into surface waters at dusk and back to deeper water at dawn. Calanoid copepods dominate the nearshore zooplankton fauna of the SCB, with *Acartia*, *Paracalanus*, *Labidocera*, and *Calanus* the most commonly collected genera (Dawson and Pieper 1993).

a. LA-3

In June 1982, SCCWRP (1983) took tows for epibenthic and demersal zooplankton on the Orange County slope. The study area was adjacent and to and west of the interim LA-3 disposal site, with similar depth ranges. In eight tows, at least 100 zooplankton taxa of eight phyla (groups) were collected, although the tows were highly dominated by calanoid copepods. Both abundance and biomass of zooplankton were notably greater in the epibenthic tows, and there was little variation in the epibenthic zooplankton assemblages over a depth of about 300 to 600 m (984 to 1,969 ft).

MITECH (1990) conducted seasonal midwater trawls at the interim LA-3 disposal site and a near-by reference site in August 1988 and January 1989. At least 37 taxa of eight phyla were collected, with 27 taxa in seven phyla in summer and 26 taxa in six phyla in winter (MITECH 1990). The tows were also highly dominated by calanoid copepods, which, for the most part, were not differentiated into species. Chaetognaths of the genus *Saggita* were also abundant. The top three taxa were the same within the interim LA-3 site and at the reference site during both seasons. While percentage of abundance varied, together these three taxa accounted for at least 75 percent of the total abundance collected during each tow.

b. LA-2

Zooplankton concentrations in the vicinity of the LA-2 disposal site are expected to be similar in composition and abundance to the LA-3 disposal site and the SCB in general. Small crustaceans, especially calanoid copepods, should dominate the fauna, although the faunal assemblage in the area is likely large. In the nearby LA/Long Beach Harbor complex, the zooplankton fauna is dominated by the calanoid copepods *Acartia tonsa* Complex and *Paracalanus parvus*, which together account for almost 70 percent of the zooplankton abundance in the harbor (Dawson and Pieper 1993). Zooplankton abundances in the SCB tend to be patchy and highly variable, but peak abundances in the LA-2 vicinity are expected in spring and early fall, with minimum values in winter.

3.3.1.3 Ichthyoplankton

Most fish release eggs and sperm to the environment for external fertilization. Both eggs and newly hatched larvae are usually pelagic, subject to dispersion by ocean currents.

Ichthyoplankton are generally well known in the SCB, due in large part to the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program, which has been investigating oceanic and biological aspects of the California Current system since the late 1940s. More than 150 ichthyoplankton taxa have been identified from within a few kilometers (miles) of the coast in the SCB (Cross and Allen 1993). The ichthyoplankton is dominated by northern anchovy (*Engraulis mordax*), accounting for 80-83 percent of the larval taxa collected in the SCB. Other common larval taxa within a few kilometers (miles) of the coast include rockfish (*Sebastes* spp.) with about 4-6 percent of the abundance, California smoothtongue (*Leuroglossus stilbius*) with 4 percent, and Pacific hake (*Merluccius productus*) with 2-3 percent of the abundance. Other frequent contributors to the ichthyoplankton assemblage are northern lampfish (*Stenobrachius leucopsarus*), Mexican lampfish (*Triphoturus mexicanus*), croakers (Family Scianidae), sanddabs (*Citharichthys* spp.), and popeye blacksmelt (*Bathylagus ochotensis*).

Ichthyoplankton mortality is extremely high and the number of individuals declines precipitously between the egg and juvenile stages. However, mortality stabilizes during late larval and early juvenile stages (Cross and Allen 1993). Ichthyoplankton abundances are spatially and temporally variable in the SCB, and distribution of some common species, such as northern anchovy and jack mackerel (*Trachurus symmetricus*), are usually patchy.

Ichthyoplankton abundance in the SCB has two peaks (Cross and Allen 1993). In the winter-spring peak, 69 percent of the nearshore ichthyoplankton assemblage is comprised of the larvae of fish with a northern range limit of Oregon to Canada. During the summer-fall abundance peak, 91 percent of larvae are fish species with a northern range from Pt. Conception to Monterey.

Geographical distribution of larval fish is related to habitat preference of the adult fish (Cross and Allen 1993). Larval stages of jack mackerel, Pacific hake and epipelagic species are most abundant 10-100 km (5.4 to 54 nmi) from the coast. California halibut and turbot (*Pleuronichthys* spp.), sea bass (*Paralabrax* spp.), and blennies (*Hypsoblennius* spp.) larvae are most abundant within 10 km (5.4 nmi) of the coast. White croaker (*Genyonomus lineatus*) larvae are abundant within 4 km (2.2 nmi) of the shore, while the larvae of nearshore associates such as queenfish (*Seriphus politus*), gobies (family Gobiidae), and silversides (family Atherinidae) are most common within 2 km (1.1 nmi) of the coast. Nearshore species tend to develop faster and recruit at a smaller size than epibenthic species, minimizing offshore transport. Northern anchovy, rockfish and sanddab larvae show no apparent geographical distribution patterns in the SCB.

a. LA-3

SCCWRP (1983) took epibenthic and demersal tows in an area adjacent to and east of the interim LA-3 disposal site on the Orange County slope. Only a few fish and larvae were collected. Species collected included sanddab, bristtlemouth (*Cyclothone* spp.), California headlightfish (*Diaphus theta*), northern lampfish, thornyheads (*Sebastolobus* spp.), and unidentified fish, larvae, and eggs.

Midwater trawls at the interim LA-3 disposal site and a near-by reference site in August 1988 and January 1989 collected an estimated 2,400 eggs or larvae, 256 from five identified fish taxa. Species represented included northern anchovy, Pacific blacksmelt (*Bathylagus pacificus*), sanddab, northern lampfish, and Pacific argentine (*Argentina sialis*), species common in the SCB (MITECH 1990). Of the unidentified eggs and larvae collected, most were tentatively assigned to the herring family, Clupeidae. These latter individuals dominated the summer ichthyoplankton assemblage at both the disposal and reference sites, indicating a recent recruitment. Large dilution factors from splitting during sample processing make it difficult to identify other trends related to seasonality or location.

b. LA-2

Ichthyoplankton assemblages, abundances and ecological trends in the vicinity of the LA-2 disposal site are expected to be similar to those throughout the SCB (see section 3.3.1.3). Northern anchovy, rockfish, halibut, turbot, sea bass, blennie and white croaker are likely to dominate the ichthyoplankton.

3.3.2 Invertebrates

3.3.2.1 Benthic Infauna

Benthic invertebrates are small organisms, or fauna, that live within the sediments on the sea floor. These infaunal organisms are highly dependent on the sediments in which they live for food and protection. They belong to a variety of invertebrate phyla (groups), although annelids, arthropods, and mollusks are the most abundant phyla in the southern California bight (SCAMIT 2001). These organisms employ a wide range of survival and feeding methods (burrowing in the sediment or building tubes in or on the surface of the sediment; subsurface or surface deposit feeding, filter feeding, and predation). In turn, they are prey for other invertebrates and fish. The benthic infauna have been monitored by a number of agencies because of their close relationship to the sediments (these organisms generally have limited mobility) and because of their importance as food for higher trophic ("food chain") levels (LACSD 2000). This community includes a wide variety of functional groups and of responses to environmental conditions. Benthic organisms are reliable indicators of environmental stress and are used worldwide for assessment of marine sediment conditions (Smith et al. 1998).

Communities of infaunal organisms can be characterized by their compositions (species present), abundance or density (number of individuals per unit area or volume, usually per square meter), species richness (number of species), and species diversity (number of different species relative to the total number of individuals). Various additional indices (evenness, dominance, Benthic Response, and Infaunal Trophic Index) have also been applied. Some of these are suitable for documenting pollutant impacts, but controversy continues over the best approach, and new methods are still being developed (OCSD 2000). Indices of species diversity have still proven useful for assessing community structure. Generally, a greater number of species represents a healthier, more stable environment, and studies suggest that decreasing diversity is one of the first indications of a stressed community.

Typically in the SCB, polychaete annelids are the most abundant and diverse phylum (major taxonomic group), followed by arthropods and mollusks. A number of minor phyla also occur and may occasionally be abundant. The dominant species or taxa (species which are most abundant) and community assemblage patterns (which species are usually found together, or how similar areas are to each other) are also used for comparisons of infaunal communities. Habitat type is an important determinant of community composition, particularly water depth and sediment characteristics, such as coarseness and heterogeneity. Because of this, natural variability is difficult to separate from the anthropogenic effects (LACSD 2000).

Since the first systematic studies of the benthic infauna of the SCB, the patchy distribution of these organisms, even the dominant species, has been noted. Attempts to define infaunal assemblages and discern the basis for their distributions have continued. Some community parameters follow gradients of environmental variables, both physical and chemical. Abundance and species richness generally decline with increasing water depth, but these relationships have been shown to derive from decreases in sediment grain size and increase in organic content with depth (Gray 1974). Natural factors, including physical disturbance, bioturbation, competition for space, and predation, have also been shown to play a role (Brenchley 1981; CSDOC 1996). Anthropogenic inputs, such as ocean discharges, affect community abundance and composition as well (Bergen et al. 1998b; OCSD 2000; LACSD 2000; Zmarzly et al. 1994).

Comparison of the infaunal communities at the interim LA-3 and LA-2 disposal sites with those at reference areas or the SCB in general is complicated by the different sampling and processing methods employed. Density and species richness were greater at the LA-2 disposal site than at the interim LA-3 disposal site because of depth and sediment differences.

At the LA-2 study area, density per station ranged from 743 indivuduals/m^2 at an adjacent disposal area station (AD1) to 3,363 individuals/m^2 at another adjacent disposal area station (AD6; USACE 2002). Species richness per station (at the LA-2 study area) ranged from 48 to 167 species, with both values recorded at adjacent disposal sites. Shannon-Wiener species diversity ranged from 2.69 at an adjacent disposal area station to 4.23 at a reference area station.

At the LA-3 study area, density per station ranged from 193 individuals/m^2 at a station within the interim site boundary to 623 indivuduals/m^2 at a recent disposal site (USACE 2002). Species richness at the LA-3 study area ranged from 22 species (at stations within the interim site boundary and historic disposal areas) to 52 species at a recent disposal area station. Species diversity at LA-3 ranged from 2.43 within the interim site boundary to 3.46 at a historic disposal area.

a. LA-3

A total of 136 species was collected in the LA-3 study area. On average, polychaetes comprised a greater proportion of the community at the reference site (R; 52%) and a smaller proportion at the recent disposal site (RD; 39%) (Table 3.3-1). Crustaceans were most abundant at the historic disposal site (HD; 29%) and least so at the interim LA-3 disposal site (S; 19%). The other taxonomic groups were more consistent in their contribution to the community. A slightly different suite of species dominated each site. The most abundant species, the polychaete *Maldane sarsi*, was very abundant at the reference site but was virtually absent from the interim disposal site. This species was moderately abundant at the recent and historic disposal sites. *Maldane sarsi* is a large tube-dwelling worm usually found in compact sediments and may be sensitive to dredge material disposal (MITECH 1990). The amphipod *Ampelisca unsocalae* and the polychaete *Prionospio ehlersi* were about half as abundant, on average, as *Maldane sarsi*, and were more evenly distributed, although they both were more abundant at the interim disposal site than elsewhere. Several other abundant species, including the clam *Cyclocardia ventricosa*, the amphipod *Harpiniopsis epistomata* and the cumacean *Eudorella pacifica* were absent from the interim disposal site, but of these only *Cyclocardia* appeared to prefer another site, being most abundant at the recent disposal site. *Cyclocardia* is a common species on the southern California slope (Thompson and Jones 1987, Thompson et al. 1984).

Cluster analysis was performed to determine which infaunal communities were most similar in terms of their species assemblages (Chambers 2001). The most similar were the two shallowest reference site stations, while Station HD3 (historical disposal site) was most unlike any other station. One major cluster consisted of all of the interim disposal site stations and the two shallowest historic disposal mound stations. The other major cluster included all of the reference site and recent disposal mound stations, as well as Station HD4. With the exception of the two shallowest reference stations, this second cluster included the deeper stations, while the first cluster included the shallower stations.

TABLE 3.3-1

BENTHIC INFAUNA COMMUNITY COMPOSITION AND PARAMETERS AT LA-3

	Stations							
	Interim LA-3 Site		Recent Disposal Site		Historical Disposal Site		Reference Site	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Density (number/m^3)	322	193-447	545	410-623	377	237-523	391	213-507
Total Number of Species	30	22-39	45	36-52	35	22-50	31	25-37
Number of Species/Replicate	15	10-24	24	13-30	18	10-34	17	12-23
Station Species Diversity	2.79	2.43-3.16	3.24	2.94-3.42	3.06	2.68-3.46	2.66	2.46-2.78
Replicate Species Diversity	2.39	1.78-2.94	2.86	2.43-3.21	2.60	1.93-3.28	2.31	1.77-2.86
% Polychaetes	49	41-59	39	28-45	42	23-52	52	40-62
% Crustaceans	19	10-25	24	21-28	29	20-36	25	14-30
% Molluscs	19	17-21	20	15-22	16	8-23	14	7-18
% Echinoderms	2	0-3	5	3-9	4	0-4	2	0-4
% Others	3	2-4	12	7-19	9	3-18	8	0-12
Five Most Abundant Species at Each Area								
Ampelisca unsocalae	18%				6%			
Prionospio ehlersi	14%							
Heteromastus filobranchus	7%							
Nephtys cornuta	5%							
Arhynchite californicus	4%						4%	
Cyclocardia ventricosa			16%		6%			
Harpiniopsis epistomata			8%		6%			
Maldane sarsi			7%		12%		30%	
Endorella pacifica			5%					
Chaetodermatidae			4%				4%	
Yoldiella nana					6%		4%	
Pectinaria californiensis							4%	

SOURCE: USACE 2002

That the interim disposal site stations did not form a unique cluster suggests that conditions are not uniform throughout the site.

Chambers (2001) concluded that since the interim disposal site stations did not form a unique cluster, the infaunal communities at the site had not been profoundly altered. However, it more likely confirms that conditions are not uniform throughout the interim disposal site, with some locations more altered than others. None of the interim disposal site stations clustered with reference site stations, and the characteristic upper slope polychaete *Maldane sarsi* was not abundant at the interim disposal site. Physical and chemical characteristics of the recent disposal (RD) stations do not explain why there should be more species there than at the other sites. The mean percentage of total organic carbon at the RD stations was higher than at the other sites, but in pair comparison, the difference was only statistically significant between the RD stations and the S stations (Chambers 2001). Regression analysis was done to examine the relationship between number of species at a station and grain size, total organic carbon, total sulfides, and water depth. This analysis did not find significant relationship between number of species and any of these physical variables.

The greater species richness and diversity at the recent disposal and historic disposal sites than at the reference site is probably due to the nature of the developing communities there. Continual inundation by dredge material at the interim LA-3 disposal site appears to depress both density and species richness of the community, particularly of sensitive species, probably through smothering but also due to changes in the physical characteristics of the sediment. However, at areas near the interim disposal site, episodic disposal may enhance these parameters by maintaining transitional communities. Opportunistic species are favored under these conditions because of their ability to disperse and reproduce both rapidly and abundantly. A Sediment Profile Image (SPI) survey done by SAIC in 1999 showed the presence of pioneering and higher order successional stage infaunal communities near the interim LA-3 disposal site, while communities at the center of the interim disposal site appeared to be at early successional stages (SAIC 1999 in SAIC, MEC, and CRG 2001 in Chambers 2001). Disposal material was easily detectable in the images as distinct depositional layers. The natural sedimentation rate is so low that sediments in unaffected areas appear uniform in the images. An SPI survey conducted by EVS in summer 2000 found evidence of both recent and historical disposal both within the interim LA-3 disposal site and outside the interim site boundary (USACE 2002). Both within and outside the interim disposal site, some material appeared to have been deposited within the year prior to the survey, and may have come from either of the two sites dredged in Newport Bay. At other locations outside the interim disposal site, depositional material was detected, but the disposal apparently occurred long enough in the past for the sediments to have been re-worked by the infaunal organisms and the community appeared to have recovered. Depositional material was not detected at stations within the reference site.

b. LA-2

The infaunal community at the LA-2 study area was dominated by polychaete worms, arthropods crustaceans, mollusks, and echinoderms (in this case, ophiuroids or brittle stars) (Table 3.3-2). The polychaete *Chloeia pinnata* was the most abundant species at the disposal site, followed by the ostracod *Euphilomedes producta*, the polychaete *Spiophanes fimbriata*, the sipunculid or acornworm *Apionsoma misakianum*, and the polychaete *Notomastus tenuis*. These five species occurred at all of the disposal site stations, although they were more abundant at some than at others. Another relatively abundant species, the polychaete *Aphelochaeta glandaria*, was very abundant at disposal site Station S2 but was absent from two other disposal site stations. The polychaete *Maldane sarsi* was the most abundant species at the adjacent disposal area, followed by *Chloeia pinnata*, the polychaetes *Paraprionospio pinnata*, *Myriochele gracilis*, and *Melinna heterodonta*. Four additional species were abundant at one station each: *Euphilomedes producta* at adjacent disposal Station AD4, the polychaetes *Paradiopatra parva* and *Pseudofabriciola californica* at Stations AD5 and AD6, respectively, and the clam *Saxicavella pacifica* at Station AD1. The top species at the reference site were *Spiophanes fimbriata*, unidentified amphiurid brittlestars, *Euphilomedes producta*, the brittlestar *Amphiodia digitata*, and the polychaete *Phisidia sanctaemariae* (formerly *Lanassa* sp. D). The amphipod *Metatiron tropakis* (formerly *Tiron tropakis*) and the ostracod *Euphilomedes charcharodonta* were also abundant at reference station R1, and the amphipod *Ampelisca unsocalae* was abundant at Station R4.

Data from the LA-2 study area was also evaluated using cluster analysis (Chambers 2001). None of the stations clustered tightly together, indicating low similarity, probably due to the high species richness and the low degree of dominance of the communities. The shallowest stations within each area clustered most closely, while the next order of clustering included stations from more than one area. The deepest station, AD1, did not cluster with any of the other stations. These results suggest that clustering was generally, but not strictly, related to depth. That disposal site stations did not cluster tightly together suggests that the infaunal community has not been altered profoundly by dredged material disposal. However, the two shallowest stations at the disposal site did not cluster with the other shallow stations, indicating that something other than depth affected the infaunal community at those stations.

3.3.2.2 Epibenthic and Pelagic Invertebrates

a. LA-3

This section describes the epibenthic invertebrates found in the LA-3 study area; specifically, information is presented on dominant species, abundance, species richness, and commercially caught species within the study area. Data for this study was collected by Chambers Group (2001) in August 2000 and January 2001. Previous trawl studies have been conducted in the LA-3 study area in August 1988 and January 1989 by

TABLE 3.3-2

BENTHIC INFAUNA COMMUNITY COMPOSITION AND PARAMETERS AT LA-2

	Stations					
	LA-2 Site		Adjacent Sites		Reference Area	
	Mean	Range	Mean	Range	Mean	Range
Density (number/m^3)	1,731	903-3,000	2,120	743-3,363	2,440	1,433-3,093
Total Number of Species	83	65-109	97	48-167	125	108-148
Number of Species/Replicate	48	34-70	54	25-98	75	59-90
Station Species Diversity	3.45	3.19-3.67	3.30	2.69-4.23	3.60	3.19-4.23
Replicate Species Diversity	3.15	2.86-3.47	3.04	2.41-3.96	3.76	3.62-3.97
% Polychaetes	67	61-74	55	42-67	50	44-53
% Crustaceans	17	13-20	23	16-35	29	28-30
% Molluscs	6	5-8	11	4-23	7	4-12
% Echinoderms	5	5-7	5	3-10	8	5-10
% Others	4	2-7	7	4-10	6	5-8
Five Most Abundant Species at Each Area						
Chloeia pinnata	14%		10%			
Euphilomedes producta	8%				4%	
Spiophanes fimbriata	7%				8%	
Apionsoma misakianum	7%					
Notomastus tenuis	6%					
Maldane sarsi			13%			
Paraprionospio pinnata			5%			
Myriochele gracilis			5%			
Melinna heterodonta			4%			
Amphiuridae juv.					5%	
Amphiodia digitata					4%	
Phisidia sanctamariae					3%	

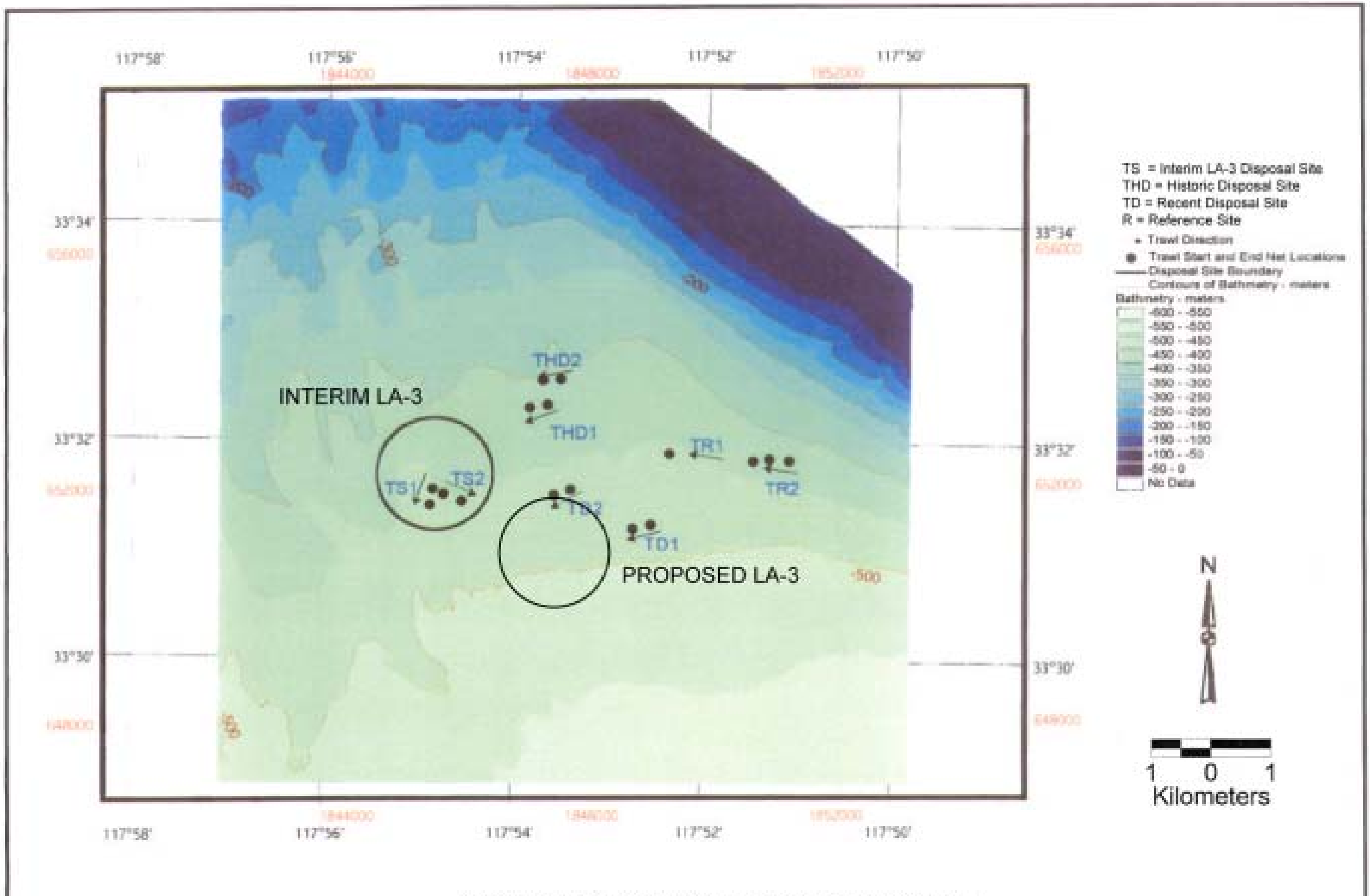
SOURCE: USACE 2002

MITECH (1990), and in nearby areas by SCCWRP (1983) and extended surveys by Cross (1987).

Two replicate five-minute otter trawls were conducted at four sites (Figures 3.3-1 and 3.3-2): inside the interim disposal site (sampling locations identified as “S” in the sampling reports and “TS” on Figures 3.3-1 and 3.3-2), at a reference location (sampling locations identified as “R” in the sampling reports and “TR” on Figures 3.3-1 and 3.3-2), at a recent disposal area (sampling locations identified as “RD” in the sampling reports and “TD” on Figures 3.3-1 and 3.3-2), and at a historical disposal area (sampling locations identified as “HD” in the sampling reports and “THD” on Figures 3.3-1 and 3.3-2), with depths ranging from 401 to 485 m (1,316 to 1,591 ft). During these surveys at least 43 species of epibenthic invertebrates, represented by seven phlya and 14 classes, were collected with at least 31 species taken in August and at least 28 species taken in January. The most diverse phlya were represented by at least 18 species each of echinoderms, at least 11 species of cnidaria, and at least 7 species of arthropods (all crustaceans). These are the historically dominant phyla collected during trawl surveys at this depth (Word and Mearns 1977; Cross 1987; MITECH 1990; Thompson, Tsukada, et al. 1993).

Dominant species. The epibenthic invertebrate communities offshore of southern California show a pattern differentiated by depth or depth-related factors, with major changes occurring about 300 m (984 ft) and again about 737 m (2,418 ft), with intermediate depths composed of overlapping assemblages (Thompson, Tsukada, et al. 1993). The species compositions at the LA-3 study area were typical of those seen on the slope at the depth range sampled (Word and Mearns 1977; Thompson, Tsukada, et al. 1993). The five most abundant species at all sites surveyed in 2000-2001 were a complex of the Pacific heart urchin *(Brissopsis pacifica*) and the California heart urchin (*Spatangus californicus*), the northern heart urchin (*Brisaster latifrons*), the fragile sea urchin *(Allocentrotus fragilis*), and the sea star *Zoroaster evermanni*. The Pacific/California heart urchin complex (difficult to distinguish in the field) comprised over 80 percent of the individuals collected. The top five species comprised over 98 percent of the total abundance, and occurred at all four locations during both seasons.

Three of the urchin species were among the most common species in the prior survey at the interim LA-3 site; in 1988-1989 California heart urchin was not taken, and the sea star *Myxoderma platyocanthum* was among the dominant species (MITECH 1990). These top species in 2000-2001, with the exception of *Zoroaster evermanni*, are considered a mid-slope assemblage (Thompson, Tsukada, et al. 1993), and were collected at depths of 150 m (492 ft) and deeper in surveys throughout the SCB (Thompson et al. 1987; Thompson, Tsukada, et al. 1993; Allen et al. 1998). Relative abundance of the four dominant urchin species changes with depth on the shelf slope, and was summarized from trawl data collected between 1971 and 1985; California heart urchin was most abundant at 300 m (984 ft), and was collected in lower abundances out to 600 m (1,968



AUGUST 2000 TRAWL LOCATIONS AT LA-3

Source: USACE, 2003b

Note: Locations are approximate

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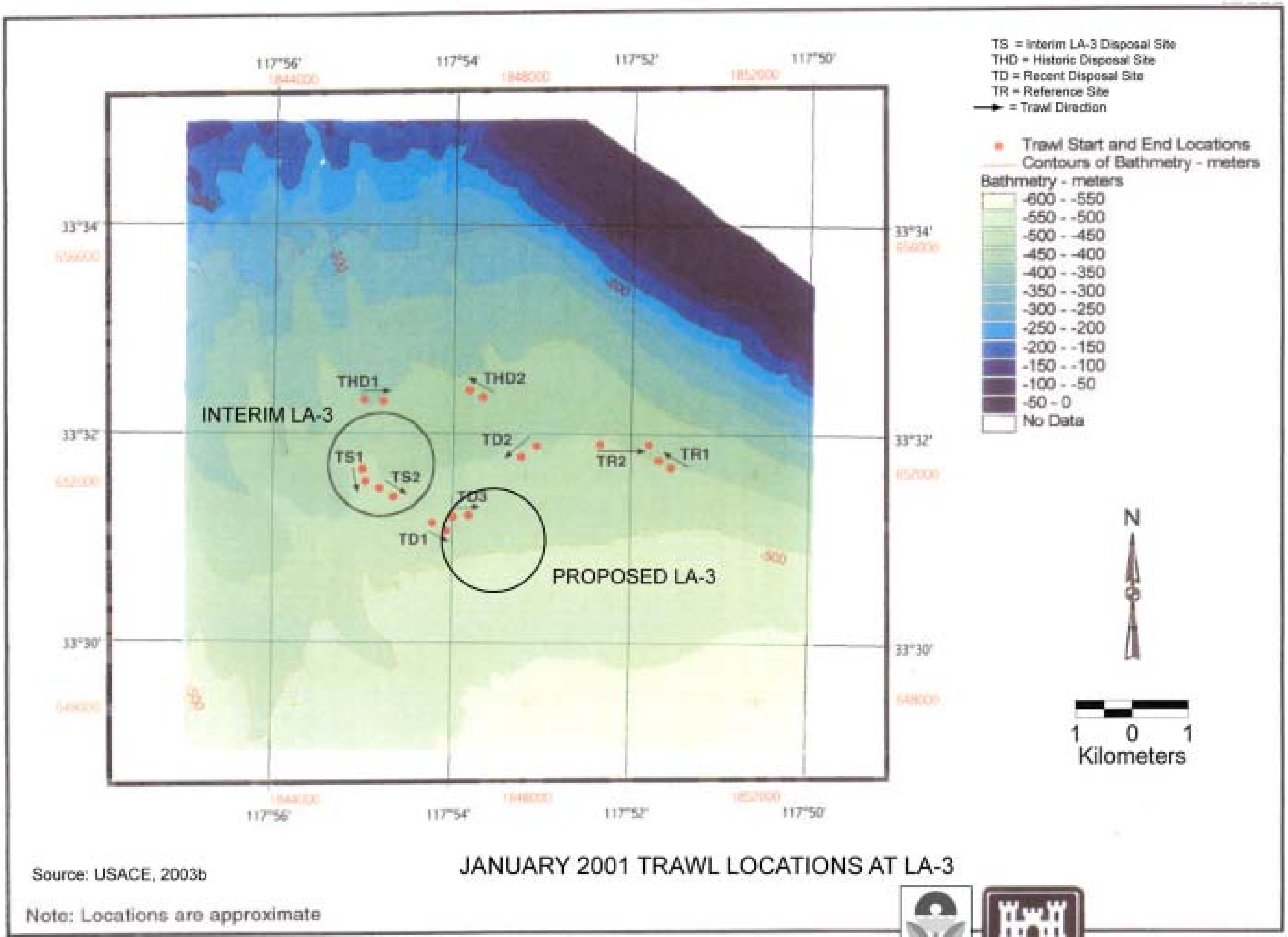
Figure 3.3-1



Source: USACE, 2003b

Note: Locations are approximate

JANUARY 2001 TRAWL LOCATIONS AT LA-3

Figure 3.3-2

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ft; Thompson, Dixon, et al. 1993). *Zoroaster evermanni* occurs at depths from 398 to 940 m (1,306 ft to 3,084 ft) off of the southern California coast (Fisher 1928). The factors that affect the distribution of urchins and sea stars on the slope is not known, but all of the species have been noted to have patchy distributions, and variations in abundance over time (Thompson, Tsukada, et al. 1993).

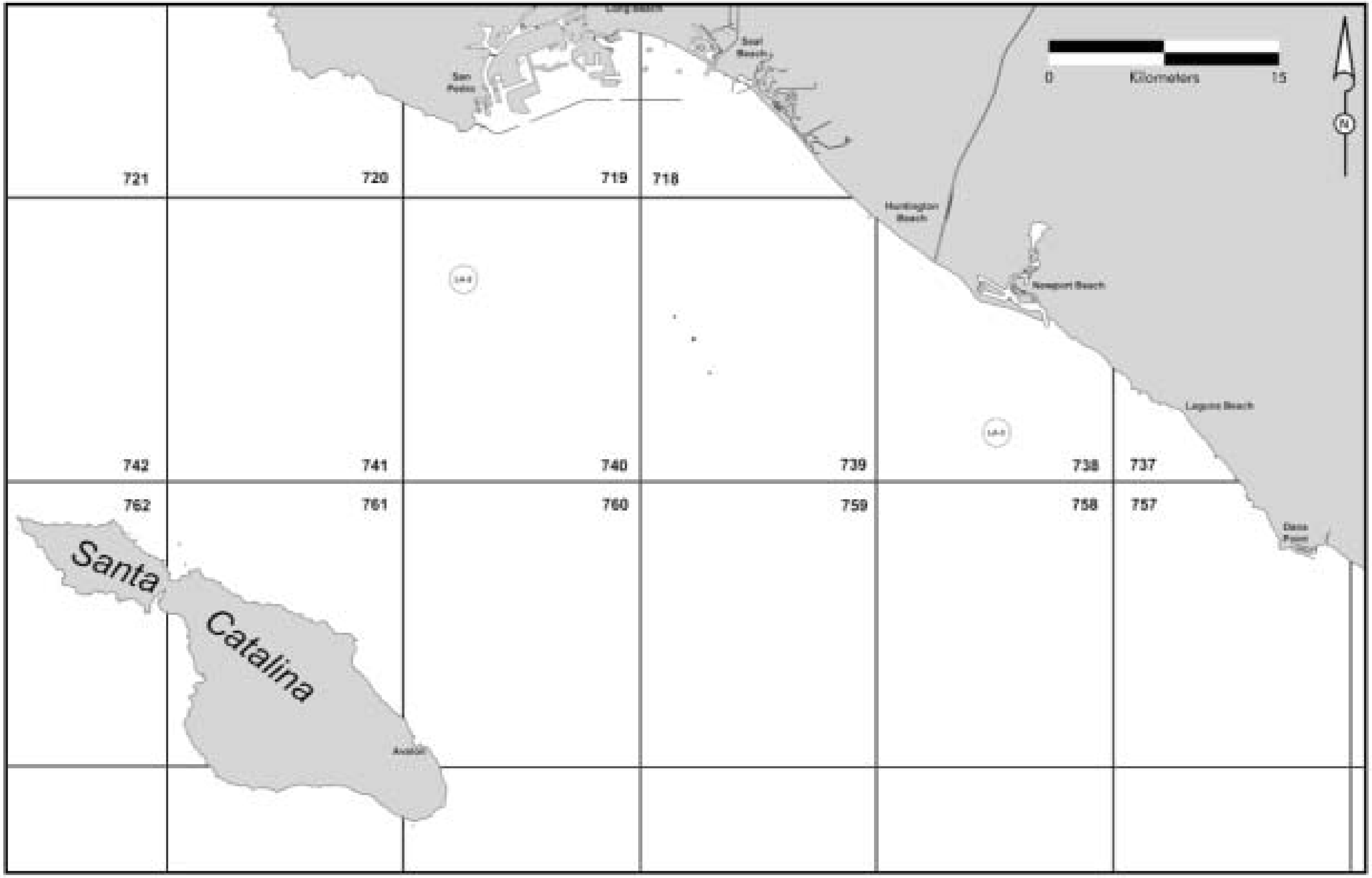
Abundance. During the August 2000 survey 22,481 individuals were taken, while 14,900 individuals were taken in January 2001. During the summer survey, abundance was greater at the interim disposal, recent disposal, and reference sites than in winter; only the historical disposal site had greater abundance in winter. This seasonality in urchin abundances was also seen in the 1988-1989 surveys (MITECH 1990). SCCWRP (1983) noted an increase in northern and California heart urchins in their summer samples, although statistically they found no temporal differences in catch parameters. CSDOC (1996) and Thompson et al. (1987) did not detect any seasonal changes in abundance over long time periods, although distribution was not uniform, with some urchins aggregating in "herds" (Thompson, Tsukada, et al. 1993). Overall abundances were lower at the interim LA-3 site compared to these other surveys; urchin abundance in particular was noticeably lower at the interim LA-3 site compared to the reference site in both surveys (MITECH 1990; USACE 2002). At the LA-2 disposal site, it was postulated that decreases in urchin populations may have been caused by smothering, a change in sediment characteristics, or a change in food supply (EPA 1987a).

Species richness. The 2000-2001 surveys show very similar species richness at each of the comparable sites compared to surveys in 1988-1989 (MITECH 1990). All of the 2000-2001 sites had fewer species compared to the nearby surveys conducted by SCCWRP (1983), but were similar to those seen in a 460 m (1,509 ft) survey conducted in 1976 and 1977 (Word and Mearns 1977). In addition, although lower than the reference stations, species richness at LA-3 is similar to that seen in other deep-water surveys.

Commercial fishery. Commercial fish catches are reported by CDFG Catch Blocks, which are 18.52 km by 18.52 km (10 nmi by 10 nmi) statistical blocks. The proposed LA-3 site is located within Catch Block 738 (see Figure 3.3-3).

Commercial fisheries for invertebrates between 1999 and 2001 in Catch Block 738 (CDFG unpubl. data 2002), which includes the LA-3 study area, showed market squid (*Loligo opalescens*), California spiny lobster (*Panulirus interruptus*), rock crabs (*Cancer* sp.), red urchin (*Strongylocentrocus franciscanus*), and spot prawn (*Pandalus platyceros*) to be the top five species taken. None of these species was collected during trawl surveys. Additional information on commercial fisheries is discussed in Section 3.4.1.

Market squid. Market squid are fished by roundhaul nets in depths ranging from 15 to 45 m (50 to 150 ft). Approximately one million kg (2,015,230 lbs) total were landed from



COMMERCIAL FISH CATCH BLOCKS

Source: USACE, 2003b

Figure 3.3-3

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Catch Block 738 between 1999 and 2001; the total landings in California in 1999 were 90 million kg (200 million lbs) (Leet et al. 2001). The entire fishery for market squid occurs in the surface waters.

California spiny lobster. The California spiny lobster fishery occurs only in southern California, and is active between Point Conception and the Mexican border. The fishery is composed exclusively of trap fishing, bringing lobsters in alive. Between 1999 and 2001 in Catch Block 738, 38,000 kg (84,518 lbs) were landed; the total landings in California in 1999 were about 227,000 kg (500,000 lbs). Most of the traps are set near rocky reefs, in depths ranging from about 10 to 100 m (32.8 to 328 ft; Leet et al. 2001). There is a sport fishery for lobster, using hoop nets from piers, or bare hand by skin or scuba diving. Both of these fisheries are nearshore, with divers typically restricted to 40 m (131 ft) or less.

Rock crab. Rock crabs are fished along the entire California coastline, but over 85 percent of the rock crab fishery is active in southern California. The fishery is composed exclusively of trap fishing, bringing most crabs in alive. Between 1999 and 2001 in Catch Block 738, 8,800 kg (19,477 lbs) were landed; the total landings in California in 1999 were 358,000 kg (790,000 lbs). Most of the traps are set on open sandy areas, or near rocky reefs, in depths ranging from 25 to 75 m (82 to 246 ft; Leet et al. 2001).

Red urchin. The red urchin fishery occurs along the entire California coastline, and about 70 percent of the urchin fishery is taken in southern California. The fishery is composed exclusively of divers collecting the urchins in nearshore waters. Between 1999 and 2001 in Catch Block 738, 2,200 kg (4,887 lbs) were landed; the total landings in California in 1999 were 4.9 million kg (10.9 million lbs). Most of the fishery is concentrated around the offshore islands and San Diego, where algae and rock reefs provide an excellent habitat (Leet et al. 2001).

Spot prawn. The spot prawn fishery in southern California is composed of both trap and trawl components, with fishing occurring at depths of 1,100 to 2,000 m (3,600 to 6,560 ft). In Catch Block 738 between 1999 and 2001, 1,900 kg (4,300 lbs) of spot prawn were landed. In 1999, the total catch for California was about 270,000 kg (600,000 lbs) (Leet et al. 2001). The entire fishery is in depths greater than the LA-3 study area.

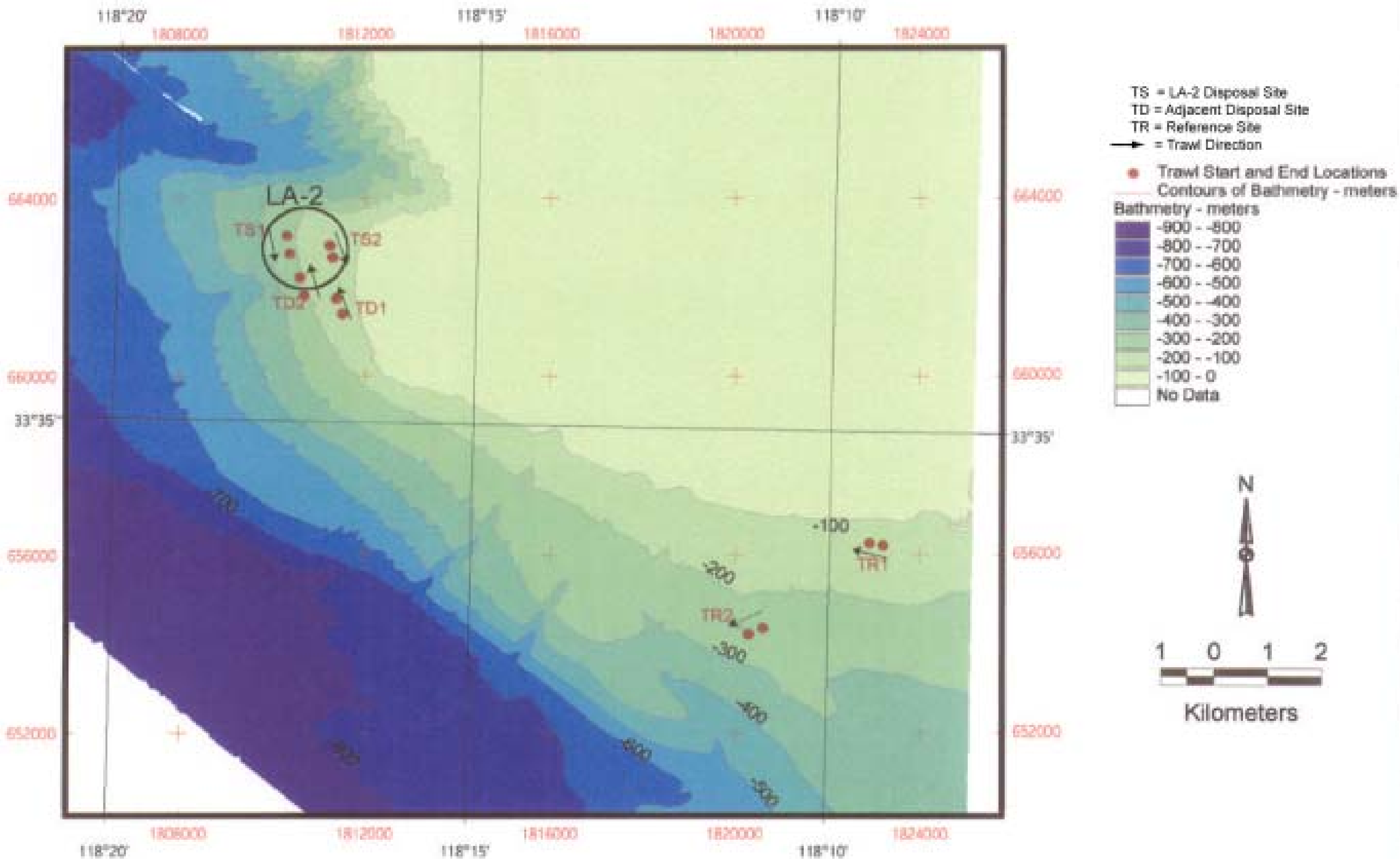
b. LA-2

This section describes the epibenthic invertebrates found in the study area of the LA-2 ODMDS. Specifically, information is presented on dominant species, abundance, species richness, and commercially caught species within the study area. Data for this study were collected by Chambers Group (2001) in August 2000 and January 2001. Previous trawl studies have been conducted in the LA-2 area by IEC (1982) and Tetra Tech and MBC (1985).

In 2000-2001 two replicate five-minute otter trawls were conducted at three sites (Figures 3.3-4 and 3.3-5): inside the disposal site (sampling locations identified as "S" in the sampling reports and "TS" on Figures 3.3-4 and 3.3-5), at a reference location (sampling locations identified as "R" in the sampling reports and "TR" on Figures 3.3-4 and 3.3-5), at an adjacent disposal area (sampling locations identified as "AD" in the sampling reports and "TD" on Figures 3.3-4 and 3.3-5), with depths ranging from 127 to 242 m (417 to 794 ft). During these surveys at least 48 species of epibenthic invertebrates, represented by eight phlya and 14 classes, were collected with at least 34 species taken in August and at least 27 species taken in January. The most diverse phlya were represented by at least 16 species each of echinoderms, at least 11 species of arthropods (all crustaceans), and at least 10 species of molluscs. These are the historically dominant phyla collected during trawl surveys at this depth (IEC 1982; Tetra Tech and MBC 1985; Thompson, Tsukada, et al. 1993; Allen et al. 1998).

Dominant species. The species composition at the LA-2 site was typical of that seen on the outer shelf - upper slope at the depth range sampled (Thompson et al. 1987; Thompson, Tsukada, et al. 1993). The five most abundant species at all sites surveyed in 2000-2001 were the fragile sea urchin, northern heart urchin, Pacific heart urchin, California heart urchin, and the Pacific/California heart urchin complex. The fragile sea urchin comprised over 75 percent of the individuals collected; the top five species comprised over 93 percent of the total abundance. The fragile sea urchin was the only species that occurred at all six locations and was also the most abundant species in the two prior surveys at the LA-2 site (IEC 1982; Tetra Tech and MBC 1985). Other abundant species in the IEC (1982) survey were the shrimp *Neocrangon resima*, the sand star *Astropectin verrilli*, and the Pacific heart urchin. Other abundant species in the Tetra Tech and MBC (1985) survey were the white urchin (*Lytechinus pictus*), highly abundant in only a few trawls, and the ridgeback rock shrimp (*Sicyonia ingentis*). All of these previously abundant species were collected during the 2000-2001 surveys, in similar abundances as in 1982, but in lesser abundances than collected in 1985. The most abundant species in 2000-2001 were a mixture of the shelf and mid-slope assemblages described by Thompson, Tsukada et al. (1993), and were collected at and below 150 m (492 ft) in surveys throughout the SCB (Thompson et al. 1987; Thompson, Tsukada, et al. 1993; Allen et al. 1998).

Abundance. During the August 2000 survey 934 individuals were taken, while 3,299 individuals were taken in January 2001. Winter was characterized by higher abundance at the disposal and adjacent disposal sites; there was no seasonal difference at the reference site. Abundance of epibenthic invertebrate is highly variable among the various surveys, with the abundance at the disposal site near the median of the range of values shown. Most of the comparison data were collected with trawls of 10-minute duration, which would increase the overall abundance of the catch. Most of the individuals collected at these depths are urchins, and their distribution is patchy throughout the SCB (Thompson, Tsukada, et al. 1993).



AUGUST 2000 TRAWL LOCATIONS AT LA-2

Source: USACE, 2003b

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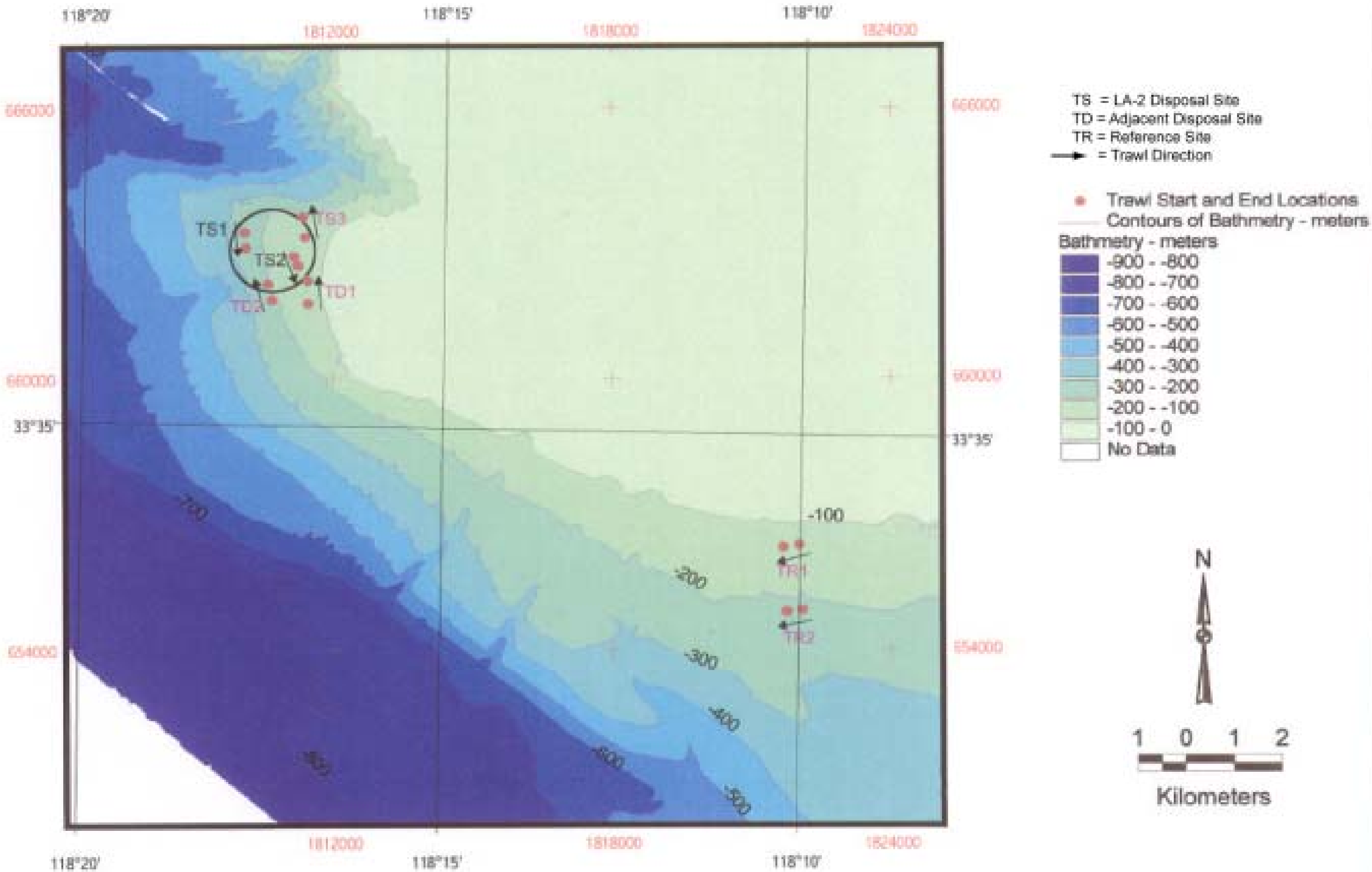
Figure 3.3-4



JANUARY 2001 TRAWL LOCATIONS AT LA-2

Source: USACE, 2003b

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Figure 3.3-5

Species richness. Species richness was very similar during the two more intensive surveys at LA-2 (Tetra Tech and MBC 1985; USACE 2002). In addition, although it was lower than the reference stations, species richness was similar to that seen in SCB-wide surveys. The lower species richness seen at the disposal site may indicate disposal-related effects, possibly a result of smothering, a change in sediment characteristics, or a change in food supply (EPA 1987a)

Commercial fishery. Commercial fish catches are reported by CDFG Catch Blocks, which are 18.52 km by 18.52 km (10 nmi by 10 nmi) statistical blocks. The LA-2 site is located within Catch Block 740 (see Figure 3.3-3).

Commercial fisheries for invertebrates between 1999 and 2001 in Catch Block 740 (CDFG unpubl. data 2002), which includes the LA-2 ODMDS, showed market squid, red urchin, ridgeback rock shrimp (also known as ridgeback prawn), California spiny lobster, and unspecified sea cucumber (likely *Parastichopus* sp.) to be the top five species taken. Additional information is discussed in Section 3.4.1.

Market squid, red urchin, and California spiny lobster are discussed in Section3.4.1. Compared to landings in Catch Block 738, the market squid fishery in Catch Block 740 is similar in size, the red urchin fishery is larger, taking about 193,000 kg (429,207 lbs), while the California spiny lobster fishery is smaller, taking 11,800 kg (26,303 lbs).

Ridgeback rock shrimp. Between 1999 and 2001, ridgeback rock shrimp landings from Catch Block 740 totaled about 14,500 kg (31,501 lbs). The minimum depth allowed for trawling is 45 m (147 ft), and generally occurs in depths shallower than 160 m (525 ft; Leet et al. 2001). The fishery is concentrated in the Santa Barbara Channel and Santa Monica Bay, with the total landings in 1999 equal to over 630,000 kg (1,391,000 lbs) (Leet et al. 2001).

Sea cucumber. The fishery for sea cucumbers began in 1978, and at this time, is conducted by diver and trawler methodologies, with total landings in Catch Block 740 between 1999 and 2001 approximately 9,100 kg (20,000 lbs). The main abundance of *Parastichopus* occurs in less than 100 m (328 ft), and the fishery is concentrated at these depths (Leet et al. 2001). In 1999, over 270,000 kg (600,000 lbs) of sea cucumbers were landed commercially in California; there is no known sport fishery (Leet et al. 2001).

3.3.3 Fish Community

3.3.3.1 LA-3

This section describes the demersal fishes found in the LA-3 study area. Specifically, information is presented on dominant species, abundance, species richness, and biomass within the study area. Data are summarized in Tables 3.3-3 and 3.3-4 and Figure 3.3-6.

TABLE 3.3-3
NUMBER OF SPECIES, TOTAL ABUNDANCE, AND FIVE MOST ABUNDANT FISH SPECIES COLLECTED WITHIN THE LA-3 STUDY AREA BY STATION. COMBINED SUMMER AND WINTER TOTALS

Station	No. of Species	Total Abundance	Species	Reported Depth Range	Abundance
S LA-3 Disposal Site	8	111	Dover sole	27 to 914 m	42
			longspine thornyhead	332 to 1,524 m	26
			dogface witch eel	to >914 m	22
			California rattail	61 to >610 m	10
			shortspine thornyhead	26 to >1,524 m	8
R Reference Area	12	204	longspine thornyhead	332 to 1,524 m	111
			splitnose rockfish	213 to 475 m	24
			shortspine thornyhead	26 to >1,524 m	13
			Dover sole	27 to 914 m	12
			bigfin eelpout	91 to 620 m	12
RD Recent Disposal Site	12	356	longspine thornyhead	332 to 1,524 m	239
			dogface witch eel	to >914 m	49
			shortspine thornyhead	26 to >1,524 m	24
			Dover sole	27 to 914 m	21
			California rattail	61 to >610 m	8
HD Historic Disposal Site	12	170	longspine thornyhead	332 to 1,524 m	46
			shortspine thornyhead	26 to >1,524 m	40
			dogface witch eel	to >914 m	29
			Dover sole	27 to 914 m	16
			rex sole	18 to 640 m	15

SOURCES: Chambers Group (2001) and COE (2002); reported depth range from Miller and Lea (1972).

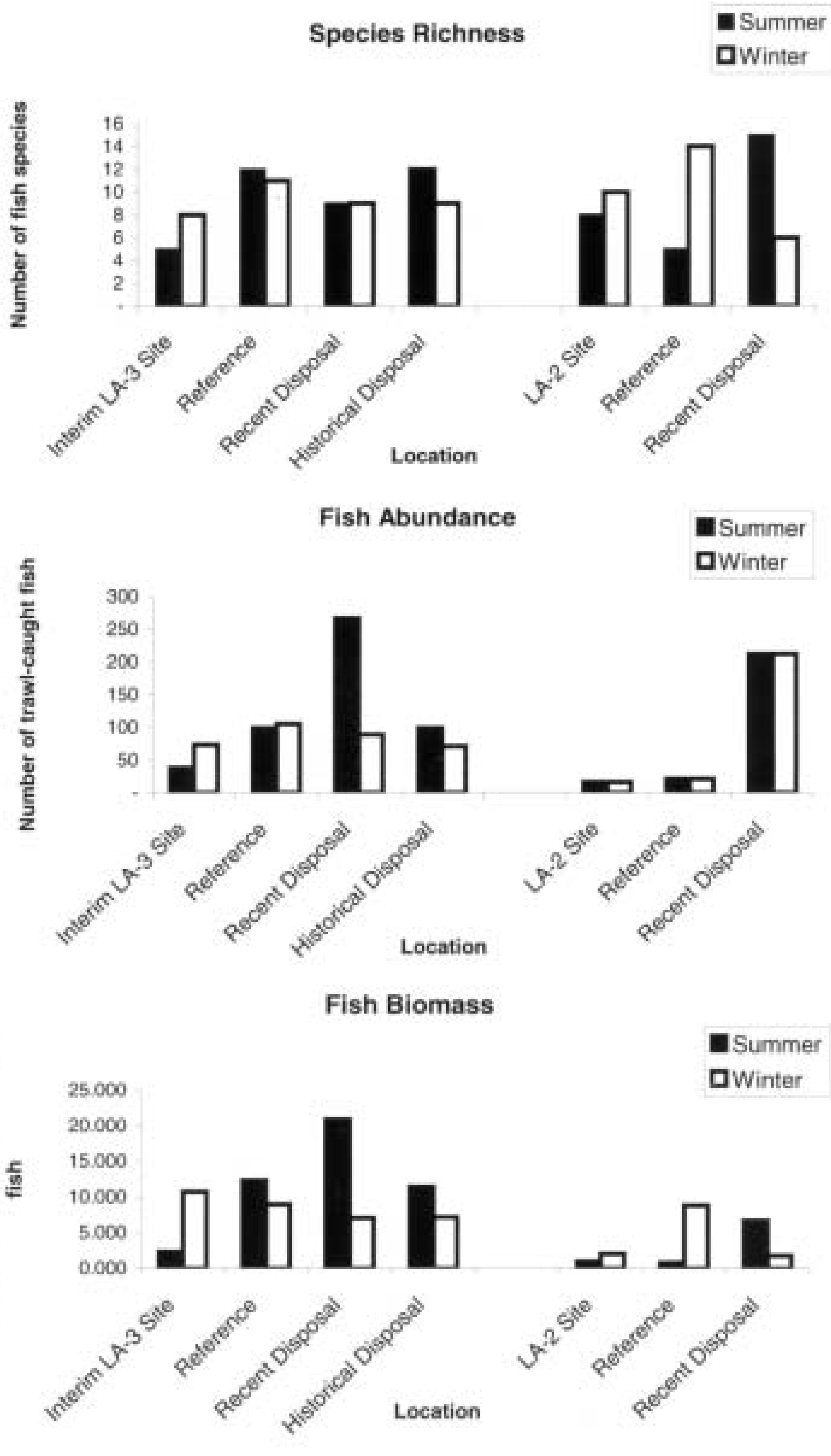
TABLE 3.3-4
COMPARISON OF AVERAGE ABUNDANCE AND SPECIES RICHNESS FOR 5 TRAWL SURVEYS IN THE SOUTHERN CALIFORNIA BIGHT (SCB) AREA AT DEPTH SIMILAR TO LA-3

Survey Year(s)	2000-2001[1]				1988-1989[2]			1981-1983[3]		1981-1982[4]			1976-1977[5]	
Survey Area	LA-3				LA-3			CSDOC/Pt. Dume		CSDOC			SCB	
Station ID	S	R	RD	HD	DT	AD	CT			E	G	K		
Av. Depth (m)	450	445	465	410	436.5	452	437	370	408	304	382.5	482	300	460
No. of Samples	4	4	4	4	4	4	4	8	8	4	4	4	2	7
Fish														
Abundance	27.8	51	88.8	42.5	26	41	69	20-200*	30-360*	105	80	148.5	200	121
Species	5.5	9	7.3	7.5	3.8	5.5	5.8	6-10*	5-10*	11	8	6	7	4
Epibenthic Invertebrates														
Abundance	737	5,041.3	1,712.5	1,853.3	1,703.3	5,181	11,631	NA	NA	1,450	3,400	6,400	300	3,500
Species	9.8	12.3	15.3	10	10.3	14	11.3			14	14.5	18	14	11

SOURCES:
[1]Chambers (2000) and COE (2002). 5-minute trawls.
[2]MITECH (1990). 10-minute trawls.
[3]Cross (1987). 10-minute trawls (includes data from SCCWRP [1983]).
[4]SCCWRP (1983). 10-minute trawls.
[5]Allen and Mearns (1977) and Word and Mearns (1977). 20- to 30-minute trawls.

NOTES:
*ranges reported
Surveys conducted from 1977 to 2001 at depths of 300 to 480 meters.

Station ID codes:
S, DT = disposal
R, CT = reference
RD = recent disposal
HD = historical disposal
AD = adjacent disposal
E, G, and K = depth isobaths



FISH ABUNDANCE, SPECIES RICHNESS, AND BIOMASS (kg) TAKEN DURING AUGUST 2000 AND JANUARY 2001 TRAWLS AT INTERIM LA-3 AND LA-2 ODMDS

During the 2000-2001 surveys (see Figures 3.3-1 and 3.3-2) a combined fourteen species of fish, represented by three classes and nine families, were collected, with 14 species taken in August 2000 and 12 species taken in January 2001; only spotted ratfish (*Hydrolagus colliei*) and black eelpout (*Lycodes diapterus*) were not taken in January. The most diverse families were represented by three species each of righteye flounders (Family Pleuronectidae) and scorpionfish (Family Scorpaenidae) (including rockfish and thornyheads), and two species of eelpouts (Family Zoarcidae). These are the historically dominant families found in trawl surveys at this depth (Allen and Mearns 1977; Cross 1987; MITECH 1990; EPA 1993).

a. Dominant Species

The fish populations that occur on the California coast are generally differentiated by depth or depth-related factors (Allen and Mearns 1977). The species composition at the LA-3 study area was typical of that seen in demersal fish communities on the slope at the depth range sampled (Allen and Mearns 1977; Cross 1987). During the 2000-2001 surveys, the most abundant species taken were longspine thornyhead (*Sebastolobus altivelis*), dogface witch-eel (*Facciolella gilberti*), Dover sole, and shortspine thornyhead (*Sebastolobus alascanus*). These four species occurred at all four locations during both seasons, and together comprised over 83 percent of the total abundance. MITECH's (1990) survey at the interim LA-3 site sampled a similar fish community, except dogface witch-eel was not taken. Thornyheads were the dominant species in the lower slope (>400 m [>1,312 ft]), with Dover sole also in high abundance, and dogface witch-eel present in much lower abundances in surveys by SCCWRP (1983) and expanded surveys by Cross (1987). The dogface witch-eel was more abundant in 2000-2001 than in other surveys. It is a deep-water species of the Family Nettastomidae, with a population center south of California (Fitch and Lavenberg 1968). The reason for its relatively high abundance in these surveys is not known, although it is possibly related to recent El Niño conditions. During an El Niño southern species have become more abundant in the SCB (Mearns 1988). The splitnose rockfish was among the most abundant species found by Cross (1987); it was present in low abundance in this survey, but was found at the interim LA-3 site in greater abundance by MITECH (1990). As indicated in Table 3.3-3, the dominant species collected in the trawl surveys range widely across the shelf and slope.

b. Abundance and Species Richness

During the August 2000 survey 503 individuals were taken, while 338 individuals were taken in January 2001. Abundance and species richness was lower at the interim disposal site during the 2000-2001 surveys compared to the three other sites sampled. In summer it had lower biomass, and in winter higher biomass, compared to the three other sites. The 2000-2001 surveys show an increase in species richness and abundance at the interim disposal and adjacent areas compared to surveys in 1988-1989, with the reference area showing a greater number of species with slightly lower abundance (MITECH 1990). The reference, recent disposal, and historical disposal sampling sites had similar, or slightly lower, abundances and species richness compared to the surveys conducted by SCCWRP (1983). However, the number of species and abundances taken at all stations was the same or higher for these depths than those seen in a 460 m (1,509 ft) survey conducted in 1976 and 1977 (Allen and Mearns 1977).

The lower abundance and diversity within the interim disposal site compared to the reference may indicate disposal-related effects, possibly a result of a decrease in food resources. MITECH (1990) collected more juvenile thornyhead individuals at the interim disposal site and suggested irregularities in the sediment surface due to deposition of dredged material might allow for greater protection from predation for smaller fishes. The greater abundance and species richness at the recent disposal and historical disposal sites (compared to within the interim site boundary) indicate that the fish populations, if they are affected by disposal, have recovered to values seen in areas not affected by disposal activities. There were no apparent seasonal trends in abundance, species richness, or biomass between the summer or winter surveys. During the MITECH (1990) surveys there were also no trends, although in SCCWRP (1983) the abundance and species richness were both higher in winter. Seasonality is attributed to oceanographic conditions related to temperature and dissolved oxygen concentrations, reproduction, depth-related age progression, and feeding (Cross 1987; Cross and Allen 1993).

c. Pelagic Species

Mid-water pelagic species in the area were only sampled in the surveys by MITECH (1990), which used an Isaac-Kidd mid-water trawl. None of the species collected was among the list of commercial species, and the catch was dominated by bristlemouths (Family Gonostomidae), hatchetfish (Family Sternoptychidae), and lanternfishes (Family Myctophidae). All of these are typical in southern California (Fitch and Lavenberg 1968). One pelagic species was observed on the surface during trawls, the ocean sunfish (*Mola mola*), which is found worldwide in tropical to temperate seas (Eschmeyer et al. 1983).

3.3.3.2 LA-2

This section describes the demersal fishes found in the study area of LA-2 ODMDS. During these surveys (see Figures 3.3-4 and 3.3-5) a combined 27 species of fish, represented by two classes and 12 families, were collected with 18 species taken in August 2000 and 21 species taken in January 2001; 12 species were common to both seasons. The most diverse families were represented by nine species of scorpionfish (Family Scorpaenidae; including rockfish and thornyhead), four species of righteye flounders (Family Pleuronectidae), and three species of lefteye flounders (Family Bothidae). These are the historically dominant families noted at these depths in other trawl surveys (IEC 1982; Tetra Tech and MBC 1985; SCCWRP 1983; CSDOC 1996). Cross (1987) noted fewer Bothidae, but much of the surveys were in deeper water where

Bothidae are less common. In one study off of San Francisco all of the Bothidae collected occurred in water less than 100 m (328 ft; EPA 1993).

a. Dominant Species

The species composition at the LA-2 site was typical of that seen in demersal fish communities on the slope at the depth range sampled (IEC 1982; Tetra Tech and MBC 1985; SCCWRP 1983; CSDOC 1996; Allen et al. 1998). Because of the shallower depth, a different species assemblage was seen compared to that at the LA-3 study area, with only seven species occurring at both locations. During the combined surveys, the most abundant species taken at LA-2 were Pacific sanddab, slender sole (*Lyopsetta exilis*), and shortspine combfish (*Zaniolepis frenata*). These three species occurred in at least five of the six locations during both seasons. Table 3.3-5 compares the five most abundant species at each site during the combined seasons, with total abundance and species richness. Surveys in 1983-1984 at the LA-2 site collected a similar fish assemblage (Tetra Tech and MBC 1985). IEC (1982) did a single trawl in the disposal site in 1980; dominant species were Dover sole, blacktip poacher (*Xeneretmus latifrons*), rex sole, and splitnose rockfish. Compared to a comprehensive SCB-wide survey in 1994, all of the top five species collected in 2000-2001, with the exception of longfin sanddab, were among the recurrent groups, species clusters, and depth clusters derived from the 22 trawls conducted between 101 and 200 m (331 and 656 ft; Allen et al. 1998). As indicated in Table 3.3-5, the dominant species collected in the trawl surveys range widely across the shelf and slope.

b. Abundance and Species Richness

During the August 2000 survey 249 individuals were taken, while 427 individuals were taken in January 2001. Comparison of abundance and species richness during the 2000-2001 surveys shows lower values at the disposal site compared to the other sites sampled. Table 3.3-5 shows a comparison between the three locations sampled. The 2000-2001 surveys show lower species richness and abundance at the disposal and adjacent areas compared to surveys in 1983-1984; however, the earlier surveys were more heavily sampled, which likely contributed to the higher species richness and abundance seen at each site and overall. Both the recent and prior surveys at LA-2 indicated there were fewer species and individuals at the disposal site compared to the reference site. Similar to the LA-3 study area, the adjacent disposal site indicates that the fish abundance and species richness resemble those seen in areas not affected by disposal activities. There were no apparent seasonal trends in species richness, abundance, and biomass between the summer or winter surveys. During the Tetra Tech and MBC (1985) surveys there were also no trends, although in other surveys the abundance and species richness were both higher in winter (SCCWRP 1983; Cross 1987). No persistent trends in seasonal abundance were detected in a 10-year monitoring program by CSDOC (1996). A comparison of abundance and species richness during other surveys is shown in

TABLE 3.3-5
NUMBER OF SPECIES, TOTAL ABUNDANCE, AND FIVE MOST ABUNDANT FISH SPECIES COLLECTED WITHIN LA-2 STUDY AREA BY STATION
COMBINED SUMMER AND WINTER TOTALS

Station	Number of Species	Total Abundance	Species	Reported Depth Range	Abundance
S			shortspine combfish	shallow to 366 m	34
LA-2			slender sole	76 to 518 m	19
Disposal	12	88	greenstriped rockfish	61 to 402 m	9
Site			Dover sole	27 to 914 m	6
			greenblotched rockfish	61 to 396 m	6
R			Pacific sanddab	9 to 549 m	127
Reference			longfin sanddab	2 to 135 m	62
Area	16	258	slender sole	76 to 518 m	23
			English sole	18 to 305 m	20
			Dover sole	27 to 914 m	6
AD			Pacific sanddab	9 to 549 m	136
Adjacent			slender sole	76 to 518 m	92
Disposal	17	330	shortspine combfish	shallow to 366 m	40
Site			halfbanded rockfish	59 to 402 m	26
			greenspotted rockfish	49 to 201 m	8

SOURCES: Chambers Group (2001) and COE (2002); reported depth range from Miller and Lea (1972).

Table 3.3-6. Abundance is lower at the LA-2 site compared to other locations in the SCB, but the species richness is similar at all locations with similar depths.

c. Pelagic Species

No mid-water pelagic surveys have been conducted in the vicinity of LA-2, but the bristlemouths, hatchetfishes, and lanternfishes taken at LA-3 are common throughout the worlds oceans (Fitch and Lavenberg 1968; Hart 1973), and are likely similarly present at LA-2. Two epipelagic species were observed on the surface during trawls in summer: the bonito shark (or shortfin mako [*Isurus oxyrinchus*]), which is found world wide in warm seas and sought by sportfishermen (Eschmeyer et al. 1983), and the ocean sunfish, mentioned in Section 3.3.3.1.c.

3.3.4 Tissue Bioaccumulation

Historical impacts of contaminants, particularly the chlorinated hydrocarbons DDT and PCBs, have been of regional concern in the SCB since the 1970s. While sources of contamination have been reduced significantly in the last several decades, many substances are bound to sediments and are available to organisms through direct uptake from sediments or accumulation through prey items. In the SCB, the most contaminated areas occur in harbors and bays and offshore of the Palos Verdes Peninsula (Mearns et al. 1991; Anderson et al. 1993). SCB-wide surveys of bioaccumulation in tissues are limited. Tissue monitoring programs tend to be localized, particularly near municipal wastewater discharges, to assess point-source impacts and local historical trends (Allen et al. 1998).

Mearns et al. (1991) analyzed sediments and invertebrate and fish tissues throughout the SCB for a variety of contaminants including PAH compounds, 17 metals, PCBs and historically important pesticides such as DDT. This study concluded that there was no evidence that levels of chemical pollution were increasing. The only contaminants found to biomagnify in the food web were mercury, PCBs, and the pesticides DDT and chlordane. With the exception of tin in San Diego Harbor, metal levels in fish tissues were within expected ranges. Metal levels tended to be higher in the tissues of fish remote from major contaminant sources (such as outfalls or harbors). High levels of organic contaminants may depress uptake of some metals in fish muscle, which suggests that continued reductions in PCBs and DDT levels may lead to increased levels of some metals in fish tissues. With the exception of the Palos Verdes Peninsula, highest tissue contamination levels in the SCB were found in harbors.

As part of the 1994 SCB Pilot Project (SCBPP), SCCWRP conducted fish tissue investigations on flatfishes from throughout the mainland shelf of the SCB to identify any regional contamination trends. Tissue contamination on the mainland shelf was widespread, with nearly 100 percent of the Pacific sanddab (*Citharichthys sordidus*) and longfin sanddab (*Citharichthys xanthostigma*) from throughout the SCB testing positive

TABLE 3.3-6
COMPARISON OF AVERAGE ABUNDANCE AND SPECIES RICHNESS FOR 7 TRAWL SURVEYS IN THE SOUTHERN CALIFORNIA BIGHT (SCB) AREA AT DEPTH SIMILAR TO LA-2

Survey Year(s)	2000-2001[1]			1994[2]	1990[3]	1985[4]	1983-1984[5]						1982[6]	1977-1982[7]
Survey Area	LA-2			SCB	SCB	SCB	LA-2			Reference			LA-2	SCB
Station ID	S	R	AD				Sh	Mid	Deep	Sh	Mid	Deep		
Av. Depth (m)	143/242	139/221	127/216	101-200	150	150	129	198	312	129	198	312	184	200-627
No. of Samples	4	4	4	31	7	13	8	24	8	8	8	8	1	19
Fish (average values)														
Abundance	44.0	129.0	165.0	259	443.6	334.4	59	266.8	34.5	201	142.5	48.8	82	NA
Species	12.5	11.0	14.5	12.8	15.3	14.1	10.75	14.8	5.5	14.25	9.5	8.5	10	11.3
Epibenthic invertebrates (average values)														
Abundance	444.5	380	1,292	793	540.3	994.2	146.5	1,063.8	192.5	1,065.5	213.8	138.8	~241	NA
Species	13	22.5	25	15.4	12.8	14.1	13.75	25.5	11.3	14.75	10.0	12.5	7	17.5

SOURCES:
[1]Chambers (2001) and COE (2002). 5-minute trawls.
[2]Allen et al. (1998). 10-minute trawls.
[3]SCCWRP (1993). 10-minute trawls.
[4]Thompson et al. (1987). 10-minute trawls.
[5]Tetra-Tech/MBC (1985). 16 of 64 trawls at 10 minutes, 48 of 64 at 5 minutes.
[6]IEC (1982). One 10-minute trawl.
[7]Moore et al. (1983). 10-minute trawls.

NOTES:
Surveys conducted from 1977 to 2001 at depths of 101 to 627 meters.

Station ID codes:
S = disposal
R = reference
AD = adjacent disposal
LA-2 Sh, Mid, Deep = disposal site isobaths
Reference Sh, Mid, Deep = reference isobaths

for DDT and PCBS (Allen et al. 1998). While DDT levels were similarly high in Dover sole, only 16 percent of the population was contaminated with PCBs. Twelve other pesticides were undetected in flatfish liver tissue samples from the SCB. SCCWRP found that while DDT and PCB contamination was widespread in the SCB, substantial reductions in DDT and PCB concentrations from reference areas had occurred in the last 10 to 20 years, with reductions of up to two orders of magnitude in contaminant levels in some fish tissues (Table 3.3-7).

3.3.4.1 LA-3

The OCSD conducts annual marine monitoring, including tissue contaminant analysis, in waters to the northwest and inshore of the interim LA-3 disposal site. Analysis of ten years of monitoring fish and macroinvertebrate tissues in relation to the OCSD municipal wastewater discharge found contaminant levels that were consistent with values reported in other areas of the SCB (CSDOC 1996). There were no long-term trends in tissue metal concentrations, including mercury, in the area off Orange County. Elevated organochlorine contaminants, including DDT and PCBs, occurred sporadically in fish tissues from the area. No patterns of distribution were evident, although some declines in organochlorine levels in fish tissues were apparent during the 10-year period. Later studies have recorded a spatial pattern relative to the outfall for PCB levels in the livers of some flatfish species, with higher levels nearest the outfall (CSDOC 1998; OCSD 2000). No spatial patterns for DDT contamination relative to the outfall have been observed. Contaminant levels in edible portions of fish were found to be below human health advisory limits.

SCCWRP (1983) collected individuals of six species of fish from the Orange County slope for tissue contamination analysis. The study area was adjacent to and west of the interim LA-3 disposal site, at depths similar to the disposal site. In muscle tissues, only zinc and copper were routinely measurable, although occasionally low levels of cadmium and chromium were detected. Silver, nickel and lead were undetected in muscle tissue. Metal concentrations were much higher in liver tissues, though nickel and lead were again undetected. The levels of metals in tissues were within the expected ranges for the SCB. Tissue analysis for PCBs and DDT showed no trends with depth in the study area, and all samples contained higher levels of DDT than PCBs. The levels detected were similar to concentrations found in the tissues of fish collected in areas distant from major contaminant sources. Concentrations of DDT in fish muscle tissues on the Orange County Slope were found to be up to 16 times less than concentrations measured near the Palos Verdes White's Point municipal wastewater outfall, while concentrations of organic contaminants in Dover sole livers were about eight times less.

In 1988, tissues from fragile sea urchins collected at the interim LA-3 disposal site, an adjacent site, and a reference site were analyzed for levels of nine metals and 4,4'-DDE (a DDT congener). There was no evidence of elevated contaminant levels in urchin tissue

TABLE 3.3-7
COMPARISON OF MEANS OF TOTAL DDT AND TOTAL PCB CONCENTRATIONS IN LIVERS OF PACIFIC SANDDAB, LONGFIN SANDDAB, AND DOVER SOLE

		Pacific Sanddab		Longfin Sanddab		Dover Sole	
Year	Depth (m)	DDT (µg/wet g)	PCB (µg/wet g)	DDT (µg/wet g)	PCB (µg/wet g)	DDT (µg/wet g)	PCB (µg/wet g)
1977	60	-	-	-	-	0.76	1.44
1985	60	4.33	5.82	6.21	7.81	0.42	0.35
	150	5.57	5.50	2.83	3.02	0.47	0.39
1994	50-70	0.14	<0.01	0.22	0.07	<0.01	<0.01
	130-170	0.16	0.03	-	-	0.13	0.04

SOURCE: Allen et al. (1998).

NOTES:
Data collected at various depths in reference areas on the mainland shelf of Southern California.
DDT = dichlorodiphenyltrichloroethane
PCB = polychlorinated biphenyls
- = not analyzed

at the disposal site when compared to the other sites (MITECH 1990). Longspine thornyheads were collected at the three aforementioned sites in 1988-1989, and muscle tissue was analyzed for the same contaminants as the urchin tissue. The only apparent difference among stations were the levels of DDE, which were at least three times higher at the adjacent site than at either the disposal or reference sites.

Fish and invertebrate tissue samples were collected in summer 2000 and winter 2001 (see Figures 3.3-1 and 3.3-2) in and around the interim LA-3 disposal site (Chambers Group 2001). The total PCB concentration in sea cucumbers (Holothuroidea) collected at LA-3 and the surrounding area in August 2000 was 0.45 ppb (Table 3.3-8). In January 2001, PCB levels ranged from 0.46 ppb in sea cucumbers from a reference area to 1.18 ppb for those collected within the boundary of the interim LA-3 site. The concentrations of PCBs were much lower than human health action limits, and well below the maximum of 36 ppb previously collected in the area in 1995 during marine monitoring studies conducted by OCSD (Chambers Group 2001).

DDT concentrations of 4.7 ppb were found in sea cucumber tissue in August 2000 (Table 3.3-8). In January 2001, DDT concentrations of 11.6 ppb were found in sea cucumbers collected from within the interim LA-3 site, which exceeded concentrations at both the adjacent and reference sites. DDT concentrations in sea cucumbers from LA-3 were found at the high range of concentrations previously collected inshore of the area. None of the sea cucumber tissue samples exceeded human health action limits for mercury. In August 2000, concentrations of chromium and selenium exceeded the median international standards for contaminants. In January 2001, sea cucumber samples from the adjacent site, an area of recent disposal, exceeded the median international standard for arsenic, and sea cucumber tissues from both the interim LA-3 disposal site and the reference site exceeded the median international standard for chromium. Contaminant levels from throughout the area suggest that sea cucumbers may be accumulating cadmium from sediments within the interim LA-3 disposal site.

Dover sole was the target species for fish tissue analysis in summer 2000 and winter 2001 (Chambers Group 2001). Total PCB concentration was 21.4 ppb in Dover sole collected at the interim LA-3 site and surrounding area in August 2000 (Table 3.3-8). In January 2001, PCB levels ranged from 11.6 ppb in Dover sole collected within the boundary of the interim LA-3 site to 57.5 ppb for those at an adjacent site, an area of recent disposal. The concentrations of PCBs were much lower than the previously mentioned action limits. The PCB levels in Dover sole were similar to levels found previously in the area, and well below PCB levels found in Dover sole tissue from the Palos Verdes area. Total DDT concentrations in flatfish from the LA-3 area were at the higher end of the range of values from Orange County inshore of LA-3, but well below levels found in Dover sole from the Palos Verdes area. None of the Dover sole samples exceeded FDA action limits or median international standards for DDT. Concentrations of mercury in Dover sole tissue from LA-3 were well below human health action levels. All Dover sole samples

TABLE 3.3-8
INVERTEBRATE (SEA CUCUMBER) AND FISH (DOVER SOLE) TISSUE CONTAMINATION CONCENTRATIONS FROM SAMPLES COLLECTED IN AND AROUND THE LA-2 AND INTERIM LA-3 DREDGED MATERIAL DISPOSAL SITES, INCLUDING FDA AND INTERNATIONAL HUMAN HEALTH LIMITS

			LA-3 Samples								LA-2 Samples					
			Sea Cucumber				Dover Sole				Sea Cucumber			Dover Sole		
	FDA1	MIS2	LA-3[3]	S[4]	R[4]	D1[4]	LA-3[3]	S[4]	R[4]	D1[4]	LA-2[3]	S[4]	R1[4]	LA-2[3]	S[4]	R[4]
Total DDTs (ppb)	5000	5000	4.7	11.6	4.4	6.1	317.9	71.5	143.2	431.1	166.2	41.4	34	1278.3	167.3	123.4
Total PCBs (ppb)	2000	2000	0.45	1.18	0.46	0.51	21.4	11.61	21.21	57.49	2.93	3.80	2.17	266	23.45	16.83
Metals (ppm)																
Arsenic	-	1.4	1.24	1.27	1.06	**1.58**	**3.33**	**2.58**	**2.57**	**5.98**	0.728	1.24	1.18	**2.27**	**1.42**	**3.39**
Cadmium	-	1.0	0.763	0.211	0.143	0.216	0.022	0.015	0.011	0.015	0.041	0.039	0.035	0.052	0.037	0.003
Chromium	-	1.0	**4.10**	**4.42**	**3.61**	0.519	0.848	0.207	0.198	0.275	**4.29**	**2.78**	**2.53**	0.718	0.712	0.155
Copper	-	20	2.48	4.41	2.51	16.7	1.29	0.829	0.975	1.16	6.10	4.82	2.14	1.84	2.81	1.79
Lead	-	2.0	0.910	1.14	0.832	0.893	0.126	0.088	0.087	0.109	0.262	0.554	0.366	0.171	0.171	0.081
Mercury	1.0	0.5	0.023	0.010	0.008	0.011	0.041	0.046	0.032	0.050	0.003	0.004	0.004	0.014	0.288	0.033
Nickel	-	-	2.06	1.65	1.49	1.52	0.425	0.259	0.231	0.257	1.64	1.33	1.13	0.941	0.545	0.199
Selenium	-	0.3	**0.339**	0.267	0.216	0.224	**0.408**	**0.345**	**0.343**	**0.398**	**0.300**	**0.477**	**0.683**	**1.05**	**0.481**	**0.447**
Silver	-	-	0.164	0.169	0.053	0.244	0.008	0.004	0.007	0.008	0.005	0.009	0.012	0.012	0.011	0.005
Zinc	-	70	7.78	8.94	8.52	9.00	6.52	5.58	6.13	5.63	3.46	4.53	4.42	8.32	9.79	6.45

SOURCE: Chambers Group 2001.

NOTES:
DDT = dichlorodiphenyltrichloroethane, PCB = polychlorinated biphenyls; results reported in parts per billion (ppb).

Results for metals reported in parts per million (ppm).

All concentrations reported in wet weight.

Results presented with The Food and Drug Administration (FDA) and Median International Standards (MIS) human health limits.

1 = FDA Action Limits. Values that meet or exceed FDA and/or MIS human health limits in bold.

2 = MIS for Contamination in Shellfish. Values that meet or exceed FDA and/or MIS human health limits in bold.

3 = Sampled August 2000. Samples Composited from Stations In and Near Disposal Site.

4 = Sampled January 2001

Station ID codes:

S = within disposal site boundary

R = reference station

D1 = adjacent area of recent disposal

exceeded the median international standards for arsenic and selenium. Dover sole collected from LA-3 appear to have somewhat elevated levels of chromium, copper and nickel compared to flatfish in other areas of the SCB. Concentrations of other metals were similar to concentrations of metals in flatfish tissue from Santa Monica Bay and the Orange County shelf.

3.3.4.2 LA-2

The Palos Verdes Shelf, approximately 9 km (5 nmi) north of the LA-2 disposal site, is historically one of the most contaminated sites in the SCB, particularly with respect to DDTs and PCBs. Until 1971, Montrose Chemical Corporation discharged DDT waste through the Los Angeles County's ocean outfall offshore of Palos Verdes (Schiff and Gossett 1998). An estimated 1,800 metric tons (approximately 4 million pounds) of total DDT were discharged per year by Montrose prior to 1971. Current discharges of DDT and PCB are extremely low; however, historical discharges of contaminants have accumulated in the sediments in the Palos Verdes area and may remain there for decades. DDT and PCB levels have decreased markedly in fish and invertebrate tissue from the area since the 1970s (LACSD 2000), however, concentrations are still among the highest ever found in tissues in the SCB. Due to prevailing currents, sediment concentrations of DDT have remained uniformly low to the south of the Palos Verdes Peninsula, in the direction of the LA-2 disposal site. However, the proximity of the disposal site to the Palos Verdes Shelf suggests the possibility that contamination levels determined from tissues collected in the LA-2 area may reflect influences from both areas, particularly in highly mobile fish species.

Fish and invertebrate tissue samples were collected in summer 2000 and winter 2001 (see Figures 3.3-4 and 3.3-5) in and around the LA-2 disposal site and at a reference area (Chambers Group 2001). Total PCB concentrations in sea cucumbers (*Parastichopus californicus*) collected at LA-2 ranged from 2.2 ppb in the reference area in January 2001 to 3.8 ppb at the LA-2 disposal site in January 2001 (see Table 3.3-8). PCB levels in tissues collected in and around the LA-2 site were elevated in comparison to the reference site and to the SCB in general. While it appeared that sea cucumbers at the LA-2 disposal site were accumulating PCBs from the sediments, total PCB concentrations in sea cucumbers from LA-2 were below action limits.

DDT levels in sea cucumber tissues were elevated in and around the LA-2 disposal site when compared to the reference site. DDT levels were also higher in tissues from the LA-2 site in August 2000 (166 ppb) than in January 2001 (41.4 ppb), which was only slightly higher than the reference station level of 34 ppb (see Table 3.3-8). Although DDT levels in sea cucumber tissues from the LA-2 area were higher than levels recorded from the Orange County shelf, DDT concentrations did not exceed human health standards. Copper concentrations in tissues were consistently higher in and around the LA-2 disposal site compared to the reference site, and sea cucumbers appeared to be accumulating copper from dredged sediments. Chromium and selenium exceeded the median international standards in all sea cucumber samples, while mercury was well below human health standards.

Total PCB concentrations in Dover sole collected at LA-2 and the surrounding area ranged from 16.8 ppb at the reference site in January 2001 to 266 ppb from in and around LA-2 in August 2000 (see Table 3.3-8). The concentrations of PCBs in Dover sole tissue were generally higher than in flatfishes elsewhere in the SCB, with the exception of the Palos Verdes Shelf (Chambers Group 2001). It appeared likely that Dover sole were accumulating PCBs while foraging in the LA-2 area. Still, concentrations of PCBs in tissues at LA-2 did not exceed human health standards.

Total DDT levels in the area ranged from 123 ppb in Dover sole tissues from the reference site in January 2001 to 1,278 ppb in tissues collected in and around LA-2 in August 2000 (see Table 3.3-8). The lower values are similar to those found in flatfish tissues from other areas with historic DDT contamination, such as Santa Monica Bay and the Orange County shelf, but higher than values from areas with no history of DDT exposure (Chambers Group 2001). DDT concentrations found in tissues in January 2001 were higher than elsewhere in the SCB with the exception of Palos Verdes. DDT levels in and around the LA-2 disposal site did not exceed human health standards. In general, metal concentrations in Dover sole tissues were higher at the LA-2 disposal site than at the reference site. Arsenic and selenium exceeded the median international standards in all Dover sole tissue samples, while mercury was well below human health standards.

3.3.5 Marine Birds

Seabirds are those species that obtain most of their food from the ocean and are found over water for more than half of the year (Briggs et al. 1987). A diversity of seabirds and other water-associated birds occurs in the SCB, with more than 106 species recorded. Some of these species are common, nesting in the area and remaining year-round, while others are occasional winter visitors, summer strays or vagrants, or spring or fall migrants passing through to faraway locations. A total of 43 species of seabirds are found in the SCB, with about 25 predominant species (Table 3.3-9; Baird 1993). Of the seabirds, the shearwaters, storm-petrels, phalaropes, gulls, terns, and auklets are the most numerous in the SCB. All seabirds that breed in the SCB, with the exception of terns and skimmers, nest on the Channel Islands. Some of the common seabird species, such as California brown pelican (*Pelecanus occidentalis*) and black storm-petrel (*Oceanodroma melania*), are southern species and breed only as far north as the Channel Islands (Baird 1993). Others, such as cormorants, are more numerous north of Point Conception, with their southern limit extending into the SCB.

TABLE 3.3-9
NUMBER OF BIRD OBSERVATIONS BY SPECIES AT LA-3 AND LA-2 DURING SUMMER 2000 FIELD SURVEYS AND SEABIRD SPECIES COMMON IN THE SCB

Common Name	Scientific Name	Number observed	
		LA-3	LA-2
Cassin's auklet	*Ptychoramphus aleuticus*	1	-
double-crested cormorant	*Phalacrocorax auritus*	1	1
Western gull (adult)	*Larus occidentalis*	79	28
Western gull (immature)	*Larus occidentalis*	60	43
Heermann’s gull	*Larus heermannii*	15	1
Pomeraine jaeger	*Stercorarius pomarinus*	1	-
California brown pelican	*Pelecanus occidentalis*	33	10
ashy storm petrel	*Oceanodroma homochroma*	1	-
black storm petrel	*Oceanodroma melania*	3	-
red-necked phalarope	*Phalaropus lobatus*	32	-
black-vented shearwater	*Puffinus opisthomelas*	2	-
pink-footed shearwater	*Puffinus creatopus*	5	1
sooty shearwater	*Puffinus griseus*	63	19
black skimmer	*Rynchops niger*	2	-
barn swallow	*Hirundo rustica*	6	-
elegant tern	*Sterna elegans*	59	-
		363	103
Other Common Seabird Species (from Baird [1993])			
Pacific Loon	*Gavia pacifica*		
Western grebe	*Aechmophorus occidentalis*		
Clark’s grebe	*Aechmophorusclarkii*		
scoters	*Melanitta* spp.		
Northern fulmar	*Fulmarus glacialis*		
Leach’s storm petrel	*Oceanodroma leucorhoa*		
Least storm petrel	*Oceanodroma microsoma*		
red phalarope	*Phalaropus fulicaria*		
Bonaparte’s gull	*Larus philadelphia*		

Other Common Seabird Species (from Baird [1993]) (cont.)	
Common Name	Scientific Name
California gull	*Larus argentatus*
herring gull	*Larus argentatus*
black-legged kittiwake	*Rissa tridactyla*
common tern	*Sterna hirundo*
arctic tern	*Sterna paradisea*
common murre	*Uria aalge*
rhinoceros auklet	*Cerorhinca monocerata*

SOURCE: ACOE 2002.

3.3.5.1 LA-3

Seabirds were observed during a six-day environmental study at the interim LA-3 disposal site in August 2000 (Table 3.3-9; USACE 2002). No other observations of seabirds have been made specifically for the disposal site. Sixteen species were observed during the LA-3 surveys, though abundance was dominated by three species: Western gull (*Larus occidentalis*), sooty shearwater (*Puffinus griseus*), and elegant tern (*Sterna elegans*). Western gulls are the most abundant gull in the SCB, and the only one that nests on the Channel Islands. The other two species are common in the SCB. Elegant terns nest at Bolsa Chica and occasionally in small numbers in Los Angeles Harbor (Keane pers. comm. 2002) as well as in south San Diego Bay and the Gulf of California. Numbers of nesting pairs has increased recently at some sites (Baird 1993). Overall, there were more than three times as many bird observations at LA-3 than at LA-2. All other species observed are considered common in the SCB. Barn swallow (*Hirundo rustica*) is a terrestrial species that is occasionally found miles from shore.

3.3.5.2 LA-2

Seabirds were observed during a four-day environmental study at the LA-2 disposal site in August 2000 (Table 3.3-9; USACE 2002). No other observations of seabirds have been made specifically for the disposal site. Seven species of birds were observed during the LA-2 surveys, and abundance was dominated by two species: Western gull and sooty shearwater, both of which were also abundant at LA-3. All other species observed are considered common in the SCB. Western gulls are the most abundant, and is the only one that nests on the Channel Islands.

3.3.6 Marine Mammals

There are a variety of marine mammals that occur in the SCB. While some are year-round residents, others are only seasonal visitors or transients. Marine mammals known to occur in the SCB include baleen whales, toothed whales, seals, sea lions, and one species of sea otter. Baleen whales do not have teeth; instead, they have a series of plates in the roof of their mouth containing bristles that are used like a sieve or mat for feeding. Toothed whales, a group that includes sperm and killer whales, dolphins, and porpoises, have no baleen. Pinnipeds include eared seals (fur seals and sea lions) and earless seals (including the harbor seal). Marine mammals that occur and their potential for occurrence at the ODMDSs are listed in Table 3.3-10.

3.3.6.1 LA-3

Three species of marine mammals were observed at LA-3 during summer 2000: common dolphin (*Delphinus delphis*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), and California sea lion (*Zalophus californianus*). Common dolphin was the most

TABLE 3.3-10
MARINE MAMMALS OF THE SOUTHERN CALIFORNIA BIGHT

Common Name	Scientific Name	Potential for Occurrence at LA-2 and LA-3 Areas[1]	Endangered, Threatened, or Other Special Status[2]
Mysticeti (Baleen Whales)			
blue whale	*Balaenoptera musculus*	L	federal: endangered
Bryde's whale	*Balaenoptera edenii*	U	-
fin whale	*Balaenoptera physalus*	L	federal: endangered
gray whale	*Eschrichtius robustus*	H	-
humpback whale	*Megaptera novaeangliae*	L	federal: endangered
Minke whale	*Balaenoptera acutorostrata*	L	
Northern right whale	*Balaena glacialis*	U	federal: endangered
sei whale	*Balaenoptera borealis*	U	federal: endangered
Odontoceti (Toothed Whales)			
Blainville's beaked whale	*Mesoplodon densirostris*	U	-
bottlenose dolphin	*Tursiops* spp.	H	-
common dolphin	*Delphinus delphis*	H	-
Cuvier's beaked whale	*Ziphius cavirostris*	U	-
Dall's porpoise	*Phocoenoides dalli*	M	-
false killer whale	*Psudorca crassidens*	U	-
Ginko-toothed whale	*Mesoplodon gingkodens*	U	-
harbor porpoise	*Phocoena phocoena*	L	-
Hector's beaked whale	*Mesoplodon hectori*	U	-
Hubb's beaked whale	*Mesoplodon carlhubbsi*	U	-
killer whale	*Orchinus orca*	L	-
Northern right whale dolphin	*Lissodephis borealis*	L	-
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	H	-
pilot whale	*Globicephala* spp.	M	-
pygmy sperm whale	*Kogia breviceps*	U	-
Risso's dolphin	*Grampus griseus*	M	-
sperm whale	*Physeter macrocephalus*	L	-
Stejneger's beaked whale	*Mesoplodon stejnegeri*	U	-

TABLE 3.3-10
MARINE MAMMALS OF THE SOUTHERN CALIFORNIA BIGHT
(cont.)

Common Name	Scientific Name	Potential for Occurrence at LA-2 and LA-3 Areas[1]	Endangered, Threatened, or Other Special Status[2]
Odontoceti (Toothed Whales)(continued)			
striped dolphin	*Stenella coeruleoalba*	U	-
Pinnipedia (Seals and Sea Lions)			
California sea lion	*Zalophus californianus*	H	-
Guadalupe fur seal	*Arctocephalus towns*	U	state: threatened
Northern elephant seal	*Mirounga angustirostris*	L	-
Pacific harbor seal	*Phoca vitulina*	M	-
Northern fur seal	*Callorhinus ursinus*	U	-
Steller's sea lion	*Eumetopias jubatus*	U	federal: threatened
Mustelidae (Sea otter)			
Southern sea otter	*Enhydra lutris nereis*	U	state: threatened

NOTES:

[1]Potential for occurrence on known ranges, estimated population numbers, and sightings:
H = High potential for occurrence (likely to occur during certain seasons or throughout the year).
M = Moderate potential for occurrence.
L = Low potential for occurrence.
U = Unlikely to occur (considered rare in study area or not within known range).

[2]All mammals are protected under the Marine Mammal Protection Act of 1972 (as amended).

abundant species observed, and this species is one of the most common cetaceans in the SCB (Dohl et al. 1981). Sightings of this species in marine mammal surveys have generally been outside of the SCB (Hill and Barlow 1992; Mangels and Gerrodette 1994), though some animals have been recorded in the San Pedro Channel (Dohl et al. 1981). California sea lion is common in the nearshore waters of the SCB.

3.3.6.2 LA-2

Two species of marine mammals were observed at LA-2 in summer 2000: bottlenose dolphin (*Tursiops truncatus*) and California sea lion. Bottlenose dolphin is present in the SCB year-round, though large seasonal variation in abundance suggests some portion of the population migrates through the SCB (Dohl et al. 1981).

3.3.7 Threatened, Endangered, and Special Status Species

One species occurs, or has a high potential to occur, in the LA-2 and LA-3 study areas that is listed by the federal government as threatened or endangered: California brown pelican (*Pelecanus occidentalis californicus*). Additional species are listed by government agencies and other entities as being “species of concern” for specific reasons. Elegant tern (*Sterna elegans*) is a state and federal species of concern, and was observed at LA-3 in summer 2000. All marine mammals are protected under the Marine Mammal Protection Act (MMPA), certain migratory birds crossing state lines are protected by the Migratory Bird Treaty Act (MBTA), and endangered plants and animals by the federal Endangered Species Act (ESA). Table 3.3-11 presents state and federally endangered, threatened, and special status species and their potential for occurrence in the vicinity of the LA-2 or LA-3 ODMDSs.

3.3.7.1 California Brown Pelican

The California brown pelican was originally listed as endangered in 1970 because of its low reproductive success, attributed to eggshell thinning as a consequence of pesticide contamination. Following the prohibition on the use of DDT, the population largely recovered. Brown pelicans occur along the coasts from California to Chile and from North Carolina through the Caribbean to South America (Cogswell 1977). The current breeding distribution of the California subspecies of the brown pelican ranges from the Channel Islands of southern California southward (including the Baja California coast and the Gulf of California) to Isla Isabela and Islas Tres Marias off Nayarit, Mexico and Isla Ixtapa off Acapulco, Guerrero, Mexico. The U.S. colonies are currently the only colonies, which are protected from human disturbance. Between breeding seasons, pelicans may range from as far north as Vancouver Island, British Columbia, and south to Central America.

TABLE 3.3-11

SENSITIVE SPECIES POTENTIALLY OCCURRING AT LA-2 AND LA-3 DISPOSAL SITES

Common Name	Scientific Name	Status[1]	Potential for Occurrence[2]	
			LA-2	LA-3
Birds				
American peregrine falcon	*Falco peregrinus anatum*	SE	U	U
bald eagle	*Haliaeetus leucocephalus*	FT, SE	U	U
black skimmer	*Rhynchops niger*	CSC	L	L
black tern	*Chlidonias niger*	FSC, CSC	L	L
California brown pelican	*Pelecanus occidentalis californicus*	FE, SE	H	H
California gull	*Larus californicus*	CSC	M	M
California least tern	*Sterna antillarum browni*	FE, SE	L	L
common loon	*Gavia immer*	CSC	M	M
double-crested cormorant	*Phalacrocorax auritus*	CSC	H	H
elegant tern	*Sterna elegans*	FSC, CSC	H	H
marbled murrelet	*Brachyramphus marmoratus*	FE, SE	U	U
osprey	*Pandion haliaetus*	CSC	U	U
Xantus' murrelet	*Synthliboramphus hypoleucus*	CSC	U	U
Cetaceans				
blue whale	*Balaenoptera musculus*	FE	L	L
fin whale	*Balaenoptera physalus*	FE	L	L
humpback whale	*Megaptera novaeanliae*	FE	L	L
Northern right whale	*Eubalaena glacialis*	FE	U	U
sei whale	*Balaenoptera borealis*	FE	U	U
sperm whale	*Physeter macrocephalus*	FE	L	L

TABLE 3.3-11
SENSITIVE SPECIES POTENTIALLY OCCURRING AT LA-2 AND LA-3 DISPOSAL SITES
(CONT.)

Common Name	Scientific Name	Status[1]	Potential for Occurrence[2] LA-2	Potential for Occurrence[2] LA-3
		Pinnipeds		
Guadalupe fur seal	*Arctocephalus townsendi*	ST, FT	U	U
Steller's sea lion	*Eumetopias jubatus*	FT	U	U
		Fissiped		
Southern sea otter	*Enhydra lutris nereis*	FT	U	U
		Reptiles		
green sea turtle	*Chelonia mydas*	FE, FT	L	L
leatherback sea turtle	*Dermochelys coriacea*	FE	L	L
loggerhead sea turtle	*Caretta caretta*	FT	L	L
olive ridley sea turtle	*Lepidochelys olivacea*	FT	U	U

[1] Status

FE = Listed as endangered by the federal government
FT = Listed as threatened by the federal government
SE = Listed as endangered by the State of California
ST = Listed as threatened by the State of California
FSC = Listed as species of concern by the federal government
CSC = Listed as species of concern by the State of California (CDFG)

[2]Estimated potential for occurrence

U = Unlikely to occur within the project area
L = Low potential to occur within the project area
M = Moderate potential to occur within the project area
H = High potential to occur within the project area

Brown pelicans are plunge divers, feeding primarily on fish in open waters nearshore and in harbors. Because of its feeding habit, the pelican requires relatively clear water to visibly locate prey, therefore restricting its distribution to tropical and subtropical waters. Northern anchovy (*Engraulis mordax*) comprises a significant portion of their diet. Feeding flocks generally include 10-50 birds and occur within 20 km (10.8 nmi) of shore in waters less than 100 m (328 ft) depth, although feeding pelicans have been sighted at sea off southern California as far as Cortes Bank (about 130 km [70.2 nmi] west of San Diego) and 88 km (47.5 nmi) offshore off central California. California brown pelicans nest on some of the offshore islands and in Mexico. They occur along the coast all year, but their numbers increase with the influx of post-breeding birds in summer. This species is currently listed by the federal government as endangered.

The major SCB colonies have been on West Anacapa Island and Santa Barbara Island, California, and Isla Coronado Norte, Baja California. In 1997, about 6,400 pairs of California brown pelicans nested on West Anacapa and Santa Barbara Islands, with all but about 500 of these on West Anacapa Island (CDFG 2000). Recently the number of nesting pairs on these two islands has increased from 4,200 pairs in 1993 to the 6,400 pairs noted in 1997. The Recovery Plan for the California brown pelican concluded that yearly variations in historical colony size throughout the SCB have most likely been related to food availability. During the summer 2000 surveys, 33 California brown pelicans were observed at the LA-3 study area, and 10 were observed at LA-2 (USACE 2002).

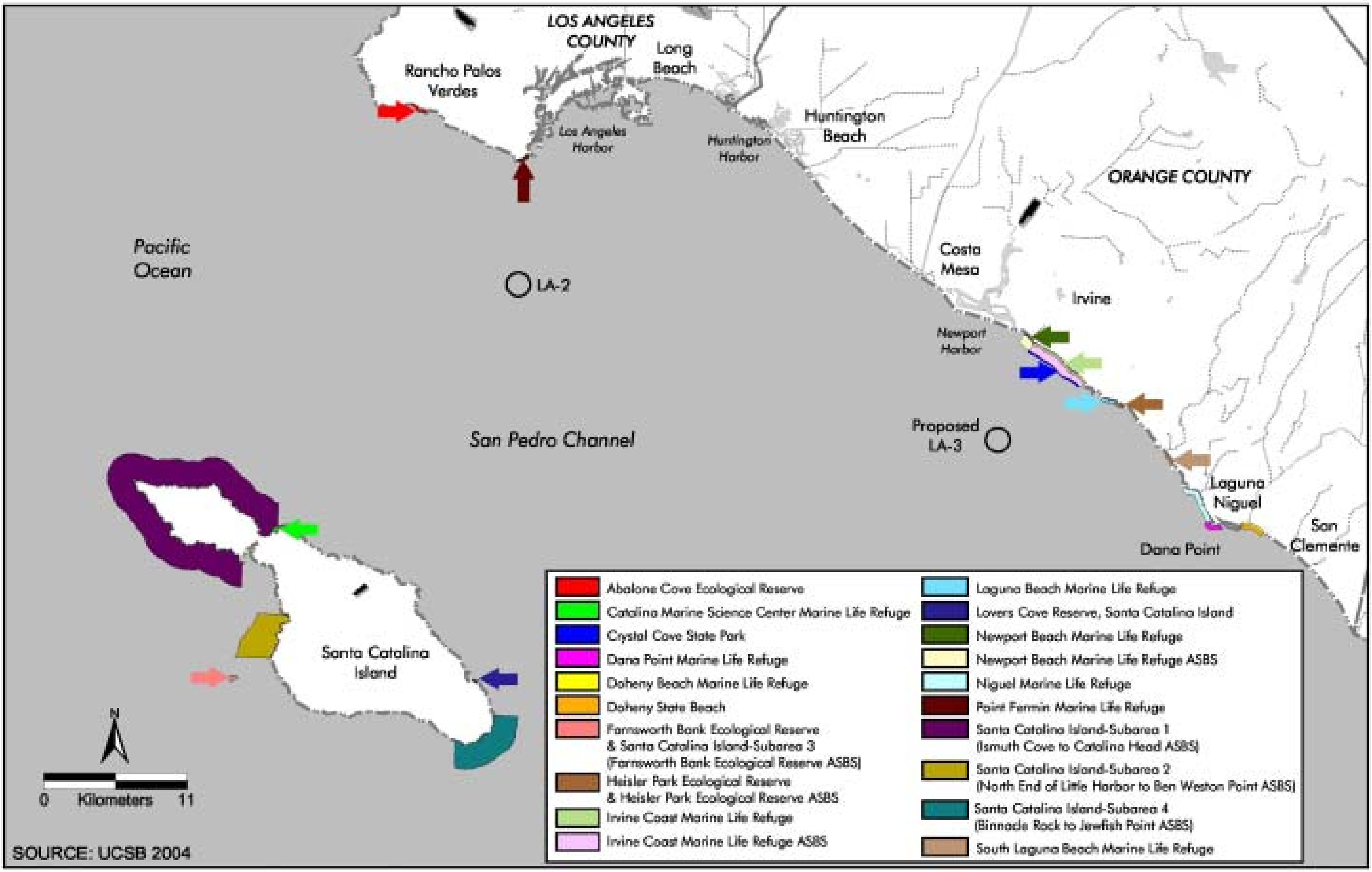
3.3.7.2 Elegant Tern

Elegant tern is classified as a federal and state species of concern. Elegant terns nest with California least terns at Bolsa Chica, and occasionally in small numbers at Terminal Island (K. Keane pers. comm. 2002). This species prefers inshore coastal waters, and rarely occurs far offshore. While they forage in relatively shallow waters with least terns, elegant terns also forage in slightly deeper waters and take larger fish (Massey and Atwood 1981). During the summer 2000 surveys, 59 elegant terns were observed at the LA-3 study area (USACE 2002). No elegant terns were observed at LA-2.

3.3.8 Marine Protected Areas

There are twenty-two Marine Protected Areas (MPAs) in the general vicinity of the LA-2 and proposed LA-3 sites (see Figure 3.3-7). A marine protected area is (McArdle 1997):

> Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part of all of the enclosed environment.



MARINE PROTECTED AREAS

Figure 3.3-7

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These twenty-two MPAs include:

- Six State Areas of Special Biological Significance (ASBS);
- Three State Ecological Reserves;
- One State Reserve
- Ten State Refuges (Clam, Fish, Game, Marine Life); and
- Two State Parks (Beaches, Historic Parks, Natural Preserves, Parks, Reserves, Underwater Parks);

In addition to these twenty-two MPAs, all state waters out to 5.6 km (3 nmi) are designated as a California Coastal Sanctuary.

3.3.8.1 Areas of Special Biological Significance

Areas of Special Biological Significance (ASBS) were established with California State Water Resources Control Board Resolution No. 74-28 to provide protection to species or communities in these areas from degradations in water quality. The California Department of Fish and Game is responsible for the management of marine resources in these ASBSs. In general, regulations in ASBSs pertain to thermal discharges, sewage and industrial discharges, and non-point discharges (McArdle 1997). Regulations accompanying the ASBS designation are not applicable to vessel wastes, the control of dredging, or the disposal of dredging spoil.

3.3.8.2 Reserves and Ecological Reserves

The Fish and Game Commission has the legal authority to designate reserves. Proposals for reserves may be submitted by any person or agency, after which time public hearings may be held and solicitations for comment may be elicited. There are no general rules that apply to reserves, as regulations are site-specific. Lover's Cove Reserve, on Santa Catalina Island, is the only reserve in the vicinity. No form of marine life may be taken for recreation in this reserve. Commercial take of lobster, abalone, and crab is allowed within 305 m (1,000 ft) from shore, and finfish may be taken in the area as well.

The Ecological Reserve Act of 1968 authorized the California Department of Fish and Game to create ecological reserves. Ecological Reserves are designed to protect threatened and endangered native plants, wildlife, or aquatic organisms or their habitat types (terrestrial and aquatic), or large, heterogeneous natural gene pools for the future of mankind (McArdle 1997). In general, regulations in these areas prohibit human disturbance (e.g. collecting specimens, fishing, swimming, boating, and so on).

3.3.8.3 Marine Life Refuges

Similar to reserves, marine life refuges may be proposed by any person or agency for sponsor by one or more representatives of the state legislature. The bill then goes before Senate and/or Assembly committees for approval prior to being submitted to the floor of the full Senate for a final vote. Generally, regulations in marine life refuges prohibit the taking of marine invertebrates and marine plant life, and commercial and recreational fishing is usually allowed, but limited.

3.3.8.4 State Parks and Beaches

State parks consist of areas designated to preserve outstanding examples of indigenous flora and fauna, natural, scenic, and cultural values, and the most significant examples of such ecological regions. State beaches consist of areas with frontage on bays and oceans and are designated to provide beach-oriented activities such as swimming, boating, and fishing (McArdle 1997).

3.3.8.5 Seabird and Shorebird Nesting Areas and Rookeries

In addition to the MPAs, there are several areas of importance to seabirds and shorebirds along the coasts of Los Angeles and Orange Counties. In Los Angeles County, a black-crowned night heron (*Nycticorax nycticorax*) rookery exists at Gull Park on the Navy Mole in Long Beach Harbor (MBC 2001). Though not threatened or endangered, black-crowned night heron is considered a rare resource (CDFG 1991). The rookery was translocated to Gull Park from the former Long Beach Naval Station in 1998.

Flat Rock Point, located just upcoast of Palos Verdes Point, and Abalone Cove Ecological Reserve (an MPA; see Figure 3.3-7), just downcoast of Palos Verdes Point, are important overwintering areas for a variety of shorebirds including willets, marbled godwit (*Limosa fedoa*), turnstones, plovers, and yellowlegs (FWS 1981). Several bird species also overwinter at Seal Beach National Wildlife Refuge in Orange County including loons, grebes, dabbling ducks, diving ducks, and sea ducks (FWS 1981). Lastly, a nesting site for the state and federally endangered California least tern (*Sterna antillarum browni*) is established at the mouth of the Santa Ana River in Orange County.

3.4 Socioeconomic Environment

3.4.1 Commercial Fishing and Mariculture

There are currently no known registered mariculture operations on the southern California coast between Palos Verdes Point and Dana Point (M. Fluharty pers. comm.

2002). There are, however, a variety of commercial fisheries in the LA-2 and LA-3 study areas.

3.4.1.1 Existing Fisheries

Statewide, the commercial catch in California between 1970 and 1985 was dominated by both wetfish (e.g., northern anchovy [*Engraulis mordax*], jack mackerel [*Trachurus symmetricus*], and Pacific mackerel [*Scomber japonicus*]) and invertebrates, such as market squid (*Loligo opalescens*) (MBC 1989). California commercial fisheries utilize a variety of gear types including trawl nets, set nets, drift nets, and set gear (including lobster/crab traps, deep-water fish traps, and hook-and-line gear). Other gear types include troll gear, harpoons, diver-collections, and beach seines.

The LA-2 and proposed LA-3 sites are located in the CDFG San Pedro Region catch-reporting area, which extends from Point Dume to the U.S./Mexico border. Along this region, the continental shelf is relatively wide, extending nearly 370 km (200 nmi) offshore. Three of the Channel Islands (Santa Catalina, San Clemente, and San Nicolas Islands) and several offshore banks interrupt the otherwise gently sloping seafloor. The six harbors in this region (two in San Pedro and one each in Long Beach, Dana Point, Oceanside, and San Diego) provided approximately 780 commercial berths in 1984 (CSCC 1984). As indicated previously, commercial fish catches are reported by CDFG Catch Blocks, which are 18.52 km by 18.52 km (10 nmi by 10 nmi) statistical blocks. The LA-2 site is located within Catch Block 740 and the proposed LA-3 site is located within Catch Block 738 (see Figure 3.3-3). Surrounding catch blocks are examined for regionwide fishery trends. CDFG Catch Block data refer to landings by weight and estimated market value and are reported by area where fish are taken, which is difficult to verify. These data do not take into account fishing effort, fishing seasons or fishery regulations (e.g., closures or limited fisheries).

Commercial fishing in the San Pedro region consists predominantly of purse-seining, crab and lobster trapping, and set-netting (MBC 1989). The principal market species in this region include Pacific sardine (*Sardinops sagax*), market squid, Pacific mackerel, jack mackerel, northern anchovy, red urchin (*Strongylocentrotus franciscanus*), California halibut (*Paralichthys californicus*), California barracuda (*Sphyraena argentea*), California spiny lobster (*Panulirus interruptus*), and swordfish (*Xiphias gladius*) (MBC 1989; CDFG unpubl. data 2002).

Though ports of origin for most landings from the region are reported from San Pedro, Terminal Island, and Newport Beach, some are reported from as far away as San Diego and San Francisco. Primary gear types include set longline, set and drift gillnet, purse and drum seine, trawl, hook and line, and crab and lobster trap. For the three years of analysis (1999, 2000, and 2001), the top three landings by weight for the seven catch blocks analyzed (738, 739, 740, 741, 758, 759, and 760) were from Catch Block 738 (extending offshore from Newport Harbor and including the proposed LA-3 site), Catch Block 739 (west of Catch Block 738 and offshore of Huntington Beach), and Catch Block 740 (offshore Catch Block 739, south of Los Angeles-Long Beach Harbor, and including the LA-2 site). Landings for these three blocks were generally substantially higher than those from surrounding blocks (with the exception of landings from Block 738 in 1999, which were lower than those from most surrounding blocks). From 1999 through 2001, annual reported landings ranged from 363 to 7,167 metric tons (400 to 7,900 tons) in Block 738, from 6,713 to 8,800 metric tons (7,400 to 9,700 tons) in Block 739, and from 1,497 to 3,629 metric tons (1,650 to 4,000 tons) in Block 740. In the surrounding Catch Blocks (741, 758, 759, and 760) annual reported landings from 1999-2001 ranged from 63.5 metric tons (70 tons; Catch Block 759 in 2000) to 1,315 metric tons (1,450 tons; Catch Block 758 in 1999), with all other reported catches between 109 to 590 metric tons (120 to 650 tons).

A setline dory fishery off Newport Beach has existed since 1891, one of the few traditional dory fisheries remaining on the west coast (Cross 1984). Fisherman use dories launched from the shores of Newport to fish on the continental shelf and slope with setlines at depths of about 100 to 600 m (328 to 1,968 ft). Principle species landed in this localized fishery include sablefish (*Anoplopoma fimbria*), thornyhead (*Sebastolobus* spp.), and rockfish (*Sebastes* spp.). While dory landings of these species pale in comparison to overall commercial landings, they represent a fishery that has changed little in over 110 years.

The top three analyzed catch blocks (738, 739, and 740) are discussed below.

a. LA-3 (Catch Block 738)

The proposed LA-3 site is located within CDFG Catch Block 738, which extends offshore from the Newport Beach shoreline (see Figure 3.3-3). From 1999 through 2001 three-year-combined top commercial landings in Block 738 included Pacific sardine (10,840 metric tons [11,950 tons]), market squid, Pacific mackerel, northern anchovy, California spiny lobster, and jack mackerel (27.2 metric tons [30 tons]). The pelagic species (Pacific sardine, market squid, Pacific mackerel, northern anchovy, and jack mackerel) are generally caught by purse seine, drum seine, and long-line, while California spiny lobster are collected by crab/lobster trap. Landings of Pacific sardine ranked first economically ($13.3 million for 1999-2001 combined), followed by Pacific mackerel ($1.0 million), market squid ($0.5 million), and northern anchovy ($0.39 million).

From 1975 to 1981, the annual commercial catch in Catch Block 738 was fairly stable, ranging from 590 to 1,179 metric tons (650 to 1,300 tons), then increased to over 3,175 metric tons (3,500 tons) in 1982 due to a large increase in northern anchovy landings (MITECH 1990). From 1983 to 1986, landings in Block 738 declined significantly ranging from 31.8 to 81.6 metric tons (from 35 to 90 tons) during those years. From 1999 through 2001, landings in Block 738 ranged from 372 to 7,167 metric tons (410 to 7,900 tons) per year.

b. LA-2 (Catch Block 740)

The LA-2 site is located within CDFG Catch Block 740, which is located south of Los Angeles-Long Beach Harbor and extends offshore more than one-half the distance to Santa Catalina Island (see Figure 3.3-3). From 1999 through 2001 three-year-combined top commercial landings in this block included Pacific sardine (4,082 metric tons [4,500 tons]), Pacific mackerel, market squid, red urchin, northern anchovy, and California halibut (95.3 metric tons [105 tons]). The pelagic species (Pacific sardine, Pacific mackerel, market squid, and northern anchovy) are generally caught by purse seine, drum seine, and lampara net (and squid by large dip-net [brail]). California halibut are caught by a variety of gear including trawl, drift and set gill net, and hook and line, while red urchin are collected by divers. Though landings of California halibut ranked sixth by weight, this species ranked first economically, with market value of landings (1999 through 2001 combined) reported at over $948,000. Other economically important species from 1999 through 2001 included Pacific sardine ($410,050), red urchin ($336,888), Pacific mackerel ($273,449), and market squid ($255,378). Other important landings by weight included: white croaker (*Genyonemus lineatus*; 95.3 metric tons [105 tons]), yellowfin tuna (*Thunnus albacarus*; 63.5 metric tons [70 tons]), jack mackerel (45.4 metric tons [50 tons]), and California barracuda (36.3 metric tons [40 tons]).

c. Catch Block 739

CDFG Catch Block 739 is located in between Catch Blocks 738 and 740, and is located directly offshore Huntington Beach. From 1999 through 2001, top commercial landings in this block exceeded those in Blocks 738 and 740 and included Pacific sardine (19,190 metric tons [21,150 tons]), Pacific mackerel, market squid, northern anchovy, jack mackerel, and California halibut (68.0 metric tons [75 tons]). Jack mackerel are caught primarily by purse seine, Pacific sardine, market squid, and northern anchovy by purse seine and drum seine, Pacific mackerel by purse seine, set gillnet and set longline, and California halibut by gillnet and trawl. Economically important landings included Pacific sardine ($1.8 million from 1999-2001), California halibut ($0.49 million), Pacific mackerel ($0.33 million), and market squid ($0.26 million).

d. Important Commercial Species

Information on important commercial species is presented in the following text.

Pelagic fish. The pelagic species targeted by commercial fishermen in the San Pedro region are those which spend all or part of their life in the water column and include Pacific sardine, Pacific mackerel, jack mackerel, and northern anchovy. All species are considered common in nearshore waters of the SCB and can generally be found in large schools in the SCB (Fitch and Lavenberg 1971; Miller and Lea 1972).

Pacific sardine are distributed from Guaymas, Mexico to Kamchatka, Russia and are common in the epipelagic zone (Miller and Lea 1972). A sustained fishery for this species developed during World War I, with effort and landings increasing from 1916 to 1936. The Pacific sardine fishery was the largest in the western hemisphere in the 1930s and 1940s, but the fishery collapsed in the 1940s and continued declining into the 1950s (Wolf and Smith 1992). However, statewide landings of this species increased from 1,164 metric tons (1,283 tons) in 1986 to 7,750 metric tons (8,543 tons) in 1991 (Wolf and Smith 1992). In the SCB, sardines have been used commercially for fish meal, oil, canned for human consumption, live bait, and animal food. Based on landings in the San Pedro Region, highest landings occurred in Blocks 738, 739, and 740.

Pacific mackerel, also referred to as chub mackerel and blue mackerel, have a trans-Pacific distribution, occurring in the eastern Pacific from Chile to the Gulf of Alaska (Miller and Lea 1972). Pacific mackerel supported one of California's major fisheries in the 1930s and 1940s, and again in the 1980s (Konno and Wolf 1992). A moratorium was placed on the fishery after the stock collapsed in 1970. In 1972, a landing quota based on spawning biomass was initiated, and a series of successful spawnings in the late 1970s initiated a recovery. From 1984 through 1991, Pacific mackerel ranked first in volume landings of finfish in California (Konno and Wolf 1992). Pacific mackerel have been used commercially for fresh fish, human consumption, pet food, and live and dead bait.

Northern anchovy occur from Cabo San Lucas, Mexico, to Queen Charlotte Islands, British Columbia, and are the most abundant anchovy off California (Miller and Lea 1972). Northern anchovy are used for meal, oil, bait, anchovy paste, and soluble protein products that are sold primarily as protein supplements for poultry food and as feed for farmed fish and other animals (Jacobsen 1992). Following the collapse of the Pacific sardine fishery in the 1940s, statewide anchovy landings increased to nearly 39,010 metric tons (43,000 tons) in 1953, but declined due to low demand and remained low through 1964. In the mid-1970s, landings peaked at over 136,000 metric tons. Landings fluctuated from 1964 through 1982, but landings were relatively low from 1979 through 1982, averaging 46,470 metric tons (51,223 tons; Jacobsen 1992).

Market squid. Market squid range from southeastern Alaska to Bahia Asunción, Baja California (Dickerson and Leos 1992). In southern California, fisherman target schools in shallow water spawning areas (15 to 30 m [49 to 98 ft]). Most boats use powerful lights to attract squid to the water surface where they capture them using roundhaul nets or brails (Dickerson and Leos 1992). The fishery for this species began in 1863, and from 1947 to 1967 annual statewide landings fluctuated greatly. More recently, statewide landings fluctuated from a low of 564 metric tons (622 tons) in 1984 to a record high of 40,892 metric tons (45,076 tons) in 1989 (Dickerson and Leos 1992). Large-scale fluctuations are characteristic of this fishery and may be due, in part, to the short life span of the squid along with fishing pressure from the previous year. Climatological changes also play a large part in squid landings.

California spiny lobster. California spiny lobster range from Monterey Bay, California, to Manzanillo, Mexico (Parker 1992). This species is usually fished commercially using box-like traps of wire mesh or plastic baited with whole or cut fish and weighted with bricks, cement, or steel, and at depths usually shallower than 27 m (88.6 ft; Parker 1992). Commercial statewide landings increased following World War II, then declined for the next 25 years, reaching a low of 68.9 metric tons (76 tons) in 1974-75. Since then, landings increased to 330.7 metric tons (364.5 tons) in 1989-90.

Red urchin. Red urchin is the largest of four sea urchin species offshore California and supports a commercial urchin fishery (Parker and Kalvass 1992). The southern California commercial fishery for red urchin is relatively new, originating in southern California in 1971 as part of a NMFS program to develop fisheries for underutilized species. From 1973 to 1981, statewide red urchin landings increased from 1,588 metric tons (1,750 tons) to almost 11,340 metric tons (12,500 tons). In 1990, whole urchin landings were estimated at $14 million, with most landings reported from the northern Channel Islands off Santa Barbara (Parker and Kalvass 1992).

3.4.1.2 Potential Fisheries

The LA-2 and LA-3 sites are areas currently utilized for the ocean disposal of dredged material and, as such, no undeveloped fisheries exist within either the LA-2 or proposed LA-3 site boundaries. No undeveloped fisheries have been identified in the immediate vicnity of the LA-2 or proposed LA-3 sites that would be impacted by the continued use of these sites for ocean disposal of dredged material.

3.4.2 Commercial Shipping

The Ports of Los Angeles and Long Beach comprise one of the most important shipping complexes in the nation. In 2002 the Port of Long Beach ranked 8th in the nation in terms of total tonnage handled (61.6 million metric tons [67.9 million short tons]) while the Port of Los Angeles ranked 12th in the nation with 47.4 million metric tons (52.2 million short tons) handled (USACE 2003c). Table 3.4-1 shows the total tonnage handled at the Los Angeles and Long Beach Harbors for the 10-year period from 1993 through 2002. As seen in this table, the total tonnage handled by these harbors was almost 109 million metric tons (120 million short tons) in 2002.

The harbors handle all types of commercial cargo including coal, petroleum and petroleum products, crude materials (inedible materials not including fuels), primary manufactured goods, food and farm products, manufactured equipment, machinery and

TABLE 3.4-1
WATERBORNE FREIGHT TRAFFIC
1994 - 2002
(thousand metric tons [thousand short tons])

Year	Los Angeles Harbor	Long Beach Harbor	Total
1993	39574 [43,623]	49,279 [54,321]	88,853 [97,944]
1994	39,136 [43,140]	51,276 [56,522]	90,412 [99,662]
1995	42,165 [46,479]	48,287 [53,227]	90,452 [99,706]
1996	41,448 [45,689]	52,975 [58,395]	94,423 [104,084]
1997	37,897 [41,774]	51,941 [57,255]	89,838 [99,029]
1998	40,047 [44,144]	52,385 [57,745]	92,432 [101,889]
1999	38,344 [42,267]	55,232 [60,883]	93,576 [103,150]
2000	43,661 [48,128]	63,367 [69,850]	107,028 [117,978]
2001	46,626 [51,396]	61,366 [67,644]	107991 [119,040]
2002	47,370 [52,216]	61,572 [67,872]	108,942 [120,088]

SOURCE: USACE 2004a.

products, and other miscellaneous cargos. Table 3.4-2 provides a summary of the commodity tonnages handeled at the two ports in 2002.

Approximately 77 percent of the tonnage handled at the Long Beach Harbor was foreign traffic, while approximately 87 percent of the tonnage handled at the Los Angeles Harbor was due to foreign traffic (USACE 2003c). As such these two ports are very important to the nation's foreign trade. As seen in Table 3.4-3, with the exception of liquid bulk cargo all forms of commercial cargo are expected to have annual growth rates ranging from 1.2 to 7.5 percent between the years 2000 and 2020. To accommodate this growth in traffic, additional acreage within the harbors is required to construct terminals, storage areas, and transporation facilities. Additionally, channel deepening will be required to accommodate larger cargo vessels. Projections for capital improvement projects within the Los Angeles and Long Beach Harbors indicate that approximately 16.28 million yd^3 (12.45 million m^3) of material could be dredged in the next 20 to 25 years (USACE 2003a).

Table 3.4-4 shows the number of commercial vessesl trips recorded at the Los Angeles and Long Beach Harbors in 2002. As seen from this table, a total of 55,754 combined inbound and outbound trips were recorded in 2002. This equates to approximately 153 vessels entering or leaving the harbor complex each day.

Vessel traffic within the San Pedro Channel traveling to and from the harbors must follow a system of traffic separation schemes (TSS) and port access routes (PAR; Figure 3.4-1). The TSS consists of a northbound coastwise traffic lane and a southbound coastwise traffic lane separated by a separation zone. Additionally, the area directly outside of the Ports of Los Angeles and Long Beach is designated a Regulated Navigation Area (RNA). Vessels within the RNA are subject to strict navigation regulations designed to ensure safe vessel separations and operating conditions.

Powered vessels over a certain size including tugboats transporting disposal barges are required to participate in the Los Angeles-Long Beach Vessel Traffic Service (VTS; see USCG/Marine Exchange Vessel Traffic Center 2001 for additional information). The VTS for the Harbors and approaches was established to "monitor traffic and provide mariners with timely, relevant and accurate information for the purpose of enhancing safe, environmentally sound and efficient maritime transportation" (USCG/Marine Exchange Vessel Traffic Center 2001). The VTS area extends out to a distance of 46.3 km (25 nmi) from Point Fermin. As such, LA-2 and the proposed LA-3 sites lie within the VTS monitoring area.

In their report *California's Ocean Resources: An Agenda for the Future*, the Resources Agency of California indicates that (Resources Agency of California 1997):

TABLE 3.4-2
2002 COMMODITY TRAFFIC
(thousand metric tons [thousand short tons])

Commodity	Los Angeles Harbor	Long Beach Harbor	Total
Coal	1,198 [1,321]	1 [1]	1,199 [1,322]
Petroleum and Petroleum Products	11,791 [12,997]	30,419 [33,531]	42,209 [46,528]
Chemicals and Related Products	3,966 [4,372]	4,755 [5,241]	8,721 [9,613]
Crude Materials, Inedible Except Fuels	4,257 [4,693]	3,630 [4,001]	7,887 [8,694]
Primary Manufactured Goods	6,981 [7,695]	6,182 [6,815]	13,163 [14,510]
Food and Farm Products	4,942 [5,448]	4,215 [4,646]	9,157 [10,094]
All Manufactured Equipment, Machinery, and Products	12,966 [14,293]	11,183 [12,327]	24,149 [26,620]
Unknown or Not Elsewhere Classified	1,267 [1,397]	1,189 [1,311]	2,457 [2,708]
TOTAL	47,370 [52,216]	61,573 [67,873]	108,943 [120,089]

SOURCE: USACE 2004a

TABLE 3.4-3
SAN PEDRO BAY CARGO FORECAST ANNUAL GROWTH RATES
2000 - 2020

Commodity	Low Forecast (%)	High Forecast (%)
Containerized Cargo	5.0	6.6
Automobile Cargo	2.3	4.1
Neo-Bulk and Break-Bulk Cargo	6.1	7.5
Liquid Bulk Cargo	-0.89	-0.38
Dry Bulk Cargo	1.2	2.2

SOURCE: Port of Long Beach 2004.

TABLE 3.4-4
2002 COMBINED INBOUND AND OUTBOUND COMMERCIAL TRIPS

Vessel Type	Los Angeles Harbor	Long Beach Harbor	Total
Self Propelled			
Passenger & Dry Cargo	8,964	29,707	38,671
Tanker	531	16	547
Tow or Tug	7,901	2,530	10,431
Non-Self Propelled			
Dry Cargo	2,173	707	2,880
Tanker	2,937	288	3,225
TOTAL	22,506	33,248	55,754

SOURCE: USACE 2004a.

> Results of the VTIS [*sic; Vessel Traffic Information System*] are impressive. Close quarters incidents (ships passing within one quarter nautical mile of one another) are down by over 50 percent, and appear to be falling each month. There have been no collisions (ship to ship contact), groundings, or allisions (ship contact with a stationary object such as a pier) in the VTIS "area of responsibility" since March 1, 1994 . . .

The proposed LA-3 site is approximately 20 km (10.8 nmi) east of the northbound coastwise traffic lane of the southern TSS and approximately 24 km (13 nmi) southeast of the RNA (see Figure 3.4-1). The LA-2 site is located within the separation zone between the northbound and southbound coastwise traffic lanes of the northern TSS and is partially contained within the designated RNA (see Figure 3.4-1).

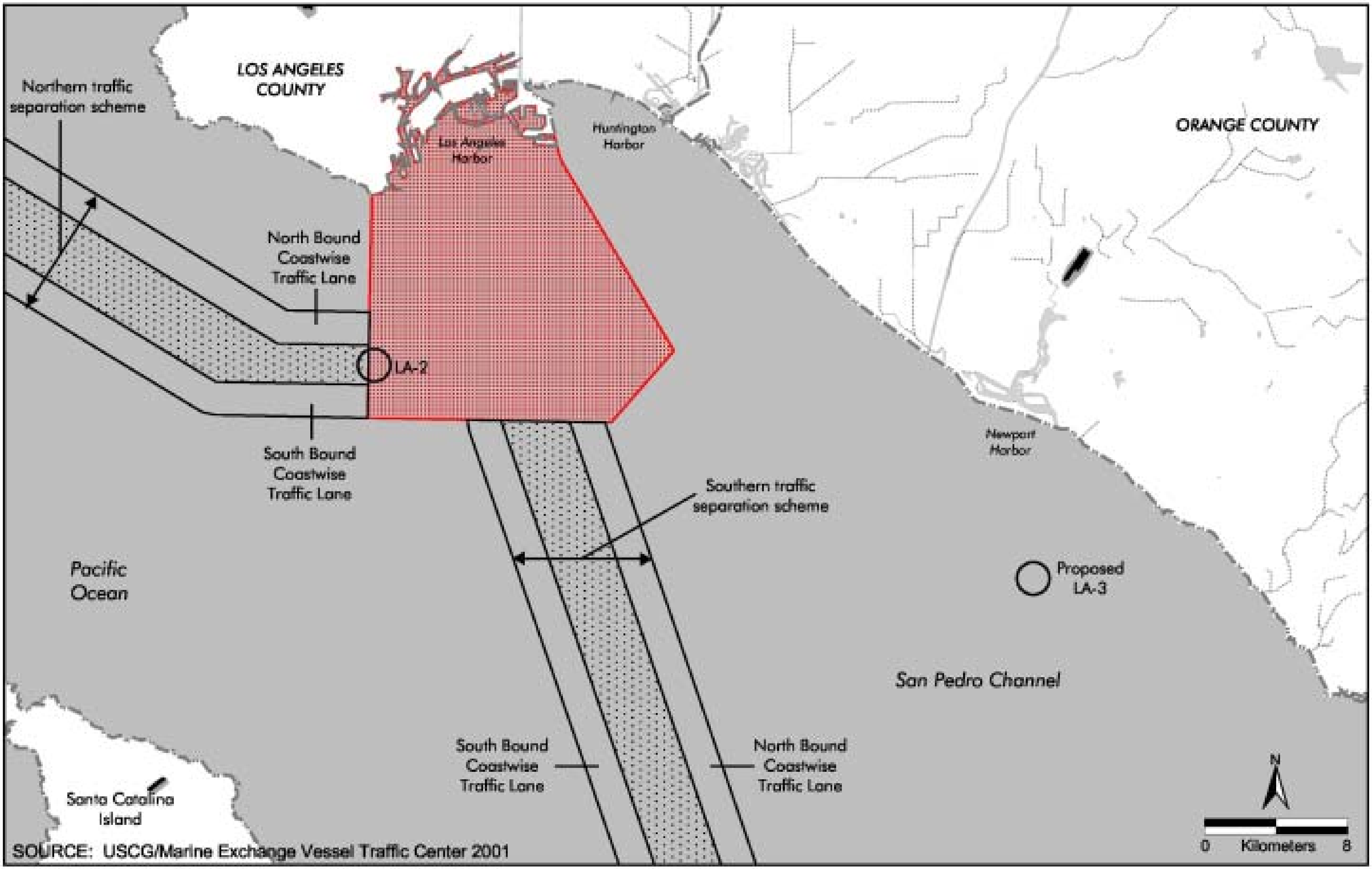
3.4.3 Military Usage

The coastal waters between San Diego and the Los Angeles Harbor are heavily utilized by the military. Marine Corps Base Camp Pendleton, located approximately 32 km (17 nmi) southeast of the proposed LA-3 site, is home to the largest amphibious marine training base on the west coast. Training activities at this base include beach landings and assaults, hydroplane maneuvers, low altitude bombing runs, rocket and gunnery practice, and helicopter takeoffs and landings. Many of these activities require unencumbered maneuvering space for surface vessels, submarines, and aircraft. These exercises are conducted throughout the year.

In addition to the exercises at Camp Pendleton, the Navy maintains a weapons station at Seal Beach (NAVWPNSTA Seal Beach). As a major provisioner of weapons and ammunition for the U.S. Navy on the west coast, the primary activity at NAVWPNSTA Seal Beach is the receipt, segregation, storage, and issuing of conventional ammunition, surface-launched missiles, air-launched missiles, and torpedoes. These munitions are loaded into cruisers, destroyers, frigates, and medium-sized amphibious ships from the facility’s 305-meter-long (1,000-foot-long) wharf located in Anaheim Bay. The Navy wharf at Anaheim Bay facilitates the transfer of ordnance onto ships capable of entering the harbor, including barges which transport ordnance to larger ships at the Navy anchorages off the coast of Long Beach. Anaheim Bay is approximately 22 km (11.9 nmi) northeast of LA-2 and approximately 30 km (16.2 nmi) northwest of the proposed LA-3 site. Munitions barges accessing the Navy anchorages would remain nearshore, outside of the likely transporation routes utilized by the ocean disposal barges.

3.4.4 Oil and Natural Gas Development

The Pacific Outer Continental Shelf (POCS) contains large reserves of oil and natural gas. At the end of 1998, proved reserves of oil and gas in the POCS were estimated to be



TRAFFIC SEPARATION SCHEME AND REGULATED NAVIGATION AREA

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Figure 3.4-1

408 million barrels and 36.4 billion cubic meters (1,286 billion cubic feet), respectively (Minerals Management Service [MMS] 2004a). These proved reserved are attributed to 13 fields. For these fields the original recoverable reserves were estimated to be 1,323 million barrels of oil and 61.1 billion cubic meters (2,159 billion cubic feet) of gas. Unproved reserves contained within 25 fields were estimated to be 1,316 million barrels of oil and 26.1 billion cubic meters (922 billion cubic feet) of gas (MMS 2004a).

State and Federal agencies regulate offshore oil and gas activities in Orange and Los Angeles Counties. The State governs oil and gas development from the mean high tide line seaward to the 5.6-km (3-nmi) limit. Beyond the 5.6-km (3-nmi) limit, oil and gas development activities are regulated by the Minerals Management Service of the federal government.

In the vicinity of LA-2 and LA-3 there currently are 12 lease tracts within the jurisdiction of the State (Figure 3.4-2). Of these twelve tracts, ten are producing, one is used for water injection, and one is not producing (CSLS 2004a). Currently, four artificial islands in Long Beach Harbor and three platforms are located within State waters (see Figure 3.4-2). All of the facilities in State waters are within 3.3 km (1.8 nmi) of the coast.

There are 4 lease tracts located in federal waters in the vicinity of LA-2 and LA-3 (Figure 3.4-3). There are four platforms located within three of these tracts, however, all four tracts have been developed. These platforms lie approximately 14 to 17 km (7.5 to 9 nmi) to the east of the LA-2 site. The distance from the proposed LA-3 site to these platforms ranges from approximately 22 to 25 km (12 to 13.5 nmi).

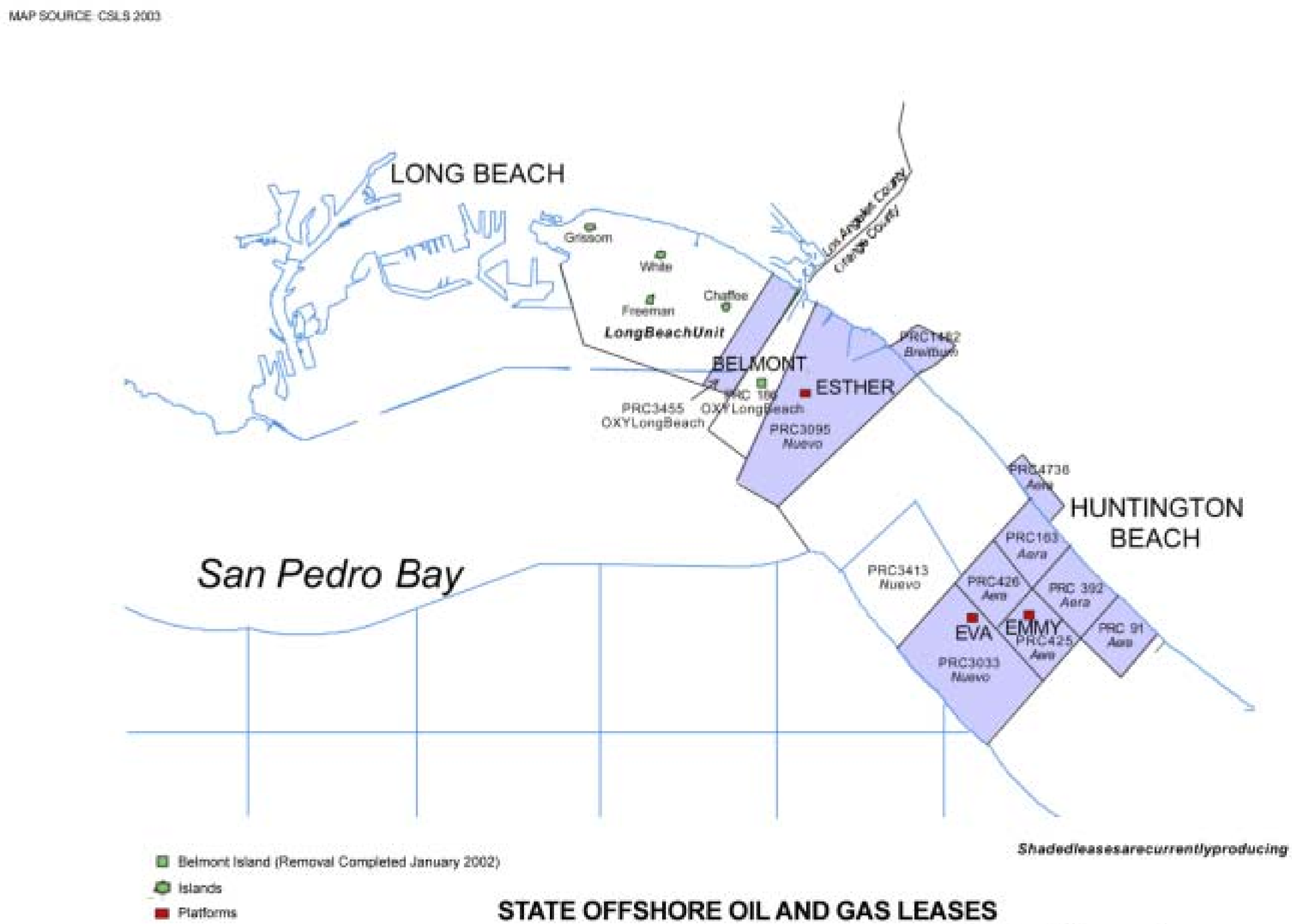
No new oil or gas development has been proposed in the immediate vicinity of the LA-2 or proposed LA-3 sites.

3.4.5 Recreational Activities

The southern California coastal areas are heavily used for recreational activities. Those recreational activities include sportfishing, recreational boating including whale watching, sailing, and fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing and picnicking. This section briefly describes the existing recreational acititivies in the vicinities of the LA-2 and proposed LA-3 sites.

3.4.5.1 Sportfishing

Recreational ocean fishing (sportfishing) is common in southern California and consists of pier fishing, surf fishing, private boat fishing, partyboat/charter fishing, and SCUBA/skin diving. Due to the depth and location of the proposed LA-3 and LA-2 ODMDSs, partyboat fishing is the type of fishing most likely to occur in the vicinity of both sites. In southern California, partyboat operations are based out of Santa Barbara



STATE OFFSHORE OIL AND GAS LEASES

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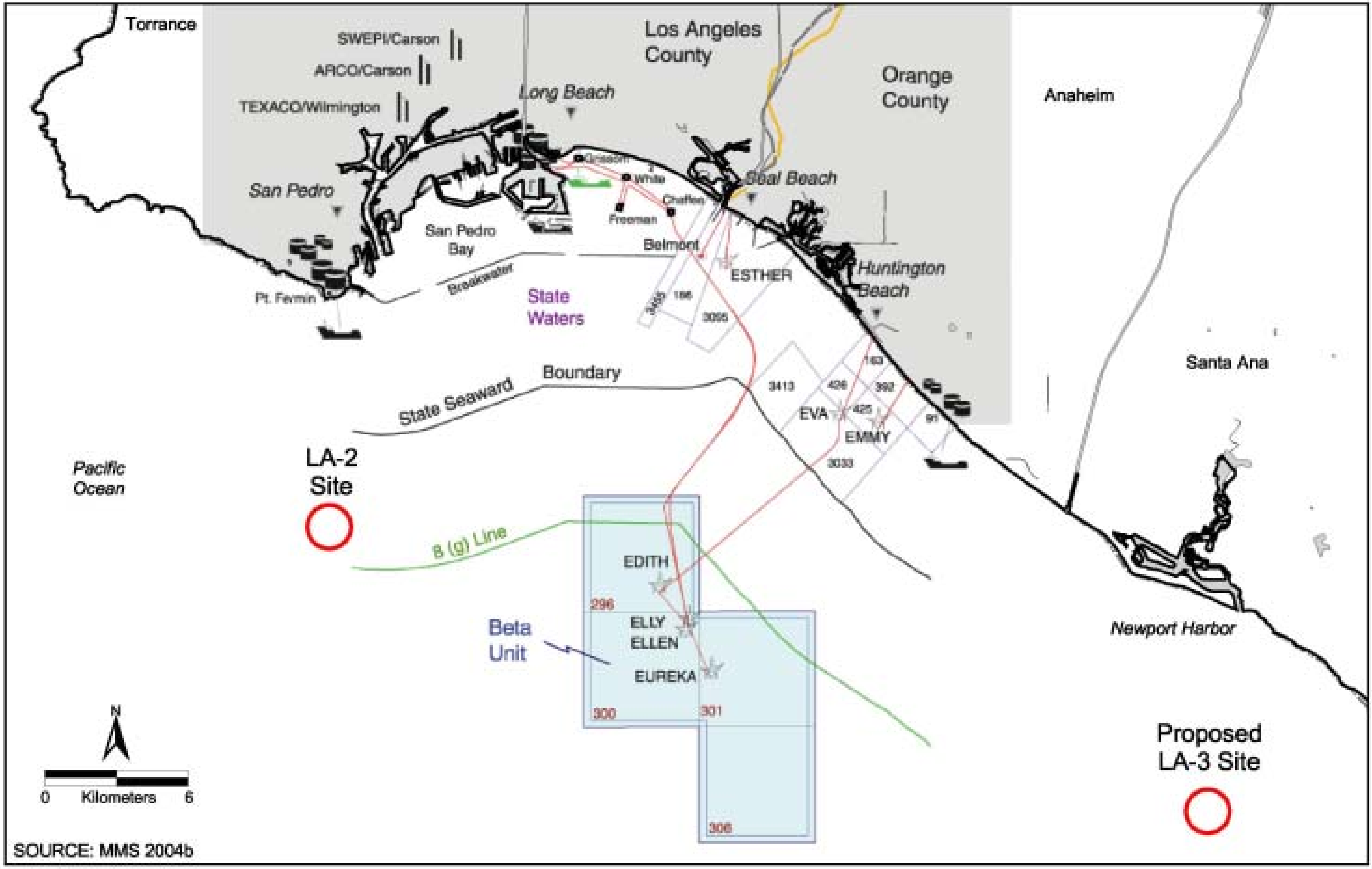
Figure 3.4-2



SAN PEDRO BAY OCS OPERATIONS

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Figure 3.4-3

Harbor, Channel Islands Harbor, Port Hueneme, Marina Del Rey, King Harbor, Los Angeles and Long Beach Harbors, Rainbow Harbor, Alamitos Bay, Newport Harbor, Dana Harbor, Oceanside Harbor, Mission Bay, and San Diego Bay. Partyboat fishing off Los Angeles and Orange Counties usually occurs in relatively shallow waters (less than 100 m [328 ft]) at reefs (natural or man-made) and kelp beds, areas where fish aggregate. During the summer, additional fishing occurs further offshore for coastal pelagic species such as yellowtail and tunas.

The most popular fish species targeted by sportfishers in southern California are rockfish *(Sebastes spp.)*, California barracuda (*Sphyraena argentea*), barred sand bass (*Paralabrax nebulifer*), kelp bass (*Paralabrax clathratus*), and Pacific bonito (*Sarda chiliensis*) (EPA 1997). Of these species, California barracuda and Pacific bonito are most likely to be caught near the water surface, kelp bass are caught throughout the water column, and barred sand bass and rockfish are most likely to be caught near bottom.

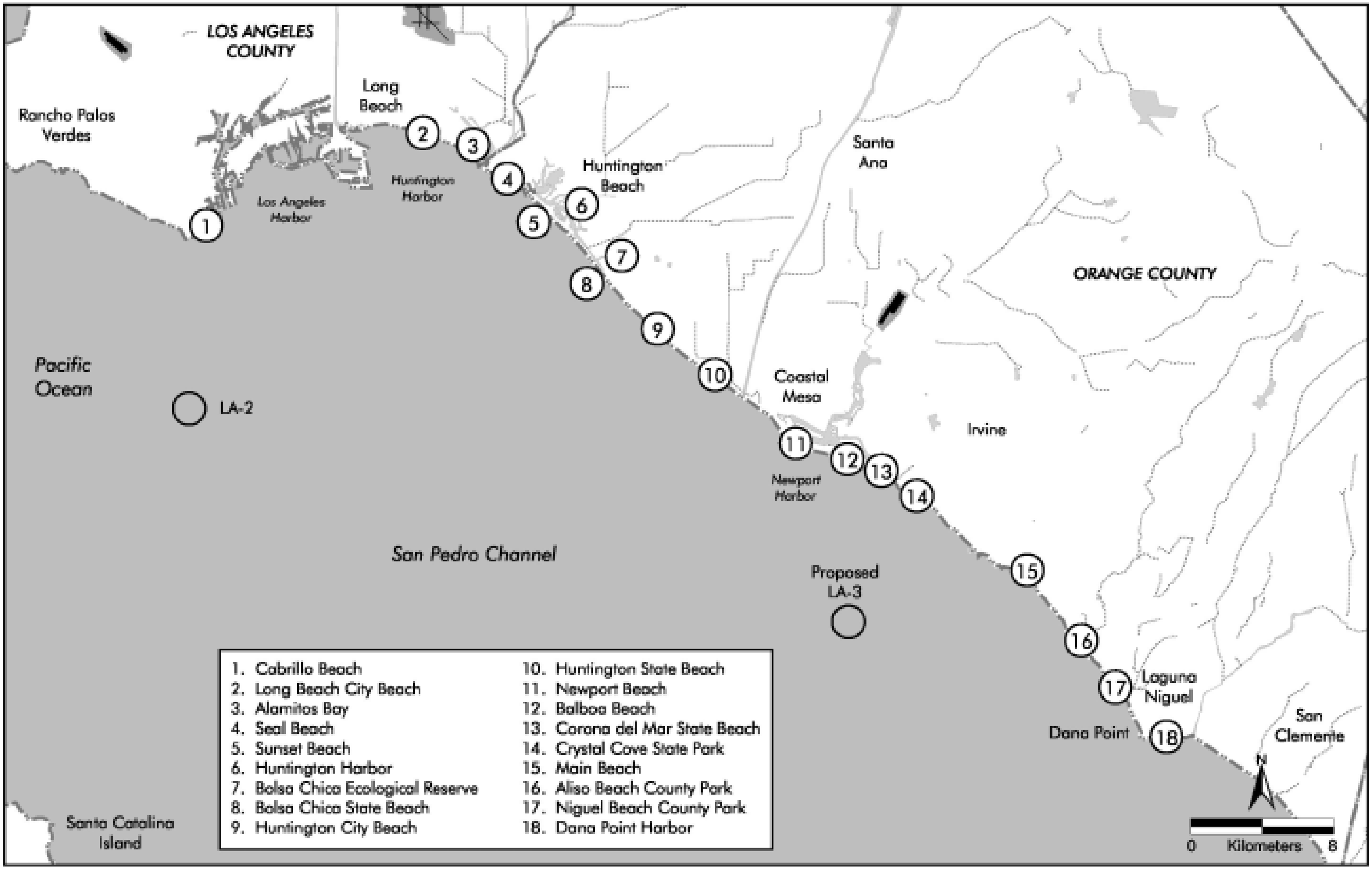
3.4.5.2 Recreational Boating

In addition to sportfishing, recreational boating could be affected by vessel traffic related to disposal operations. Recreational boating generally is not restricted to specified travel areas although most areas of concentrated private boating activitiy occur in areas with suitable harbors and marinas. Within Los Angeles and Orange Counties harbors that contain marinas include Los Angeles Harbor, Long Beach Harbor, Long Beach Marina, Huntington Harbor, Alamitos Bay, Newport Beach Harbor, and Dana Point Harbor. Additionally, Avalon Bay and Two Harbors are areas of concentrated boating activity on Santa Catalina Island.

Offshore islands are one of the major attractants to ocean going recreational boating. Santa Catalina Island is approximately 35 to 50 km (18.9 to 27 nmi) from the major harbors. Because of these relatively short distances, combined with the relatively unrestricted and major anchorages at the island, most pleasure boat traffic visting the offshore islands travels between the mainland harbors and the harbors on Santa Catalina Island. The boats generally follow a straight path between the island and mainland, and these routes often come close to the LA-2 and LA-3 sites. In addition to privately owned pleasure boats, regular ferry service operates between Santa Catalina Island and the Harbors at Los Angeles, Long Beach, Newport Beach, and Dana Point.

3.4.5.3 Other Recreational Activities

Most of the recreational activities other than offshore fishing and boating occur at the beaches or in the nearshore areas. Those activities include surf fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing and picnicking. Figure 3.4-4 shows some of the coastal parks and beaches in the vicinity of the LA-2 and proposed LA-3 sites.



COASTAL PARKS AND BEACHES IN THE PROJECT VICINITY

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Figure 3.4-4

- In addition to the coastal parks and beaches, other areas used by recreationists include marine protected areas (MPAs), which are discussed above in Section 3.3.8 of this EIS.

Figure 3.3-7 shows the MPAs in the vicinity of the LA-2 and proposed LA-3 sites. As discussed in Section 3.3.8 of this EIS, some MPAs restrict fishing and other human activities. MPAs that allow recreational fishing are draws for recreational activities. Due to the favorable climate of southern California, the beach and coastal areas are frequented by large numbers of people throughout the year.

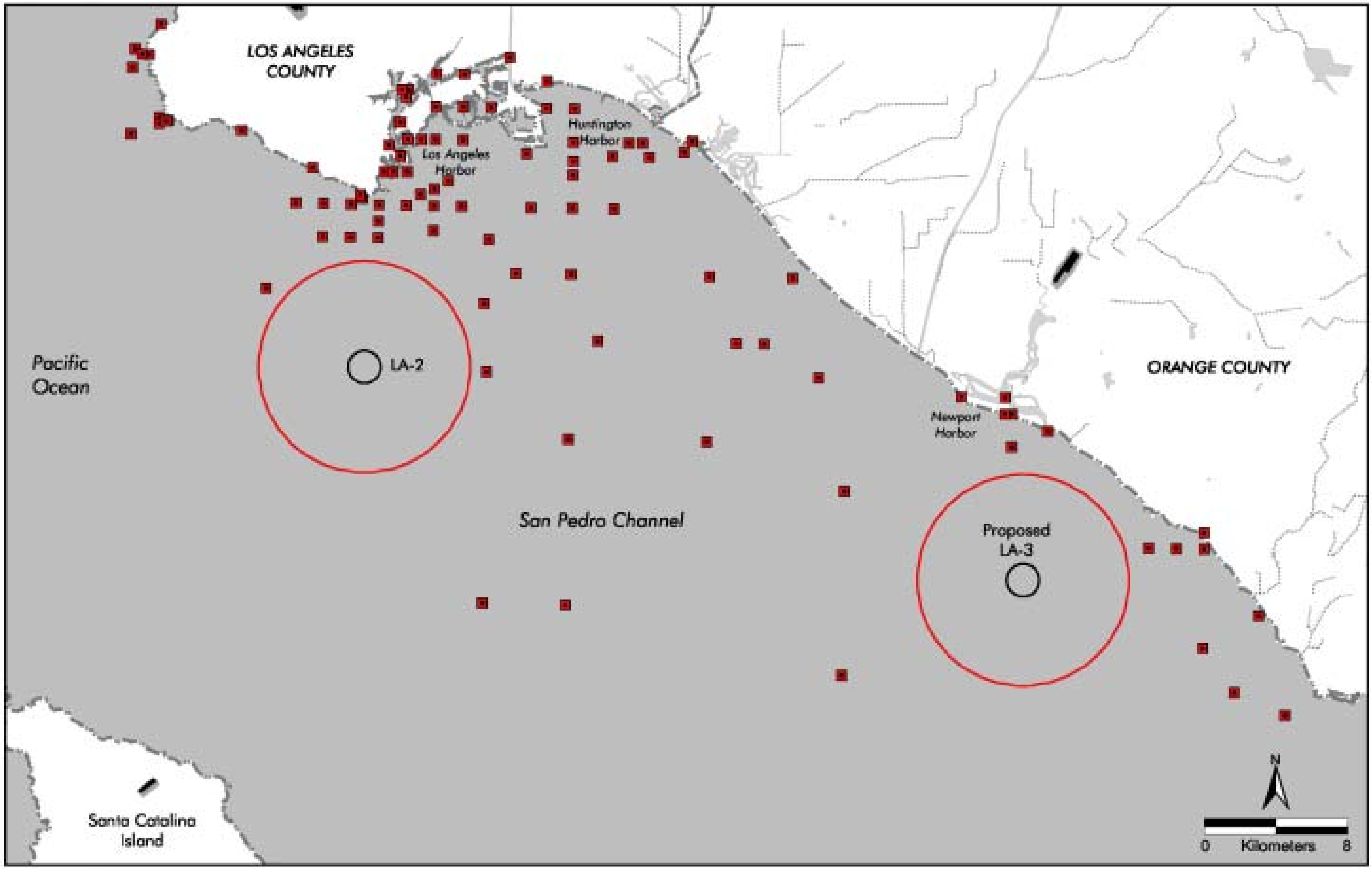
3.4.6 Archeological, Historical, and Cultural Resources

The southern California coast has had a long period of human occupation, both prehistoric and historic. As a result the coast of the mainland and Channel Islands contain numerous archaeological, historical, and cultural resources. The offshore regions are also thought to contain a number of these resources. Submerged cultural resources could include aboriginal remains, shipwrecks, and downed aircraft. Extensive dredging and construction projects in the harbor areas have likely destroyed most submerged cultural resources in those areas. In the vicinity of the LA-2 and proposed LA-3 sites the most likely cultural resources to be found are shipwrecks.

Figure 3.4-5 shows the approximate locations of shipwrecks as documented by the California State Lands Commision. As seen in this figure there are no documented shipwrecks within 5 km (2.7 nmi) of either the proposed LA-3 or LA-2 sites. The nearest known shipwreck to the proposed LA-3 site, identified as the Yankee Boy that sank in 1950, is approximately 6.3 km (3.4 nmi) to the east of the site boundary. Another shipwreck identified as the Silver Wave (sunk in 1936) lies approximately 6.6 km (3.6 nmi) north of the proposed LA-3 site boundary. The nearest shipwreck to the LA-2 site is unknown wreckage approximately 5.9 km (3.2 nmi) to the east of the site boundary (see Figure 3.4-5)

3.4.7 Public Health and Welfare

The effect of ocean disposal on human health and welfare is an issue of primary concern for the USACE and EPA. A potential health hazard associated with ocean disposal of dredged material is bioaccumulation of toxic substances in marine organisms, including fish and shellfish, which are then harvested for human consumption. As discussed in Chapter 1, dredged sediments that are proposed for ocean disposal are subject to strict testing requirements prior to their disposal. On-going sediment testing will be conducted on the material proposed for disposal and will be compared to sediment taken from the



SHIPWRECKS IN THE VICINITY OF THE LA-2 AND LA-3 SITES

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Figure 3.4-5

reference sites. Should the testing indicate that the accumulation of contaminants in the disposal area(s) represents an unacceptable risk to the marine environment or to human health, management actions would be taken to reduce or mitigate these impacts. This could include determining that dredged material is unsuitable for ocean disposal.

A second concern relating to the ocean disposal of dredged material is the potential for mounding of the disposed material causing a navigation hazard in the vicinity of the disposal sites. However, mounding within the disposal site is not expected to pose a hazard due to water depths at the two sites and the relatively low mounds expected to result from continued operation of the sites.

A further concern would be the interference of the disposal barges with shipping traffic as they travel to and from the disposal sites. As discussed in Section 3.4.2 above, traffic in the San Pedro Basin is heavy and, as a result, strict navigation regulations including traffic separation lanes and a Regulated Navigation Area have been instituted to monitor and control shipping traffic. Navy traffic as well as a large number of fishing and recreational boats also utilize the area. While the Navy traffic generally would be subject to the navigation rules outlined above, the smaller private craft are relatively free to move about.

Safety issues also include the potential for disposal barge traffic to interfere with present or future offshore oil and gas developments. There are developed offshore oil and gas facilities in the general vicinity of the LA-2 and proposed LA-3 disposal sites. However, the existing developed offshore sites are either within approximately 3.3 km (1.8 nmi) of the shore or are located more than 14 km (7.5 nmi) from either the LA-2 or proposed LA-3 sites. Additionally, neither LA-2 nor the proposed LA-3 site lie in areas currently proposed for future oil or gas development.

Finally, there is potential concern that dredged material that is deposited at the disposal sites could affect the aesthetics of the area. The LA-2 side is located approximately 16.7 km (9 nmi) from the breakwaters at San Pedro. This is an area heavily utilized by sportfishers and recreational boaters. The proposed LA-3 site is located over 6.5 km (3.5 nmi) from the nearest shoreline. Furthermore, it is located over 5.5 km (3.0 nmi) from the primary route utilized by recreational boaters traveling from the Newport Beach area to Avalon Bay on Santa Catalina Island.

Potential impacts and mitigation measures related to public health and safety are discussed in Chapter 4, Environmental Consequences.

CHAPTER 4.0

ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter evaluates the significance of potential effects of the proposed action on the physical, biological, and socioeconomic resources at the proposed project sites. The potential impacts are evaluated for the Preferred Alternative (Section 4.2), the No Action Alternative (Section 4.3), and other ocean disposal alternatives (Section 4.4). A summary and comparison of the site-specific impacts associated with the disposal of dredged material under each alternative according to the five general and eleven specific criteria are also provided in Chapter 2.

The significance of the potential environmental effects is evaluated according to the following criteria (outlined in EPA 1988):

- Class I - Significant adverse impacts that cannot be mitigated to insignificance. No measures can be taken to avoid or reduce the adverse impacts to insignificant levels.
- Class II - Significant adverse impacts that can be mitigated to insignificance. The impacts are potentially similar in significance to Class I impacts, but can be reduced or avoided by implementation of mitigation measures.
- Class III - Adverse but insignificant impacts or no anticipated impacts. No mitigation measures are necessary.
- Class IV - Beneficial effects. These effects could result in improved conditions relative to pre-project conditions.

The adjective "significant" is used to describe the level of severity of impacts resulting from the proposed action. In the following sections, significant is defined as a substantial (or potentially substantial) change to resources in the vicinity of the proposed project sites. Along with significance, the spatial (localized versus widespread) and temporal (short-term versus long-term) extent of the impacts is discussed. Mitigation measures are discussed as appropriate.

In evaluating the potential impacts of the proposed action and alternatives it is noted that both the permanent LA-2 and proposed LA-3 sites have been subject to previous physical disturbance and alteration. Site selection and implementation are designed to ensure that future physical disturbance to the ocean bottom will generally be confined to areas of previous disturbance and will be contained within the designated site boundaries. Consequently, physical impacts that are anticipated to occur within the boundary of the disposal site generally are not considered significant. Significant impacts could occur if substantial physical disturbance and impacts were to occur outside of the designated site boundaries.

In addition to the impact analysis discussed here, verification that significant impacts do not occur outside of the site boundaries will be demonstrated through implementation of the Site Management and Monitoring Plan (SMMP) being developed as part of the proposed action. The SMMP will include physical monitoring to confirm that the material that is deposited is landing where it is supposed to land, as well as monitoring to confirm that the sediment chemistry conforms to the pre-disposal testing requirements. The SMMP is discussed in more detail in Section 4.5.2 and is included as Appendix A of this EIS.

The individual impacts and assessment of the significance of those impacts are discussed in detail in the following sections.

Table 4.1-1 provides a summary of the potential impacts on the physical, biological, and socioeconomic environments for each of the alternatives. Additional comparisons and evaluation of the alternatives relative to the EPA's specific site selection criteria are presented in Table 2.2-1.

4.2 Preferred Alternative

A description of the potential impacts of the proposed action on the physical, biological, and socioeconomic environments of the Preferred Alternative, Alternative 3, is provided in this section.

TABLE 4.1-1
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS FOR THE PROPOSED ALTERNATIVES

	Preferred Alternative (Alternative 3)								No Action Alternative (Alternative 1)							
	LA-3				LA-2				LA-3				LA-2			
Description	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment(4)	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment
Physical Environment																
Air Quality	II	R	E	(5)	II	R	E	(5)	III	R	E	(6)	II	R	E	(6)
Physical Oceanography	III	L	E		III	L	E		III	R	E		III	R	E	
Water Quality																
- Turbidity	III	L	S		III	L	S		III	L	S		III	L	S	
- Dissolved Oxygen	III	L	S		III	L	S		III	L	S		III	L	S	
- Pollutants	III	L	S		III	L	S		III	L	S		III	L	S	
Geology and Sediments																
Sediment Grain Size	III	L	E		III	L	E		III	L	E		III	L	E	
Sediment Quality	III	L	E		III	L	E		III	L	E		III	L	E	
Biological Environment																
Plankton	III	L	S		III	L	S		III	L	S		III	L	S	
Benthic Infauna	III	L	E		III	L	E		III	L	E		III	L	E	
Benthic Epifauna	III	L	E		III	L	E		III	L	E		III	L	E	
Fish	III	L	E		III	L	E		III	L	E		III	L	E	
Birds	III	L	S		III	L	S		III	L	S		III	L	S	
Mammals	III	L	S		III	L	S		III	L	S		III	L	S	
Threatened/Endangered	III	L	S		III	L	S		III	L	S		III	L	S	
Socioeconomic Environment																
Fisheries																
- Commercial	III	L	E		III	L	E		III	L	E		III	L	E	
- Recreational	III	L	E		III	L	E		III	L	E		III	L	E	
Commercial Shipping	III	R	E		III	R	E		III	R	E		III	R	E	
Military Usage	III	R	E		III	R	E		III	R	E		III	R	E	
Oil and Natural Gas Development																
- Present	III	L	E		III	L	E		III	L	E		III	L	E	
- Future	III	L	E		III	L	E		III	L	E		III	L	E	
Recreational Usage																
- Sportfishing	III	L	S		III	L	S		III	L	S		III	L	S	
- Boating	III	L	S		III	L	S		III	L	S		III	L	S	
- Other Recreation	III	L	S		III	L	S		III	L	S		III	L	S	
Cultural/Historical	III	L	E		III	L	E		III	L	E		III	L	E	
Public Health/Welfare																
- Health	III	R	E		III	R	E		III	R	E		III	R	E	
- Safety	III	L	S		III	L	S		III	L	S		III	L	S	

TABLE 4.1-1
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS FOR THE PROPOSED ALTERNATIVES
(continued)

	Maximize use of LA-2 (Alternative 2)								Maximize use of LA-3 (Alternative 4)							
	LA-3				LA-2				LA-3				LA-2			
Description	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment(4)	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment	Impact Class(1)	Spatial Extent(2)	Temporal Extent(3)	Comment
Physical Environment																
Air Quality	III	R	E	(7)	I	R	E	(7)	I	R	E	(8)	I	R	E	(8)
Physical Oceanography	III	L	E		III	L	E		III	L	E		III	L	E	
Water Quality																
- Turbidity	III	L	S		III	L	S		III	L	S		III	L	S	
- Dissolved Oxygen	III	L	S		III	L	S		III	L	S		III	L	S	
- Pollutants	III	L	S		III	L	S		III	L	S		III	L	S	
Geology and Sediments																
Sediment Grain Size	III	L	E		III	L	E		III	L	E		III	L	E	
Sediment Quality	III	L	E		III	L	E		III	L	E		III	L	E	
Biological Environment																
Plankton	III	L	S		III	L	S		III	L	S		III	L	S	
Benthic Infauna	III	L	E		III	L	E		III	L	E		III	L	E	
Benthic Epifauna	III	L	E		III	L	E		III	L	E		III	L	E	
Fish	III	L	E		III	L	E		III	L	E		III	L	E	
Birds	III	L	S		III	L	S		III	L	S		III	L	S	
Mammals	III	L	S		III	L	S		III	L	S		III	L	S	
Threatened/Endangered	III	L	S		III	L	S		III	L	S		III	L	S	
Socioeconomic Environment																
Fisheries																
- Commercial	III	L	E		III	L	E		III	L	E		III	L	E	
- Recreational	III	L	E		III	L	E		III	L	E		III	L	E	
Commercial Shipping	III	R	E		III	R	E		III	L	E		II	L	E	
Military Usage	III	R	E		III	R	E		III	L	E		III	L	E	
Oil and Natural Gas Development																
- Present	III	L	E		III	L	E		III	L	E		III	L	E	
- Future	III	L	E		III	L	E		III	L	E	(7)	III	L	E	
Recreational Usage																
- Sportfishing	III	L	S		III	L	S		III	L	S		III	L	S	
- Boating	III	L	S		III	L	S		III	L	S		III	L	S	
- Other Recreation	III	L	S		III	L	S		III	L	S		III	L	S	
Cultural/Historical	III	L	E		III	L	E		III	L	E		III	L	E	
Public Health/Welfare																
- Health	III	R	E		III	R	E		III	R	E		III	R	E	
- Safety	III	L	S		III	L	S		III	L	S		III	L	S	

TABLE 4.1-1
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS FOR THE PROPOSED ALTERNATIVES
(continued)

Notes:
(1) Impact Class: I = significant; II = significant but can be reduced by mitigation; III = insignificant or none; IV = beneficial.
(2) Spatial Extent: S = confined within site boundaries; L = localized (up to 1 nmi outside of site boundaries); R = regional (beyond 1 nmi from site boundaries).
(3) Temporal Extent: S = short term (less than or equal to 5 hours); E = extended (greater than 5 hours).
(4) No disposal at LA-3; consequently, no adverse impacts to LA-3 site.
(5) Air impacts to the air basin are a result of emissions resulting from hauling activities to both LA-2 and LA-3 sites combined. Worst-case impacts to air quality may be mitigated through the dredging permitting process.
(6) No hauling activities to LA-3. Air impacts to the air basin are a result of emissions resulting from hauling activities to LA-2 site. Worst-case impacts to air quality may be mitigated through the dredging permitting process.
(7) No hauling activities to LA-3. Air impacts to the air basin are a result of emissions resulting from hauling activities to LA-2 site. Average-year impacts to air quality are projected to be significant and not mitigable.
(8) Air impacts to the air basin are a result of emissions resulting from hauling activities to both LA-2 and LA-3 sites combined. Average-year impacts to air quality are projected to be significant and not mitigable.

4.2.1 Effects on the Physical Environment

The following sections examine the potential effects of dredged material disposal on local and regional air quality, physical oceanography, water quality, geology, and sediment quality.

The transport and fate of dredged material proposed for disposal at both LA-2 and LA-3 was modeled to better determine potential effects to water and sediment quality and biological communities in the vicinity of the disposal sites. Methodologies and results of these numerical simulations are detailed in the Fate of Dredged Material Disposed at LA-3 and LA-2 report (USACE 2004b). The simulations used the following data for both sites: (1) hourly current profiles, (2) water quality profiles, (3) wave characteristics, and (4) sediment characteristics of dredged material. Both the STFATE and LTFATE models were employed to determine the short-term and long-term impacts, respectively, of the settling sediments.

4.2.1.1 Air Quality

As discussed in Chapter 3, the proposed action (the designation of an ODMDS) does not permit the actual disposal of dredged material. However, because the federal Clean Air Act and the SCAQMD rules and regulations are applicable to the proposed action, a basic air quality evaluation of the potential impacts to air quality resulting from future use of the disposal sites is presented here. Subsequent projects that would generate material to be disposed of at LA-2 or LA-3 would be subject to individual environmental review and would require assessment of the potential direct and cumulative air quality impacts resulting from those individual projects.

The site(s) chosen for ocean disposal of dredged material will ultimately affect the emissions resulting from hauling the material to that site(s) due to the varying haul distances resulting from each alternative. Consequently, for the purposes of assessing the potential air quality impacts resulting from implementation of the alternatives presented in this analysis, the projected hauling emissions for each of the alternatives are compared to Clean Air Act Conformity Demonstration thresholds and to SCAQMD significance thresholds.

Additionally, because the air emissions due to hauling the dredged material to the disposal site are directly a function of the total dredged material amount and the hauling distances between the various dredging projects and the site, the air emissions estimates presented here assume the projected dredging projects and material volumes identified in the Final Draft Zone of Siting Feasibility (ZSF) Study (USACE 2003a). The intent of this air quality analysis is to present a basis for comparing the relative impacts to air quality that could result due to implementation of each of the proposed alternatives.

Dredging operations that would produce material to be disposed of at an ODMDS could involve a number of alternative dredging procedures. Typically these would involve a combination of hopper, clamshell, or hydraulic techniques. The amount, frequency, and methods of dredging used would be the same irrespective of which alternative ocean disposal site is utilized. Consequently, the effects on air quality resulting from the dredging operations are not evaluated in this EIS. Air quality effects for each individual dredging project will be evaluated on a case-by-case basis for each dredging permit application. Thus, the following analysis focuses on the potential air emissions resulting from the hauling activities.

The dredged material to be disposed of is normally transported to the disposal site on a split-hulled barge or disposal scow towed by diesel-powered tugboats or tenders. Available disposal scows and barges typically range in capacity from 800 to 4,000 yd^3 (612 to 3,058 m^3; USACE 2003a). For the purposes of this assessment an average capacity of 2,000 yd^3 (1,529 m^3) was assumed. The variation in potential air quality effects resulting from the different ocean disposal alternatives is principally due to the variation in the transportation distance from the individual dredge sites to the ODMDS.

Table 4.2-1 shows the approximate distance between the various dredge material source sites and the proposed LA-3 and permanent LA-2 ODMDS sites. The tugboats or tenders hauling the dredged material are assumed to have one diesel engine producing 1,640 kilowatts (kW; 2,200 horsepower [hp]), two 75-kW (100 hp) generators that operate continuously while the vessel is in operation, and a cruising speed of 15.7 km/hr (8.5 knots). In addition to the cruising time to and from the ODMDS, it is assumed that each round trip includes one additional hour at idle speed for hookup, disposal, unhook, and other maneuvering. Hauling operations are assumed to occur for 10 hours a day, 6 days per week. A discussion of the potential dredging projects and their timing and frequency is presented in the Final Draft ZSF Study (USACE 2003a).

As discussed in Chapter 2, the worst-case number of daily and yearly trips occurs assuming that all of the projects identified in the ZSF Study were to occur simultaneously. Using these assumptions the worst-case total daily trips and the worst-case total yearly trips between each of the source and disposal sites for each of the alternatives are shown in Tables 4.2-2 and 4.2-3, respectively. Table 4.2-4 shows the average number of yearly trips over the 10-year period of assessment that are anticipated for each of the alternatives. These worst-case yearly and average yearly trips correspond to the worst-case yearly and average yearly disposal volumes discussed in Chapter 2 and shown in Tables 2.1-1 through 2.1-4.

Using these assumptions and information on marine vessel emission factors from the EPA (EPA 2000), air emissions due to the hauling operations were projected for each of the alternatives. The detailed air emissions calculations are included as Appendix B of this EIS. Table 4.2-5 shows the worst-case daily emissions, Table 4.2-6 shows the

TABLE 4.2-1
ONE-WAY TRIP DISTANCES

Harbor/Facility	One-Way Trip Distance (km)		One-Way Trip Distance (nmi)	
	LA-2	LA-3	LA-2	LA-3
Los Angeles River Estuary	21	40	11	22
Los Angeles Harbor	14	42	8	23
Long Beach Harbor	18	40	10	22
Marina del Rey	47	85	25	46
Sunset/Huntington Harbor	27	37	15	20
Newport Harbor	43	11	23	6
Dana Point Harbor	61	23	33	12
Upper Newport Bay	43	11	23	6
Anaheim Bay	23	34	12	18

TABLE 4.2-2
WORST-CASE DAY TOTAL NUMBER OF BARGE ROUND TRIPS

Harbor/Facility	Alternative 1 - No Action		Alternative 2		Alternative 3		Alternative 4	
	Worst-Case Day LA-2	Worst-Case Day LA-3	Worst-Case Day LA-2	Worst-Case Day LA-3	Worst-Case Day LA-2	Worst-Case Day LA-3	Worst-Case Day LA-2	Worst-Case Day LA-3
Regular Maintenance								
Los Angeles River Estuary	2	NA	2	NA	2	0	2	0
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Marina del Rey	1	NA	1	NA	1	0	1	0
Sunset/Huntington Harbor	2	NA	2	NA	0	1	0	1
Newport Harbor	0	NA	1	NA	0	4	0	4
Dana Point Harbor	0	NA	1	NA	0	2	0	2
Upper Newport Bay	0	NA	1	NA	0	4	0	4
Anaheim Bay	2	NA	2	NA	2	0	2	0
Total Regular Maintenance	13	NA	16	NA	11	11	5	13
Capital Improvement								
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Upper Newport Bay*	0	NA	3	NA	0	4	0	4
Total Capital Improvement	6	NA	9	NA	6	4	0	6
TOTAL	19	NA	25	NA	17	15	5	19

* Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).

TABLE 4.2-3
WORST-CASE YEAR TOTAL NUMBER OF BARGE ROUND TRIPS

Harbor/Facility	Alternative 1 - No Action		Alternative 2		Alternative 3		Alternative 4	
	Worst-Case Year LA-2	Worst-Case Year LA-3	Worst-Case Year LA-2	Worst-Case Year LA-3	Worst-Case Year LA-2	Worst-Case Year LA-3	Worst-Case Year LA-2	Worst-Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	57	NA	57	NA	57	0	57	0
Los Angeles Harbor	8	NA	8	NA	8	0	0	8
Long Beach Harbor	29	NA	29	NA	29	0	0	29
Marina del Rey	51	NA	51	NA	51	0	51	0
Sunset/Huntington Harbor	75	NA	75	NA	0	75	0	75
Newport Harbor	0	NA	188	NA	0	188	0	188
Dana Point Harbor	0	NA	38	NA	0	38	0	38
Upper Newport Bay	0	NA	75	NA	0	75	0	75
Anaheim Bay	113	NA	113	NA	113	0	113	0
Total Regular Maintenance	333	NA	634	NA	258	376	221	413
Capital Improvement								
Los Angeles Harbor	198	NA	198	NA	198	0	0	198
Long Beach Harbor	198	NA	198	NA	198	0	0	198
Upper Newport Bay*	0	NA	795	NA	0	795	0	795
Total Capital Improvement	396	NA	1,191	NA	396	795	0	1,191
TOTAL	729	NA	1,825	NA	654	1,171	221	1,604

* Upper Newport Bay capital improvement project occurs over two years (worst-case year assumes 1,060,000 cubic yards for capital improvement).

TABLE 4.2-4
AVERAGE YEAR TOTAL NUMBER OF BARGE ROUND TRIPS

	Alternative 1 - No Action		Alternative 2		Alternative 3		Alternative 4	
Harbor/Facility	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	10	NA	10	NA	10	0	10	0
Los Angeles Harbor	5	NA	5	NA	5	0	0	5
Long Beach Harbor	19	NA	19	NA	19	0	0	19
Marina del Rey	17	NA	17	NA	17	0	17	0
Sunset/Huntington Harbor	5	NA	5	NA	0	5	0	5
Newport Harbor	0	NA	5	NA	0	5	0	5
Dana Point Harbor	0	NA	4	NA	0	4	0	4
Upper Newport Bay	0	NA	5	NA	0	5	0	5
Anaheim Bay	8	NA	8	NA	8	0	8	0
Total Regular Maintenance	64	NA	78	NA	59	19	35	43
Capital Improvement								
Los Angeles Harbor	7	NA	7	NA	7	0	0	7
Long Beach Harbor	7	NA	7	NA	7	0	0	7
Upper Newport Bay	0	NA	106	NA	0	106	0	106
Total Capital Improvement	14	NA	120	NA	14	106	0	120
TOTAL	78	NA	198	NA	73	125	35	163

TABLE 4.2-5
WORST-CASE YEAR MAXIMUM DAILY EMISSIONS
(kg per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	SCAQMD Thresholds
PM	21	36	31	29	68.0[(1)]
NOx	**857**	**1,439**	**1,249**	**1,148**	24.9
NO_2	1,273	2,138	1,855	1,705	NA
SO_2	**642**	**1,076**	**937**	**860**	68.0[(2)]
CO	101	163	152	134	249.5
HC	11	17	17	15	24.9[(3)]
CO_2	57,183	95,862	83,459	76,565	NA

NOTE: Emissions assume 10-hour day, 313-work-day year. **Bold** type indicates that emissions exceed threshold.

SCAQMD = South Coast Air Quality Management District
PM = Particulate matter
NOx = Nitrogen oxides
NO_2 = Nitrogen dioxide
SO_2 = Sulfur dioxide
CO = Carbon monoxide
HC = Hydrocarbons
CO_2 = Carbon dioxide

[(1)]Threshold is for PM10.
[(2)]Threshold is for SOx.
[(3)]Threshold is for reactive organic compounds (ROCs).
NA: not applicable - no threshold specified

TABLE 4.2-6
WORST-CASE YEAR AVERAGE DAILY EMISSIONS
(kg per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	SCAQMD Thresholds
PM	2	9	5	6	68.0[(1)]
NOx	**93**	**370**	**182**	**240**	24.9
NO_2	138	551	271	357	NA
SO_2	**70**	**277**	**137**	**180**	68.0[(2)]
CO	11	41	22	28	249.5
HC	1	4	3	3	24.9[(3)]
CO_2	6,204	24,645	12,200	16,045	NA

NOTE: Emissions assume 10-hour day, 313 work-day year. **Bold** type indicates that emissions exceed threshold.

SCAQMD = South Coast Air Quality Management District
PM = Particulate matter
NOx = Nitrogen oxides
NO_2 = Nitrogen dioxide
SO_2 = Sulfur dioxide
CO = Carbon monoxide
HC = Hydrocarbons
CO_2 = Carbon dioxide

[(1)]Threshold is for PM10.
[(2)]Threshold is for SOx.
[(3)]Threshold is for reactive organic compounds (ROCs).
NA: not applicable - no threshold specified

average daily emissions averaged over a worst-case year, and Table 4.2-7 shows the average daily emissions averaged over an average year. Table 4.2-8 shows the worst-case yearly emissions while Table 4.2-9 shows the average yearly emissions.

Also shown in Tables 4.2-5 through 4.2-7 are the SCAQMD air emission significance thresholds for evaluating projects occurring within the SCAB. As seen in Table 4.2-5 and Table 4.2-6, for Alternative 3 both worst-case daily emissions and average daily emissions for a worst-case year are projected to exceed the SCAQMD thresholds for NO_x and SO_2. All other emissions are projected to be below significance thresholds. Additionally, as seen in Table 4.2-7, all average daily emissions for an average year are projected to be below SCAQMD thresholds.

Likewise, Tables 4.2-8 and 4.2-9 include the CAA *de minimis* thresholds for evaluating the air emissions resulting from federal actions. As seen in Table 4.2-8, for Alternative 3 the worst-case yearly emissions of NO_x and NO_2 exceed the *de minimis* thresholds. However, as seen in Table 4.2-9 all of the projected emissions resulting from the hauling activities associated with Alternative 3 for an average year are below the *de minimis* thresholds.

Consequently, the potential exists for significant air quality emissions to occur under Alternative 3 in the unlikely event that all of the dredging activities identified were to occur simultaneously in any given year. However, assuming more realistic hauling activities for an average year results in air emissions that are less than the identified thresholds. Because the actual individual dredging and hauling activities are subject to additional environmental review and permitting, air quality impacts are considered Class II as air emissions could be mitigated, for example, by limiting the hauling activities allowed under the individual permits.

It is also noted that the EPA has recently adopted new emissions standards for new marine diesel engines that went into effect in January of 2004. These standards apply to new manufactured marine engines and existing engines that are installed in new vessels or converted from land-based to marine engines. Consequently, as the existing tug fleet is retired, future emissions are anticipated to be less than those presented here.

4.2.1.2 Physical Oceanography

The proposed use of both the LA-2 and/or LA-3 ODMDSs is not expected to affect the waves, currents, or tides in the vicinity of these locations (Class III). It is these parameters that will largely affect the dispersal and transport of dredged material

Changes in seafloor topography can potentially result in changes in near-bottom current patterns. Substantial accumulations of dredged material deposited at either of the disposal

TABLE 4.2-7
AVERAGE DAILY EMISSIONS FOR 10-YEAR PROJECT ASSESSMENT PERIOD
(kg per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	SCAQMD Thresholds
PM	0.3	1.0	0.5	0.7	68.0[(1)]
NOx	11.7	**42.1**	21.3	**26.3**	24.9
NO_2	17.4	62.6	31.7	39.1	NA
SO_2	8.8	31.4	16.0	19.7	68.0[(2)]
CO	1.3	4.6	2.6	3.1	249.5
HC	0.1	0.5	0.3	0.3	24.9[(3)]
CO_2	781.9	2,800.0	1,426.7	1,753.6	NA

NOTE: Emissions assume 10-hour day, 313 work-day year. **Bold** type indicates that emissions exceed threshold.

SCAQMD = South Coast Air Quality Management District
PM = Particulate matter
NOx = Nitrogen oxides
NO_2 = Nitrogen dioxide
SO_2 = Sulfur dioxide
CO = Carbon monoxide
HC = Hydrocarbons
CO_2 = Carbon dioxide

[(1)]Threshold is for PM10.
[(2)]Threshold is for SOx.
[(3)]Threshold is for Reactive Organic Compounds (ROC).
NA: not applicable - no threshold specified

TABLE 4.2-8
WORST-CASE YEARLY EMISSIONS
(metric tons per year)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Federal *de Minimis* Thresholds
PM	0.8	3.4	1.7	2.2	63.5[1]
NOx	**33.9**	**135.2**	**66.6**	**87.8**	9.1
NO_2	50.4	**201.0**	**98.9**	**130.4**	90.7
SO_2	25.4	101.0	50.0	65.7	NA
CO	4.0	14.8	8.2	10.3	90.7
HC	0.4	1.5	0.9	1.1	9.1[2]
CO_2	2,264.3	8,995.5	4,453.0	5,856.3	NA

NOTE: Emissions assume 10-hour day, 313 work-day year. **Bold** type indicates that emissions exceed threshold.

PM = Particulate matter
NOx = Nitrogen oxides
NO_2 = Nitrogen dioxide
SO_2 = Sulfur dioxide
CO = Carbon monoxide
HC = Hydrocarbons
CO_2 = Carbon dioxide

[1]Threshold is for PM_{10}.
[2]Threshold is for volatile organic compounds (VOCs).
NA: not applicable - no threshold specified

TABLE 4.2-9
AVERAGE YEARLY EMISSIONS FOR 10-YEAR PROJECT ASSESSMENT PERIOD
(metric tons per year)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Federal *de Minimis* Thresholds
PM	0.1	0.4	0.2	0.2	63.5[(1)]
NOx	4.3	**15.4**	7.8	**9.6**	9.1
NO_2	6.4	22.8	11.6	14.3	90.7
SO_2	3.2	11.5	5.8	7.2	NA
CO	0.5	1.7	0.9	1.1	90.7
HC	0.1	0.2	0.1	0.1	9.1[(2)]
CO_2	285.4	102.2	520.7	640.1	NA

NOTE: Emissions assume 10-hour day, 313 work-day year. **Bold** type indicates that emissions exceed threshold.

PM = Particulate matter
NOx = Nitrogen oxides
NO_2 = Nitrogen dioxide
SO_2 = Sulfur dioxide
CO = Carbon monoxide
HC = Hydrocarbons
CO_2 = Carbon dioxide

[(1)]Threshold is for PM_{10}.
[(2)]Threshold is for volatile organic compounds (VOCs).
NA: not applicable - no threshold specified

sites could affect the direction and magnitude of seafloor currents. However, it is these currents that will also act to disperse dredged material. Near-bottom currents at LA-3 are low (usually less than 6 cm per second [cm/sec]; [0.2 feet per second {ft/sec}] and always less than 16 cm/sec [0.53 ft/sec]) compared with those at LA-2 (usually less than 12 cm/sec [0.4 ft/sec] and always less than 40 cm/sec [1.3 ft/sec]). The potential for erosion of disposed sediments is therefore greater at LA-2 than at LA-3. Essentially no erosion is predicted for the LA-3 site (USACE 2004b).

Under Alternative 3, the LA-3 site would be permanently designated at an annual maximum disposal quantity of 2,500,000 yd^3 (1,911,000 m^3), and the LA-2 site would be managed at an annual maximum disposal volume of 1,000,000 yd^3 (765,000 m^3). Effects to physical oceanography are not expected to be significant at either site (Class III).

4.2.1.3 Water Quality

The disposal of dredged material at the LA-2 and LA-3 sites will result in short-term, localized effects to water quality parameters. Short-term water column effects were predicted based on numerical modeling of dredged material transport and fate. The STFATE model and a particle trajectory model were used to predict the maximum concentrations of the slowly settling sediment after the initial discharge (USACE 2004b).

Upon release from the disposal barge, the dredged material descends to the seafloor by gravity. Coarser sediments and silt-clay clasts settle more rapidly and accumulate close to the disposal point, whereas slower settling sediments decelerate with increasing depth as the sediments entrain surrounding waters and, if water depths are sufficiently deep, eventually reach neutral buoyancy. This is the point of dynamic collapse where material is no longer influenced by its bulk properties, but only as a collection of sediment particles. After this point the disposed material is subject to passive diffusion, which is dependent on the prevailing currents.

The discharge of dredged material will result in a localized, turbid plume that will dissipate with distance from the disposal site. Transparency within the plume will be reduced from ambient levels. Heavier sediments, such as coarse particles and silt-clay clasts, will descend more rapidly than finer sediments. Finer sediments, such as silt and clay particles, will descend more slowly, but will be subject to dispersal and dilution. Depending on the characteristics of the sediments, dissolved oxygen concentrations may be decreased within the plume. If sediment contaminants are present within the plume (e.g. metals, hydrocarbons, pesticides, etc.), this may result in temporarily elevated levels in the affected water column. Results of numerical modeling indicate that within four hours of disposal, sediment constituents are well diluted as they settle and disperse within the site boundary and over the entire water column until settling on the seafloor (USACE 2004b).

The U.S. EPA's Green Book (EPA and USACE 1991) specifies two criteria related to dilution of dredged material:

- Criterion I – The maximum concentration of a constituent outside the disposal site boundary during the first four-hour period after discharge must satisfy applicable water quality standards; and

- Criterion II – The maximum concentration of a constituent anywhere in the marine environment four hours after discharge must satisfy the water quality standards. The final concentration of a conservative constituent after mixing is expressed as the initial concentration divided by the dilution factor, assuming an ambient concentration of the constituent of zero.

Water quality criteria for the ocean disposal of dredged material are specified in 40 CFR 227.

The dredged material proposed for ocean disposal will be tested for contaminants as part of the dredged material screening process. The dilutions determined through the numerical modeling process will be used with the initial contaminant concentrations determined from the sediment testing to project the resulting concentrations of those contaminants after the initial dilution. The diluted concentrations will be compared to the criteria specified in 40 CFR 227 to determine if the water criteria would be met if the material were disposed of in the ocean. If the criteria would be met then the material is deemed acceptable for ocean disposal and no significant water quality impacts would occur. If the criteria would not be met, then the dredged material would not be suitable for ocean disposal and would have to be disposed of through some other means. Consequently, screening of the dredged material will ensure that no significant impacts to water quality would result from the ocean disposal of the dredged material at either site.

Effects to water quality parameters from disposal operations are predicted to be localized and temporary. Field studies performed at the LA-2 and LA-5 (the LA-5 ODMDS is located in approximately 146 to 201 m (479 to 659 ft) of water about 10 km (5.4 nmi) southwest of San Diego, California) disposal sites indicated that the disposal plume diluted to background concentrations within two to five hours (EPA 1987a, b). Effects on water quality parameters from disposal operations at both LA-3 and LA-2 are classified as adverse but insignificant (Class III) assuming only dredged material of suitable quality is permitted for disposal.

4.2.1.4 Geology and Sediments

The disposal of dredged material at the LA-2 and LA-3 ODMDSs will result in sediment accumulation at each site. The accumulation of sediments in the vicinity of each site was modeled based on predicted sediment and water column parameters. The STFATE model was used to determine the effect of instantaneous disposal events on local sediments using repeated runs to simulate continuing disposal (USACE 2004b). The LTFATE model was used to determine the long-term fate of settled dredge material at each site. The LTFATE model simulates the movement of sediments on the seafloor due to near-bottom currents and oscillatory currents resulting from wind waves.

Based on results of Sediment Profile Imaging (SPI) surveys at both sites, the disposal sediments will likely be "reworked" by benthic organisms and, over time, the depositional layer will more closely resemble those sediments upon which they were deposited. Reworking includes excavating, burrowing, and ingestion and ejection of sediments as a method of feeding for many benthic and epibenthic organisms.

In some cases disposal mounds will accumulate on the seafloor. Bathymetric surveys at LA-3 and LA-2 in 1998 identified disposal mounds at both sites from past disposal operations; however, the vertical relief of all mounds was less than 30 cm (1 ft; Gardener et al. 1998a, b).

As discussed, materials proposed for disposal at the LA-2 and LA-3 sites will be screened according to federal regulations to prevent the occurrence of adverse effects to marine organisms resulting from sediment contamination. The screening process is designed to detect and quantify sediment contaminants prior to disposal to evaluate the proper disposal options for each project. In short, sediments that may result in adverse effects or toxicity to marine organisms due to chemical contaminants will not be qualified for ocean disposal at either of the sites. To verify the effectiveness of the screening process, the Site Management and Monitoring Plan (SMMP) will ensure that the physical, chemical, and biological characteristics of the site are not being adversely affected due to disposal operations.

Numerical Modeling

The STFATE and LTFATE models were used to determine the fate and accumulation of dredged material disposed of at LA-2 and LA-3. Detailed methodologies can be found in the fate of the dredged material modeling report (USACE 2004b). However, it is important to note that the modeling performed assumes that all material disposal occurs within a circle of 305 m (1,000 ft) radius about the site center irrespective of which site is utilized.

a. LA-3

Under Alternative 3, the proposed LA-3 site would be permanently designated at a maximum annual disposal volume of 2,500,000 yd^3 (1,911,000 m^3). Consequently, the maximum annual disposal volume modeled for this alternative at LA-3 was 2,500,000 yd^3 (1,911,000 m^3), with all of the dredged material derived from Upper Newport Bay

Basins II and III (Scenario I in the dredged material fate modeling report; USACE 2004b).

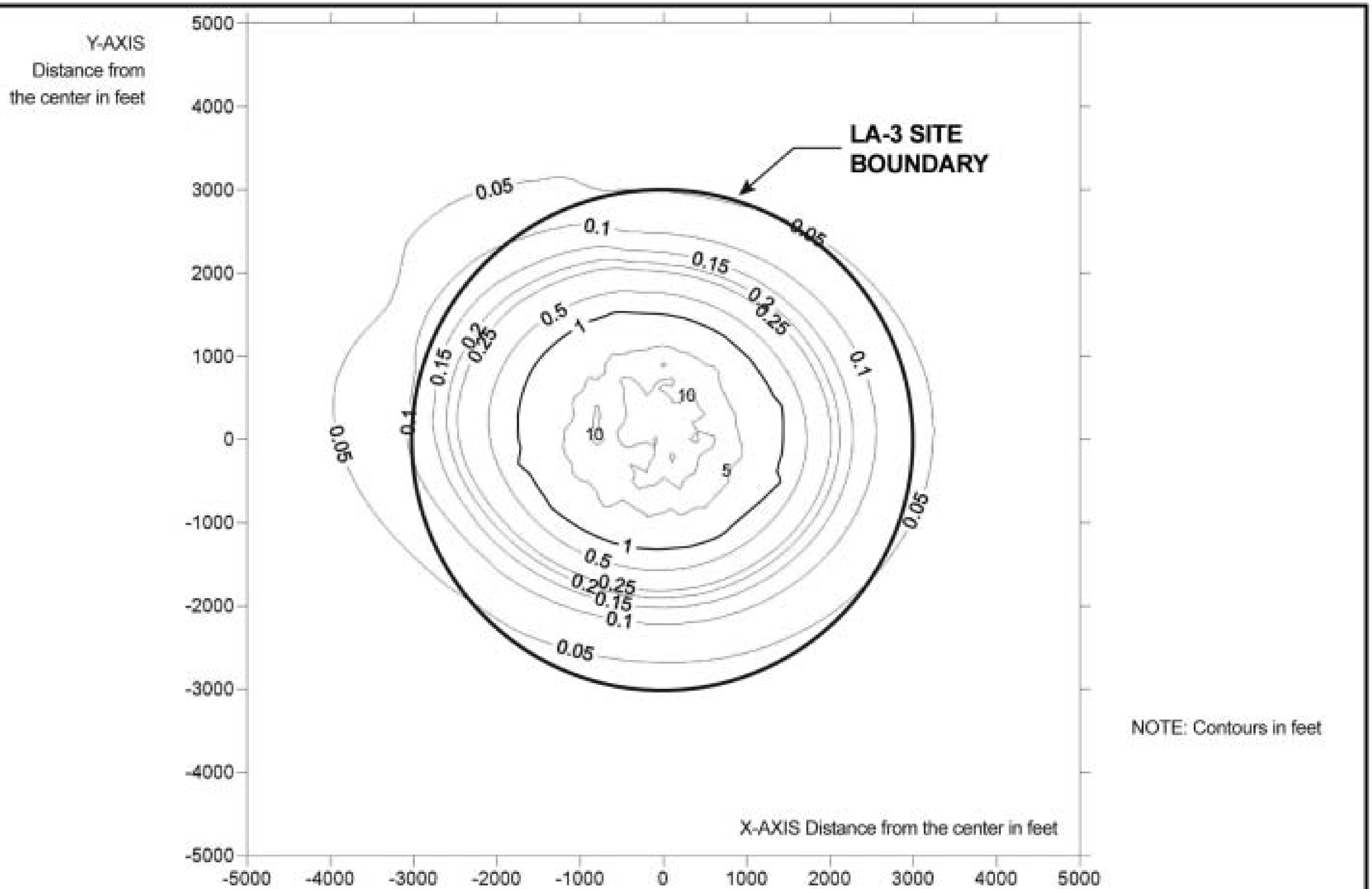
Results indicate that greater than 99 percent of the material in the sediment computations (gravel to very fine sand) settled within a 3,050-m by 3,050-m (10,000-ft by 10,000-ft) square grid including and surrounding the site boundary. As seen in Figure 4.2-1 he 30-cm (1-ft) contour resulting from the maximum annual disposal volume of 2,500,000 yd^3 (1,911,000 m^3) lies well within the proposed site boundary (USACE 2004b).

Long-term accumulation was also assessed assuming that the sediment characteristics match Scenario I of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 2,483,000 yd^3 (1,898,000 m^3) over the 10-year period (based on an annual average disposal volume of 248,000 yd^3 [190,000 m^3]; see Table 2.1-3) range from 4.19 m (13.75 ft) within 305 m (1,000 ft) of the site center to 0.02 m (0.05 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. These accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-3 detected discrete marine disposal mounds (MDMs) adjacent to, and southeast of, the LA-3 ODMDS (Gardner et al. 1998b). Continued use of LA-3 will result in the presence of more of these MDMs, though they will be worked through with time. Dredge sediments detected at a station north of the LA-3 boundary in 1988 were not detected during the 2000 surveys (USACE 2002). Though dredged material was detected at several stations south of the disposal site in 2000, the infauna had recovered completely and the sediments had been reworked and resembled the native bottom.

There are differences in certain sediment parameters among stations (1) within the interim LA-3 disposal site, (2) at reference sites, (3) at sites where sediments from the 1998-1999 Upper Newport Bay project were present, and (4) at sites where sediments from historical disposal operations were present (Chambers Group 2001). Many of these are likely the result of past dredge disposal operations. Within the interim LA-3 site boundary, total organic carbon, total volatile solids, and percentage of silt were lower than at locations surrounding LA-3 and at reference locations. Oil and grease were higher within the site compared with the other sites, as well. Continued use of LA-3 will result in continued alterations in sediment characteristics including elevated levels of some contaminants.

The concentrations of some sediment contaminants, such as the metals cadmium and silver, were higher within the interim LA-3 site boundary compared with adjacent and reference areas in 2000. Levels of most contaminants in 2000 were lower at LA-3 than those measured in 1999, suggesting the sediments are being reworked.



Modeled Footprint of Sediment Accumulation at LA-3
for an Annual Disposal Volume of 2,500,000 yd^3

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Figure 4.2-1

As previously discussed, only suitable material that has been screened according to EPA protocols will be deemed acceptable for future ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-3 will likely continue as a result of dredged material disposal. This effect is considered locally not significant (Class III) and is expected to continue for the duration of site use. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to area within the site and immediately adjacent to the site, and will extend for the duration of site use.

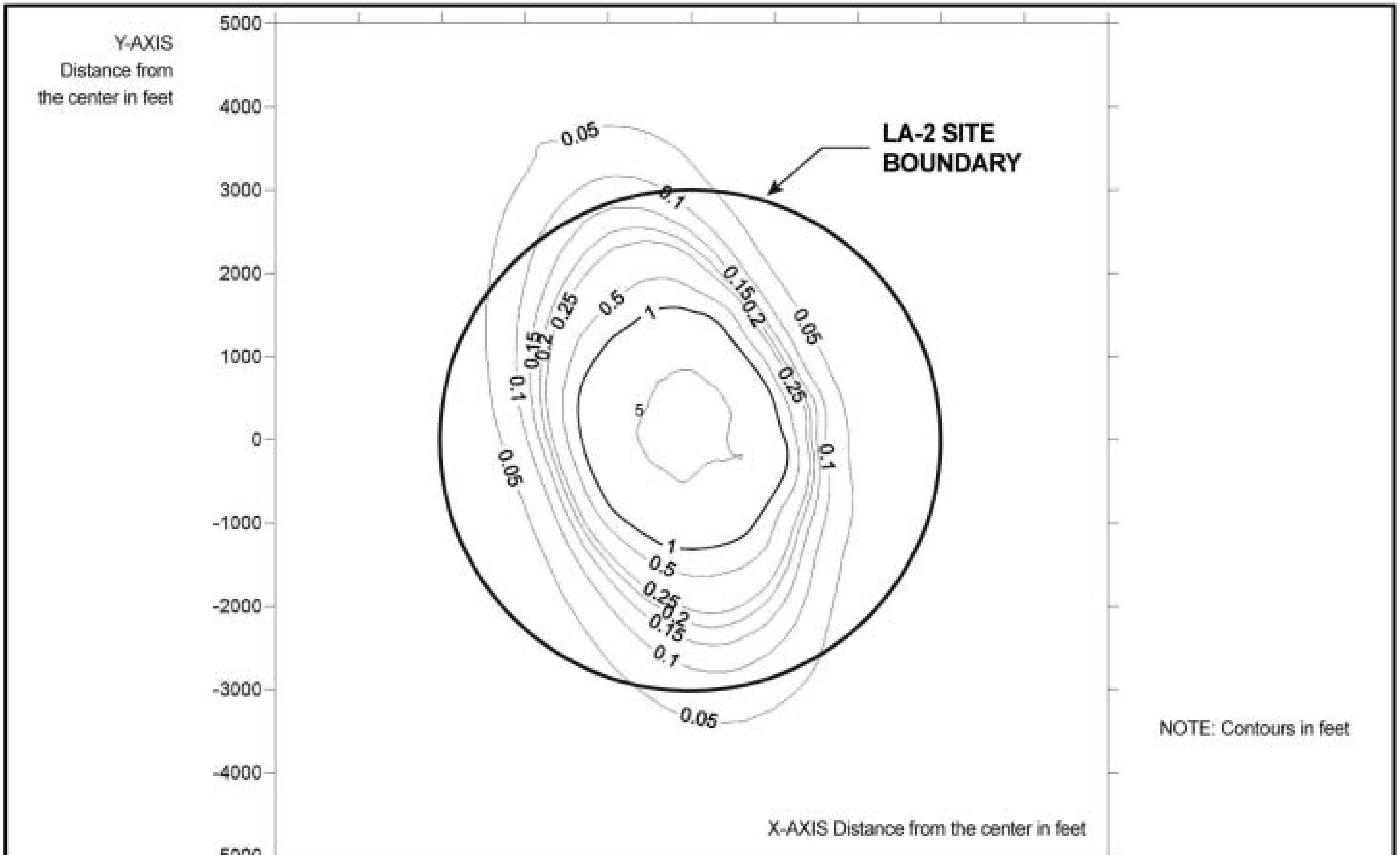
b. LA-2

Under Alternative 3, the LA-2 site would be managed at a maximum annual disposal volume of 1,000,000 yd^3 (765,000 m^3). Consequently, the maximum annual disposal volume modeled for this alternative at LA-2 was 1,000,000 yd^3 (765,000 m^3), with all of the dredged material derived in Los Angeles and Long Beach Harbors (75%), the Los Angeles River Estuary (15%), and Marina del Rey (10%; Scenario IV in the dredged material fate modeling report (USACE 2004b).

Results indicate that over 94 percent of the material in the sediment computations (gravel to very fine sand) settled within the 3,050-m by 3,050-m grid (10,000-ft by 10,000-ft) including and surrounding the site boundary. As seen in Figure 4.2-2, the 30-cm (1-ft) contour resulting from the maximum annual disposal volume of 1,000,000 yd^3 (765,000 m^3) lies well within the LA-2 site boundary (USACE 2004b).

Long-term accumulations were assessed also assuming that the sediment characteristics match Scenario IV of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 1,416,000 yd^3 (1,083,000 m^3) over the 10-year period (based on an annual average disposal volume of 142,000 yd^3 [109,000 m^3]; see Table 2.1-3) range from 2.71 m (8.91 ft) within 305 m (1,000 ft) from the site center to 0.02 m (0.07 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. These accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-2 detected discrete marine disposal mounds (MDMs) within the and in the area surrounding the LA-2 ODMDS, particularly east and west of the site (Gardner et al. 1998a). Continued use of LA-2 will result in the presence of more of these MDMs, though they will be worked through with time. Sediment profile surveys at LA-2 in 2000 indicated that dredged material was not detected outside the site boundary, suggesting the material had been reworked and resembled the native bottom (USACE 2002).



Modeled Footprint of Sediment Accumulation at LA-2 for an Annual Disposal Volume of 1,000,000 yd^3

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Figure 4.2-2

There are differences in certain sediment parameters among stations (1) at reference sites, (2) within the LA-2 disposal site, and (3) adjacent to the LA-2 disposal site, and many of these are likely the result of past dredge disposal operations (Chambers Group 2001). However, these differences between and among station groupings were not statistically significant ($p<0.05$). The greatest difference was between concentrations of oil and grease within the LA-2 site and at the reference stations. The concentrations of some sediment metals (cadmium, copper, lead, mercury, and zinc), polychlorinated biphenyls (PCBs), and the pesticide DDT within LA-2 were higher in 2000 compared to sediments from a reference area. These higher concentrations likely resulted from the past disposal of dredged material.

As discussed previously only suitable material that has been screened according to EPA protocols will be deemed acceptable for ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-2 will likely continue as a result of dredged material disposal, with finer sediments accumulating within and immediately adjacent to the LA-2 site compared with natural conditions. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to the area within and immediately adjacent to the site, and will extend for the duration of site use.

4.2.2 Effects on the Biological Environment

The following section describes the potential effects of the proposed action and alternatives on the biological communities in the vicinity of the LA-2 and proposed LA-3 sites.

4.2.2.1 Plankton

Potential effects to planktonic organisms will result from contact with the disposal plume, especially the slower-settling particles (silt and clay). Coarser particles will fall more rapidly to the bottom and the parcel of water affected by their discharge will be much smaller than for the finer particles. Previous monitoring performed at the LA-2 and LA-5 ODMDSs indicated that the disposal plume would dissipate within two to five hours after discharge (U.S. EPA 1987a, b; the LA-5 ODMDS is located in approximately 146 to 201 m (479 to 659 ft) of water about 10 km (5.4 nmi) southwest of San Diego, California.) Some of the potential adverse effects of ocean disposal of dredged material on planktonic organisms are the direct loss of organisms, inhibition of phytoplankton photosynthesis due to increased turbidity, interference with feeding (e.g. filter-feeding zooplankton), and uptake and potential bioaccumulation of contaminants (e.g. metals, pesticides, etc.).

Some phytoplankton will be entrained in the discharge plume, while photosynthesis will be temporarily inhibited after discharge. However, the sediments should fall rapidly upon initial disposal and slow as surrounding water is entrained. Phytoplankton concentrations are highest in the euphotic zone (the light-penetrating zone where photosynthesis occurs), which in the Southern California Bight is the upper 30 to 40 m (98 to 131 ft) of water. Therefore, direct loss of organisms will be localized and temporary. Inhibition of photosynthesis will also be limited in space and duration.

Due to the limited area of impact (in the immediate vicinity of disposal operations), the short duration of impact (few to several hours), and the ability of phytoplankton and zooplankton to reproduce rapidly, direct losses of phytoplankton, zooplankton and ichthyoplankton are classified as insignificant (Class III).

4.2.2.2 Infauna

Infauna communities are influenced by the sediments in which they live. Sediment grain size affects the infauna through its effect on the stability and cohesiveness of the sediments. Coarser sediments, for example, allow more rapid diffusion of oxygen into the sediment because of the larger pore spaces. However, coarse sediments lack the cohesive properties of sediments that are rich in clay-size particles. Potential effects to the benthic infauna as a result of disposal operations include burial, inhibition of filter-feeding, and bioaccumulation of contaminants. The magnitude of effects at each disposal site will depend on the affected organisms, the extent and rate of deposition, and the quality of accumulated sediments.

Impacts to infauna from deposition of dredged material can range from negligible to total mortality of the infauna. Some organisms may be able to excavate certain accumulations, while others may be buried indefinitely, in which case recolonization of the affected area becomes important. Predictions on the effect of burial are difficult because they depend on the infaunal species, rate of deposition, burial depth, properties of the disposed sediments, water temperature, and so on. Estimates of critical burial depths (the depth at which infauna cannot excavate out of and are lost) range widely from about 5 to 50 cm (0.16 to 1.6 ft) depending on sediment type and species examined (Kranz 1974; Maurer et al. 1981; Nichols et al. 1978). Most studies that examined burial, excavation, and/or colonization of infauna have focused on estuarine and nearshore species and may not directly apply to the dominant organisms and communities at LA-2 and LA-3. For the purposes of this analysis, accumulation rates greater than 30 cm (1 ft) per year are assumed to result in loss of the existing infauna community (until the area is recolonized).

The extent to which infauna will be smothered is estimated from disposal modeling, which calculates the maximum annual accumulation (USACE 2004b). The short-term deposit heights from individual disposal events are unknown. Marine disposal mounds were identified at both the LA-3 and LA-2 sites, and the vertical relief of all mounds was less than the resolution of the multibeam mapping system (30 cm [1 ft]) (Gardner et al.

1998a, 1998b). Annual and long-term (10-year) estimates of sediment deposition resulting from disposal of dredged material vary with location and alternative. Effects on the infauna from past dredging operations are discussed in the following text.

a. LA-3

Based on site monitoring results, areas with evidence of recent disposal activity were biologically dissimilar to surrounding areas at LA-3 in 2000 (Chambers Group 2001). Notable differences included: (1) increased species richness, density, and species diversity compared with surrounding areas; (2) decreased percentage of polychaetes comprising the infaunal community compared with surrounding areas; and (3) slightly higher percentage of mollusks, echinoderms, and lesser taxa (e.g. phoronids) compared with surrounding areas.

The polychaete *Maldane sarsi* dominated reference areas in 2000 and was common at areas of historic dredge disposal in the vicinity of the LA-3 site (Chambers Group 2001). However, it was uncommon in areas of recent dredge disposal and within the interim LA-3 site boundary. Differences among these areas were highly significant, indicating the presence of dredged material has reduced the density of this organism at LA-3. These results are similar to those reported by MITECH (1990). Continued disposal at LA-3 will likely reduce the density of *Maldane sarsi* and other organisms that are likely adversely affected by the deposition of dredged material.

Sediment accumulation modeling results indicate that the maximum deposition height at LA-3 will be 4.22 m (13.84 ft) within 305 m (1,000 ft) from the site center, 2.93 m (9.60 ft) within 610 m (2,000 ft), and 0.19 m (0.62 ft) within 914 m (3,000 ft). Therefore, assuming worst-case disposal volumes, the infauna will likely be buried beyond the depth at which they could excavate out of at some point between 610 to 914 m (2,000 to 3,000 ft) from the site center. Beyond 914 m (3,000 ft), outside of the site boundary, the rate of accumulation is predicted to be low enough to allow some portion of the infauna to excavate and survive. This impact is considered insignificant (Class III) and is localized and long-term (as long as disposal operations continue). Recolonization of the affected area is expected to begin almost immediately upon cessation of disposal activities. If accumulations are more gradual, it can be assumed that maximum deposition height in an average year will be 0.42 m (1.37 ft) within 305 m (1,000 ft) from the site center, 0.29 m (0.95 ft) within 610 m (2,000 ft), and 0.02 m (0.06 ft) within 914 m (3,000 ft). Therefore, using this scenario, only the infauna within about 610 m (2,000 ft) from the site center would be lost. As this is within the proposed site boundary, this impact is still considered insignificant (Class III).

b. LA-2

Based on site monitoring results, areas within the LA-2 site boundary and areas with evidence of recent disposal activity were biologically dissimilar to reference areas

(Chambers Group 2001). Notable differences included: (1) decreased species richness and density compared with reference areas; (2) decreased percentage of polychaetes, crustaceans, and echinoderms comprising the infaunal community compared with reference areas; and (3) slightly higher percentage of mollusks and lesser taxa compared with reference areas. However, some of these differences may be due to depth differences among sampling locations.

Similar to results from LA-3, the polychaete *Maldane sarsi* was less abundant at LA-2 compared with surrounding areas (Chambers Group 2001). Site monitoring results indicate the abundances of stress-tolerant species were elevated at LA-2, whereas suspension feeders representative of undisturbed areas (e.g. the brittle star *Amphiodia urtica*) were less abundant at LA-2 than at other upper slope/outer shelf habitats within the SCB (EPA 1997). Continued disposal at LA-2 will likely reduce the density of *Maldane sarsi* and other organisms that are likely adversely affected by the deposition of dredged material. Site monitoring also indicated that most of the area surrounding LA-2 that received dredged material in the past had infaunal assemblages in 1990 that were similar to assemblages in unaffected sediments (EPA 1997).

Sediment accumulation modeling results indicate that the maximum deposition height at LA-2 will be 1.92 m (6.29 ft) within 305 m (1,000 ft) from the site center, 1.19 m (3.90 ft) within 610 m (2,000 ft), and 0.14 m (0.46 ft) within 914 m (3,000 ft). Therefore, assuming worst-case disposal volumes, the infauna will likely be buried beyond the depth at which they could excavate out of at some point between 610 to 914 m (2,000 to 3,000 ft) from the site center. Beyond 914 m (3,000 ft), outside of the site boundary, the rate of accumulation is predicted to be low enough to allow some portion of the infauna to excavate and survive. This impact is considered insignificant (Class III) and is localized and long-term (as long as disposal operations continue). Recolonization of the affected area is expected to begin almost immediately upon cessation of disposal activities. If accumulations are more gradual, it can be assumed that maximum deposition height in an average year will be 0.27 m (0.89 ft) within 305 m (1,000 ft) from the site center, 0.17 m (0.55 ft) within 610 m (2,000 ft), and 0.02 m (0.07 ft) within 914 m (3,000 ft). Therefore, using this scenario only some, if any, of the infauna within about 305 m (1,000 ft) from the site center would be lost. As this is within the site boundary, this impact is still considered insignificant (Class III).

4.2.2.3 Epifauna

Effects to epifauna at the disposal sites from disposal of dredged material are similar to those of benthic infauna and include burial, inhibition of feeding, and bioaccumulation of contaminants. The magnitude of effects at each disposal site will depend on the affected organisms, the extent and rate of deposition, and the quality of accumulated sediments. Short of complete burial, the degree to which smaller sediment accumulations or intense turbidity will affect the epifauna is largely dependent on the mobility of organisms and their ability to escape the affected area.

a. LA-3

The epifauna at LA-3 and surrounding disposal areas is dominated by relatively slow-moving species including the urchins *Brissopis pacifica*, *Spatangus californicus*, *Allocentrotus fragilis*, and *Brissaster latifrons*, and the sea star *Zoraster evermanni*. These same species are also abundant at reference locations suggesting dredged material disposal has not altered the epifaunal community composition. Continued disposal at LA-3 is not likely to alter the epifaunal community composition at the disposal site and surrounding area; however, the abundance of epifaunal organisms at the disposal site is expected to be reduced compared to surrounding areas. Effects from disposal operations at LA-3 will likely lead to the loss of some epifaunal organisms. However, the dominant organisms at LA-3 are common on the outer shelf and upper slope of the SCB and losses are not expected to lead to notable decreases in the stocks of these organisms. Impacts to marine epifauna are designated adverse but insignificant (Class III) and limited to the area within the site boundaries where sediment accumulations are predicted to be highest. Effects will persist for the duration of use.

Sea cucumbers (*Parastichopus californicus*) at LA-3 were analyzed for bioaccumulation of a wide variety of contaminants including metals, pesticides, and PCBs. Sea cucumbers feed on small benthic organisms and detritus by ingesting sediments. No contaminants were measured above levels likely to pose human health hazards. Therefore, effects related to tissue bioaccumulation from disposal at LA-3 are considered Class III.

b. LA-2

The epifauna at LA-2 and surrounding disposal areas is dominated by relatively slow-moving species including the urchins *Allocentrotus fragilis*, *Brissopsis pacifica*, *Spatangus californicus*, and *Brissaster latifrons*. It is unclear whether disposal activities have led to decreased species richness within the site boundary (Chambers Group 2001). Surveys in August 2000 and January 2001 within the site collected about two-thirds the species found at reference locations. However, the highest species richness was recorded at disposal mound sites outside the site boundary. Abundance within the site was low compared with reference sites in August 2000, but more than twice the density at reference sites in January 2001. Site monitoring surveys indicate *Allocentrotus fragilis* is much more abundant at stations characterized by dredged material than at stations without dredged material (EPA 1997). Continued disposal at LA-2 may perpetuate small-scale community changes, such as increased abundance of the urchin *Allocentrotus fragilis*, as well as differences in density (higher or lower) compared with reference areas. Effects from disposal operations at LA-2 will likely lead to the loss of some epifaunal organisms. However, the dominant organisms at LA-2 are common on the outer shelf and upper slope of the SCB and losses are not expected to lead to notable decreases in the stocks of these organisms. Impacts to marine epifauna are designated adverse but insignificant (Class III) and limited to the area within the site boundaries where sediment accumulations are predicted to be highest. Effects will persist for the duration of use.

Sea cucumbers (*Parastichopus californicus*) at LA-2 were analyzed for bioaccumulation of a wide variety of contaminants including metals, pesticides, and PCBs. Sea cucumbers feed on small benthic organisms and detritus by ingesting sediments. No contaminants were measured above levels likely to pose human health hazards. Therefore, effects related to tissue bioaccumulation from disposal at LA-2 are considered Class III.

4.2.2.4 Fishes

Potential effects to fishes from disposal operations include contact with the disposal plume, altered seafloor habitat, impaired visibility and/or feeding, a reduction and/or change in prey items, and bioaccumulation of contaminants. Information on effects of dredged material disposal on nearshore fishes is limited. Northern anchovy, one of the most abundant pelagic species in southern California, actively avoided clouds of sediments from Los Angeles Harbor in laboratory experiments (Brewer 1976) and would presumably avoid a turbid disposal plume if possible. This is likely true of other coastal pelagic species including jack mackerel, Pacific mackerel, and Pacific sardine, which are commonly landed by the commercial fishery in areas surrounding both LA-3 and LA-2.

a. LA-3

The fish community at LA-3 (both within the interim site boundary and at areas of past disposal activity) resembled that of reference areas in 2000-2001, though slightly fewer species and individuals were collected within the site than at surrounding areas (Chambers Group 2001). Lower species richness and abundance within LA-3 was also recorded during surveys in 1988-1989 (MITECH 1990). The reason(s) for these differences are unknown but may be related to availability of prey items or differences in seafloor habitat. Some of the dominant fish species at LA-3, such as longspine thornyhead and shortspine thornyhead, are relatively mobile and may be able to avoid the disposed sediments. However, fish species that are not as mobile, such as Dover sole and dogface witch-eel, may be more prone to effects from sedimentation and high turbidity. These effects are classified as Class III (insignificant), localized to the area affected by disposal operations, and will persist for the duration of site use. As with epifauna, there is no evidence of bioaccumulation in fishes at LA-3, so effects due to disposal operations are classified as Class III as well.

b. LA-2

The fish community at LA-2 (both within the site boundary and at areas of past disposal activity) resembled that of reference areas in 2000-2001, though fewer individuals were collected within the site than at surrounding areas suggesting site use by demersal fish may be reduced as a result of dredged material disposal (Chambers Group 2001). Surveys in 1983-1984 recorded lower species richness and abundance within LA-2 compared with reference areas, differences considered to be potentially related to dredged material disposal (EPA 1988). However, species richness at LA-2 in 2000-2001 was similar to that of a reference area.

Some of the dominant fish species at LA-2, such as shortspine combfish and rockfish, are relatively mobile and may be able to avoid the disposed sediments. However, fish species that are not as mobile, such as slender sole and Pacific sanddab, may be more prone to effects from sedimentation and high turbidity. These effects are classified as Class III (insignificant), localized to the area affected by disposal operations, and will persist for the duration of site use. As with epifauna, there is no evidence of bioaccumulation in fishes at LA-2, so effects due to disposal operations are classified as Class III as well.

c. Essential Fish Habitat

In accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act, an assessment of Essential Fish Habitat (EFH) has been conducted for the proposed project. The project is located within an area designated as EFH for two Fishery Management Plans (FMPs): Coastal Pelagics Plan and Pacific Groundfish Management Plan. Many of the 86 species federally managed under these plans are known to occur in the area and could be affected by the proposed project. The USACE has determined that the proposed project will not result in any significant, adverse impacts to any species on the Fishery Management Plans or their habitat.

4.2.2.5 Birds

Disposal of dredged sediments at the LA-3 and LA-2 ODMDSs is expected to have negligible effects on birds. Both the LA-3 and LA-2 ODMDSs are several kilometers (miles) from known bird breeding, nesting, and roosting areas. Potential effects to birds include the temporary reduction in foraging in the vicinity of the discharge plume due to increased turbidity and possibly a reduction in prey items. The noise and activity from the disposal tug and barge will temporarily disturb birds that might otherwise be in the area of disposal operations. However, this effect is very localized and temporary as birds will be able to return to the disposal area immediately after disposal activities. Disposal operations at both sites will result in temporary increases in surface turbidity, potentially reducing the ability of marine birds in the area to successfully forage. However, due to the patchy distribution of prey species near the ocean surface (such as northern anchovy, market squid, zooplankton, etc.), and the abundance of similar foraging habitat surrounding both sites, this effect is considered localized as well as temporary. All potential effects to birds from disposal activities are considered adverse but insignificant (Class III).

4.2.2.6 Marine Mammals

Marine mammals in the vicinity of the LA-3 and LA-2 ODMDSs during disposal operations will potentially be disturbed by the noise and activity of the disposal tug and barge, and by the turbid plume from the disposed sediments. Disposal operations at both the LA-3 and LA-2 ODMDSs are not expected to affect breeding or nursing of any marine mammal species. The migratory path of gray whales may be temporarily deflected; industrial sounds have been found to result in slight changes in swimming speed and course in gray whales (Malme et al. 1984). However, gray whales are fairly tolerant of noise from ships and are likely to deviate their migratory course just enough to avoid ships (Lecky 1992). The California sea lion population is growing, though vessel collisions with this species are unlikely; in 1998 there were only three mortalities of this species resulting from vessel collisions off the Pacific coast of the United States (Forney et al. 2000). Similar to birds (See Section 4.2.2.5), foraging may be temporarily hindered in the vicinity of disposal operations due to a decrease in water clarity, and there may be a potential reduction in prey items. This potential effect is likely to be localized and temporary, and is considered adverse but insignificant (Class III).

4.2.2.7 Threatened, Endangered, and Special Status Species

As discussed in Chapter 3 of this EIS, Table 3.3-11 presents the endangered, threatened, and special status species as listed by the state or federal government and their potential for occurrence in the vicinity of the LA-2 or LA-3 ODMDSs. As seen in this table, the only federally listed or special status species that have a high probability of occurrence in the vicinity of the LA-3 and LA-2 disposal sites are the California brown pelican and elegant tern. Potential effects to these two bird species include the temporary reduction in foraging in the vicinity of the discharge plume due to increased turbidity and possibly a reduction in prey items. California brown pelican was more abundant at LA-3 than LA-2 in 2000-2001, and elegant tern was only observed at LA-3. However, due to the abundance of surrounding foraging habitat and the very localized and temporary nature of disturbance from disposal activities, impacts to these two species are designated as insignificant (Class III).

4.2.3 Effects on the Socioeconomic Environment

4.2.3.1 Commercial Fishing and Mariculture

There are no known mariculture operations near the LA-3 and LA-2 sites that could potentially be affected by dredge disposal operations. Analysis of commercial fishery landing data from the catch blocks in the vicinity of the two disposal sites indicate that the areas are important to the commercial fisheries of southern California, though landings vary greatly between sites and among years. Major variability among years is likely the result of market demand for particular species or migratory/population fluctuations resulting from climatic variation. Trends observed at LA-3 and LA-2 reflected region-wide fishery trends not attributed to dredged material disposal (EPA 1997).

a. LA-3

The majority of the landings (both by weight and dollar value) in the vicinity of the LA-3 ODMDS are from coastal pelagic species including Pacific sardine, northern anchovy, Pacific mackerel, and jack mackerel. These species are not likely to be affected by disposal operations as they could likely avoid a disposal plume. California spiny lobster are usually fished in waters shallower than about 91 m (300 ft; Barsky 2001) and are, therefore, not likely to be affected by sediments from ocean disposal at LA-3. Analysis of commercial catch data from 1970 through 1995 determined there were no detectable effects from dredged material disposal at LA-3 on commercial catch statistics (EPA 1997). Potential effects to commercial fishing from the use of LA-3 are insignificant (Class III).

b. LA-2

The majority of the landings (both by weight and dollar value) in the vicinity of the LA-2 ODMDS are from coastal pelagic species including Pacific sardine, northern anchovy, and Pacific mackerel. These species are not likely to be affected by disposal operations as they could likely avoid a disposal plume. California spiny lobster are usually fished in waters shallower than about 91 m (300 ft; Barsky 2001) and are, therefore, not likely to be affected by sediments from ocean disposal at LA-3. Benthic species such as red urchin and California halibut are more likely to be affected by dredged material disposal. However, analysis of commercial catch data from 1970 through 1995 determined there were no detectable effects from dredged material disposal at LA-2 on commercial catch statistics (EPA 1997). Potential effects to commercial fishing from the use of LA-2 are insignificant (Class III).

4.2.3.2 Commercial Shipping

As discussed in Chapter 3, large amounts of both national and foreign trade cargo are handled at the major commercial ports at Los Angeles and Long Beach Harbors (Harbors). The transport of dredged material to the disposal site could present one potential hazard to navigation: conflicts between the disposal barges and commercial vessel traffic. Mounding within the disposal site is not expected to pose a hazard due to water depths at the two sites and the relatively low mounds expected to result from continued operation of the sites.

a. LA-3

As described in Chapter 3, vessels traffic within the San Pedro Channel traveling to and from the harbors must follow a system of traffic separation schemes (TSS), port access routes (PAR), and Restricted Navigation Areas (RNA). The proposed LA-3 site is approximately 20 km (10.8 nmi) east of the northbound coastwise traffic lane of the southern TSS and approximately 24 km (13 nmi) southeast of the RNA (see Figure 3.4-1). Powered vessels over a certain size including tugboats transporting disposal barges are required to participate in the Los Angeles-Long Beach Vessel Traffic Service (VTS). The VTS for the Harbors and approaches was established to “monitor traffic and provide mariners with timely, relevant and accurate information for the purpose of enhancing safe, environmentally sound and efficient maritime transportation” (USCG/Marine Exchange Vessel Traffic Center 2001). The VTS area extends out to a distance of 46.3 km (25 nmi) from Point Fermin. As such the proposed LA-3 site lies within the VTS monitoring area.

Although on a worst-case day this alternative could generate up to 15 barge trips to and from the proposed LA-3 site (see Table 4.2-2), because of the vessel monitoring and traffic separation schemes in place, no substantial conflicts with commercial traffic are anticipated. Additionally, as all dredged material destined for disposal at LA-3 would come from the Orange County area, the transport barges would not have to cross any of the TSS lanes. Therefore, no significant impacts are expected to occur to commercial shipping from the transportation of dredged material to the proposed disposal site by barges (Class III).

b. LA-2

The LA-2 site is located within the separation zone between the northbound and southbound coastwise traffic lanes of the northern TSS and is partially contained within the designated RNA (see Figure 3.4-1). Consequently all barge traffic to and from LA-2 will likely operate within the RNA and could cross the northbound coastwise traffic lane resulting in the potential for some conflicts between the disposal traffic and other commercial traffic. However, the USACE has incorporated a special condition into all permits for use of the LA-2 site that requires disposal of materials “...as far from the Gulf of Catalina Traffic Separation Scheme as is practical” (EPA 1988).

As with LA-3 all vessel traffic to and from LA-2 would be within the Los Angeles-Long Beach VTS area. Traffic within the RNA must comply with navigational regulations. Although on a worst-case day this alternative could generate up to 17 barge trips to and from the LA-2 site (2 of which would originate from Anaheim Bay in Orange County; see Table 4.2-2), because of the vessel monitoring and traffic separation schemes in place, no substantial conflicts with commercial traffic are anticipated. Therefore, no significant effects are expected to occur to commercial shipping from the transportation of dredged material to the proposed disposal site by barges (Class III).

4.2.3.3 Military Usage

a. LA-3

Marine Corps Base Camp Pendleton, a major amphibious marine training base, is located approximately 32 km (17 nmi) southeast of the proposed LA-3 site. Given this large separation, no conflicts between disposal barges and military operations at Camp Pendleton are anticipated (Class III).

Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach) is located approximately 30 km (16.2 nmi) northwest of the proposed LA-3 site. Munitions barges accessing the Navy anchorages would remain nearshore. Furthermore, under the Preferred Alternative dredged material disposal barges utilizing LA-3 would originate primarily from the Newport Beach and Dana Point area. Consequently, no conflicts are anticipated with military operations at NAVWPNSTA Seal Beach (Class III).

b. LA-2

The primary naval military operations in the vicinity of the LA-2 site are those associated with NAVWPNSTA Seal Beach. In the waters surrounding LA-2, as with the barge traffic, naval vessels are strictly monitored within the RNA and are required to utilize the TSS lanes and participate in the VTS. Consequently, no interference with military operations is anticipated with the continued use of the LA-2 site (Class III).

4.2.3.4 Oil and Natural Gas Development

As discussed in Section 3.4.4, no new oil or gas development has been proposed in the immediate vicinity of the LA-2 or LA-3 sites. The final designation of the proposed LA-3 site and continued use of the LA-2 site are not anticipated to cause any significant impacts to the existing oil and gas facilities in the adjacent areas (Class III).

Existing developed oil and gas facilities are either within 3.3 km (1.8 nmi) of the coast in the State of California waters or are in federal waters more than 14 km (7.5 nmi) from either the LA-2 or proposed LA-3 sites. The federal sites are located within tracts that could be subject to additional development. If future oil and gas development were to occur, the potential for interactions between vessels associated with production operations and disposal barges could increase. However, when traveling to and from Los Angeles and Long Beach Harbors, large vessel traffic is required to utilize the transportation separation schemes described above. Consequently, minimal vessel interactions would be expected occur and would not be considered significant (Class III).

Should future development be proposed, potential conflicts could be lessened if oil and gas production facilities were placed as far from the LA-2 and proposed LA-3 sites as possible. Further, should additional oil and gas structures and operations be developed, disposal barges would be required to adopt operating practices to avoid conflicts with those operations and structures. These effects are not significant (Class III).

4.2.3.5 Recreational Activities

Sportfishing

As indicated in Section 3.4.5.1 of this EIS, most partyboat sportfishing in the vicinity of LA-2 and LA-3 generally takes place in relatively shallow water of 100 m (328 ft) or less. Additionally, most of the important sportfish are pelagic, which are not expected to be adversely impacted by the ongoing ocean disposal of dredged material (Class III).

a. LA-3

Given the depth of the proposed LA-3 site of over 460 m (1,500 ft), very little sportfishing is anticipated to occur within the LA-3 site boundaries. Additionally, there are no reefs or rocky bottoms to attract fish and there are no kelp beds in the vicinity. As indicated, some fishing of pelagic fish could occur. However, these would be minimally affected by the disposal operations because the dredged material settles out of the water column relatively quickly and as the pelagic fish are highly mobile, they can easily avoid the disposal operations.

The 100 m (328 ft) contour is approximately 4.6 km (2.5 nmi) away from the proposed LA-3 site boundary. Consequently, there are no important sportfishing grounds within the proposed LA-3 disposal site. As discussed above, dredged material disposal could have an adverse effect on demersal fish. However, those effects would be localized and are not anticipated to significantly impact the demersal fish populations.

While the potential for accidents between disposal barges and fishing boats does exist, given the maneuverability of the fishing boats and the size and slow speed of the disposal barges, the probability of an accident is very low. No significant impacts to sportfishing activities are anticipated on a regional level (Class III).

b. LA-2

The depths of the LA-2 site range from approximately 110 (360 ft) to 340 m (1,115 ft). Consequently, although unlikely, some sportfishing activity could occur within the LA-2 site boundaries. Given the relatively deep waters and the site’s location within the RNA and outer harbor waters, sportfishing activity in the area is rare.

The demersal fish within the LA-2 site are somewhat diminished and could be adversely affected by on-going disposal activities at the site. However, this effect would be localized and is not expected to affect the populations of demersal fish in other more favorable fishing locations. As with the LA-3 site, disposal operations are not anticipated to significantly affect pelagic fish species.

While the potential for accidents between disposal barges and fishing boats does exist, given the maneuverability of the fishing boats and the size and slow speed of the disposal barges, the probability of an accident is very low. Consequently, the continued use of the LA-2 site for the ocean disposal of dredged material is not anticipated to significantly impact sportfishing on a regional level. (Class III).

Boating

The recreational activity most likely to be impacted by ocean disposal operations at either LA-2 or LA-3 is pleasure boating. Large numbers of pleasure boats utilize the marinas and harbors in Orange and Los Angeles Counties.

a. LA-3

The proposed LA-3 site is located over 6.5 km (3.5 nmi) from the nearest coast. Furthermore, much of the pleasure boating activity out of Newport Harbor travels between the harbor and Avalon Bay on Santa Catalina Island. Generally these boats travel a straight path that takes them over 5.5 km (3.0 nmi) to the north of the proposed LA-3 site. Pleasure craft traveling between Dana Point Harbor and Avalon would pass over 8.5 km (4.5 nmi) to the south of the site. Although in a worst-case year barge activity is assumed to occur 6 days per week, given the separations between the site and the paths most traveled by pleasure boats, the potential for conflicts is considered minimal (Class III).

b. LA-2

As with boating traffic from Newport Harbor, a substantial number of pleasure boats travel from the Harbors to Santa Catalina Island. Vessels traveling from the Los Angeles and Long Beach Harbors generally travel a path that is almost identical to that taken by the disposal barges accessing the LA-2 site. Consequently, the potential for conflicts between the disposal barges and pleasure craft does exist. However, given that the disposal barges would be traveling under the regulations imposed in the RNA, and given the relatively slow speed of the barges even when cruising (assumed to be approximately 15.7 km/hr [8.5 knots]), the potential for conflicts is considered very low. Additionally, pleasure craft are highly maneuverable and would be able to avoid the large, slow moving barges. As such the potential for conflicts between the disposal barges and pleasure craft is considered minimal (Class III).

Other Recreational Activities

Most of the recreational activities other than offshore fishing and boating occur at the beaches or in the nearshore areas. Those activities include surf fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing and picnicking.

a. LA-3

As indicated above, there would be a short-term impact to water clarity in the immediate vicinity of the proposed LA-3 site immediately following the disposal of dredged material. However, the proposed LA-3 site boundary lies over 6.5 km (3.5 nmi) from the nearest coast. Consequently, no impacts to the aesthetics of beach visitors are anticipated due to the continued use of LA-3 (Class III).

b. LA-2

As indicated above, there would be a short-term impact to water clarity in the immediate vicinity of the LA-2 site immediately following the disposal of dredged material. However, the LA-2 site boundary lies over 8.5 km (4.6 nmi) from the nearest coast. Consequently, no impacts to the aesthetics of beach visitors are anticipated due to the continued use of LA-2 (Class III).

4.2.3.6 Archaeological, Historical, and Cultural Resources

As indicated in Section 3.4.6, there no known shipwrecks within 5 km (2.7 nmi) of either the LA-2 or proposed LA-3 sites. As such there are no known cultural resources within either of the disposal sites. Furthermore, the Preferred Alternative involves the continued disposal of dredged material at these two existing disposal sites. Consequently, no impacts to archaeological, historical, or cultural resources are anticipated (Class III).

4.2.3.7 Public Health and Welfare

If toxic substances were to accumulate in the tissues of marine organism as the result of the disposal of contaminated dredged material, adverse impacts to human health could occur if those organisms were subsequently consumed. The USACE and EPA require strict testing of dredged material proposed for ocean disposal as part of the permitting process. This testing includes sediment analyses, bioassays, and bioaccumulation testing. If toxic or hazardous materials are found above acceptable levels, then the material may not be discharged in the ocean. As such, the potential impacts to public health are not considered significant (Class III).

As discussed above, human safety could also be impacted due to collisions between ocean going vessels and the dredged material disposal barges. Impacts could also occur if disposal barges were to interfere or collide with oil and gas development facilities in the San Pedro Bay. These impacts have been addressed in Sections 4.2.3.1 through 4.2.3.5 above and are determined to not be significant (Class III).

Given the minimal mounding anticipated for the long-term disposal of dredged material and the depth of the LA-2 and proposed LA-3 sites, potential impacts to navigation resulting from material mounding within the disposal sites is considered insignificant (Class III).

4.3 No Action Alternative

If the No Action Alternative (Alternative 1) were selected then the EPA would not designate an appropriate ODMDS for disposal of suitable dredged material from the Newport Harbor and general Orange County area. The interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. LA-2 would remain available for disposal of suitable dredged material and managed at historical levels evaluated in the original site designation EIS (an average of 200,000 yd^3 [153,000 m^3] per year).

As stated in Chapter 1, the purpose of the proposed action is to ensure that adequate, environmentally acceptable ocean disposal site capacity is available for suitable dredged material generated in the greater Los Angeles-Orange County area in conjunction with other management options including upland disposal and beneficial reuse.

By not permanently designating LA-3, the No Action Alternative could limit future maintenance and improvement projects in the LA/Newport area by limiting the amount of dredged material that could be deposited at a designated ocean disposal site. This in turn could result in a negative impact on future maritime operations in the area (Class I impact).

If LA-3 were not designated as a permanent ODMDS, the limited capacity of the existing LA-2 ODMDS and associated increased hauling distances, in combination with lack of other management options, would likely either eliminate or sharply reduce regular dredging activities within the Upper Newport Bay reserve. It is anticipated that if dredging activities within the reserve were eliminated, the bay eventually would fill with sediment from San Diego Creek and ultimately would become upland habitat (Class I impact; Newport Bay Naturalists and Friends 2004).

Consequently, the No Action Alternative does not meet the goals and objectives of the proposed action (Class I).

4.3.1 Effects on the Physical Environment

4.3.1.1 Air Quality

As discussed previously, for the No Action Alternative the LA-3 ODMDS is not designated and all dredged material for which it is economically feasible is disposed of at the LA-2 site. Because it is assumed that some projects within Orange County would not be able to utilize ocean disposal due to economic considerations, the total amount of material disposed of is less for the No Action Alternative than for the Preferred Alternative (Alternative 3; total of material disposed at both LA-2 and LA-3 under Alternative 3). Consequently, the total number of miles traveled under the No Action Alternative is less than those under the Preferred Alternative.

Air quality impacts associated with the No Action Alternative were evaluated using the same assumptions as summarized in Section 4.2.1.1 for the Preferred Alternative. The detailed air emissions calculations are included as Appendix B of this EIS. Table 4.2-5 shows the worst-case daily emissions, Table 4.2-6 shows the average daily emissions averaged over a worst-case year, and Table 4.2-7 shows the average daily emissions averaged over an average year for the No Action Alternative. Table 4.2-8 shows the worst-case yearly emissions while Table 4.2-9 shows the average yearly emissions.

Also shown in Tables 4.2-5 through 4.2-7 are the SCAQMD air emission significance thresholds for evaluating projects occurring within the SCAB. As seen in Table 4.2-5 and Table 4.2-6, for the No Action Alternative both worst-case daily emissions and average daily emissions for a worst-case year are projected to exceed the SCAQMD thresholds for NO_x and SO_2. All other emissions are projected to be below significance thresholds. Additionally, as seen in Table 4.2-7, all average daily emissions for an average year are projected to be below SCAQMD thresholds.

Likewise, Tables 4.2-8 and 4.2-9 include the CAA *de minimis* thresholds for evaluating the air emissions resulting from federal actions. As seen in Table 4.2-8, for the No Action Alternative the worst-case yearly emissions of NO_x exceed the *de minimis* thresholds. However, as seen in Table 4.2-9 all of the projected emissions resulting from the hauling activities associated with the No Action Alternative for an average year are below the *de minimis* thresholds.

Consequently, even for the No Action Alternative the potential exists for significant air quality emissions to occur in the unlikely event that all of the dredging activities identified were to occur simultaneously in any given year. However, assuming more realistic hauling activities for an average year results in air emissions that are less than the identified thresholds. Because the actual individual dredging and hauling activities are subject to additional environmental review and permitting, air quality impacts are considered Class II as air emissions could be mitigated, for example, by limiting the hauling activities allowed under the individual permits.

It is also noted that the EPA has recently adopted new emissions standards for new marine diesel engines that went into effect in January of 2004. These standards apply to new manufactured marine engines and existing engines that are installed in new vessels or converted from land-based to marine engines. Consequently, as the existing tug fleet is retired, future emissions are anticipated to be less than those presented here.

Comparison of the results shown for the No Action Alternative and Alternative 3 (the Preferred Alternative) in Table 4.2-5, Table 4.2-6 and Table 4.2-7 indicate that overall the air emissions resulting from implementation of the No Action Alternative are less than those that would occur with implementation of Alternative 3. This is primarily due to the reduced amount of total dredge material hauled and disposed between the two alternatives.

4.3.1.2 Physical Oceanography

The proposed use of the LA-2 ODMDS is not expected to affect the waves, currents, or tides in the vicinity of this location (Class III). It is these parameters that will largely affect the dispersal and transport of dredged material

Under the No Action Alternative, the interim designation of the LA-3 site would expire and there would be no further disposal beyond that approved or permitted at the time of expiration. Infaunal organisms would gradually rework seafloor sediments at LA-3 so that they eventually resembled pre-disposal sediments. Sediment Profile Imaging (SPI) surveys in summer 2000 indicated that areas with detectable dredged material in 1988 showed no signature of dredged material 12 years later (USACE 2002). There are no anticipated impacts to physical oceanography at LA-3 from this alternative.

LA-2 would continue to be used and managed for an average annual disposal volume of 200,000 yd^3 (153,000 m^3). Without the designation of LA-3, disposal volumes at LA-2 would likely increase compared with those from the recent past. However, the total disposal volume for the No Action Alternative is anticipated to be similar to that for the Preferred Alternative (see discussion in Sections 2.1.1 and 2.1.3.1). As such, effects to physical oceanography are not expected to be significant (Class III; Refer to Section 4.3.1.4 for a summary of sediment effects from the No Action Alternative). Bathymetric surveys performed in 1993 did not record any mounding of dredged material at LA-2 since the last surveys performed in 1990 (EPA 1997). However, the depth resolution of these surveys was approximately 1.8 m (6 ft).

4.3.1.3 Water Quality

Under the No Action Alternative, the interim designation of the LA-3 site would expire and there would be no further disposal beyond that approved or permitted at the time of expiration. There are no anticipated impacts to physical or chemical water column parameters at LA-3 resulting from this alternative. LA-2 would continue to be used and managed for an average annual disposal volume of 200,000 yd^3 (153,000 m^3). Without the designation of LA-3, disposal volumes at LA-2 would likely increase compared with those from the recent past. Still, effects to physical and chemical water column parameters are not expected to be significant (Class III) because material is disposed of one barge at a time as with all other alternatives. (See Section 4.2.1.3 for a summary of water quality effects from dredged material disposal).

4.3.1.4 Geology and Sediments

a. LA-3

Under the No Action Alternative, the interim designation of the LA-3 site would expire and there would be no further disposal beyond that approved or permitted at the time of expiration. Sediments at and in the vicinity of the LA-3 site would continue to be reworked by benthic organisms so that sediment characteristics (such as texture and redox profile) would eventually resemble those from pre-disposal periods. This return of sediment characteristics to pre-disposal conditions is not considered an adverse effect (Class III).

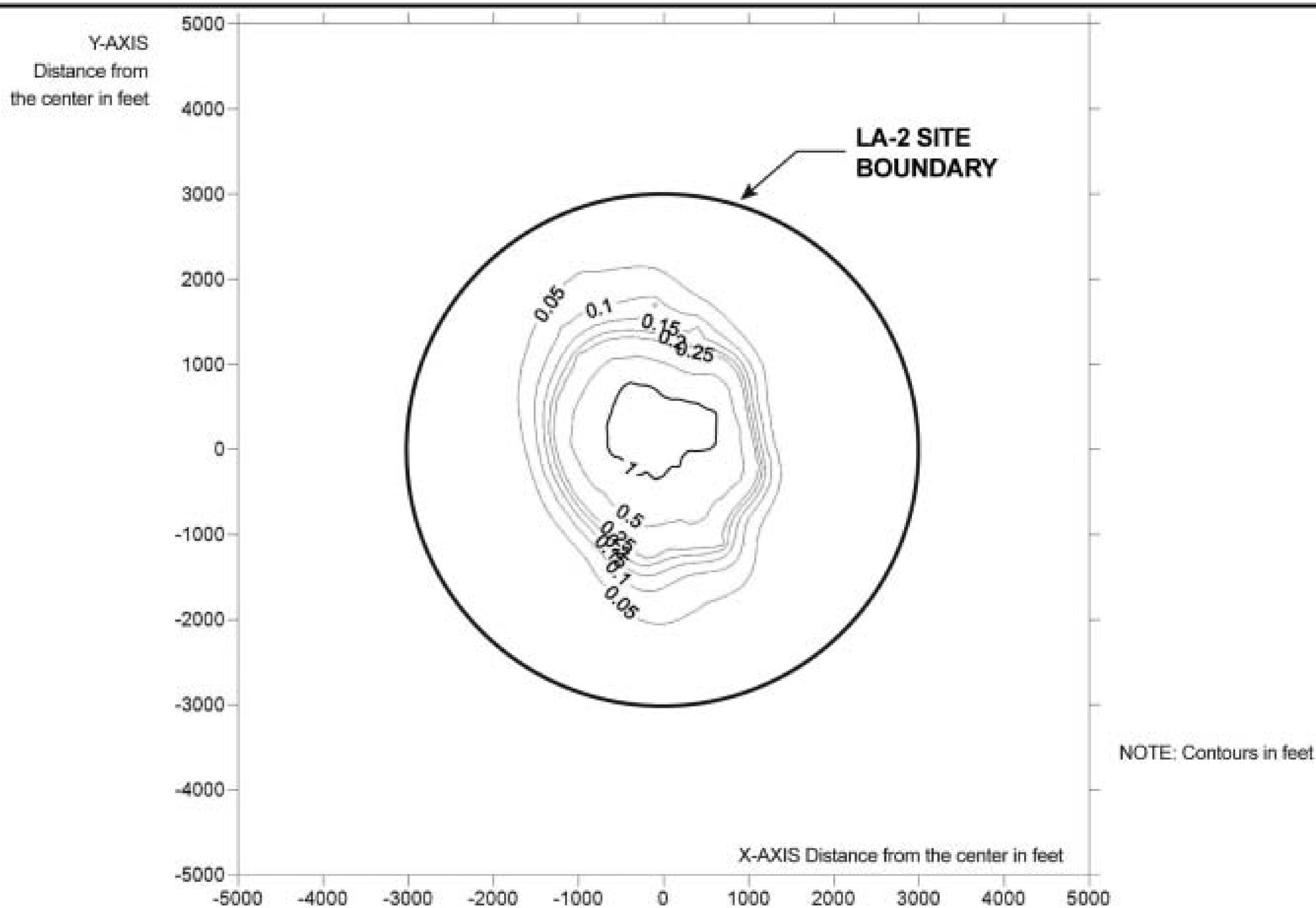
b. LA-2

The LA-2 site would continue to be managed at an average annual disposal volume of 200,000 yd^3 (153,000 m^3), the volume modeled during the LA-2 site designation process (EPA 1988). However, without the designation of LA-3, worst-case maximum annual dredged volumes requiring disposal at LA-2 could be greater than 200,000 yd^3 (153,000 m^3). Based on potential dredging projects in Los Angeles and Orange Counties requiring ocean disposal as determined using the ZSF study, an annual maximum of 1,451,000 yd^3 (1,109,000 m^3) is projected for disposal at LA-2 under the No Action Alternative.

Consequently, dredged material fate modeling for this alternative was performed for an annual disposal volume of 200,000 yd^3 (153,000 m^3) and was also assessed for a worst-case annual maximum of 1,451,000 yd^3 (1,109,000 m^3). The results of the 200,000 yd^3 (153,000 m^3) modeling, which assume that 100 percent of the dredged material comes from Los Angeles and Long Beach Harbors (Scenario III in the dredged material fate modeling report; USACE 2004b), are shown in Figure 4.3-1. Results indicate that 94 percent of the material in the sediment computations (gravel to very fine sand) settled within the 3,050-m-by-3,050-m (10,000-ft-by-10,000-ft) grid including and surrounding the site boundary; and as can be seen from Figure 4.3-1 the 30-cm (1-ft) contour lies well within the LA-2 site boundary (USACE 2004b).

For a worst-case annual disposal volume of 1,451,000 yd^3 (1,109,000 m^3), the modeling results were assessed assuming that Scenario IV in the dredged material fate modeling report is applicable (75% sediment from Los Angels and Long Beach Harbors, 15% from the Los Angeles River Estuary, and 10% from Marina del Rey; USACE 2004b). The results of the modeling indicate that the 30-cm (1-ft) contour lies well within the LA-2 site boundary (USACE 2004b).

Long-term accumulation was assessed also assuming that the sediment characteristics match Scenario IV of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 1,516,000 yd^3



Modeled Footprint of Sediment Accumulation at LA-2 for an Annual Disposal Volume of 200,000 yd^3

Figure 4.3-1

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(1,159,000 m^3) over the 10-year period (based on an annual average disposal volume of 152,000 yd^3 [116,000 m^3]; see Table 2.1-1) range from 2.91 m (9.54 ft) within 305 m of the site center to 0.02 m (0.08 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. Effects to the physical environment due to these accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-2 detected discrete marine disposal mounds (MDMs) within the LA-2 ODMDS and in the area surrounding the LA-2 ODMDS, particularly east and west of the site (Gardner et al. 1998a). Continued use of LA-2 will result in the presence of more of these MDMs, though they will be worked through with time. Sediment profile surveys at LA-2 in 2000 indicated that dredged material was not detected outside the site boundary, suggesting the material had been reworked and resembled the native bottom (USACE 2002).

There are differences in certain sediment parameters among stations (1) at reference sites, (2) within the LA-2 disposal site, and (3) adjacent to the LA-2 disposal site, and many of these are likely the result of past dredge disposal operations (Chambers Group 2001). However, these differences between and among station groupings were not statistically significant ($p<0.05$). The greatest difference was between concentrations of oil and grease within the LA-2 site and at the reference stations. The concentrations of some sediment metals (cadmium, copper, lead, mercury, and zinc), polychlorinated biphenyls (PCBs), and the pesticide DDT within LA-2 were higher in 2000 compared to sediments from a reference area. These higher concentrations likely resulted from the past disposal of dredged material.

As discussed previously, only suitable material that has been screened according to EPA protocols will be deemed acceptable for ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-2 will likely continue as a result of dredged material disposal, with finer sediments accumulating within and immediately adjacent to the LA-2 site compared with natural conditions. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to the area within and immediately adjacent to the site, and will extend for the duration of site use.

4.3.2 Effects on the Biological Environment

a. LA-3

Upon cessation of ocean disposal activities at LA-3, sediment conditions at the affected areas within and surrounding the site would gradually begin to resemble those at reference areas. Likewise, the infauna, epifaunal, and demersal fish communities would begin to resemble those at unaffected areas, which is not considered an adverse effect

(Class III). Even though differences between or among areas in most cases were slight, this process would likely take several years, depending on the method of recolonization. Relatively mobile organisms, such as many of the fish species and perhaps even some of the urchins, would migrate from the surrounding areas. Sedentary organisms, such as anemones, would rely on larval recruitment for recolonization. There are no predicted effects from the No Action Alternative on birds, marine mammals, or any special status species in the vicinity of LA-3. Impacts are considered insignificant (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Assuming no alternative ocean disposal sites for Orange County projects, the volume of material disposed of at LA-2 would increase. Annual and cumulative (10-year) sediment accumulations within 914 m (3,000 ft) from the site center at LA-2 would increase by 7 to 46 percent relative to the Preferred Alternative. Impacts to epifauna are considered to be adverse but not significant (Class III). Effects to fishes are also similar to those of the Preferred Alternative and are considered insignificant (Class III). Effects to birds, special status species (California brown pelican and elegant tern), and marine mammals would be similar to those of the Preferred Alternative--adverse but insignificant (Class III).

4.3.3 Effects on the Socioeconomic Environment

4.3.3.1 Commercial Fishing and Mariculture

Under the No Action Alternative, disposal operations would cease at LA-3 and there would be no potential effects to commercial fishing in the area due to disposal operations. The LA-2 ODMDS would still be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Based on the calculated disposal volumes that are of the same magnitude as those assumed for the Preferred Alternative (Alternative 3), this disposal is unlikely to result in any additional effect on commercial fishing in the vicinity of the site. Therefore, impacts are considered insignificant (Class III).

4.3.3.2 Commercial Shipping

As discussed in Chapter 3, large amounts of both national and foreign trade cargo are handled at the major commercial ports at Los Angeles and Long Beach Harbors (Harbors). The transport of dredged material to the disposal site could present two potential hazards to navigation: conflicts between the disposal barges and commercial vessel traffic and mounding within the disposal site.

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently there would be no potential impacts to commercial shipping (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Up to 19 barge round trips per day are anticipated under the No Action Alternative (4 of which would originate in Anaheim Bay and Sunset/Huntington Harbor in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). However, all shipping traffic in the vicinity of LA-2 is strictly monitored, disposal operations would continue as in the past, and no significant impacts to commercial shipping are anticipated (Class III).

4.3.3.3 Military Usage

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently there would be no potential impacts to military usage (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Up to 19 barge round trips per day are anticipated under the No Action Alternative (4 of which would originate in Anaheim Bay and Sunset/Huntington Harbor in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). However, all shipping traffic in the vicinity of LA-2 is strictly monitored, disposal operations would continue as in the past, and no significant impacts to military usage are anticipated (Class III).

4.3.3.4 Oil and Natural Gas Development

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently, the interim LA-3 site and adjacent area could be made available for new oil or gas development (Class III). However, it is noted that no oil or gas development is currently proposed for the LA-3 area.

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Disposal operations would continue as in the past and no significant impacts to oil and gas development are anticipated (Class III).

Should future development be proposed, potential conflicts could be lessened if oil and gas production facilities were placed as far from the LA-2 site as possible. Further, should additional oil and gas structures and operations be developed, disposal barges would be required to adopt operating practices to avoid conflicts with those operations and structures. These effects are not significant (Class III).

4.3.3.5 Recreational Activities

Sportfishing

As indicated in Section 3.4.5.1 of this EIS, most partyboat sportfishing in the vicinity of LA-2 and LA-3 generally takes place in relatively shallow water of 100 m (328 ft) or less. Additionally, most of the important sportfish are pelagic, which are not expected to be adversely impacted by the ongoing ocean disposal of dredged material (III).

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently, some recovery of sportfish species could occur within the interim LA-3 site and vicinity, which is not considered an adverse effect (Class III). However, given the great depths at the LA-3 site, any benefits to sportfishing would be minimal.

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Up to 19 barge round trips per day are anticipated under the No Action Alternative (4 of which would originate in Anaheim Bay and Sunset/Huntington Harbor in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). However, disposal operations would continue as in the past and no significant impacts to sportfishing are anticipated (Class III).

Boating

The recreational activity most likely to be impacted by ocean disposal operations at either LA-2 or LA-3 is pleasure boating. Large numbers of pleasure boats utilize the marinas and harbors in Orange and Los Angeles Counties.

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently, potential conflicts between disposal barges and pleasure boats would be removed (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Up to 19 barge round trips per day are anticipated under the No Action Alternative (4 of which would originate in Anaheim Bay and Sunset/Huntington Harbor in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). However, disposal operations would continue as in the past and no significant impacts to boating are anticipated (Class III).

Other Recreational Activities

Most of the recreational activities other than offshore fishing and boating occur at the beaches or in the nearshore areas. Those activities include surf fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing and picnicking.

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently there would be no potential impacts to other recreational activities (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Disposal operations would continue as in the past and no significant impacts to other recreational resources are anticipated (Class III).

4.3.3.6 Archaeological, Historical, and Cultural Resources

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. However, the site has been disturbed by past disposal operations. This disturbance would remain and is considered not significant (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Disposal operations would continue as in the past and no significant impacts to cultural resources are anticipated (Class III).

4.3.3.7 Public Health and Welfare

a. LA-3

Under the No Action Alternative, disposal operations would cease at LA-3. Consequently there would be no potential impacts to public health and welfare (Class III).

b. LA-2

Under the No Action Alternative, the LA-2 site would continue to be used and managed at an annual average disposal volume of 200,000 yd^3 (153,000 m^3). Disposal operations would continue as in the past. Dredged material proposed for disposal would continue to be subject to the USACE and EPA testing procedures. Given the minimal mounding anticipated for the long-term disposal of dredged material and the depth of the LA-2 site, potential impacts to navigation resulting from material mounding within the disposal sites is considered insignificant (Class III). As such, no significant impacts to public health and welfare are anticipated (Class III).

4.4 Other Ocean Disposal Alternatives

4.4.1 Effects on the Physical Environment

4.4.1.1 Air Quality

a. Alternative 2

As discussed previously, for Alternative 2 the LA-3 ODMDS is not designated and all dredged material is disposed of at the LA-2 site. Because all dredged material is assumed to be deposited at LA-2 irrespective of economics, this alternative results in the greatest number of barge miles traveled.

Air quality impacts associated with Alternative 2 were evaluated using the same assumptions as summarized in Section 4.2.1.1 for the Preferred Alternative. The detailed air emissions calculations are included as Appendix B of this EIS. Table 4.2-5 shows the worst-case daily emissions, Table 4.2-6 shows the average daily emissions averaged over a worst-case year, and Table 4.2-7 shows the average daily emissions averaged over an average year for Alternative 2. Table 4.2-8 shows the worst-case yearly emissions while Table 4.2-9 shows the average yearly emissions.

Also shown in Tables 4.2-5 through 4.2-7 are the SCAQMD air emission significance thresholds for evaluating projects occurring within the SCAB. As seen in Table 4.2-5 and Table 4.2-6, for Alternative 2 both worst-case daily emissions and average daily emissions for a worst-case year are projected to exceed the SCAQMD thresholds for NO_x and SO_2. All other emissions are projected to be below significance thresholds. Additionally, as seen in Table 4.2-7, the average daily emissions of NO_x for an average year also are projected to exceed SCAQMD thresholds.

Likewise, Tables 4.2-8 and 4.2-9 include the CAA *de minimis* thresholds for evaluating the air emissions resulting from federal actions. As seen in Table 4.2-8, for Alternative 2 the worst-case yearly emissions of NO_x and NO_2 exceed the *de minimis* thresholds. Additionally, as seen in Table 4.2-9, the projected average annual emissions of NO_x resulting from the hauling activities associated with Alternative 2 exceed the *de minimis* thresholds.

Consequently, the potential exists for significant air quality emissions to occur under Alternative 2 even assuming average yearly hauling activities. Although the actual individual dredging and hauling activities are subject to additional review and permitting, because average yearly emissions are anticipated to exceed identified thresholds, air quality impacts are considered significant and Class I.

It is noted that the EPA has recently adopted new emissions standards for new marine diesel engines that went into effect in January of 2004. These standards apply to new manufactured marine engines and existing engines that are installed in new vessels or converted from land-based to marine engines. Consequently, as the existing tug fleet is retired, future emissions are anticipated to be less than those presented here.

Comparison of the results shown for Alternative 2 and the all other alternatives in Tables 4.2-5 through 4.2-9 indicates that Alternative 2 results in the greatest overall air emissions relative to the other alternatives.

b. Alternative 4

As discussed previously, for Alternative 4 all dredged material is disposed of at the proposed LA-3 site for which a positive economic benefit is determined. The remaining material is disposed of at LA-2.

Air quality impacts associated with Alternative 4 were evaluated using the same assumptions as summarized in Section 4.2.1.1 for the Preferred Alternative. The detailed air emissions calculations are included as Appendix B of this EIS. Table 4.2-5 shows the worst-case daily emissions, Table 4.2-6 shows the average daily emissions averaged over a worst-case year, and Table 4.2-7 shows the average daily emissions averaged over an average year for Alternative 4. Table 4.2-8 shows the worst-case yearly emissions while Table 4.2-9 shows the average yearly emissions.

Also shown in Tables 4.2-5 through 4.2-7 are the SCAQMD air emission significance thresholds for evaluating projects occurring within the SCAB. As seen in Table 4.2-5 and Table 4.2-6, for Alternative 4 both worst-case daily emissions and average daily emissions for a worst-case year are projected to exceed the SCAQMD thresholds for NO_x and SO_2. All other emissions are projected to be below significance thresholds. Additionally, as seen in Table 4.2-7, the average daily emissions of NO_x for an average year also are projected to exceed SCAQMD thresholds.

Likewise, Tables 4.2-8 and 4.2-9 include the CAA *de minimis* thresholds for evaluating the air emissions resulting from federal actions. As seen in Table 4.2-8, for Alternative 4 the worst-case yearly emissions of NO_x and NO_2 exceed the *de minimis* thresholds. Additionally, as seen in Table 4.2-9, the projected average annual emissions of NO_x resulting from the hauling activities associated with Alternative 4 exceed the *de minimis* thresholds.

Consequently, the potential exists for significant air quality emissions to occur under Alternative 4 even assuming average yearly hauling activities. The actual individual dredging and hauling activities are subject to additional review and permitting. However, because average yearly emissions are anticipated to exceed identified thresholds, air quality impacts are considered significant and Class I.

It is also noted that the EPA has recently adopted new emissions standards for new marine diesel engines that went into effect in January of 2004. These standards apply to new manufactured marine engines and existing engines that are installed in new vessels or converted from land-based to marine engines. Consequently, as the existing tug fleet is retired, future emissions are anticipated to be less than those presented here.

Comparison of the results shown for Alternative 4 and the other alternatives in Tables 4.2-5 through Table 4.2-9 indicates that Alternative 4 results in greater overall air emissions than either Alternatives 1 (No Action) or 3 (Preferred Alternative), but less than those projected under Alternative 2.

4.4.1.2 Physical Oceanography

a. Alternative 2

Under Alternative 2, the interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. There would be no further disposal at LA-3 beyond that approved or permitted at the time of expiration. Infaunal organisms would gradually rework seafloor sediments at LA-3 so that they eventually resembled pre-disposal sediments. Sediment Profile Imaging (SPI) surveys in summer 2000 indicated that areas with detectable dredged material in 1988 showed no signature of dredged material 12 years later (USACE 2002). As with the No Action Alternative, there are no anticipated impacts to physical oceanography at LA-3 from this alternative.

The LA-2 site would continue to be used with an annual volume limit of 3,500,000 yd^3 (2,676,000 m^3), sufficient to account for the greater amounts of dredged material generated in both Los Angeles and Orange Counties. Effects to physical oceanography are not expected to be significant (Class III). Bathymetric surveys performed in 1993 did not record any mounding of dredged material at LA-2 since the last surveys performed in 1990 (EPA 1997). However, the depth resolution of these surveys was approximately 1.8 m (6 ft).

b. Alternative 4

Under Alternative 4, the LA-3 site would be permanently designated at an annual maximum disposal quantity of 3,500,000 yd^3 (2,676,000 m^3) and the LA-2 site would be limited to an annual maximum disposal volume of 500,000 yd^3 (382,000 m^3). Effects to physical oceanography are not expected to be significant at either site (Class III).

4.4.1.3 Water Quality

a. Alternative 2

Under Alternative 2, the interim designation of the LA-3 site would expire and there would be no further disposal beyond that approved or permitted at the time of expiration. Effects to water column parameters at the LA-3 site would not be significant (Class III). The LA-2 site would continue to be used with an annual volume limit of 3,500,000 yd^3 (2,676,000 m^3), sufficient to account for the greater amounts of dredged material generated in Los Angeles and Orange Counties. Still, effects to water column parameters are not expected to be significant (Class III) because material is disposed of one barge at a time as with all other alternatives.

b. Alternative 4

Under Alternative 4, the LA-3 site would be permanently designated at an annual maximum disposal quantity of 3,500,000 yd^3 (2,676,000 m^3) and the LA-2 site would be limited to an annual maximum disposal volume of 500,000 yd^3 (382,000 m^3). Based on the results of modeling efforts and the assumption that only suitable material is disposed of at both sites, effects to water column parameters are not expected to be significant at either site (Class III), particularly since material is disposed of one barge at a time as with all other alternatives.

4.4.1.4 Geology and Sediments

a. Alternative 2

i. LA-3

Effects to sediments at LA-3 from Alternative 2 are identical to those for the No Action Alternative; the interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. There would be no further disposal at LA-3 beyond that approved or permitted at the time of expiration. Sediments at and in the vicinity of the LA-3 site would continue to be reworked by benthic organisms so that sediment characteristics (such as texture and redox profile) would eventually resemble those from pre-disposal periods. This return of sediment characteristics to pre-dredge conditions is considered beneficial, which is not considered an adverse effect (Class III).

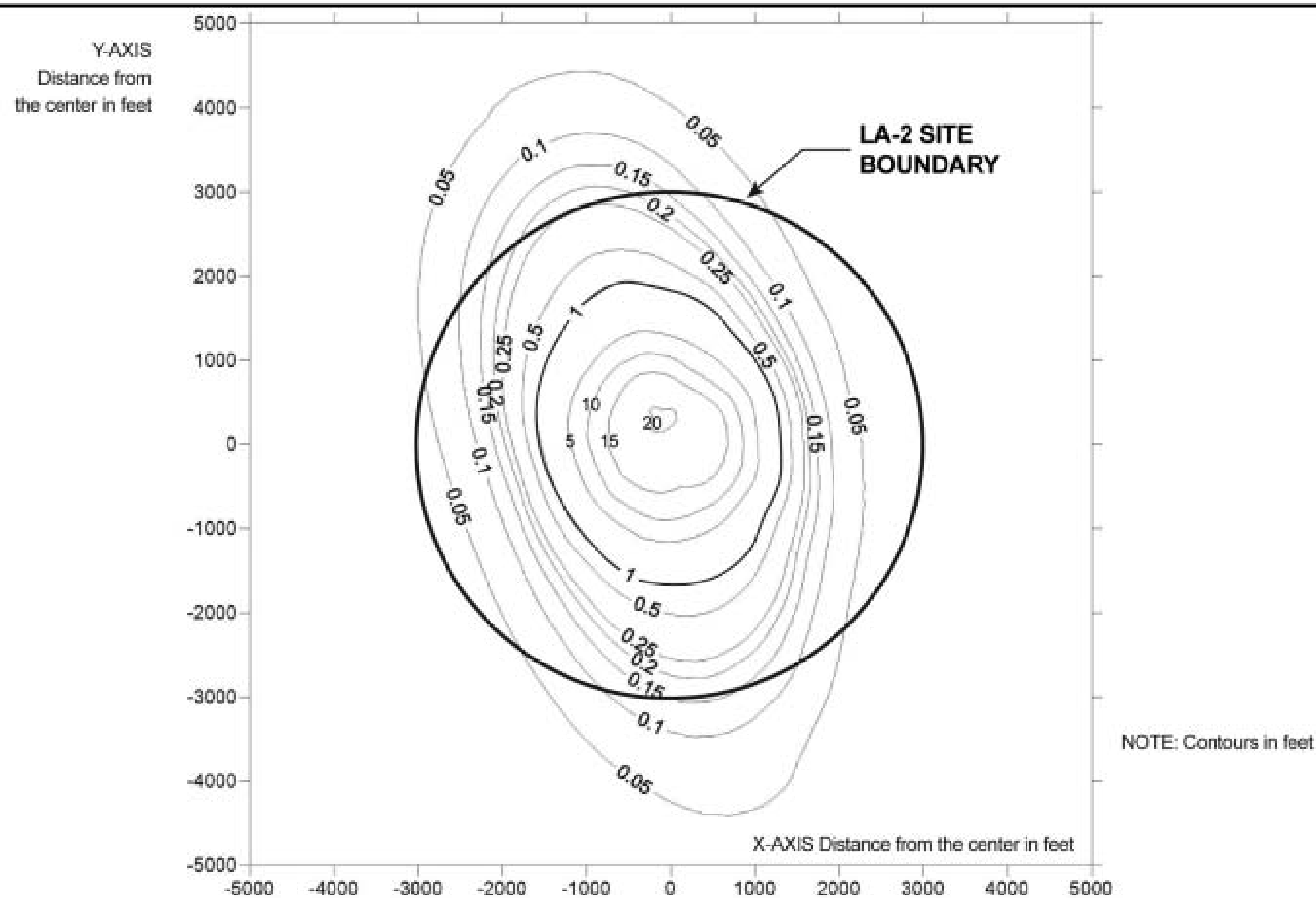
ii. LA-2

Under Alternative 2, the LA-2 site would continue to be used. However, without the designation of LA-3, LA-2 would be managed at a maximum annual disposal volume of 3,500,000 yd^3 (2,676,000 m^3). Consequently, the maximum annual disposal volume modeled at LA-2 for this alternative was 3,500,000 yd^3 (2,676,000 m^3), with the majority of the material derived from Upper Newport Bay Basins II and III and the remaining material from Los Angeles/Long Beach Harbors, the Los Angeles River Estuary, and Marina del Rey (Scenario V in the dredged material fate modeling report; USACE 2004b).

Results indicate that greater than 98 percent of the material in the sediment computations (gravel to very fine sand) settled within the 3,050-m by 3,050-m (10,000-ft by 10,000-ft) grid including and surrounding the site boundary. As seen in Figure 4.4-1, the 30-cm (1-ft) contour resulting from the maximum annual disposal volume of 3,500,000 yd^3 (2,676,000 m^3) lies well within the LA-2 site boundary (USACE 2004b).

Long-term accumulation was assessed also assuming that the sediment characteristics match Scenario V of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 3,898,000 yd^3 (2,980,000 m^3) over the 10-year period (based on an annual average disposal volume of 390,000 yd^3 [298,000 m^3]; see Table 2.1-2) range from 6.93 m (22.73 ft) within 305 m of the site center to 0.03 m (0.10 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. These accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-2 detected discrete marine disposal mounds (MDMs) within the LA-2 ODMDS and in the area surrounding the LA-2 ODMDS, particularly east and west of the site (Gardner et al. 1998a). Continued use of LA-2 will result in the presence of more of these MDMs, though they will be worked



Modeled Footprint of Sediment Accumulation at LA-2 for an Annual Disposal Volume of 3,500,000 yd^3

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Figure 4.4-1

through with time. Sediment profile surveys at LA-2 in 2000 indicated that dredged material was not detected outside the site boundary, suggesting the material had been reworked and resembled the native bottom (USACE 2002).

There are differences in certain sediment parameters among stations (1) at reference sites, (2) within the LA-2 disposal site, and (3) adjacent to the LA-2 disposal site, and many of these are likely the result of past dredge disposal operations (Chambers Group 2001). However, these differences between and among station groupings are not statistically significant ($p<0.05$). The greatest difference was between concentrations of oil and grease within the LA-2 site and at the reference stations. The concentrations of some sediment metals (cadmium, copper, lead, mercury, and zinc), polychlorinated biphenyls (PCBs), and the pesticide DDT within LA-2 were higher in 2000 compared to sediments from a reference area. These higher concentrations likely resulted from the past disposal of dredged material.

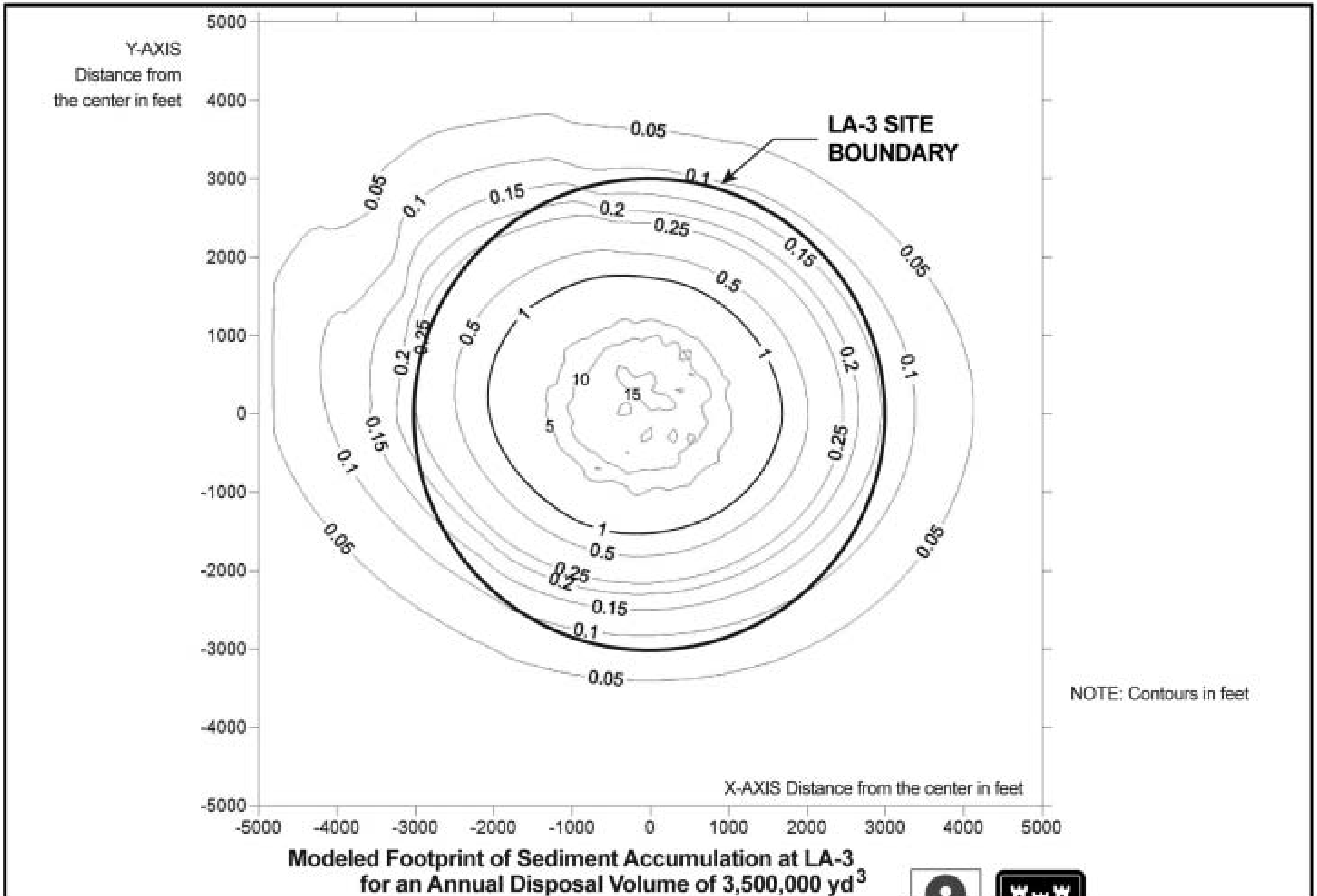
As discussed previously, only suitable material that has been screened according to EPA protocols will be deemed acceptable for ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-2 will likely continue as a result of dredged material disposal, with finer sediments accumulating within and immediately adjacent to the LA-2 site compared with natural conditions. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to the area within and immediately adjacent to the site, and will extend for the duration of site use.

b. Alternative 4

i. LA-3

Under Alternative 4, the LA-3 site would be permanently designated at a maximum annual disposal quantity of 3,500,000 yd^3 (2,676,000 m^3). Consequently, the maximum annual disposal volume modeled for this alternative at LA-3 was 3,500,000 yd^3 (2,676,000 m^3), with 2,500,000 yd^3 (1,911,000 m^3) of the dredged material derived from Upper Newport Bay Basins II and III, and 1,000,000 yd^3 (765,000 m^3) of the material derived from Los Angeles and Long Beach Harbors (75%), the Los Angeles River Estuary (15%), and Marina del Rey (10%). This corresponds to the Scenario II sediment characteristics in the fate modeling report (USACE 2004b).

Results indicate that greater than 55 percent of the material in the sediment computations (gravel to very fine sand) settled within the 3,050-m-by-3,050-m (10,000-ft-by-10,000-ft) grid including and surrounding the site boundary. As seen in Figure 4.4-2, the 30-cm (1-ft) contour resulting from the maximum annual disposal volume of 3,500,000 yd^3 (2,676,000 m^3) lies well within the proposed site boundary (USACE 2004b).



Modeled Footprint of Sediment Accumulation at LA-3 for an Annual Disposal Volume of 3,500,000 yd^3

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Figure 4.4-2

Long-term accumulation was assessed also assuming that the sediment characteristics match Scenario II of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 3,226,000 yd^3 (2,466,000 m^3) over the 10-year period (based on an annual average disposal volume of 322,000 yd^3 [246,000 m^3]; see Table 2.1-4) range from 4.91 m (16.12 ft) within 305 m (1,000 ft) of the site center to 0.03 m (0.11 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. These accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-3 detected discrete marine disposal mounds (MDMs) adjacent to, and southeast of, the LA-3 ODMDS (Gardner et al. 1998b). Continued use of LA-3 will result in the presence of more of these MDMs, though they will be worked through with time. Dredge sediments detected at a station north of the LA-3 boundary in 1988 were not detected during the 2000 surveys (USACE 2002). Though dredged material was detected at several stations south of the disposal site in 2000, the infaunal recovery had recovered completely and the sediments had been reworked and resembled the native bottom.

There are differences in certain sediment parameters among stations (1) within the proposed LA-3 disposal site, (2) at reference sites, (3) at sites where sediments from the 1998-1999 Upper Newport Bay project were present, and (4) at sites where sediments from historical disposal operations were present (Chambers Group 2001). Many of these are likely the result of past dredge disposal operations. Within the interim LA-3 site boundary, total organic carbon, total volatile solids, and percentage of silt were lower than at locations surrounding LA-3 and at reference locations. Oil and grease were higher within the site compared with the other sites, as well. Continued use of LA-3 will result in continued alterations in sediment characteristics including elevated levels of some contaminants.

The concentrations of some sediment contaminants, such as the metals cadmium and silver, were higher within the interim LA-3 site boundary compared with adjacent and reference areas in 2000. Levels of most contaminants in 2000 were lower at LA-3 than those measured in 1999, suggesting the sediments are being reworked.

As discussed previously, only suitable material that has been screened according to EPA protocols will be deemed acceptable for future ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-3 will likely continue as a result of dredged material disposal. This effect is considered locally not significant (Class III) and is expected to continue for the duration of site use. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to area within and immediately adjacent to the site, and will extend for the duration of site use.

ii. *LA-2*

Under this alternative the LA-2 site would be managed at a maximum disposal volume of 500,000 yd^3 (382,000 m^3). This volume was assessed assuming that the dredged sediment is derived from Los Angeles and Long Beach Harbors (75%), the Los Angeles River Estuary (15%), and Marina del Rey (10%). This corresponds to the Scenario IV sediment characteristics in the fate modeling report (USACE 2004b).

Results indicate that over 94 percent of the material in the sediment computations (gravel to very fine sand) settled within the 3,050-m by 3,050-m (10,000-ft by 10,000-ft) grid including and surrounding the site boundary. The results of the modeling indicate that the 30-cm (1-ft) contour lies well within the LA-2 site boundary (USACE 2004b).

Long-term accumulation was assessed also assuming that the sediment characteristics match Scenario IV of the dredged material fate modeling report (USACE 2004b). Long-term (10-year) accumulations assuming a maximum disposal volume of 673,000 yd^3 (515,000 m^3) over the 10-year period (based on an annual average disposal volume of 68,000 yd^3 [52,000 m^3]; see Table 2.1-4) range from 1.29 m (4.23 ft) within 305 m (1,000 ft) of the site center to 0.01 m (0.03 ft) between 1,219 m (4,000 ft) and 1,524 m (5,000 ft) from the site center. These accumulation impacts are considered localized and not significant (Class III).

Bathymetric surveys performed in 1998 at LA-2 detected discrete marine disposal mounds (MDMs) within and in the area surrounding the LA-2 ODMDS, particularly east and west of the site (Gardner et al. 1998a). Continued use of LA-2 will result in the presence of more of these MDMs, though they will be worked through with time. Sediment profile surveys at LA-2 in 2000 indicated that dredged material was not detected outside the site boundary, suggesting the material had been reworked and resembled the native bottom (USACE 2002).

There are differences in certain sediment parameters among stations (1) at reference sites, (2) within the LA-2 disposal site, and (3) adjacent to the LA-2 disposal site, and many of these are likely the result of past dredge disposal operations (Chambers Group 2001). However, these differences between and among station groupings were not statistically significant ($p<0.05$). The greatest difference was between concentrations of oil and grease within the LA-2 site and at the reference stations. The concentrations of some sediment metals (cadmium, copper, lead, mercury, and zinc), polychlorinated biphenyls (PCBs), and the pesticide DDT within LA-2 were higher in 2000 compared to sediments from a reference area. These higher concentrations likely resulted from the past disposal of dredged material.

As discussed previously, only suitable material that has been screened according to EPA protocols will be deemed acceptable for ocean disposal. Therefore, effects to sediment chemical quality are considered adverse but insignificant (Class III). Changes in sediment particle size distribution at LA-2 will likely continue as a result of dredged material disposal, with finer sediments accumulating within and immediately adjacent to the LA-2 site compared with natural conditions. Since accumulations outside the site boundary are less than 30 cm (1 ft), effects to the physical environment due to deposition of dredged material are considered insignificant (Class III), limited to the area within and immediately adjacent to the site, and will extend for the duration of site use.

4.4.2 Effects on the Biological Environment

4.4.2.1 Plankton

a. Alternative 2

Under Alternative 2, ocean disposal at LA-2 would be maximized, while the interim status designation of the LA-3 site would remain expired prohibiting future disposal at this site. There would be no further disposal at LA-3 beyond that approved or permitted at the time of expiration. Effects to marine phytoplankton, zooplankton, and ichthyoplankton at LA-2 would be similar to effects of the No Action Alternative even with a substantial increase in disposal volume. This is due to the localized and temporary nature of water column impacts, as well as the overall abundance of these organisms. Effects at LA-2 are considered insignificant (Class III). There would be no impacts to plankton populations at LA-3 (Class III).

b. Alternative 4

Under Alternative 4, ocean disposal at LA-3 would be maximized, while LA-2 would be managed at a higher volume than currently permitted. Effects to marine phytoplankton, zooplankton, and ichthyoplankton at LA-2 and LA-3 would still be insignificant (Class III). This is due to the localized and temporary nature of water column impacts, as well as the overall abundance of these organisms.

4.4.2.2 Infauna

a. Alternative 2

Under Alternative 2, in a worst-case year sediment deposition at LA-2 would increase by as much as approximately 3.2 times within 305 m (1,000 ft) of the site center compared with the deposition rate of the Preferred Alternative. The extent of infauna burial would thus increase and would cover a larger area. Impacts to infauna would be considered insignificant (Class III) as deposition heights outside the site boundary would be less than 30 cm (1 ft). These impacts would persist for the duration of site use. Disposal of dredged material at LA-3 would discontinue and the infauna would gradually shift to a community resembling nearby, unaffected areas (Class III; a similar effect of the No Action Alternative).

b. Alternative 4

Under Alternative 4, the sediment deposition rate at LA-2 would be equal to half the rate of the Preferred Alternative. The extent of burial would be much less than that of the Preferred Alternative and would be considered insignificant (Class III) since outside the site boundary the maximum deposition height would be about 2 cm (0.07 ft). Conversely, in a worst-case year the deposition rate at LA-3 would be slightly more than that of the Preferred Alternative (by about 26%). Impacts to infauna would still be considered insignificant (Class III), still limited to a localized area within the site boundary, and would persist for the duration of site use.

4.4.2.3 Epifauna

a. Alternative 2

Under Alternative 2, in a worst-case year sediment deposition at LA-2 would increase by approximately 3.2 times within 305 m (1,000 ft) of the site center compared with the deposition rate of the Preferred Alternative. Impacts to seafloor epifauna (potentially including decreased species richness and abundance) would thus increase and would cover a larger area. Impacts to epifauna would still be considered insignificant (Class III), still limited to a localized area mostly within the site boundary, and would persist for the duration of site use. Disposal of dredged material at LA-3 would discontinue and the infauna would gradually shift to a community resembling nearby, unaffected areas (Class III; a similar effect of the No Action Alternative).

b. Alternative 4

Under Alternative 4, the sediment deposition rate at LA-2 would be equal to half the rate of the Preferred Alternative. The extent of deposition-related impacts, much less than that of the Preferred Alternative, would be considered insignificant (Class III), limited to a localized area mostly within the site boundary, and would persist for the duration of site use.

Conversely, the deposition rate at LA-3 would be slightly more than that of the Preferred Alternative (by about 26%). Impacts to epifauna would still be considered insignificant (Class III), still limited to a localized area mostly within the site boundary, and would persist for the duration of site use.

4.4.2.4 Fishes

a. Alternative 2

Under Alternative 2, in a worst-case year sediment deposition at LA-2 would increase by approximately 3.2 times within 305 m (1,000 ft) of the site center compared with the deposition rate of the Preferred Alternative. Effects to the demersal fish community, potentially including decreased species richness and abundance at affected areas, would be greater than those predicted with the Preferred Alternative, but still considered insignificant as the effects are localized to the area affected by disposal (Class III). Disposal of dredged material at LA-3 would discontinue and the fish community would gradually shift to a community resembling nearby, unaffected areas (Class III; a similar effect of the No Action Alternative).

b. Alternative 4

Under Alternative 4, the sediment deposition rate at LA-2 would be equal to half the rate of the Preferred Alternative. Still, effects to the demersal fish community may persist (potentially including decreased species richness and abundance), but would still be insignificant as the effects are localized to the area affected by disposal (Class III).

The sediment deposition rate at LA-3 would increase compared to the Preferred Alternative. Effects to the demersal fish community would also likely persist, but would be considered insignificant as the effects are localized to the area affected by disposal (Class III).

4.4.2.5 Birds

a. Alternative 2

Continued disposal at LA-2, even at increased capacity, is not expected to result in any significant impacts to birds. Therefore, effects to birds at LA-2 from Alternative 2 are considered insignificant (Class III). Once disposal operations at LA-3 cease there would be no effects to birds in the vicinity of LA-3 (Class III).

b. Alternative 4

Under Alternative 4, disposal operations at both sites would continue. Effects to bird populations would be similar to those of the Preferred Alternative and are designated insignificant (Class III).

4.4.2.6 Marine Mammals

a. Alternative 2

Continued disposal at LA-2, even at increased capacity, is not expected to result in any significant impacts to marine mammals. Therefore, effects to these species at LA-2 from Alternative 2 are considered insignificant (Class III). Once disposal operations at LA-3 cease there would be no further potential effects to marine mammals in the vicinity of LA-3 (Class III).

b. Alternative 4

Under Alternative 4, disposal operations at both sites would continue. Effects to marine mammals would be similar to those of the Preferred Alternative and are designated insignificant (Class III).

4.4.2.7 Threatened, Endangered, and Special Status Species

a. Alternative 2

Under Alternative 2, disposal capacity at LA-2 would increase compared with that of the Preferred Alternative. However, there is no foreseeable incremental increase in potential effects to California brown pelican or elegant tern resulting from this increase. Effects are similar to those of the Preferred Alternative (e.g. temporary disturbance and a potential reduction in foraging opportunities) and are designated insignificant (Class III). Disposal of dredged material at LA-3 would discontinue and there would be no impacts to these two species in the vicinity of the LA-3 ODMDS (Class III).

b. Alternative 4

Under Alternative 4, disposal capacity at LA-2 would be much less than that for of the Preferred Alternative. Impacts to California brown pelican and elegant tern would still be insignificant (Class III). The disposal capacity at LA-3 would be more than that of the Preferred Alternative. However, impacts to California brown pelican and elegant tern would still be considered insignificant (Class III).

4.4.3 Effects on Socioeconomic Environment

4.4.3.1 Commercial Fishing and Mariculture

a. Alternative 2

Under Alternative 2, disposal operations would cease at LA-3 and there would be no potential effects to commercial fishing in the LA-3 area due to disposal operations (Class III). The LA-2 ODMDS would still be used at a higher capacity; however, there is unlikely to be any additional effect on commercial fishing in the vicinity of the site. Therefore, as with the Preferred Alternative impacts are considered insignificant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Still, there are unlikely to be any significant impacts to commercial fishing in the vicinity of either of these sites. Therefore, as with the Preferred Alternative impacts are considered insignificant (Class III).

4.4.3.2 Commercial Shipping

a. Alternative 2

Under Alternative 2, disposal operations would cease at LA-3 and there would be no potential effects to commercial shipping in the area due to disposal operations (Class III).

The LA-2 ODMDS would still be used at a higher capacity. Up to 25 barge round trips per day are anticipated under Alternative 2 as compared to 17 round trips per day for the Preferred Alternative. Ten of these 25 barge round trips are anticipated to originate in the Orange County area (see Table 4.2-2). Barge traffic utilizing the LA-2 site from the Orange County area (Newport Harbor, Dana Point Harbor, and Anaheim Bay) would be required to cross the northbound and possibly the southbound coastwise travel lanes of the southern TSS depending on the exact route taken to LA-2. However, given the strict vessel traffic control in the vicinity of the LA-2 site there is unlikely to be any additional effect on commercial shipping in the vicinity of the site. Therefore, as with the Preferred Alternative impacts are considered insignificant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Up to 5 barge round trips per day at LA-2 are anticipated for Alternative 4 (2 of which would originate in Anaheim Bay in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). The reduced barge traffic to and from LA-2 under this alternative would result in a reduction in the potential for conflicts between commercial vessels and disposal barges in the congested Los Angeles/Long Beach Port area (Class III).

Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative (see Table 4.2-2). The proposed LA-3 site lies approximately 20 km (10.8 nmi) to the east of the northbound coastwise travel lane of the southern TSS (see Figure 3.4-1). Consequently, barge traffic traveling from the Los Angeles and Long Beach Harbor areas to the LA-3 site is not likely to utilize the TSS lanes, but rather to travel relatively close to the coast. Because the disposal barges are expected to travel outside of the designated commercial shipping traffic lanes, impacts to commercial shipping are not considered significant (Class III). Additionally, it is noted that only 4 of the 19 disposal barge round trips per day are anticipated to come from the Los Angeles/Long Beach area (see Table 4.2-2).

4.4.3.3 Military Usage

a. Alternative 2

Under Alternative 2, disposal operations would cease at LA-3 and there would be no potential effects to military operations in the area due to disposal operations (Class III).

The LA-2 ODMDS would still be used at a higher capacity. Up to 25 barge round trips per day are anticipated under the Alternative 2 as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). Barge traffic utilizing the LA-2 site from the Orange County area (Newport Harbor, Dana Point Harbor, and Anaheim Bay) would be required to cross the northbound and possibly the southbound coastwise travel lanes of the southern TSS depending on the exact route taken to LA-2. Ten of the 25 barge round trips are anticipated to originate in the Orange County area. Consequently, the potential exists to conflict with Naval vessel traffic associated with Naval Weapon Station Seal Beach. Given the strict vessel traffic control in the vicinity of the LA-2 site there is unlikely to be any additional effect on commercial shipping in the vicinity of the site. Therefore, as with the Preferred Alternative impacts are considered insignificant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Up to 5 barge round trips per day at LA-2 are anticipated for Alternative 4 (2 of which would originate in Anaheim Bay in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). The reduced barge traffic to and from LA-2 under this alternative would result in a reduction in the potential for conflicts between military vessels and disposal barges in the congested Los Angeles/Long Beach Port area (Class III).

Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative (see Table 4.2-2). The proposed LA-3 site lies approximately 20 km (10.8 nmi) to the east of the northbound coastwise travel lane of the southern TSS (see Figure 3.4-1). Consequently, barge traffic traveling from the Los Angeles and Long Beach Harbor areas to the LA-3 site is not likely to utilize the TSS lanes, but rather to travel relatively close to the coast. Because the disposal barges are expected to travel down the coast outside of the TSS lanes and could come relatively close to the Naval anchorages off of Anaheim Bay, the potential exists for conflicts between barge traffic and Naval vessels. However, it is noted that only 4 of the 19 disposal barge round trips per day are anticipated to come from the Los Angeles/Long Beach area (see Table 4.2-2). As noted, all vessel traffic in the area is strictly monitored. Consequently, this potential impact is not considered significant (Class III).

4.4.3.4 Oil and Natural Gas Development

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. Consequently, the interim LA-3 site and adjacent area could be made available for new oil or gas development (Class III). However, it is noted that no oil or gas development is currently proposed for the LA-3 vicinity.

The LA-2 ODMDS would still be used at a higher capacity. Up to 25 barge round trips per day are anticipated under the Alternative 2 as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). Barge traffic utilizing the LA-2 site from the Orange County (Newport Harbor, Dana Point Harbor, and Anaheim Bay) area would be required to cross the northbound and possibly the southbound coastwise travel lanes of the southern TSS depending on the exact route taken to LA-2. It is noted that the developed federal oil and gas tracts between LA-2 and LA-3 lie directly on a path between Newport Harbor and the LA-2 site. Consequently, disposal barge traffic utilizing the LA-2 site would be required to divert around the developed oil platforms.

Ten of the 25 barge round trips are anticipated to originate in the Orange County area. Consequently, the potential exists for collisions between the disposal barges and the developed oil and gas platforms. The potential for collisions with these facilities can be avoided through strict navigation routes and by utilizing the VTS. Consequently, this potential impact is not considered significant (Class III).

Should future development be proposed, potential conflicts could be lessened if oil and gas production facilities were placed as far from the LA-2 site as possible. Further, should additional oil and gas structures and operations be developed, disposal barges would be required to adopt operating practices to avoid conflicts with those operations and structures. These effects are not significant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Disposal operations would continue at the LA-2 site as in the past, although at a reduced level with up to 5 barge round trips per day at LA-2 (2 of which would originate in Anaheim Bay in Orange County) as compared to 17 round trips per day for the Preferred Alternative (see Table 4.2-2). No significant impacts are anticipated (Class III).

Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative (see Table 4.2-2). The LA-3 site lies approximately 20 km (10.8 nmi) to the east of the northbound coastwise travel lane of the southern TSS (see Figure 3.4-1). Consequently, barge traffic traveling from the Los

Angeles and Long Beach Harbor areas to the LA-3 site is not likely to utilize the TSS lanes, but rather to travel relatively close to the coast. The developed federal oil and gas facilities located between LA-2 and LA-3 lie within the separation zone of the southern TSS. However, the developed state oil and gas facilities lie roughly 3.3 km (1.8 nmi) off the coast between Seal Beach and Huntington Beach.

Consequently, the disposal barges traveling between the Los Angeles and Long Beach areas would be required to travel in a corridor between these developed facilities. The potential for collisions with these facilities can be avoided through strict navigation routes. It is noted that only 4 of the 19 disposal barge round trips per day are anticipated to come from the Los Angeles/Long Beach area (see Table 4.2-2). Consequently, these potential impacts are not considered significant (Class III).

Should future development be proposed, potential conflicts could be lessened if oil and gas production facilities were placed as far from the LA-2 and LA-3 sites as possible.Further, should additional oil and gas structures and operations be developed, disposal barges would be required to adopt operating practices to avoid conflicts with those operations and structures. These effects are not significant (Class III).

4.4.3.5 Recreational Activities

As indicated in Section 3.4.5.1 of this EIS, most partyboat sportfishing in the vicinity of LA-2 and LA-3 generally takes place in relatively shallow water of 100 m (328 ft) or less. Additionally, most of the important sportfish are pelagic, which are not expected to be adversely impacted by the ongoing ocean disposal of dredged material (Class III).

Sportfishing

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. Consequently, some recovery of sportfish species could occur within the interim LA-3 site (Class III). However, given the great depths at the LA-3 site, any benefits to sportfishing would be minimal.

The LA-2 ODMDS would still be used at a higher capacity. Up to 25 barge round trips per day are anticipated under the Alternative 2 as compared to 17 round trips per day for the Preferred Alternative and 19 round trips per day for the No Action Alternative. Ten of the 25 barge round trips are anticipated to originate in the Orange County area and thus would be traveling along the coast (see Table 4.2-2). While the potential for accidents between disposal barges and fishing boats does exist, given the maneuverability of the fishing boats and the size and slow speed of the disposal barges, the probability of an accident is very low and not considered significant (Class III).

The depths of the LA-2 site range from approximately 110 (360 ft) to 340 m (1,115 ft). Consequently, although unlikely some sportfishing activity could occur within the LA-2 site boundaries. Given the relatively deep waters and the site's location within the RNA and outer harbor waters, sportfishing activity in the area is rare.

The demersal fish within the LA-2 site are somewhat diminished and could be adversely affected by on-going disposal activities at the site. As this alternative would result in the maximum amount of dredged material disposed at LA-2 compared to the other alternatives, this potential adverse effect would be greatest at LA-2 under this alternative. However, this effect would be localized and is not expected to affect the populations of demersal fish in other more favorable fishing locations.

Consequently, the continued use of the LA-2 site for the ocean disposal of dredged material is not anticipated to significantly impact sportfishing on a regional level. (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Disposal operations would continue at the LA-2 site as in the past, although at a reduce level with up to 5 barge round trips per day at LA-2 as compared to 17 round trips per day for the Preferred Alternative. Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative. Four of the nineteen disposal barge round trips per day are anticipated to come from the Los Angeles/Long Beach area and thus would be traveling along the coast (see Table 4.2-2).

While the potential for accidents between disposal barges and fishing boats does exist, given the maneuverability of the fishing boats and the size and slow speed of the disposal barges, the probability of an accident is very low and not considered significant (Class III).

The depths of the LA-2 site range from approximately 110 (360 ft) to 340 m (1,115 ft). Consequently, although unlikely some sportfishing activity could occur within the LA-2 site boundaries. Given the relatively deep waters and the site's location within the RNA and outer harbor waters, sportfishing activity in the area is rare.

The demersal fish within the LA-2 site are somewhat diminished and could be adversely affected by on-going disposal activities at the site. As this alternative would result in the minimum amount of dredged material disposed at LA-2 compared to the other alternatives, this potential adverse effect would be lowest at LA-2 under this alternative. Nevertheless, this adverse effect would be localized and is not expected to affect the populations of demersal fish in other more favorable fishing locations.

As discussed previously in Section 4.2.3.5a of this EIS, there are no important sportfishing grounds within the LA-3 disposal site. Although the effect of dredged material disposal could have an adverse effect on demersal fish, those effects would be localized and are not anticipated to significantly impact the demersal fish populations.

Consequently, the continued use of the LA-2 and LA-3 sites for the ocean disposal of dredged material is not anticipated to significantly impact sportfishing on a regional level. (Class III).

Boating

The recreational activity most likely to be impacted by ocean disposal operations at either LA-2 or LA-3 is pleasure boating. Large numbers of pleasure boats utilize the marinas and harbors in Orange and Los Angeles Counties.

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. Consequently, potential conflicts between disposal barges and pleasure boats would be removed (Class III).

The LA-2 ODMDS would still be used at a higher capacity. Up to 25 barge round trips per day are anticipated under Alternative 2 as compared to 17 round trips per day for the Preferred Alternative and 19 round trips per day for the No Action Alternative (see Table 4.2-2). Additionally, 10 of these 25 barge round trips are anticipated to originate in the Orange County area and thus would be traveling along the coast. These 10 barge trips would cross the paths utilized by pleasure boats traveling between the mainland and Santa Catalina Island. While the potential for accidents between disposal barges and pleasure boats does exist, this increase in barge trips is not considered substantial. The disposal barges traveling in the LA-2 vicinity will be operating under the regulations within the RNA and VTS and, given the maneuverability of the pleasure boats and the size and slow speed of the disposal barges, the probability of an accident is very low and not significant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Disposal operations would continue at the LA-2 site as in the past, although at a reduce level with up to 5 barge round trips per day at LA-2 as compared to 17 round trips per day for the Preferred Alternative. The reduced number of barges traveling to and from the LA-2 site would reduce the potential for conflicts with pleasure boats (Class III).

Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative. Four of the nineteen disposal barge round trips per day are anticipated to originate from the Los Angeles/Long Beach area and thus would be traveling along the coast (see Table 4.2-2). These four barge trips would cross the paths utilized by pleasure boats traveling between the mainland and Santa Catalina Island. However, this is not considered a substantial increase in boating traffic.

While the potential for accidents between disposal barges and pleasure boats does exist, given the maneuverability of the pleasure boats and the size and slow speed of the disposal barges, the probability of an accident is very low and not considered significant (Class III).

Other Recreational Activities

Most of the recreational activities other than offshore fishing and boating occur at the beaches or in the nearshore areas. Those activities include surf fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing and picnicking.

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. Consequently, there would be no impacts to other recreational activities in the LA-2 area (Class III).

The LA-2 ODMDS would still be used at a higher capacity. As indicated above, there would be a short-term impact to water clarity in the immediate vicinity of the LA-2 site immediately following the disposal of dredged material. However, the LA-2 site boundary lies over 8.5 km (4.6 nmi) from the nearest coast. Consequently, no impacts to the aesthetics of beach visitors are anticipated due to the continued use of LA-2 (Class III)

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present.

As indicated above, there would be a short-term impact to water clarity in the immediate vicinity of the proposed LA-3 site immediately following the disposal of dredged material. However, the proposed LA-3 site boundary lies over 6.5 km (3.5 nmi) from the nearest coast. Consequently, no impacts to the aesthetics of beach visitors are anticipated due to the continued use of LA-3 (Class III).

There would also be a short-term impact to water clarity in the immediate vicinity of the LA-2 site immediately following the disposal of dredged material. However, the LA-2 site boundary lies over 8.5 km (4.6 nmi) from the nearest coast. Consequently, no impacts to the aesthetics of beach visitors are anticipated due to the continued use of LA-2 (Class III).

4.4.3.6 Archaeological, Historical, and Cultural Resources

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. However, the site has been disturbed by past disposal operations. This disturbance would remain and is considered not significant (Class III).

The LA-2 site would continue to be used although with an increased volume limit. However, as indicated in Section 3.4.6, there are no known shipwrecks or other cultural resources within 5 km (2.7 nmi) of the LA-2 site. Alternative 2 involves the continued disposal of dredged material at an existing disposal site and, as such, no impacts to archaeological, historical or cultural resources are anticipated (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. As such the ocean disposal of dredged material would continue at these two sites. As indicated in Section 3.4.6, there are no known shipwrecks or other cultural resources within 5 km (2.7 nmi) of either the LA-2 or proposed LA-3 sites. Furthermore, Alternative 4 involves the continued disposal of dredged material at areas already disturbed by past disposal operations. Consequently, no impacts to archaeological, historical or cultural resources are anticipated (Class III).

4.4.3.7 Public Health and Welfare

a. Alternative 2

Under Alternative 2 disposal operations would cease at LA-3. Consequently there would be no potential impacts to public health and welfare (Class III). The LA-2 site would continue to be used although at an increased volume limit. Dredged material proposed for disposal would continue to be subject to the USACE and EPA testing procedures. As such, no significant impacts to public health and welfare are anticipated (Class III).

Human safety could also be impacted due to collisions between ocean going vessels and the dredged material disposal barges. Impacts could also occur if disposal barges were to interfere or collide with oil and gas development in the San Pedro Bay. Under Alternative 2 disposal operation would cease at LA-3. Consequently, disposal barge traffic traveling to and from the LA-3 site would be eliminated (Class III).

Up to 25 barge round trips per day at LA-2 are anticipated under Alternative 2 as compared to 17 round trips per day for the Preferred Alternative. Ten of these 25 barge round trips are anticipated to originate in the Orange County area (see Table 4.2-2). Consequently, the potential exists for collisions between the disposal barges and the developed oil and gas platforms. These impacts have been discussed in Section 4.4.3.4 and may be avoided through strict navigation and vessel monitoring (Class III). The remaining impacts have been addressed in Sections 4.4.3.2, 4.4.3.3, and 4.4.3.5 above and are determined to not be significant (Class III).

Given the minimal mounding anticipated for the long-term disposal of dredged material and the depth of the LA-2 site, potential impacts to navigation resulting from material mounding within the disposal site are considered insignificant (Class III).

b. Alternative 4

Under Alternative 4, disposal operations would be maximized at LA-3, while LA-2 would be used at a much lower capacity than at present. Dredged material proposed for disposal at these sites would continue to be subject to the USACE and EPA testing procedures. As such, no significant impacts to public health and welfare are anticipated (Class III).

Human safety could also be impacted due to collisions between ocean going vessels and the dredged material disposal barges. Impacts could also occur if disposal barges were to interfere or collide with oil and gas development in the San Pedro Bay. Disposal operations would continue at the LA-2 site as in the past, although at a reduce level with up to 5 barge round trips per day at LA-2 as compared to 17 round trips per day for the Preferred Alternative and 19 round trips per day for the No Action Alternative (see Table 4.2-2). Consequently the potential for conflicts between ocean going vessels and disposal barges traveling to and from the LA-2 site would be minimized under this alternative (Class III).

Up to 19 barge round trips per day at LA-3 are anticipated for Alternative 4 as compared to 15 round trips per day for the Preferred Alternative (see Table 4.2-2). The proposed LA-3 site lies approximately 20 km (10.8 nmi) to the east of the northbound coastwise travel lane of the southern TSS (see Figure 3.4-1). As such, barge traffic traveling from the Los Angeles and Long Beach Harbor areas to the LA-3 site is not likely to utilize the TSS lanes, but rather to travel relatively close to the coast. The developed federal oil and gas facilities located between LA-2 and LA-3 lie within the separation zone of the southern TSS. However, the developed state oil and gas facilities lie roughly 3.3 km (1.8 nmi) off the coast between Seal Beach and Huntington Beach.

Consequently, the disposal barges traveling between the Los Angeles and Long Beach areas would be required to travel in a corridor between these developed facilities. The potential for collisions with these facilities can be avoided through strict navigation routes (Class III). Additionally, because the disposal barges are expected to travel down the coast outside of the TSS lanes and could come relatively close to the Naval anchorages off of Anaheim Bay, the potential exists for conflicts between barge traffic and Naval vessels. Because of the strict vessel monitoring requirements in the area, this is not considered a significant impact (Class III). It is noted that only 4 of the 19 disposal barge round trips per day are anticipated to come from the Los Angeles/Long Beach area (see Table 4.2-2).

Given the minimal mounding anticipated for the long-term disposal of dredged material and the depth of the LA-2 and proposed LA-3 sites, potential impacts to navigation resulting from material mounding within the disposal sites are considered insignificant (Class III).

The remaining impacts have been addressed in Sections 4.4.3.2 and 4.4.3.5 and are determined to not be significant (Class III).

4.5 Management of the Disposal Site(s)

As discussed previously, verification that significant impacts do not occur outside of the site boundaries will be demonstrated through implementation of the Site Management and Monitoring Plan developed as part of the proposed action. The SMMP includes physical monitoring to confirm that the material that is deposited is landing where it is supposed to land as well as monitoring to confirm that the sediment chemistry conforms to the pre-disposal testing requirements. An appropriately developed SMMP will be implemented regardless of which alternative is selected for implementation.

The main purpose of the SMMP is to provide a structured framework for resource agencies to ensure that dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities (Section 103(a) of the MPRSA). Three main objectives for management of both the LA-2 and proposed LA-3 ODMDSs are:

- Protection of the marine environment;
- Beneficial use of dredged material whenever practical; and
- Documentation of disposal activities at the ODMDS.

The EPA and USACE Los Angeles District personnel will achieve these objectives by jointly administering the following activities:

- Regulation and administration of ocean disposal permits;

- Development and maintenance of a site monitoring program;
- Evaluation of permit compliance and monitoring results; and
- Maintenance of an active database for dredged material testing and site monitoring results to insure compliance with annual disposal volume targets and to facilitate future revisions to the SMMP.

Other activities implemented through the SMMP to achieve these objectives include:

- Regulating quantities and types of material to be disposed of, and the time, rates, and methods of disposal; and
- Recommending changes for site use, disposal amounts, or designation for a limited time based on periodic evaluation of site monitoring results.

4.5.1 Ocean Disposal Permits

Dredging projects that propose disposal at an ODMDS require permits. Disposal of materials into the ocean is only permitted if there are no practical alternatives. Environmental risks, impacts, and costs of ocean disposal are some factors evaluated in this process. As such, information required for permit applications must be consistent with USACE's Regulatory Program requirements (33 CFR 320-330), NEPA regulations (33 CFR 230 and 325), and EPA's Ocean Dumping Regulations (40 CFR Parts 220, 225, 227, and 228), and may include the following:

- Written documentation of the need to dispose of dredged material in the ocean;
- Description of historical dredging and activities at or adjacent to the proposed dredging site that may represent sources of contamination to the site;
- Type and quantity of the dredged material proposed for disposal at the site;
- Existing conditions of the proposed dredging area including the proposed dredging depths, overdredge depths, and depths adjacent to the boundary of the proposed dredging area;
- Composition and characteristics of the proposed dredged material including the results from physical, chemical, and biological testing. These data are used to determine whether the proposed dredged material is suitable for disposal at the site;

- Estimate of the planned start and completion dates for the dredging operation; this information is needed to avoid potential resource conflicts and may be used to schedule inspections at the dredging site and/or the disposal site; and

- Development of a debris management plan that addresses the disposal of materials other than the dredged sediment (i.e., pilings or metal debris) to ensure that these other materials are not discharged at the disposal site.

In accordance with the requirements and procedures defined in the EPA's Ocean Dumping Regulations (40 CFR Parts 220, 225, 227, and 228), the suitability of dredged material proposed for disposal at the ODMDS must be demonstrated through appropriate physical, chemical, and biological testing. Ocean Dumping Regulation Section 227.6 prohibits the disposal of certain contaminants other than trace chemical constituents of dredged material. Further, regulatory decisions rely on assessments of the potential for unacceptable adverse impacts based on persistence, toxicity, and bioaccumulation of the constituents instead of specific numerical limits (EPA and USACE 1991).

Determining the suitability of dredged material involves a four-tiered testing procedure. Tiers I and II apply existing or easily obtained information and limited chemical testing to predict effects. If it is predicted that the dredged material has any potential for significant adverse effects, higher tiers are activated. Water column and benthic bioassay and bioaccumulation tests are utilized in Tiers III and IV to determine effects on representative marine organisms.

The EPA Green Book (EPA and USACE 1991) protocols will be used when testing the bioaccumulation potential of dredged material proposed for ocean disposal. The Green Book protocols state that if testing results indicate that the bioaccumulation of contaminants statistically exceeds that of reference material tests, the following eight factors will be assessed to evaluate Limited Permissible Concentrations (LPC) compliance (EPA and USACE 1991):

- Number of species in which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference material;

- Number of contaminants for which bioaccumulation from the dredged material is statistically greater than the bioaccumulation from the reference material;

- Magnitude by which bioaccumulation from the dredged material exceeds bioaccumulation from the reference material;

- Toxicological importance of the contaminants whose bioaccumulation from the dredged material statistically exceeds bioaccumulation from the reference material;

- Phylogenetic diversity of the species in which bioaccumulation from the dredged material statistically exceeds bioaccumulation from the reference material;

- Tendency for contaminants with statistically significant bioaccumulation to biomagnify within aquatic food webs (Biddinger and Gloss 1984; Kay 1984).

- Magnitude of toxicity and number of phylogenetic diversity of species exhibiting greater mortality in the dredged material than in the reference material; and

- Magnitude by which contaminants whose bioaccumulation from the dredged material exceeds that from the reference material also exceeds the concentrations found in comparable species living in the vicinity of the proposed disposal site.

Decisions regarding the suitability of dredged material to be disposed of in the ocean will be guided by the criteria contained in the MPRSA and EPA's Ocean Dumping Criteria. The USACE is authorized by the MPRSA to administer the permit program for dredged material. The USACE, Los Angeles District will prepare the Public Notice concerning the proposed disposal operation. EPA Region IX, as well as other Federal and state agencies, will participate in the review of the application. EPA Region IX, in accordance with 40 CFR 220.4(c), will approve, disapprove, or propose conditions on the MPRSA Section 103 permit. EPA Region IX will not approve disposal of material into the ocean that has the potential for significant adverse biological impacts.

Additional conditions on the disposal operations may be imposed for disposal permits subsequently issued for individual projects in order to preclude or minimize potential interference with other activities and/or uses of the ocean. There are several management options for the permitting process including: limits on disposal volumes, seasonal restrictions, full or partial approval of dredged material proposed for disposal, disposal within a spatially-limited portion of the disposal site, or other requirements such as dredged barge operators to stay within a specified transit path, utilize navigation equipment for specified accuracy, and maintain appropriate ship logs.

EPA Region IX will work with the USACE Los Angeles District and the U.S. Coast Guard to monitor, inspect, and conduct surveillance of disposal operations in the Los Angeles-Orange County area. As authorized under MPRSA Section 105(a), EPA Region IX may take appropriate enforcement actions if violations of the permit(s) are detected.

4.5.2 Site Management and Monitoring

In accordance with 40 CFR 228.3, the EPA is responsible for management of ocean disposal sites, including Ocean Dredged Material Disposal Sites. Additionally, in accordance with 40 CFR 228.9(c) the EPA requires full participation of the permittees and encourages participation by state, federal, and local agencies in the development and implementation of monitoring programs for disposal sites. The EPA will involve the USACE in site monitoring and management since the USACE is a major dredger and federal agency in the Los Angeles/Orange County region.

In concert with the implementation of this action, a detailed Site Management and Monitoring Plan (SMMP) has been developed by the EPA and USACE. The main purpose of the SMMP is to provide a structured framework for resource agencies to ensure that dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities (Section 103(a) of the MPRSA). It is the next step in the continuum of effective resource management that starts with the site designation process.

The SMMP is also used to track all disposal activities in the region as well as to aid in the verification of model predictions. Another key aspect of the SMMP is its inherent flexibility to accommodate unforeseen needs and the associated ability to revise the plan, if necessary, as changes arise or needs are identified in the future. While the basic management and monitoring plan has been structured based on the experience to date at LA-2 and LA-3, there is always the possibility that an unanticipated event or problem will arise that will require accommodations to this current framework. To this end, EPA Region IX and the USACE Los Angeles District will periodically review the SMMP to discuss potential problems or address concerns of other state and federal regulatory agencies or the public regarding disposal activities.

The SMMP, which is included as Appendix A of this EIS, will undergo final public review as part of the proposed rule package for this action required by NEPA.

4.6 Cumulative Impacts as a Result of the Project

4.6.1 Physical Environment

Disposal barge operations will result in air emissions that will contribute to the generally poor air quality in the Los Angeles and Orange County regions. Because of the poor air quality in the region, all air emissions are important. However, compared to all other emission sources in the basins, of which automobiles are the greatest polluters, emissions resulting from the individual barge hauling activities would generally be considered adverse but insignificant.

Under worst-case assumptions all alternatives including the No Action Alternative could result in both daily and yearly emissions that exceed applicable thresholds. However, on an average yearly basis only Alternatives 2 and 4 would result in emissions that could exceed both federal *de minimis* thresholds and SCAQMD thresholds.

Consequently, if the worst-case anticipated dredging operations were to occur in any given year, emissions resulting from any of the alternatives could be cumulatively significant. However, because the actual individual dredging and hauling activities are subject to additional review and permitting, worst-case emissions could be controlled through the permitting process. Consequently, it is anticipated that only those alternatives for which the average yearly emissions are projected to exceed applicable standards would be cumulatively significant.

As such, cumulative air emissions resulting from the No Action Alternative (Alternative 1) and from the Preferred Alternative (Alternative 3) would be considered adverse but cumulatively not significant through the permitting process (Class II). However, because average emissions for Alternatives 2 and 4 could exceed the applicable thresholds, air emissions resulting from these alternatives would be considered cumulatively significant (Class I).

Ongoing and future ocean discharges in the general vicinity of the LA-2 and LA-3 ODMDSs include the discharge of treated wastewater from six facilities: the Joint Water Pollution Control Plant (JWPCP) in Palos Verdes, the Terminal Island Treatment Plant (TITP) in Long Beach, the Orange County Sanitation District (OCSD) facility in Orange County, the city of Avalon outfall on Santa Catalina Island, and the Aliso Water Management Agency (AWMA) and Southeast Regional Reclamation Authority (SERRA) facilities in south Orange County (refer to Figure 1.1-1).

The JWPCP discharge is approximately 8.5 km (4.6 nmi) NNW of LA-2 on the Palos Verdes Shelf and approximately 45 km (24 nmi) NW of the proposed LA-3 site. The TITP outfall is about 12.9 km (7.0 nmi) NNE of LA-2 in Outer Los Angeles Harbor and approximately 40 km (21.6 nmi) NW of the proposed LA-3 site. The OCSD outfall is approximately 13 km (7.0 nmi) WNW of the proposed LA-3 site at a depth of 60 m (197 ft), and approximately 26 km (14 nmi) WSW of the LA-2 site. The Avalon outfall is approximately 30 km (16 nmi) south of the LA-2 site and approximately 42 km (22.4 nmi) WSW of the proposed LA-3 site. The AMWA and SERRA outfalls are about 12 and 20 km (6.5 and 11 nmi) ESE of the proposed LA-3 site, and approximately 51 and 59 km (27.5 and 32 nmi) ESE of the LA-2 site, respectively.

It is likely that solids discharged from the wastewater facilities sink to the bottom and are redistributed by bottom currents, which are stronger at shallower depths than at the LA-2 and proposed LA-3 sites. Overall, cumulative impacts resulting from the Preferred Alternative, as well as the other alternatives, are considered adverse but insignificant (Class III).

4.6.2 Biological Environment

The discharge of treated wastewater has led to changes in the community structure of benthic and epibenthic organisms in the vicinity of the JWPCP and OCSD outfalls (LACSD 2000; OCSD 2000). Off Palos Verdes, reduced wastewater emissions have led to improvements in sediment quality and subsequently the benthic infauna. The community has shifted from one dominated by pollution-tolerant organisms to one that more closely resembles an unaffected community. Off Orange County, outfall effects are evident in the area surrounding the outfall, including increased abundance of pollution-indicator species. However, there has also been a recorded decrease in pollution-tolerant organisms near the outfall, most likely resulting from reduced mass emissions. The discharge of treated wastewater from the OCSD has not led to any long-term changes in the fish and epibenthic invertebrate assemblages off Orange County, though small-scale differences in the area of the outfall have been recorded.

Overall, cumulative impacts resulting from the Preferred Alternative, as well as the other alternatives, are insignificant (Class III) for the biological resources in the vicinity of the two ODMDSs.

4.6.3 Socioeconomic Environment

The continued ocean disposal of dredged material at the LA-2 and proposed LA-3 ODMDSs will contribute to limited cumulative impacts to the socioeconomic uses of the San Pedro Basin in the vicinity of Los Angeles and Orange Counties.

The effects of nearshore wastewater discharge on commercial fishing off Palos Verdes and Newport Beach are unknown, but landings in the commercial Catch Blocks in the areas of the JWPCP and OCSD outfalls are among the highest in the central portion of the Southern California Bight (between Point Dume and San Mateo Point; EPA 1997).

There has been a gradual loss of commercial fishing areas due to offshore oil development, outsourcing of canning operations to southern Pacific islands (thus removing a prime customer of the local fishing industry), and other conflicting uses of the coastal area. Commercial catches have also been on the decline most likely due to overfishing and possibly due to loss of habitat and stresses from pollutants. Nevertheless, the continued disposal of dredged material at LA-2 and LA-3 will not cause any permanent loss of additional fishing area. Consequently, the continued use of the LA-2 and proposed LA-3 sites as dredge material disposal sites is only anticipated to cause temporary losses of fishing area during the time the disposal barges are actually on site due to temporary vessel conflicts. The continued use of the LA-2 and proposed LA-3 sites for the ocean disposal of dredged material will have an adverse but insignificant cumulative impact on fishing (Class III).

Impacts to demersal fish populations due to the continued use of the LA-2 and proposed LA-3 sites would be extremely localized within the disposal site boundaries. Therefore, the cumulative impact on fish populations due to the continued use of the LA-2 and proposed LA-3 sites would be adverse but insignificant (Class III).

As discussed in Section 4.6.1, the continued disposal of dredged material at the LA-2 and proposed LA-3 sites would contribute inputs of materials in the San Pedro Basin offshore of the Los Angeles and Orange County areas that could be substantial. Consequently, materials discharged at the ODMDSs would contribute to pollution stresses on fish populations in the area. Ecological effects of pollution stresses on coastal fish populations are not well understood. However, increased body burdens of pollutants associated with the disposal activities were not detected in fishes sampled in the recent field surveys. Therefore, the contribution to pollution stresses on fish populations due to the continued use of the LA-2 and proposed LA-3 sites is presumed to be adverse but insignificant (Class III).

Barge trips to and from the disposal sites would contribute to cumulative heavy vessel (commercial and military) traffic in the San Pedro Basin. On a worst-case day the Preferred Alternative could generate up to 15 barge trips to and from the LA-3 site, while on a worst-case day the Preferred Alternative could generate up to 17 barge trips to and from the LA-2 site. Consequently, the continued use of the LA-2 and proposed LA-3 disposal sites would cumulatively add to the potential for vessel conflicts within the Basin. However, because of the vessel monitoring and traffic separation schemes in place within the project area, the risk of conflicts with heavy vessel traffic is considered adverse but cumulatively not significant (Class III).

Disposal operations take place away from shore and are not anticipated to cumulatively impact recreational activities.

Further, the continued availability of the LA-2 and LA-3 sites for the ocean disposal of dredged material would facilitate the improvement and maintenance of shipping lanes, channels, and docking of the area ports. This is because the availability of these disposal sites would provide flexibility in the management options for the disposal of dredged material that is associated largely with channel deepening and port improvement projects. The goal of these port improvement projects is to provide for the access and movement of larger, more efficient commercial vessels that would result in transportation savings. Consequently, the continued availability of the LA-2 and proposed LA-3 ODMDSs is essential to the efficient operation of commercial shipping in the region (Class III)..

4.7 Relationship Between Short-Term and Long-Term Resource Uses

The proposed action is not expected to produce significant, long-term adverse impacts to resources including the physical, biological, and socioeconomic environments within the study region. Local adverse effects to sediments, benthic invertebrates, and demersal fish may occur. Impacts will persist as long as the sites continue to be used for dredged disposal. If disposal operations were discontinued at these sites, there would be a gradual recovery of the benthic communities over time.

Both the LA-2 and LA-3 sites have been used for dredge disposal since the late 1970's, respectively; continued use of these areas as ODMDSs is not expected to interfere with the long-term use of any resource in the area. No significant effects to commercial fishing or sportfishing have occurred because the sites represent a small percentage of total fishing grounds in the San Pedro Channel. In addition, new oil and gas developments are not expected in the area and if they do occur it is feasible that recovery of these resources can be realized without significantly interfering with disposal activities. Therefore, no adverse impact to utilization of these resources is expected.

The only effect to resources on-site expected as a result of the proposed action is a minor reduction in biological productivity at the disposal sites, which is offset by the benefits of maintaining the channels and waterways in the area for recreational and commercial traffic and the subsequent disposal of dredged material at an environmentally suitable location.

4.8 Irreversible or Irretrievable Commitment of Resources

The irreversible or irretrievable resources committed to the proposed final designation of the proposed LA-3 site or to the revised maximum managed disposal quantities at LA-2 will remain the same as those committed to the present sites. These commitments include:

- Energy resources used to dredge, transport, and dispose of the material;
- Economic costs associated with ocean disposal activities; and
- Benthic resources of the immediate disposal area degraded by the disposal of dredged material.

However, the commitments associated with the proposed action are less significant than the environmental effects associated with alternative disposal methods.

CHAPTER 5.0
COORDINATION

This chapter contains information on the public involvement and interagency activities related to the Draft Environmental Impact Statement (DEIS) for designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California (Section 5.1), evidence of formal consultation with the appropriate agencies (Section 5.2), and the public distribution and requested review of the DEIS (Section 5.3).

5.1 Notice of Intent and Public Scoping Meeting

The Notice of Intent (NOI) to prepare an environmental impact statement related to the designation of an ocean dredged material disposal site known as LA-3 was published in the *Federal Register* on July 3, 2003 (Exhibit 1).

A total of four public scoping meetings were held on July 21 and July 22, 2003. Meetings were held in the morning and afternoon of July 21, 2003 in Newport Beach, California, and in the morning and afternoon of July 22, 2003 in Long Beach, California. The purpose of these meetings was to identify affected public and agency concerns and to define the issues and alternatives to be addressed in detail in the EIS. During the meetings the EPA described the need for and the process of site designation and identified the four alternatives to be considered. The alternatives include the No Action Alternative (Alternative 1), the Maximize Use of LA-2 Alternative (Alternative 2), the Local Use of LA-3 and LA-2 Alternative (Alternative 3), and the Maximize Use of LA-3 Alternative (Alternative 4).

Comments made during the public scoping meetings covered the following general topics:

- Concern regarding turbidity and pollution and potential for onshore drift of sediments discharged at LA-3 to Newport Beach and Corona del Mar

- Location of the LA-3 site: Closeness of the site location from shore; closeness of state special designated area

- Concern that LA-3 would act as another pollution source in Newport Canyon

- Opposition to the shipping of sediments from the ports of Long Beach and Los Angeles to LA-3

5.2 Formal Consultation

Formal consultation with federal and state agencies is required by the Endangered Species Act to identify any threatened, endangered, or special status species that may be affected by the proposed action. The formal consultation process with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service was initiated on December 3, 2001 (Exhibits 2 and 3). Additional consultation documentation including responses from these two agencies is shown in Exhibits 4 and 5.

Consultation with the State Historic Preservation Officer (SHPO) is required by the National Historic Preservation Act to identify any areas within the study region of architectural, archeological, historic, or cultural value that are listed or eligible for listing on the National Register of Historic Places.

5.3 Public Distribution of the Draft Environmental Impact Statement

Table 5.3-1 lists the agencies, organizations, and individuals to whom the DEIS was distributed. The public distribution list of the draft Environmental Impact Statement occurs as follows:

A Notice of Availability (NOA) of the DEIS is published in the Federal Register and local newspapers and sent to agencies, companies, organizations and individuals identified on the U.S. Army Corps of Engineers Los Angeles District Environmental Resources Branch's mailing list for the project. A copy of the DEIS may be reviewed at any of the locations shown in Table 5.3-2. Comments on the document will be accepted throughout the 45-day public comment period initiated by the date of publication of the NOA.

TABLE 5.3-1
DISTRIBUTION LIST FOR THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

Name	Organization
	Federal Agencies
Joshua Burnam	U.S. Army Corps of Engineers, Regulatory Branch
R. Mikulskis	U.S. Coast Guard
Lisa Hans	U.S. Environmental Protection Agency, San Francisco
Steven John	U.S. Environmental Protection Agency
John Hanlon	U.S. Fish and Wildlife Service
Bob Hoffman	U.S. National Marine Fisheries Service
	State Agencies
Larry Simon	California Coastal Commission
Marilyn Fluharty	California Department of Fish and Game
Michael Lyons	Los Angeles Regional Water Quality Control Board
	Local Agencies
Tom Rossmiller	City of Newport Beach, Harbor Resources
Joseph Chesler	County of Los Angles Department of Beaches and Harbors
Laurie Ames	County of Los Angeles Department of Beaches and Harbors
Susan Brodeur	County Of Orange, Watershed and Coastal Resources
Dennis Eschen	Long Beach Parks, Recreation and Marine
Tom Johnson	Port of Long Beach
Kathryn Curtis	Port of Los Angeles
	Independent Groups
Mitzi Taggert	Heal the Bay
	Libraries
	Lloyd Taber – Marina del Rey Library
	Long Beach Public Library
	Los Angeles Public Library – Central Library
	Los Angeles Public Library – San Pedro Regional Branch Library
	Newport Beach Public Library – Balboa Branch
	Newport Beach Public Library – Central Library
	Newport Beach Public Library – Corona del Mar Branch
	Newport Beach Public Library – Mariners Branch

TABLE 5.3-2

LOCATIONS WHERE THE DEIS CAN BE REVIEWED OR REQUESTED

Copies of this DEIS May Be Reviewed at the Following Locations	
Lloyd Taber - Marina del Rey Library 4533 Admiralty Way Marina del Rey, CA 90292	Newport Beach Public Library Corona del Mar Branch 420 Marigold Avenue Corona del Mar, CA 92625
Long Beach Public Library 101 Pacific Avenue Long Beach, CA 90822	Newport Beach Public Library Mariners Branch 2005 Dover Drive Newport Beach, CA 92660
Los Angeles Public Library Central Library 630 West 5th Street Los Angeles, CA 90071	U.S. Environmental Protection Agency Library 75 Hawthorne Street 13th Floor San Francisco, CA 94105
Los Angeles Public Library San Pedro Regional Branch Library 931 South Gaffey Street San Pedro, CA 90731	U.S. Environmental Protection Agency Southern California Field Office 600 Wilshire Boulevard, Suite 1460 Los Angeles, CA 90017
Newport Beach Public Library Balboa Branch 100 East Balboa Boulevard Balboa, CA 92661	EPA website: www.epa.gov/region9/
Newport Beach Public Library Central Library 1000 Avocado Avenue Newport Beach, CA 92660	U.S. Army Corps of Engineers' website: www.spl.usace.army.mil

Copies of this DEIS may be requested by writing to the following address:

U.S. Environmental Protection Agency
Region IX
Wetlands, Oceans and Estuaries Branch (W-7)
ATTN: Allan Ota
75 Hawthorne Street
San Francisco, CA 94105

EXHIBIT 1

Summary: EPA has no significant concerns with the preferred alternative.

ERP No. D–BLM–K65250–NV Rating LO, Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area (NCA) and Associated Wilderness and Other Contiguous Lands Resource Management Plan, Implementation, Great Basin, NV.

Summary: EPA had no significant concerns with the preferred alternative.

ERP No. D–FHW–G40173–LA Rating LO, I–49 South Lafayette Regional Airport to LA–88 Route U.S. 90 Project, Upgrading Existing U.S. 90 from the Lafayette Regional Airport to LA–88, Funding, Iberia, Lafayette and St. Martin Parishes, LA.

Summary: EPA has no objection to the selection of the preferred alternative.

ERP No. D–FHW–H40179–MO Rating LO, Missouri River Corridor Widening and Improvements, New Four Lane Expressway, Corridor consist of Four Segments: Front Street, Chouteau Trafficway, South Riverfront Expressway (SRE) and Little Blue Expressway (LBE), Funding, Jackson and Clay Counties, MO.

Summary: EPA has no objections to the proposed project. However, EPA recommends that a chronological evaluation of other planned actions relative to the proposed implementation schedule of the Missouri River Corridor be utilized to derive the preferred alternative.

ERP No. D–NPS–C61055–NJ Rating LO, Morristown National Historical Park General Management Plan, Implementation, Morris and Somerset Counties, NJ.

Summary: EPA has no objections with the management plan and requests the opportunity to review future NEPA documents prepared for specific actions outlined in the programmatic plan.

ERP No. DA–FHW–B40037–RI Rating EC2, Jamestown Bridge Replacement Project, New Information Regarding the Demolition of the Old Jamestown Bridge (Bridge No. 400), Federal Aid Project Number (BRF–0138(002), U.S. Coast Guard Bridge, NPDES and U.S. Army COE Section 404 Permits Issuance, Towns of North Kingstown and Jamestown, Washington and Newport Counties, RI.

Summary: EPA expressed environmental concerns and requested additional information to more fully describe flora and fauna to the project area and the existing conditions at candidate reef sites; to document the impacts associated with both the demolition and disposal phases of the project; and to address air quality issues associated with the work.

ERP No. DS–FTA–C40150–NY Rating EC2, Second Avenue Subway Project, Transit Access Improvements to Manhattan's East Side and Excess Crowd Reduction on the Lexington Avenue Subway, Funding, New York, NY.

Summary: EPA has environmental concerns with the proposed project's air quality impacts, particularly carbon monoxide (CO) and particulate matter, as well as wetland impacts.

Final EISs

ERP No. F–AFS–F65032–MN Holmes/ Chipmunk Timber Sale Project, Implementation, Superior National Forest, LaCroix Ranger District, Saint Louis County, MN.

Summary: EPA determined that previous environmental concerns have been addressed in this Final EIS.

ERP No. F–AFS–K65245–AZ Kachina Village Forest Health Project, Forest Health Improvements and Potential Wildfire Reductions on National Forest System Land, Implementation, Coconino National Forest, Mormon Lake Ranger District, Coconino County, AZ.

Summary: No formal comment letter was sent to the preparing agency.

ERP No. F–BLM–K09808–NV Ivanpah Energy Center Project, 500 Megawatt (MW) Gas-Fired Electric Power Generating Station Construction and Operation, Approval, Right-of-Way Grant, BLM Temporary Use Permit, FHWA Permit to Cross Federal Aid Highway, U.S. Army COE Section 10 and 404 Permits and NPDES Permit Issuance, Clark County, NV.

Summary: No formal comment letter was sent to the preparing agency.

ERP No. F–FHW–E40783–SC Dave Lyle Boulevard Extension on New Location, SC–161/Dave Lyle Boulevard Intersection in York County to SC–75, at the US–521/SC–75 Intersection, near the South Carolina/North Carolina Border in Lancaster, Funding, York and Lancaster Counties, SC.

Summary: EPA continues to have environmental concerns with the proposed project regarding impacts and mitigation for endangered species, wetlands, and traffic noise.

ERP No. F–FHW–F40410–IL Milan Beltway Extension, Airport Road to Blackhawk Road/John Deere Expressway, Funding and Permits Issuance, Rock River, Rock Island County, IL.

Summary: EPA has no objections to the preferred alternative, which we believe will have minimal environmental impacts, provided mitigation is implemented, and which meets the stated purpose of addressing area traffic volume.

ERP No. F–FHW–K40247–CA CA–22/ West Orange County Connection Project, Transportation Improvements between I–605 and CA–55, Funding, Cities of Los Alamitos, Seal Beach, Garden Grove, Westminster, Santa Ana and Orange, Orange County, CA.

Summary: EPA has no objections to the proposed project. However, EPA asked that FHWA's Record of Decision clarify if the project disturbs or removes polychlorinated biphenyls (PCBs), a toxic substance, at facilities or structures proposed for displacement.

ERP No. F–JUS–K81028–CA Juvenile Justice Facility and East County Hall of Justice Development, Potential Construction of Both Projects on the Same Site or on Separate Sites, Alamenda County, CA.

Summary: EPA expressed a lack of objections to this project.

ERP No. F–NPS–K65239–AZ Tonto National Monument General Management Plan, New Administrative Facility Construction within the Monument Boundaries, Implementation, AZ.

Summary: No formal comment letter was sent to the preparing agency.

ERP No. FS–AFS–L61199–ID Salmon Wild and Scenic River Management Plan, Timeline Change From December 31, 2002 to December 31, 2005 and Clarification of Economic Impacts on the Camps, Stub Creek, Arctic Creek and Smith Gulch Creek, Salmon National Forest, Salmon County, ID.

Summary: No formal comment letter was sent to the preparing agency.

Dated: June 30, 2003.

Joseph C. Montgomery,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 03–16848 Filed 7–2–03; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6641–8]

Public Input Requested on the Proposed Site Designation of the "LA–3" Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Intent to initiate the scoping phase for public input in advance of preparing an Environmental Impact Statement (EIS) to designate "LA–3" as a permanent ocean dredged material disposal site (ODMDS) off Newport Bay, California.

EXHIBIT 1

PURPOSE: EPA has the authority to designate ODMDS under Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33USC 1401 *et seq.*). EPA's preparation of this EIS is being carried out pursuant to the October 29, 1998 Notice of Policy and Procedures for Voluntary Preparation of National Environmental Policy Act (NEPA) (63 FR 58045). Public comments on the scope of the EIS evaluation will be accepted for 45 days from the date of this notice.

FOR FURTHER INFORMATION, TO SUBMIT COMMENTS, AND TO BE PLACED ON A PROJECT MAILING LIST, CONTACT: Mr. Allan Ota, U.S. Environmental Protection Agency, Region 9, Dredging and Sediment Management Team (WTR–8), 75 Hawthorne Street, San Francisco, California 94105–3901, Telephone: (415) 972–3476 or FAX: (415) 947–3537 or E-mail: *R9_LA3LA2disposal sites_scoping@epa.gov.*

SUMMARY: EPA intends to conduct public meetings and collect public comments in advance of preparing an EIS to designate LA–3 as a permanent ODMDS off Newport Bay, California. The EIS will also re-evaluate an annual disposal volume limit for the existing LA–2 ODMDS, and how to minimize cumulative environmental impacts from two ODMDS in the region.

NEED FOR ACTION: Dredging is essential for maintaining safe navigation in harbors and marinas in the Los Angeles County and Orange County region. Not all dredged materials are suitable for beneficial re-use (*e.g.*, construction, wetlands restoration), and it is not feasible to use the existing LA–2 ODMDS for all projects in the region. The LA–3 ODMDS has been used by some Orange County projects in the past, but its "interim" status has expired. Therefore there is a need to designate LA–3 as a permanent ODMDS.

ALTERNATIVES: The following proposed alternatives have been tentatively defined.

—"No Action"—Do not designate LA–3 as a permanent ODMDS, and continue to manage the existing LA–2 ODMDS without a designated maximum annual disposal volume limit.

—"Maximize Use of LA–2"—Do not designate LA–3 as a permanent ODMDS, but establish a maximum annual disposal volume limit for the LA–2 site adequate to meet the ocean disposal needs of all Los Angeles-Orange County region projects.

—"Local Use of LA–3 and LA–2"—Designate LA–3 as a permanent ODMDS primarily for Orange County projects, and establish a higher maximum annual disposal volume limit for LA–2 to accommodate most Los Angeles area projects.

—"Maximize Use of LA–3"—Designate LA–3 as a permanent ODMDS with a maximum annual disposal limit to meet the ocean disposal needs of all Los Angeles-Orange County region projects to the extent feasible, and establish an annual disposal volume limit for LA–2 to accommodate only those projects that could not feasibly use LA–3.

SCOPING: EPA is requesting written comments from federal, state, and local governments, industry, non-governmental organizations, and the general public on the need for action, the range of alternatives considered, and the potential impacts of the alternatives. Scoping comments will be accepted for 45 days, beginning with the date of this Notice. Public scoping meetings are scheduled at two locations on the following dates: 1. July 21, 2003, 2–4 p.m. and 7–9 p.m., in Orange County at the Upper Newport Bay Peter and Mary Muth Interpretive Center, 2301 University Drive, Newport Beach, California 92660 (corner of University Drive and Irvine Avenue). 2. July 22, 2003, 2–4 p.m. and 7–9 p.m., in Los Angeles County at the Port of Long Beach, 925 Harbor Plaza, Long Beach, California 90802, on the 5th Floor Conference Room.

Estimated Date of Draft EIS Release: February 2004.

Dated: June 30, 2003.

Anne Norton Miller,

Director, Office of Federal Activities.

[FR Doc. 03–16846 Filed 7–2–03; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[OPP–2003–0229; FRL–7315–4]

Pyridaben; Notice of Filing a Pesticide Petition to Establish a Tolerance for a Certain Pesticide Chemical in or on Food

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: This notice announces the initial filing of a pesticide petition proposing the establishment of regulations for residues of a certain pesticide chemical in or on various food commodities.

DATES: Comments, identified by docket ID number OPP–2003–0229, must be received on or before August 4, 2003.

ADDRESSES: Comments may be submitted electronically, by mail, or through hand delivery/courier. Follow the detailed instructions as provided in Unit I. of the **SUPPLEMENTARY INFORMATION.**

FOR FURTHER INFORMATION CONTACT: Shaja R. Brothers, Registration Division (7505C), Office of Pesticide Programs, Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460–0001; telephone number: (703) 308–3194; e-mail address: brothers.shaja@epa.gov.

SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this Action Apply to Me?

You may be potentially affected by this action if you are an agricultural producer, food manufacturer, or pesticide manufacturer. Potentially affected entities may include, but are not limited to:

- Crop production (NAICS 111)
- Animal production (NAICS 112)
- Food manufacturer (NAICS 311)
- Pesticide manufacturer (NAICS 32532)

This listing is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. Other types of entities not listed in this unit could also be affected. The North American Industrial Classification System (NAICS) codes have been provided to assist you and others in determining whether this action might apply to certain entities. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed under **FOR FURTHER INFORMATION CONTACT.**

B. How Can I Get Copies of this Document and Other Related Information?

1. *Docket.* EPA has established an official public docket for this action under docket identification (ID) number OPP–2003–0229. The official public docket consists of the documents specifically referenced in this action, any public comments received, and other information related to this action. Although a part of the official docket, the public docket does not include Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. The official public docket is the collection of materials that is available for public viewing at the Public Information and Records Integrity Branch (PIRIB), Rm. 119, Crystal Mall #2, 1921 Jefferson Davis Hwy., Arlington, VA. This docket

EXHIBIT 2

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

December 3, 2001

REPLY TO
ATTENTION OF

Office of the Chief
Environmental Resources Branch

Mr. Bob Hoffman
National Marine Fisheries Service
501 West Ocean Blvd. Suite 4200
Long Beach, California 90802-4221

Dear Mr. Hoffinan:

The U.S. Army Corps of Engineers is preparing a Notice of Intent (NOI) for the preparation of a Draft Environmental Impact Statement (DEIS) for the LA-3 Ocean Disposal Site Permanent Certification Project. We are conducting a study program for designating the LA-3 existing interim site as a permanent site for the ocean disposal of dredged materials in Orange County, California. The study area is located on the continental slope of the Newport Submarine Canyon at a depth of about 450 meters, approximately 7.5 kilometers southwest of the entrance of Newport Harbor in Orange County, California.

Please provide us your written comments for this project and provide a current list of any endangered, threatened, proposed or candidate species, pursuant to the Endangered Species Act of 1973, that may be affected by the proposed project. This letter also requests your review and written comments for this project, pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, as amended. Comments, and the species list, should be forwarded by December 17, 2001 to:

Ms. Ruth Bajza Villalobos
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: Mr. Larry Smith
P.O. Box 532711
Los Angeles, California 90053-2325

Should you require additional information or have any questions, please contact Mr. Larry Smith, Project Ecologist, at (213) 452-3846.

Sincerely,

Andrew W Miller

for Ruth Bajza Villalobos
Chief, Planning Division

EXHIBIT 3

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

December 3, 2001

REPLY TO
ATTENTION OF

Office of the Chief
Environmental Resources Branch

Mr. John Hanlon
U.S. Fish and Wildlife Service
2493 Portola Road, Suite B
Ventura, California 93003

Dear Mr. Hanlon:

The U.S. Army Corps of Engineers is preparing a Notice of Intent (NOI) for the preparation of a Draft Environmental Impact Statement (DEIS) for the LA-3 Ocean Disposal Site Permanent Certification Project. We are conducting a study program for designating the LA-3 existing interim site as a permanent site for the ocean disposal of dredged materials in Orange County, California. The study area is located on the continental slope of the Newport Submarine Canyon at a depth of about 450 meters, approximately 7.5 kilometers southwest of the entrance of Newport Harbor in Orange County, California.

Please provide us your written comments for this project and provide a current list of any endangered, threatened, proposed or candidate species, pursuant to the Endangered Species Act of 1973, that may be affected by the proposed project. Please include species of concern. This letter also requests your review and written comments for this project. Comments, and the species list, should be forwarded by December 17, 2001 to:

Ms. Ruth Bajza Villalobos
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: Mr. Larry Smith
P.O. Box 532711
Los Angeles, California 90053-2325

Should you require additional information or have any questions, please contact Mr. Larry Smith, Project Environmental Coordinator, at (213) 452-3846.

Sincerely,

Andrew Miller
for Ruth Bajza Villalobos
Chief, Planning Division

EXHIBIT 4

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

FEB 12 2002 F/SWR4:RSH

Ms. Ruth Bajza Villalobos
Chief, Planning Division
Los Angeles District
U.S. Army Corps of Engineers
ATTN: Mr. Larry Smith, CESPL-PD-RN
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Ms. Bajza Villalobos:

Thank you for providing the National Marine Fisheries Service (NMFS) the opportunity to provide comments relative to the preparation of a Draft Environmental Impact Statement (DEIS) for the LA-3 Ocean Disposal Site Permanent Certification Project. This letter is provided in accordance with the Fish and Wildlife Coordination Act and PL 94-265 - the Magnuson-Stevens Fishery Conservation and Management Act.

Per your request, NMFS believes that there are no endangered, threatened, proposed or candidate species under the jurisdiction of NMFS that may be affected by the proposed project. The DEIS should describe and consider impacts to Federally managed fish species and other marine resources from the continued disposal of material at this site. A description of past disposal practices and expected future actions should also be included in the DEIS.

Should you have any questions, please contact me at 562-980-4043 or email: bob.hoffman@noaa.gov.

Sincerely,

Robert S. Hoffman
Acting Assistant Regional Administrator
for Habitat Conservation

cc:
USFWS - Carlsbad (Jack Fancher)
CDFG - San Diego (Marilyn Fluharty)

EXHIBIT 5

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

In Reply Refer To:
FWS-OR-2543.1

JAN 11 2002

Ms. Ruth Bajza Villalobos
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: Mr. Larry Smith
P.O. Box 532711
Los Angeles, California 90053-2325

Re: Request for Information on Proposed, Threatened, and Endangered Species for LA-3 Ocean Disposal Site Permanent Certification Project, Orange County, California

Dear Ms. Villalobos:

This is in response to your letter, received on December 14, 2001, requesting information concerning federally listed species that may be affected by the proposed certification of LA-3 as a permanent ocean disposal site. LA-3 is located on the continental slope of the Newport Submarine Canyon at a depth of about 450 meters, approximately 7.5 kilometers southwest of Newport Harbor in Orange County, California. To assist you in evaluating the potential occurrence of these species within the area of interest, we are providing the enclosed list, which identifies federally listed endangered, threatened, and proposed species that occur in the general region.

The area around the proposed disposal site may be used for foraging by the federally endangered California brown pelican (*Pelecanus occidentalis*), which can forage a considerable distance offshore. The federally endangered California least tern (*Sterna antillarum browni*) forages adjacent to Newport Harbor during the breeding season (April 1 to September 15), but rarely forages more than two miles from shore while breeding and rearing young (Jack Fancher, pers. comm.). Therefore, it is unlikely that California least terns utilize the area around the ocean disposal site.

Section 7 of the Endangered Species Act (Act) of 1973, as amended, requires Federal agencies to consult with us should it be determined that their actions may affect federally listed threatened or endangered species. Section 9 of the Act prohibits the "take" (e.g., harm, harassment, pursuit, injury, kill) of federally listed wildlife. "Harm" is further defined to include habitat modification or degradation where it kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Take incidental to otherwise lawful activities can be authorized under sections 7 (Federal consultations) and 10 (habitat conservation plans) of the Act.

EXHIBIT 5

We share administration of the Act with the National Marine Fisheries Service (NMFS). NMFS also administers the Marine Mammal Protection Act of 1972 and should be contacted regarding potential impacts to marine species protected under these laws. We also recommend that you contact the California Department of Fish and Game regarding potential impacts to state-listed or state-sensitive species.

Should you have any questions regarding the species list provided, or your responsibilities under the Act, please contact Fish and Wildlife Biologist Jonathan Snyder of my staff at (760) 431-9440 with any questions.

Sincerely,

Karen A. Evans
Assistant Field Supervisor

Enclosure

References:

Fancher, Jack. U.S. Fish and Wildlife Service. Personal Communication. January 2002.

EXHIBIT 5

Federally Endangered, Threatened, Proposed, and Candidate Species Which May Occur in the Project Area, LA-3 Ocean Disposal Site, Orange County, California

Common Name	Scientific Name	Federal Status
Birds		
California brown pelican	*Pelecanus occidentalis californicus*	Endangered

CHAPTER 6.0

PREPARERS AND CONTRIBUTORS

This chapter provides a list of the individuals involved in the preparation of the EIS (Table 6-1).

TABLE 6-1
LIST OF PREPARERS

Name	Expertise	Experience	Responsibility
U.S. Environmental Protection Agency			
Allan Ota, M.S.	Biological oceanography	20 years conducting research, and preparation and review of technical reports; regulatory role in EPA marine protection programs.	EIS review
U.S. Army Corps of Engineers			
Kathleen Stryker Anderson	Environmental science	16 years project management and sediment remediation.	Project Manager
Lawrence J. Smith	Coastal ecology/marine dredging	18 years	Environmental Coordinator
Contractor: RECON Environmental Inc.			
David M. Gottfredson, B.S.	NEPA documentation, air quality, and acoustics	Over 10 years experience preparing technical studies and documents in support of CEQA/NEPA environmental review.	Project Manager, EIS preparation

TABLE 6-1
LIST OF PREPARERS
(continued)

Name	Expertise	Experience	Responsibility
Charles S. Bull, M.A.	NEPA compliance	Over 32 years experience preparing cultural resources, acoustical technical studies and other environmental documents in support of CEQA/NEPA environmental review.	EIS review
Paul Fromer, M.S.	NEPA documentation and habitat conservation planning	Over 24 years experience preparing biological technical studies, habitat management plans, and other environmental documents in support of CEQA/NEPA environmental review.	EIS review
Loretta Gross	Technical editing	Over 25 years of document production and copy editing support.	Document production
Eija Blocker, B.A.	Technical editing	Over 20 years of documentation, translation, and copy editing support.	Document production

TABLE 6-1
LIST OF PREPARERS
(continued)

Name	Expertise	Experience	Responsibility
Vince Martinez, B.A.	Graphics and cartography	4 years experience producing graphics and cartography for technical reports.	Graphics production
Rommel Reyes, B.S.	GIS analysis	Over 7 years of GIS/GPS support work and data analysis.	GIS and graphics production
Contractor: **MBC Applied Environmental Sciences, Inc.**			
Shane Beck, B.A.	Physical oceanography and fisheries biology	Over 11 years conducting ecological studies and preparation of technical reports.	Preparation and review of EIS sections: Affected Environ-ment and Environmental Consequences. EIS Review.
David Vilas, B.A.	Physical oceanography and sedimentology	Over 21 years conducting physical and biological research and preparation of technical reports.	Preparation and review of EIS sections: Affected Environ-ment and Environmental Consequences.

TABLE 6-1
LIST OF PREPARERS
(continued)

Name	Expertise	Experience	Responsibility
Carol Paquette, B.S.	Benthic biology and ecology	Over 30 years researching benthic environments and preparation of technical reports.	Preparation and review of EIS sections: Affected Environment and Environmental Consequences.
Name	Expertise	Experience	Responsibility
Robert Moore, B.A.	Fisheries biology	Over 24 years conducting environmental studies and preparation of technical reports.	Preparation and review of EIS sections: Affected Environment and Environmental Consequences.
Contractor: **Noble Consultants, Inc.**			
Chia-Chi Lu, Ph.D., P.E.	Ocean/coastal engineering	Plan formulation and model Simulations	Zone of Siting Feasibility study and fate of dredged material disposed at LA-3 and LA-2
Mills Soldate, Ph.D.	Marine physics science	Model simulations	Fate of dredged material disposed at LA-3 and LA-2

TABLE 6-1
LIST OF PREPARERS
(continued)

Name	Expertise	Experience	Responsibility
David Altman, MS	Coastal engineering	Plan formulation	Zone of Siting Feasibility study
Contractor: Germano & Associates			
Joseph D. Germano, Ph.D.	Marine biology, sediment profile imagery	Over 20 years conducting marine environmental studies with emphasis on dredged material disposal management & impact assessment	Baseline sediment characteristics; site management and monitoring plan
Peggy L. Myre, M.S.	Geochemistry	Over 15 years conducting contaminated sediment assessments and dredged material disposal/management studies	Baseline sediment characteristics; site management and monitoring plan
Raymond M. Valente, M.S.	Marine science, sediment profile imagery	Over 18 years of experience in marine environmental monitoring and impact assessment with emphasis on dredged material disposal	Baseline sediment characteristics

TABLE 6-1
LIST OF PREPARERS
(continued)

Name	Expertise	Experience	Responsibility
Contractor: Chambers Groups Inc.			
Novel Davis, Ph.D.	Marine biology	Marine environment studies and EIS preparation	Biological baseline survey and statistic analysis
Todd A. Chapman	Marine biology	Marine and freshwater studies	Biological baseline survey

CHAPTER 7.0
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APPENDIXES

APPENDIX A

LA 2/ LA 3 Ocean Dredged Material Disposal Site Management & Monitoring Plan

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1.0 Introduction

The disposal of dredged material in ocean waters, including the territorial sea is regulated under the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), 33 U.S.C. § 1401, ff. The transportation of dredged material for disposal into ocean waters is permitted by the U.S. Army Corps of Engineers (USACE) (or, in the case of federal projects, authorized for disposal under MPRSA §103(e)) only after environmental criteria established by U.S. Environmental Protection Agency (EPA) are applied. The Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580) made a number of changes to the MPRSA. As amended by Section 506 of WRDA 92, Section 102 (c) of the MPRSA provides that, in the case of ocean dredged material disposal sites (ODMDS), no site shall receive a final designation unless a management plan has been developed. EPA and the USACE issued a joint guidance document in February 1996 for the development of ocean dredged material disposal site management plans (EPA/USACE, 1996).

MPRSA Section 102(c)(3), as amended by WRDA 92, sets forth a number of requirements regarding the content and development of site management plans, including:

(A) a baseline assessment of conditions at the site;

(B) a program for monitoring the site;

(C) special management conditions or practices to be implemented at each site that are necessary for protection of the environment;

(D) consideration of the quantity of the material to be disposed of at the site, and the presence, nature, and bioavailability of the contaminants in the material;

(E) consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure of the site; and

(F) a schedule for review and revision of the plan (which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter).

Similar ocean dredged material disposal sites receiving similar material may be combined into a single management plan provided that all MPRSA Section 102 (c)(3) requirements are met for each site (EPA/USACE, 1996). Both the LA-2 and LA-3 sites qualify under this criterion, and disposal at these sites is coordinated jointly by the same EPA and USACE offices; therefore, this management plan will fulfill the requirements for both the LA-2 and LA-3 sites.

The requirements of this Site Management and Monitoring Plan (SMMP) (and the compliance and enforcement provisions of the MPRSA regulations themselves) apply to all projects using the LA-2 and LA-3 ODMDS, including both projects which have received an "ocean dumping permit" issued by the USACE under Section 103 of the MPRSA, and federal projects conducted by or for the USACE. Throughout this SMMP, the term "permittee" is used generically to apply to all these projects, even though the USACE does not issue a "permit" per se for its own dredging projects.

2.0 Site Management Plan

This management plan has been developed jointly by the U.S. EPA Region IX and the USACE Los Angeles District. Both the LA-2 and LA-3 sites have been in use since the mid-1970s; the LA-2 site was officially designated as a permanent ocean dredged material disposal site in February 1991, and the LA-3 site has remained in interim status until now. While a site management plan for the LA-2 site was established previously, the current site designation EIS provides the opportunity to re-examine both sites in light of historical data on the effects of three decades of dredged material disposal and to design a coordinated management/monitoring plan that will allow effective natural resource coordination by the EPA and USACE for both sites.

2.1 Background

This site management plan for the LA-2 and LA-3 ODMDS was developed with the advantage of having more than 25 years of agency experience managing these two sites. A wealth of previous data exists (see attached EIS), and the streamlined nature of the plan reflects many of the lessons learned from past disposal projects and monitoring surveys at these two locations. The main purpose of the management plan is to provide a structured framework for resource agencies to ensure that dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities (MPRSA 103 § [a]). It is the next step in the continuum of effective resource management that starts with the site designation process.

Another key aspect of the management plan is the inherent flexibility to accommodate unforeseen needs and the associated ability to revise the plan, if necessary, as changes arise or needs are identified in the future. While the basic management and monitoring plan has been structured based on the experience to date with these two locations, there is always the possibility that an unanticipated event or problem will arise that will require accommodations to this current framework. To this end, the SMMP will be reviewed periodically by EPA Region IX and the USACE Los Angeles District to discuss potential problems or address concerns of other state and federal regulatory agencies or of the public regarding disposal activities.

2.1.1 Objectives

The three main objectives for management of both the LA-2 and LA-3 ODMDS are not different than any other open-water disposal site:

- Protection of the marine environment,
- Beneficial use of dredged material whenever practical, and
- Documentation of disposal activities at the ODMDS.

EPA and USACE Los Angeles District personnel will achieve these objectives by jointly administering the following activities:

- Regulation and administration of ocean disposal permits,
- Development and maintenance of a site monitoring program,
- Project-specific compliance tracking of disposal operations,
- Evaluation of permit compliance and monitoring results, and
- Maintenance of an active database for dredged material testing and site monitoring results to insure compliance with annual disposal volume targets and to facilitate future revisions to the SMMP.

2.1.2 Site Management Roles & Responsibilities

While EPA and the USACE work in coordination on all ODMDS in U.S. waters, they also have separate authorities over these sites. The roles and responsibilities for managing both the LA-2 and LA-3 ODMDS are outlined in Table 1 below:

Table 1
Designation of Management Responsibilities

Site Management Task	Responsible Agency
ODMDS Site Designation	EPA Region IX
Disposal Project Evaluation & Permit Issuance	USACE Los Angeles District[1] with EPA Region IX concurrence

[1] Issued by either the Planning/Operations or Regulatory Branch of the USACE Los Angeles District, as appropriate

Table 1
Designation of Management Responsibilities (cont.)

Site Management Task	Responsible Agency
Project-specific Compliance Tracking of Disposal Operations	USACE Los Angeles District and EPA Region IX
Enforcement Actions for Permit Violations at Dredging Site	USACE Los Angeles District (lead agency)
Enforcement Actions for Permit Violations for Disposal Operations (primary) and Dredging Site (secondary)	EPA Region IX
Disposal Site Monitoring	USACE Los Angeles District with periodic assistance from EPA Region IX
Disposal Site Data Maintenance – Pre-disposal and Confirmatory Testing	USACE Los Angeles District and EPA Region IX

2.1.3 Funding

Funding for this site management plan was provided by USACE Los Angeles District; funds for past disposal site monitoring have been provided by the USACE Los Angeles District and EPA. Funding for future site monitoring will be provided by the USACE and other users; EPA will provide periodic funding and/or EPA research vessel for site monitoring. A dredged material testing database is currently under development by the regional Contaminated Sediment Task Force and may be used for LA-3 as well.

2.2 Baseline Assessment of Site Conditions

A comprehensive description of physical, chemical, and biological characteristics of the sediments and water column can be found in the attached draft EIS; a brief summary of the site conditions at LA-2 and LA-3 will be presented below.

2.2.1 Disposal Site Characterization

The historical interim LA-3 site is located on the continental slope of Newport Submarine Canyon at a depth of about 450 meters (m; 1,475 feet [ft]), approximately 7.5 kilometers (km; 4.7 miles) southwest of the entrance of Newport Harbor. This region is characterized by a relatively smooth continental slope (approximately two-degree slope) incised by a complicated pattern of superimposed, meandering broad submarine canyons that can be up to 30 m (98 ft) deep and 200-800 m (656-2,625 ft) wide. The interim site boundary was centered at 33º31'42" N and 117º54'48" W with a 915-meter (3,000-foot) radius. The new LA-3 site chosen as the preferred alternative in the draft EIS is the same size but located 2.4 km to the southeast of the current interim site and centered at 33°31'00" N and 117°53'30" W.

In addition to the LA-3 ODMDS site, the LA-2 ODMDS site has been designated for the ocean disposal of dredged material. The existing LA-2 ODMDS is located on the outer continental shelf, margin, and upper southern wall of San Pedro Sea Valley at depths from 110 to 320 m (360 to 1,050 ft), about 11 km (6.8 miles) south-southwest of the entrance to Long Beach Harbor. The relatively flat continental shelf occurs in water depths to about 125 m (410 ft) with a regional slope of 0.8 degree. The slope becomes steep at about 7 degrees seaward to the shelf break. The southern wall of San Pedro Sea Valley drops away with slopes steeper than 9 degrees. The site boundary is centered at 33º37'6" N and 118º17'24" W with a radius of 915 meters (3,000 ft).

2.2.1.1 Currents, Temperature, Salinity, and Dissolved Oxygen

2.2.1.1.1 LA-3

SAIC (2001) found predominant currents to be longshore, though upcoast currents were more prevalent below about 25 m (82 ft) depth, and downcoast currents prevailed above 25 m (82 ft). Barotropic tidal currents (which are driven by pressure differentials) in the region were relatively weak as compared to the background, lower frequency fluctuations. Strong, periodic current fluctuations at exactly 24 hours (with a weaker but probably linked response at 12 hours) in the study area likely resulted from the diurnal sea-breeze system in the study area. Currents driven by local sea breezes forced a strong sheared flow in the upper third of the water column over the outer shelf, with strongest winds and strongest currents recorded in summer.

Long-term water temperatures from monitoring in the area range from approximately 12-24°C (54-75 °F) at the surface to 10-13°C (50-55 °F) at the bottom (CSDOC 1996, 1998). In 1994, temperatures at depths of about 200 m (656 ft) in the area approached 9°C (48 °F; SCCWRP 2002). Seasonal temperature structures in the LA-3 area are typical of the southern California bight (SCB). In winter, the water column is unstratified or weakly stratified, with temperature difference of less than 2°C (3.6 °F) between the surface and 60 m (197 ft) depth (MITECH 1990).

Salinities over the Orange County Slope over a ten-year period ranged from 33-34 ppt at the surface to 33.2-34 ppt to a depth of 100 m (328 ft; CSDOC 1996). Salinity increased gradually with depth, with salinities of slightly more than 34 ppt found at depths of about 200 m (656 ft) in 1994. Seasonal changes in surface salinity can be pronounced, with salinity reductions of up to 4 to 5 ppt noted in the upper 10 m (32.8 ft) of the water column due to freshwater runoff during winter (CSDOC 1996). Evaporation can cause slight salinity increases in surface waters, but below the thermocline, water column salinities remain stable.

Seasonal patterns of dissolved oxygen concentrations in the LA-3 area are typical of the SCB. Generally, higher concentrations are found in surface waters due to atmospheric mixing, with a decrease in dissolved oxygen (DO) concentrations with depth (CSDOC 1996, 1998). During winter, the DO reduction with depth is gradual, with typical reductions of about 2 mg/l between the surface and 60 m (197 ft; CSDOC 1998). Lowest concentrations in the area tend to occur at depth in spring, when colder, oxygen-depleted water is upwelled into the area (SCCWRP 1983). Developing in spring, and most evident during the summer, DO levels are characterized by a subsurface DO maximum near the bottom of the surface-mixed layer, usually in the upper 10 to 40 m (32.8 to 131 ft), a rapid decline through the thermocline, then a more gradual reduction with depth below the thermocline. In fall, as water column stratification decreases, differences in DO concentrations throughout the water column are reduced and the DO maximum may be found slightly deeper than in summer. The long-term range of DO concentrations in the LA-3 area is approximately 6-11 mg/l at the surface and 3-7 mg/l at a depth of 90 m (295 ft; CSDOC 1996).

2.2.1.1.2. LA-2

SAIC (1992) deployed three current meters in the vicinity of the LA-2 site in 1991. Surface currents over the outer shelf at Mooring A were directed alongshore (within ±30°) 58 percent of the time, split almost equally between upcoast and downcoast (SAIC 1992). The overall mean speed was about 15 cm/sec (0.29 kn). At mid-depth, 54 percent of the current was directed north-northwest to east-northeast, with average currents directed upcoast at 4.72 cm/sec (0.09 kn). There was also a weak onshore flow at mid-depth (0.24 cm/sec [0.005 kn]). Near bottom, current directions were oriented approximately 30° clockwise from the alongshore alignment (30° to 180° True) with the overall mean velocity downcoast at 0.4 cm/sec (0.008 kn) and offshore at 0.17 cm/sec (0.003 kn).

Seasonality in the area of LA-2 is similar to that throughout the SCB, with temperature structures changing throughout the year. Water quality results from the Los Angeles County Sanitation Districts (LACSD) monitoring inshore and upcoast of LA-2 showed limited vertical temperature stratification in February 2000 with a temperature difference of about 3°C (5.4 °F) from the surface to 100 m (328 ft; LACSD 2000). During winter, limited stratification or isothermal conditions are typical in the area. In May 2000, upwelling processes brought cold water closer to the surface and further inshore than during other times of the year. At the same time, surface waters became warmer, forming a shallow thermocline (LACSD 2000). By August, a strong thermocline had formed in the area, with temperatures mostly above 18°C (64 °F) in the upper 10 to 20 m (32.8 to 65.6 ft) of the water column, and peak surface temperatures over 21°C (70 °F). In November, a strong thermocline was still present. Surface water temperatures were lower than their summer highs, but the depth of the thermocline had increased, suggesting that heat energy was stored deeper in the water column.

Salinity in the LA-2 area is relatively stable, with a range between 31.5 and 34.7 ppt among seasons and throughout the water column. Reduced surface salinities in the area are attributable to freshwater runoff from the Los Angeles/Long Beach Harbor complex and the San Gabriel River (LACSD 2000). This feature is apparent inshore of LA-2 throughout the year, but most notable in the winter months. Highest salinities are found at depth in spring, when seasonal upwelling brings deeper water onto the Palos Verdes shelf. During the summer and fall, evaporation tends to increase the salinity of the surface waters in the area of LA-2, leading to salinity minimums below the thermocline.

Dissolved oxygen distributions in the area are primarily determined by vertical stratification (LACSD 2000). Water in the upper 30 m (98 ft) of the water column tends to be at or close to saturation year-round, with values as high as 12.3 mg/l recorded. Dissolved oxygen levels tend to be lowest below 30 m (98 ft) when upwelling brings oxygen-depleted deep water up onto the shelf. At 100 m (328 ft) depth, DO levels are about one-half that of surface waters. Dissolved oxygen concentrations as low as 1.5 mg/l have been found near LA-2 at a depth of 380 m (1,247 ft; IEC 1982).

2.2.1.2 Sediment Grain-Size, TOC, Metals, and Hydrocarbons

2.2.1.2.1 LA-3

In summer 2000, sediments within the LA-3 interim site boundary had a larger proportion of sand and gravel and a lower proportion of silt compared with sediments at stations surrounding the site and at the reference site (Chambers Group 2001). The percentages of fines (silt and clay combined) in sediments at LA-3 in 2000 (37 to 94%) were similar to, but in general slightly lower than, the percentages of fines in sediments from Newport Canyon in 1999 (46 to 98%) and in Newport Canyon from 1985 through 1989 (66 to 97%) (Maurer et al. 1994; SAIC 2000) This is expected, as Newport Canyon serves as a sediment trap, accumulating fine-grained sediments (Maurer et al. 1994; SAIC 2000). TOC values at the LA-3 recent and historical disposal sites (1.2 to 4.3%; Chambers Group, 2001) were slightly higher than those found throughout the shelf of the SCB (mean = 0.75%, maximum = 5.1%) (Schiff and Gossett 1998).

In general, distribution of sediment metals in 2000 was similar among the reference, recent disposal, historical disposal, and LA-3 boundary sites (Chambers Group 2001). Overall, sediment metal concentrations at all LA-3 sampling sites ranged as follows, with all concentrations reported as dry weight: arsenic (4.6 to 13.7 mg/kg), cadmium (0.41 to 1.08 mg/kg), chromium (20.0 to 47.9 mg/kg), copper (17.4 to 26.0 mg/kg), lead (8.97 to 19.9 mg/kg), mercury (0.04 to 0.13 mg/kg), nickel (11.4 to 26.1 mg/kg), selenium (<0.50 to 1.43 mg/kg), silver (0.11 to 1.16 mg/kg), and zinc (57.2 to 101 mg/kg).

Total polycyclic aromatic hydrocarbon (PAH) concentrations were relatively similar among stations within the interim LA-3 boundary, areas with recent disposal mounds, and the reference area (Chambers Group 2001). Higher total PAH concentrations at the historical disposal mound area resulted from comparatively high levels of benzo(a)pyrene and pyrene at one station within that area (HD1). However, no PAH concentration exceeded prescribed ERL levels. Concentrations of most pesticides in sediments were undetectable at most locations at LA-3 (Chambers Group 2001). Mean levels of all pesticides except 2,4’-DDD, 2,4’-DDT, and toxaphene were elevated at the recent disposal mound stations due to anomalously high values at one station within that area (Station RD4). Pesticide concentrations at the other sampling sites were comparatively low, though concentration of 4,4'-DDE ranged from 3 to 43 μg/kg (dry weight) at the historical disposal site, disposal site, and reference areas. Sediment polychlorinated biphenyls (PCB) concentrations at LA-3 were all relatively low, and the ERL for total PCBs was not exceeded at any location (Chambers Group 2001). In general, hydrocarbon concentrations at LA-3 and surrounding areas in summer 2000 were comparable to those measured in previous surveys at LA-3 and off Orange County (SCCWRP 1983; MITECH 1990; Schiff and Gossett 1998; OCSD 2000; SAIC, MEC, and CRG 2001 cited in Chambers Group 2001).

2.2.1.2.2 LA-2

Sediments in the LA-2 site and surrounding areas in summer 2000 were composed primarily of silt and sand, lesser amounts of clay, and relatively small gravel fractions (Chambers Group 2001). Sediments within and adjacent to the LA-2 site boundary differed from those collected at the reference area in that the reference area sediments were composed of smaller amounts of fines and larger fractions of sand. Sediments averaged 5 to 9 percent clay, 22 to 40 percent silt, and 50 to 73 percent sand and gravel combined (Chambers Group 2001). Total organic carbon (TOC) values at LA-2 ranged from 0.4 to 6.0 percent, with the highest value (6.01%) recorded at a reference site (Chambers Group 2001). TOC percentages within the LA-2 site boundary (0.9 to 1.5%) were similar to values recorded at the adjacent disposal site (0.4 to 2.1%).

The range of sediment metal concentrations in 2000 at LA-2 was similar to that recorded at LA-3, with variability within and among the three sampling strata (Chambers Group 2001). Overall, sediment metal concentrations at the LA-2 sampling sites ranged as follows, with all concentrations reported as dry weight: arsenic (3.3 to 12.6 mg/kg), cadmium (0.11 to 1.29 mg/kg), chromium (20.1 to 69.4 mg/kg), copper (7.58 to 38.3 mg/kg), lead (6.5 to 31.6 mg/kg), mercury (0.03 to 0.22 mg/kg), nickel (7.95 to 30.2 mg/kg), selenium (<0.47 to 1.1 mg/kg), silver (0.08 to 0.94 mg/kg), and zinc (31.1 to 87.3 mg/kg).

Individual sediment PAH compound concentrations differed among locations at LA-2, though total PAH concentrations were relatively similar among the three LA-2 sampling areas (Chambers Group 2001). Highest mean total PAH concentrations were recorded at the stations adjacent to the LA-2 disposal site, and mean values were slightly higher at the reference site than within the disposal site. Pesticides were detected at all stations at LA-2, and the DDT congeners were most commonly detected (Chambers Group 2001). Sediment PCB concentrations at LA-2 were variable among station groups and highest at the adjacent disposal sites (Chambers Group 2001). In general, PCB concentrations were lowest at the reference site, with higher values recorded at the disposal and adjacent disposal sites. Mean total PCB values were 3.0 μg/kg at the reference sites, 13.9 μg/kg within the disposal site, and 22.6 μg/kg at the adjacent disposal area. DDT concentrations within the LA-2 disposal site were similar to values reported at LA-2 in 1983-1984 (EPA 1987) and throughout the SCB in 1994 (Schiff and Gossett 1998). DDT values at LA-2 were much lower than those recorded further inshore near the JWPCP wastewater discharge in 2000, where sediment concentrations exceeded 32,000 μg/kg (LACSD 2000). Total PCBs in 2000 were lower than those recorded in 1983-1984 (EPA 1987) and further inshore in 2000 (LACSD 2000) and similar to those recorded on the mainland shelf of the SCB (Schiff and Gossett 1998).

2.2.1.3 Biological Environment

2.2.1.3.1 Plankton

Plankton distributions tend to be patchy, and individual stations sampled more than once exhibit great variation; the overall plankton patterns are similar at both the LA-2 and LA-3 disposal sites. In general, greatest concentrations of plankton are found in the SCB in early fall and spring months, and abundances are lowest in late fall and winter months (AHF1959). The phytoplankton of the SCB consists of a great variety of species covering a wide size range. Surveys conducted for the State Water Resources Control Board (SWRCB) during the late 1950s at 800 stations from Point Conception to San Diego identified at least 81 phytoplankton taxa (AHF 1959). Of the individuals counted, 54 percent were diatoms and 41 percent were dinoflagellates, with ciliates and miscellaneous forms accounting for the remainder (AHF 1965). The abundance of phytoplankton in the SCB varies. Populations are more abundant in spring, and to a lesser degree so in fall (Hardy 1993). Phytoplankton are restricted to the upper photic zone of the water column. In general, abundances are greatest in subsurface, near the bottom of the surface-mixed layer, corresponding to depths with a favorable balance of light energy and nutrients to promote growth.

The zooplankton of the SCB consists of a large and diverse group of organisms. The SCB is a transition zone between subarctic, central, and equatorial species assemblages, and zooplankton assemblages and ecology are related to oceanic variability (Dawson and Pieper 1993). Zooplankton abundances tend to be patchy and highly variable (Thrailkill 1956; Dawson and Pieper 1993). Zooplankton in the near shore waters of the SCB show seasonal trends, with highest abundances occurring from April to June, and lowest abundances from December to February. Peak abundances may be found seasonally inshore to mid-depths, but generally decrease with distance from shore. Unlike phytoplankton, zooplankton are found throughout the water column, but are generally most abundant in the euphotic zone. Zooplankton tend to be strongly diurnal, with vertical migrations into surface waters at dusk and back to deeper water at dawn. Calanoid copepods dominate the nearshore zooplankton fauna of the SCB, with *Acartia*, *Paracalanus*, *Labidocera,* and *Calanus* the most commonly collected genera (Dawson and Pieper 1993).

2.2.1.3.2 Benthos

Typically in the SCB, polychaete annelids are the most abundant and diverse phylum (major taxonomic group), followed by arthropods and mollusks. A number of minor phyla also occur and may occasionally be abundant. The dominant species or taxa (species which are most abundant) and community assemblage patterns (species which are usually found together, or how much areas are similar to each other) are also used for comparisons of infaunal communities. Habitat type is an important determinant of community composition, particularly water depth and sediment characteristics, such as coarseness and heterogeneity. Because of this, natural variability is difficult to separate from the anthropogenic effects (LACSD 2000).

Since the first systematic studies of the benthic infauna of the SCB, the patchy distribution of these organisms, even the dominant species, has been noted. Attempts to define infaunal assemblages and discern the basis for their distributions have continued. Some community parameters follow gradients of environmental variables, both physical and chemical. Abundance and species richness generally decline with increasing water depth, but these relationships have been shown to derive from decreases in sediment grain size and increase in organic content with depth (Gray 1974). Natural factors, including physical disturbance, bioturbation, competition for space, and predation, have also been shown to play a role (Brenchley 1981; CSDOC 1996).

Comparison of the infaunal communities at the LA-3 and LA-2 disposal sites with those at reference areas or the SCB in general is complicated by the different sampling and processing methods employed. Density and species richness were greater at LA-2 disposal site than at the LA-3 disposal site because of depth and sediment differences. At LA-2, mean density per study ranged from 1,730 to 7,700 individuals/m^2 within the site boundary, from 2,120 to 11,125 individuals/m^2 at adjacent disposal areas, and 840 to 6,380 individuals/m^2 at reference sites and other study areas of similar depth in the vicinity. This demonstrates considerable overlap between areas. SCB-wide values for similar depths ranged from 1,550 to 4005 individuals/m^2. Mean species richness ranged from 27 species (in small samples) to 73 species at the disposal site. Values ranged from 27 species (small samples) to 54 species at adjacent disposal areas, and from 12 (small samples) to 87 species at reference sites and other study areas.

Mean density at the LA-3 site ranged from 322 to 545 individuals/m^2 (the last value from samples washed on a finer screen than other samples). Historic and recent disposal site densities ranged from 377 to 545 individuals/m^2, and adjacent sites ranged from 953 to 1,360 individuals/m^2. Designated reference sites ranged from 391 to 954 individuals/m^2, while regional values for similar depths averaged 833 individuals/m^2. Species richness ranged from 14 species (small samples) to 29 species at the disposal site, 18 to 24 species at the recent and historic disposal sites, 17 to 69 species at adjacent areas, and 16 to 20 species at reference sites.

2.2.1.3.3 Nekton

The fish populations that occur on the California coast are generally differentiated by depth or depth-related factors (Allen and Mearns 1977). The species composition at the interim LA-3 site was typical of that seen in demersal fish communities on the slope at the depth range sampled (Allen and Mearns 1977; Cross 1987). During the 2000-2001 surveys, the most abundant species taken were longspine thornyhead (*Sebastolobus altivelis*), dogface witch-eel (*Facciolella gilberti*), Dover sole, and shortspine thornyhead (*Sebastolobus alascanus*). These four species occurred at all four locations during both seasons, and together comprised over 83 percent of the total abundance (Chambers Group, 2001). Commercial fisheries between 1999 and 2001 in Catch Block 738 (CDFG unpubl. data 2002) showed that fish catch was dominated by schooling species that occurred in the surface waters, with Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), jack mackerel (*Trachurus symmeticus*), and white croaker (*Genyonemus lineatus*) comprising the top five species.

The species composition at the LA-2 site was typical of that seen in demersal fish communities on the slope at the depth range sampled (IEC 1982; Tetra Tech and MBC 1985; SCCWRP 1983; CSDOC 1996; Allen et al. 1998). Because of the shallower depth, a different species assemblage was seen compared to that at the interim LA-3 site, with only seven species occurring at both locations. During the combined surveys, the most abundant species taken at LA-2 were Pacific sanddab, slender sole (*Lyopsetta exilis*), and shortspine combfish (*Zaniolepis frenata*). Commercial and sportfisheries in Catch Block 740 (CDFG unpublished data 2002) between 1999 and 2001 were dominated by three offshore schooling species that occur in the surface waters, Pacific sardine, Pacific mackerel, and northern anchovy, and two species that are associated with sandy bottom, California halibut (*Paralichthys californicus*) and white croaker.

2.2.2 Disposal Site History

The present LA-3 site has been used for disposing sediment dredged from harbors and flood channels within the County of Orange since 1976. A total of 2,969,178 yd^3 of dredged material has been disposed of at LA-3 since its first use more than 25 years ago (see Table 1.1-2, Draft EIS).

The LA-2 ODMDS was designated as a permanent disposal site on February 15, 1991, with an anticipated disposal volume of 200,000 yd^3 per year. This volume was developed during the EIS study based upon the historical and predicted future maintenance dredging at Los Angeles, Long Beach, and Marina del Rey Harbors. However, due to newly planned capital projects, the disposal quantity has occasionally exceeded the annual limit. A total of 5,175,341 yd^3 of dredged material has been disposed of at LA-2 since its inception (see Table 1.1-3, Draft EIS).

2.3 Special Management Conditions or Practices

In addition to any project-specific site-use conditions, the following generic conditions on the use of LA-2 or LA-3 include the following (as explained in section 1.0 Introduction, references to “permit” and “permittee” are generic references to all projects or project sponsors):

A) *Mandatory conditions.* All permits or federal project authorizations authorizing use of the LA-2 or LA-3 shall include the following conditions, unless approval for an alternative permit condition is sought and granted pursuant to paragraph (C) of this section:

1) Transportation of dredged material to the LA-2 or LA-3 shall only be allowed when weather and sea state conditions will not interfere with safe transportation and will not create risk of spillage, leak, or other loss of dredged material in transit to the LA-2 or LA-3.

2) Dredged material shall not be leaked or spilled from disposal vessels during transit to the LA-2 or LA-3 ODMDS.

3) When dredged material is discharged within the LA-2 or LA-3 site, no portion of the vessel from which the materials are to be released (*e.g.*, hopper dredge or towed barge) can be further than 200 meters (650 feet) from the center of the target area designated in the permit. The center of the ODMDS (Table 2) is also the center of the target area for disposal:

Table 2
Dimensions and Center Coordinates for the Southern California Disposal Sites

ODMDS	Dimensions		Center Coordinates	
	Diameter of Surface Target Area	Diameter of Disposal Site (Seafloor Target Area)	Latitude (NAD 83)	Longitude (NAD 83)
LA –2	610 m (2000 ft)	1830 m (6000 ft)	33º37'6" N	118º17'24" W
LA – 3	610 m (2000 ft)	1830 m (6000 ft)	33°31'00"N	117°53'30"W

4) No more than one disposal vessel may be present within the permissible dumping target area referred to in paragraph (3) of this section at any time.

5) Disposal vessels shall use an appropriate primary navigation/tracking system capable of indicating and recording the position of the vessel carrying dredged material (for example, a hopper dredged vessel or towed barge) with a minimum accuracy and precision of 30.5 meters (100 feet) during all disposal operations. The primary system must also indicate the opening and closing of the doors of the vessel carrying the dredged material. If the primary navigation/tracking system fails, all disposal operations must cease, until the navigational capabilities are restored. If the primary system fails during transit to the ODMDS, a back-up navigation/tracking system, with all of the capabilities listed in this condition, may be used to complete the trip.

6) The permittee shall maintain daily records of the amount of material dredged and loaded into barges for disposal; the times that disposal vessel depart for, arrive at, and return from LA-2 or LA-3; the exact locations and times of disposal; and the volumes of material disposed at LA-2 or LA-3 during each vessel trip. The permittee shall further record wind and sea state observations at intervals to be established in the permit.

7) For each disposal vessel trip, the permittee shall maintain a computer printout from a Global Positioning System or other acceptable navigation system showing transit routes and disposal coordinates, including the time and position of the disposal vessel, when dumping was commenced and completed.

8) An authorized and responsible representative of the prime contractor or permittee (not a subcontractor) shall inspect each disposal vessel prior to its departure for either ODMDS. The authorized representative shall certify (along with the disposal vessel captain), whether the specifications on the approved Scow Certification Checklist have been met. The authorized representative shall promptly inform the permittee, whether there are any inaccuracies or discrepancies concerning this information and shall provide a summary for the calendar month in a report to EPA and USACE by the 15th day of the following month. Space for a representative from EPA or the USACE will be available on any disposal vessel should a federal regulator desire to observe disposal operations on any specific trip.

9) The permittee shall report any variances from mandatory or special conditions during disposal operations to the District Engineer and the Regional Administrator within 24 hours. In addition, the permittee shall prepare and submit reports, including a cover letter summarizing problems and corrective action(s) taken, certified accurate by the designated authorized representative, on a frequency that shall be specified in permits, to the District Engineer and the Regional Administrator setting forth the information required by Mandatory Conditions in paragraphs (7) and (8) of this section.

10) At the completion of short-term dredging projects, at least annually for ongoing projects, and at any other time or interval requested by the District Engineer or Regional Administrator, permittees shall prepare and submit to the District Engineer and Regional Administrator a report that includes complete records of all dredging, transport, and disposal activities, such as navigation logs, disposal coordinates, scow certification checklists, and other information required by permit conditions. Electronic data submittals may be required to conform to a format specified by the agencies. Permittees shall include a report indicating whether any dredged material was dredged outside the areas authorized for dredging or was dredged deeper than authorized for dredging by their permits.

B) *Project-specific conditions.* Permits or federal project authorizations authorizing use of the LA-2 or LA-3 may include additional conditions, if EPA or the USACE determines these conditions are necessary to facilitate safe use of the LA-2 or LA-3, the prevention of potential harm to the environment, or accurate monitoring of site use. These can include any conditions that EPA or the Corps of Engineers determine to be necessary or appropriate to facilitate compliance with the requirements of the MPRSA, such as timing of operations or methods of transportation and disposal.

C) *Alternative permit/project conditions.* Alternatives to the permit conditions specified in this section in a permit or federal project authorization may be authorized if the permittee demonstrates to the District Engineer and the Regional Administrator that the alternative conditions are sufficient to accomplish the specific intended purpose of the permit condition in issue and further demonstrates that the waiver will not increase the risk of harm to the environment, the health or safety of persons, nor will impede monitoring of compliance with the MPRSA, regulations promulgated under the MPRSA, or any permit issued under the MPRSA.

2.4 Quantity of Material and Type of Material Allowed

Both LA-2 and LA-3 are restricted to the disposal of dredged material only. Under the preferred alternative, LA-3 would be permanently designated at an annual maximum quantity of 2,340,000 yd^3, and the LA-2 site would be used for an annual maximum volume of 1,300,000 yd^3. Management decisions about the suitability of dredged material for ocean disposal are guided by criteria in the MPRSA and EPA's Ocean Dumping Regulations; guidance on specific aspects of these regulations is provided in *Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters* (the "Green Book"; EPA/USACE 1991). EPA Region IX in coordination with USACE Los Angeles District may develop additional regional guidance in the future for sediment testing which should be used in addition to the 1991 Green Book. The USACE Los Angeles District has the authority to evaluate the suitability of projects for ocean disposal and issue the required permits.

Regulatory decisions about dredged material proposed for ocean disposal will be based on the following:

1. Compliance with applicable criteria defined in the EPA's Ocean Dumping Regulations at 40 CFR Part 227.
2. Requirements imposed on the permittee under the USACE Permitting Regulations at 33 CFR Parts 320-330 and 335-338.
3. The potential for significant adverse environmental impacts at either LA-2 or LA-3 from disposal of the proposed dredged material.

Potential environmental impacts from dredged material disposal are considered significant when such impacts pose an unacceptable risk to the marine environment or human health. Determinations will be based on appropriate methods to evaluate differences between the proposed dredged material and reference site sediments for chemicals of concern, acute toxicity of the proposed dredged material, the magnitude of bioaccumulation, and potential ecological impacts. The main concerns are that disposal of sediments may cause: 1) significant mortality or bioaccumulation of contaminants within the disposal site or adjacent to the site boundaries and 2) adverse ecological changes to either the ODMDS or the surrounding ocean floor. Changes in the benthic community are expected, because different sediment-grain size and periodic disturbance will promote colonization of the site by different benthic species that may be on the surrounding bottom outside the site.

Management actions, involving the permit process or disposal site(s), are designed to reduce or mitigate any adverse environmental impact (see Section 3, Site Monitoring Plan). Management options for the permitting process include, but are not limited to: 1) full or partial approval of the dredged material proposed for ocean disposal, 2) prohibition of sediments proposed for ocean disposal, or 3) special management restrictions for ocean disposal of the suitable material (e.g., limits on disposal quantities, specification of frequency, timing, equipment, or disposal at designated areas within either ODMDS). Management actions for the disposal site following unfavorable monitoring results may include, but are not limited to: additional confirmatory monitoring to delineate the extent of the problem, capping to isolate the sediments from potential biological receptors, or closure of the site.

2.5 Anticipated Site Use

Both the LA-2 and LA-3 sites are permanent sites in deep water (110 – 450 meters; 360 – 1475 feet) where accumulation of material will never become a navigation hazard; therefore, no closure is planned for either of these sites at this time.

2.6 Site Management Plan Review and Revision

Because this SMMP has been developed after almost 3 decades of dredged material disposal at these two sites with no unreasonable or significant impacts to the marine environment, we feel reasonably confident that the important site management and monitoring requirements are known and covered in this document. However, there is always the possibility for unanticipated problems or events, in which case modifications to the management or monitoring plan will be decided jointly with EPA Region IX and USACE Los Angeles District personnel.

Absent any unforeseen or unanticipated problems with the management or monitoring of dredged material disposal at either LA-2 or LA-3 ODMDS, this plan will be reviewed (and revised if necessary) at 10-year intervals.

3.0 Site Monitoring Plan

Site monitoring is a requirement for use of both the LA-2 and LA-3 disposal sites; disposal operations will be prohibited if resources for implementing the SMMP are not available. Routine monitoring surveys (described below) at either site will occur at least every 5 years or more frequently as determined by EPA. The primary purpose of the environmental monitoring plan is to verify the predictions in the DEIS of site conditions following disposal. Simply stated, these predictions are that: a) only acceptable dredged material is disposed at the site, b) no substantial amounts of dredged material will go outside the site, c) no substantial amount of bioaccumulation is occurring inside the site, and d) no adverse effects are occurring to biological resources outside the site. A summary of how these predictions are addressed in the tiered site monitoring plan (described in detail in the sections to follow) is presented in Table 3. Dredged material that is suitable for ocean disposal under the 1991 Green Book guidelines is expected to cause acceptable impacts within the disposal site. These include burial of any onsite benthic communities and potentially some chronic, sub-lethal biological effects to any onsite fauna from associated chemicals of concern in the disposed sediments. Partial recolonization will occur within the site, but full recovery of the benthic community the designated boundary of LA-2 or LA-3 is not expected during active use of either site, because continued disposal operations will tend to bury any recolonizing fauna. Full recolonization of the site with no long-term associated environmental impact would be expected if either site is ever closed in the future and disposal is discontinued.

Table 3
A Summary of the Tiered Disposal Site Monitoring Design

	Predictions Tested Within Tier				
Tier Level	a. Only Acceptable Material Inside	b. No Material Outside	c. No Bioaccumulation Inside	d. No Outside Adverse Effects	Trigger Level to Initiate Next Tier or Management Action
1	✓	✓	(by default)	(by default)	Sediment chemistry elevated above disposal or historical values, or material outside site
2			✓	✓	Material fails bioeffects testing, or anomalous recolonization pattern outside site
3				✓	Management action to be determined by regulatory agencies

Two types of monitoring will be carried out at the LA2/LA3 disposal sites: routine compliance monitoring as part of ongoing disposal projects, and periodic tiered disposal site monitoring (Figure 1). The routine project compliance monitoring that provides the necessary feedback for on-going disposal site management are those tasks outlined in Section 2.3 above that are carried out by the permittee. Compliance monitoring results consist of completed post-cruise scow log sheets, inspection reports, records of transport and disposal activities, *etc.*, as specified in each issued permit. If any of these reports show serious discrepancies (e.g., known permit violations for disposal scow conditions, awareness of misplaced dredged material as a result of permittee disposal reports), the resulting management actions can include fines or additional monitoring activities carried out by the permittee at the disposal site as specified by either USACE Los Angeles District or EPA Region IX.

The periodic disposal site tiered disposal site monitoring consists of a hierarchical series of sampling tasks that will provide a comprehensive assessment of current conditions at each site to be compared against baseline conditions. Baseline conditions at both sites are documented in EPA Region IX's DEIS for the LA-3 site designation action, and this document summarizes all the data from the multiple previous surveys performed at these two sites. These documents will be used, along with reference data, to evaluate future changes to each site. In addition, all sediment testing results for dredged material characterization projects will be entered into the regional sediment quality database being assembled by the Los Angeles Contaminated Sediment Task Force (CSTF; see http://www.coastal.ca.gov/web/sediment/sdindex.html and www.sccwrp.org) for comparison with results from sediment grabs at the disposal site as part of compliance monitoring.

As part of the tiered site monitoring program described in this section, EPA Region IX and USACE Los Angeles District will determine if there are any detectable significant impacts to the following areas, based on monitoring physical, chemical, and biological parameters:

1. Inside the ODMDS boundary
2. Over an area adjacent to the ODMDS boundary if monitoring shows that significant accumulations of dredged material (> 15 cm [5.9 inches]) are outside the site boundary or that adverse bioeffects are occurring inside the site. [NOTE: This is an extremely conservative trigger level that will have little or no adverse effects on the benthic infauna; details to follow in Section 3.1.1 below].

The monitoring plan includes the on-going compliance monitoring as well as two interdependent lines of monitoring: a Physical/Biological monitoring module and a Chemical/Bioeffects monitoring module (Figure 1). Each type of monitoring is "tiered" to insure that information is collected in a cost-effective manner and limited resources are not wasted. This program facilitates monitoring of both short-term (dredged material is largely confined within site boundaries as modeling studies predict; see Chapter 4 of DEIS) and long-term (recolonization and bioeffects testing) conditions, enabling both EPA Region IX and the USACE Los Angeles

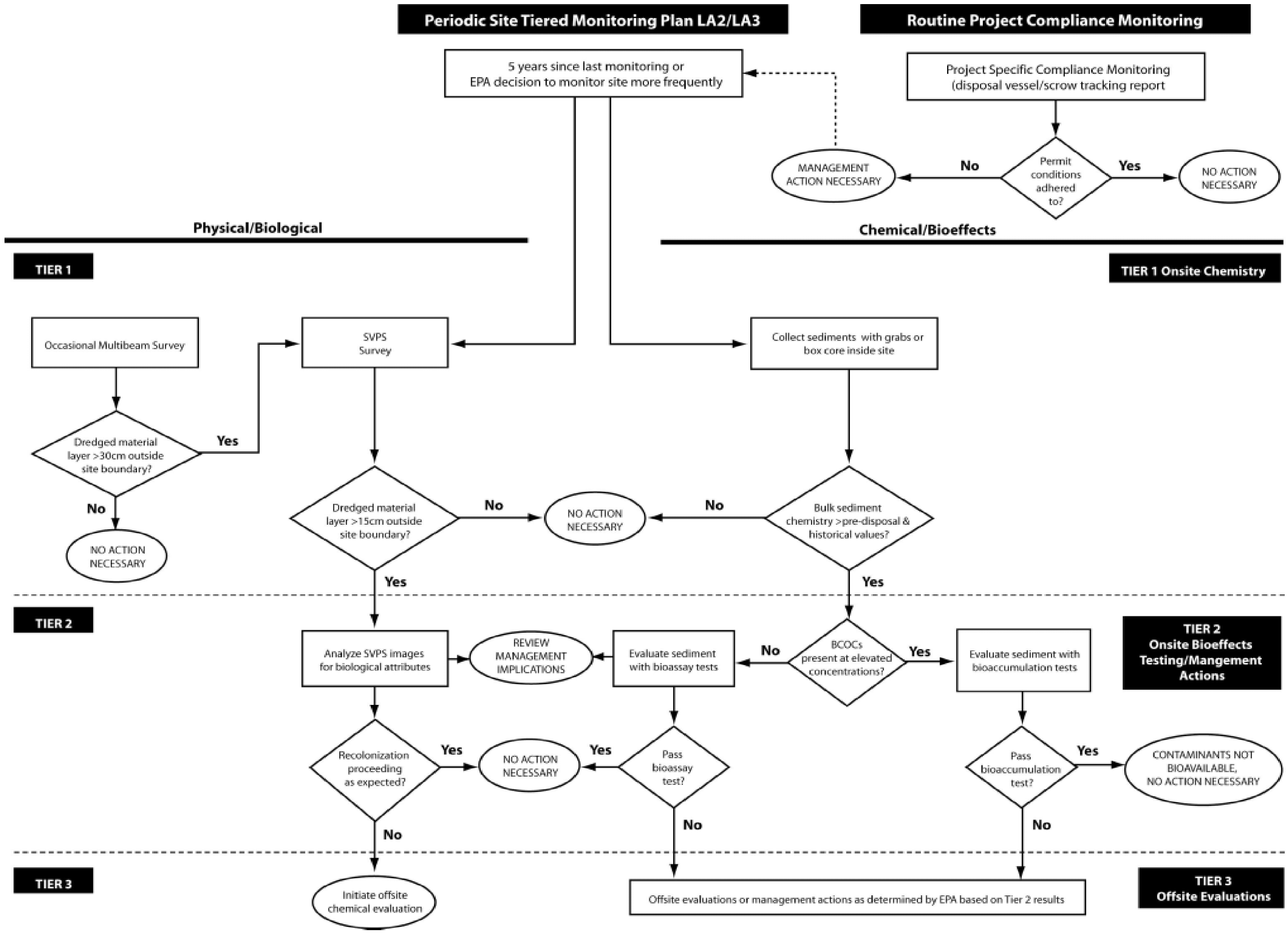

Figure 1. Tiered Site Monitoring Plan

District to make management decisions in a timely manner should potential unacceptable impacts be discovered. The physical, biological, and chemical monitoring also will help these agencies verify whether disposal operations are being carried out in compliance with permit requirements and environmental regulations.

A wide variety of past studies at both sites have shown that water column effects are transient and impacts to most components of the biological environment (plankton, epifauna, fish, birds, mammals, threatened or endangered species) and socioeconomic environment (commercial/recreational fisheries, shipping, military usage, oil and natural gas development) are rated as a Class III impact (adverse but insignificant or no anticipated impacts; no mitigation measures are necessary; see Chapter 4 of DEIS). Long-term dredged material monitoring programs on the east-coast (Disposal Area Monitoring System, or DAMOS, run by the USACE New England District since 1979) and west coast (Puget Sound Dredged Disposal Analysis, PSDDA, run by the USACE Seattle District since 1986; SF-DODS monitoring, run by the USACE San Francisco District since 1996 and periodic monitoring conducted by EPA Region IX) have demonstrated that monitoring resources are better allocated toward measuring impacts that are not transient, i.e. persist on time scales that are greater than those occurring in the range of hours to days. As such, the planned sampling efforts for both the LA-2 and LA-3 sites are focused on the seafloor and fulfill the needs for both compliance sampling (Tier 1) and impact assessment (Tiers 2 and 3).

Readers will note that all 3 tiers of the Physical/Biological Module will be carried out during the same initial monitoring cruise on which the sediments for the Tier 1 on-site chemistry are collected for the Chemical/Bioeffects Module. Sufficient sediment for potential Tier 2 activities under the Chemical/Bioeffects Module should be collected during the initial cruise in the event that bulk chemistry analyses reveals the need for acute or chronic bioeffects testing. Only Tier 3 activities under the Chemical/Bioeffects Module would potentially require an additional monitoring cruise to the disposal site unless sufficient sediment for Tier 2 activities is not collected during the initial cruise or if sediment holding times are violated by the time that the Tier 2 bioassay/bioaccumulation tests are scheduled to begin.

3.1 Physical/Biological Module

The monitoring for physical/biological processes is focused on the potential transport of dredged material out of the site boundaries following disposal and the recolonization of dredged material by benthic infauna. A site-specific numerical model was run for predictions of transport and fate of dredged material disposed at both LA-2 and LA-3 (CE, 2004; see Chapter 4, DEIS for summary of results), and no substantial accumulations are expected outside the site boundary; the physical portion of the module focuses on mapping and tracking the dredged material deposit on the seafloor to verify the predictions of the numerical model. If material is found outside the site in accumulations thicker than expected, biological monitoring will be performed to document that infaunal recolonization is proceeding as expected.

3.1.1 Tier 1 Physical Monitoring

> *Tier 1 Physical Monitoring shall primarily consist of a sediment vertical profiling system (SVPS) survey of transects radiating out from the disposal site boundary to map any dredged material outside the site boundary. Also, periodic high-resolution multibeam surveys will be performed when the equipment is available to map the topography and distribution of dredged material deposits within the disposal site boundaries. Such a survey will be performed using a multibeam system with similar frequency and beam width as the baseline surveys (Gardner 2000) so that data can be overlain and "depth difference" maps produced to show the spatial extent and thickness of the disposed dredged material within the site.*

Physical monitoring activities, including field measurement and data analysis, focus on the question: Is a substantial (> 15 cm [5.9 inches]) accumulation of dredged material occurring outside of the disposal site boundaries?

A series of radial transects starting at the edge of the site and continuing out 500 meters beyond the edge of the detectable dredged material layer will be sampled with SVPS technology. SVPS stations will be placed at 200–500 m (655–1640 ft) intervals along the transects or at appropriate spacing so that any area outside the site boundary with dredged material has at least 3–5 stations located on the dredged material. The SVPS system must be equipped with a digital camera to allow on-board evaluation of results (necessary for assessing the adequacy of station locations for mapping the dredged material and for Tier 2 activities; see below).

The SMMP is designed to ensure that significant deposits of dredged material do not consistently occur or extend beyond the site boundaries. A substantial deposit is defined as 15 cm (5.9 inches) or more since the last monitoring event (thicker deposits are expected to occur and are acceptable within the site boundaries). Physical mapping of the dredged material footprint on the seafloor will be conducted at periodic intervals in order to confirm that management guidelines for disposal operations are operating within expected criteria and the predictions from the numerical models are correct.

The 15 cm (5.9 inches) depositional interval of dredged material outside the site boundary has been selected as a trigger level to proceed to Tier 2 for a number of reasons:

1. The maximum depositional interval that can be detected by the SVPS equipment is 20 cm (7.9 inches), but the camera settings are usually adjusted so that actual prism penetration is somewhat less than that (12–19 cm; 4.7–7.5 inches) in order to capture details at the sediment-water interface.

2. Impacts to infauna from deposition of dredged material can range from negligible to total mortality, depending on the type of material and rate of deposition (a 50-cm [19.7-inch] layer deposited at the rate of 1 cm (0.4 inch) per week over the course of a year would have little detectable impact as compared with a 50-cm [19.7-inch] layer that occurred at a location in one depositional event). Estimates of depositional intervals through which native infauna can re-establish themselves range from 5 cm (2 inches) to 85 cm (33.5 inches) (Kranz, 1974; Nichols et al., 1978; Maurer et al., 1980, 1986).

3. Repeated monitoring at the LA-2 and LA-3 sites (see DEIS) as well as at other open-water dredged material sites off all coasts of the USA (e.g., Rhoads and Germano, 1986; Germano et al., 1994; Hall, 1994; Newell et al., 1998) have shown that even in dredged material deposits exceeding a meter or more (where one can safely assume that all resident infauna were smothered and killed), benthic recolonization and community succession will occur with full ecosystem recovery over time, so any impact to the benthic community from deposition of dredged material that has passed testing criteria as acceptable for open-water disposal will be temporary. Using 15 cm (5.9 inches) as trigger level is an extremely conservative value; while this will most likely have little, if any, adverse effects on the benthic infauna, it will be a good verification check for the disposal model's predicted footprint of dredged material on the seafloor.

During the years when the optional physical monitoring (multibeam survey) is performed, it should be done as the first phase of Tier 1 sampling before any further Tier 1 monitoring (SVPS and sediment grabs/box cores). This phased approach will not cause any increase in costs; while some post-cruise time to process the multibeam data and perform the depth-difference analysis would be needed regardless, these two types of surveys would typically be done on two different cruises (or vessels) either to maximize efficiency in ship equipment configuration or personnel utilization. The depth difference results from the multibeam survey would provide useful ancillary information to show areas a) where dredged material has gone outside the boundary to help direct the transects for SVPS sampling and b) where the dredged material accumulations are within the site boundary in order to confirm the location of sediment sampling stations. Note that the depth resolution of the currently-available multibeam equipment is 30 cm (11.8 inches), so any detected depositional layers less than this thickness are most likely sampling artifacts.

3.1.2 Tier 2 Physical/Biological Monitoring

Tier 2 Physical monitoring will consist of an on-board evaluation by trained personnel in SVPS image interpretation to determine if benthic recolonization is occurring as predicted to verify that the sediment outside the site is not causing an adverse impact; a subsequent detailed image analysis will be performed back in the laboratory, but the on-board evaluation will determine if Tier 3 sediment sampling is required.

Having some dredged material beyond the site boundary is not considered an adverse impact unless the sediment quality is compromised to the point where it is impairing biological recovery; as such, the assessment of infaunal successional status serves as a surrogate for an *in-situ* bioassay of sorts. Using infaunal successional status as determined from sediment profile image interpretation as an indication of dredged material disposal impact has been a successful monitoring strategy for dredged material disposal under the DAMOS program for over two decades; this streamlined approach has been cited by the National Research Council as one that "has successfully addressed most important questions related to dredged material disposal" (NRC, 1990). Experienced scientists can readily assess benthic recolonization from determining the successional stage of the infaunal community based on the information in sediment profile images (Rhoads and Germano, 1982, 1986). The images will be downloaded from the camera after the stations have been sampled and the infaunal successional status of each location determined.

Numerous studies have shown that organism-sediment interactions in fine-grained sediments follow a predictable sequence after a major seafloor perturbation. This theory states that primary succession results in "the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest..., our definition does not demand a sequential appearance of particular invertebrate species or genera" (Rhoads and Boyer 1982). This theory is presented in Pearson and Rosenberg (1978) and further developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into three stages: Stage I is the initial community of tiny, densely populated polychaete assemblages; Stage II is the start of the transition to head-down deposit feeders; and Stage III is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 2).

After an area of bottom is disturbed by natural or anthropogenic events, the first invertebrate assemblage (Stage I) appears within days after the disturbance. Stage I consists of assemblages of tiny tube-dwelling marine polychaetes that reach population densities of 10^4 to 10^6 individuals per m^2. These animals feed at or near the sediment-water interface and physically stabilize or bind the sediment surface by producing a mucous "glue" that they use to build their tubes.

If there are no repeated disturbances to the newly colonized area, these initial tube-dwelling suspension or surface-deposit feeding taxa are followed by burrowing, head-down deposit-feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. Stage II is the beginning of the transition to burrowing, head-down deposit feeders that rework the sediment deeper with time and mix oxygen from the overlying

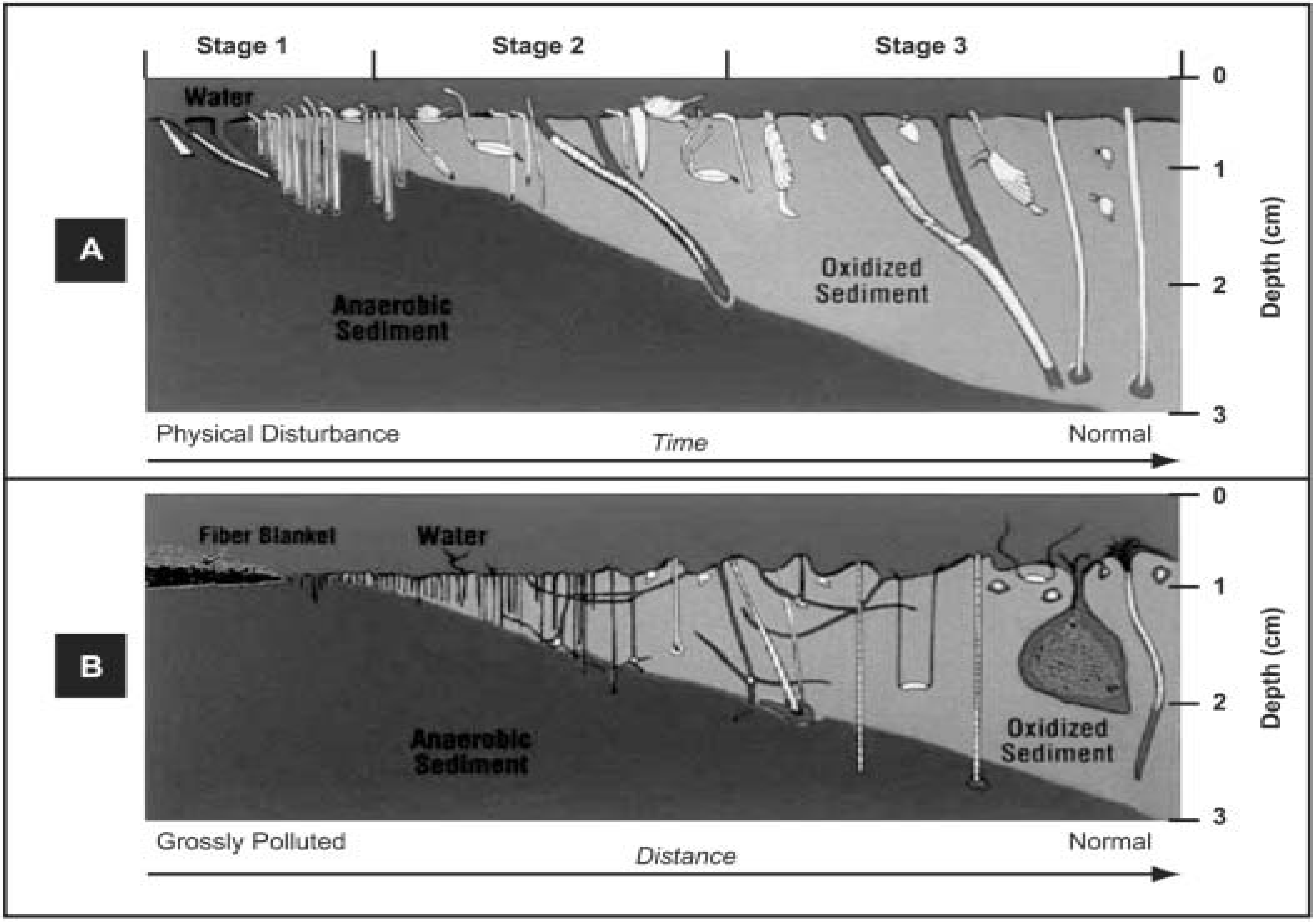

Figure 2. Soft bottom benthic community response to disturbance (A) or organic enrichment (B); from Rhoads and Germano, 1982

water into the sediment. Stage II animals may include tubiculous amphipods, polychaetes, and mollusks. These animals are larger and have lower population densities than Stage I animals.

Stage III is the mature and stable community of deep-dwelling, head-down deposit feeders. In contrast to Stage I organisms, these animals rework the sediments to depths of 3 to 20 cm or more, loosening the sedimentary fabric and increasing the water content of the sediment. They also actively recycle nutrients because of the high exchange rate with the overlying water resulting from their burrowing and feeding activities. The presence of Stage III taxa can be a good indication that the sediment surrounding these organisms has not been severely disturbed recently. Because Stage III species tend to have relatively low rates of recruitment and ontogenetic growth, they may not reappear for several years once they are excluded from an area. These inferences are based on past work, primarily in temperate latitudes, showing that Stage III species are relatively intolerant to physical disturbance, organic enrichment, and chemical contamination of sediments. Population densities are low (10 to 10^2 individuals per m^2) compared to Stage I.

We would predict that by the time monitoring takes place, the benthic community should be in at least a transitional Stage I going to Stage II community or later. The surface oxidized layer of sediment would be at least 1–1.5 cm thick, and the subsurface sediments would not show signs of organic enrichment. If the sediment profile images reveal locations with low reflectance subsurface sediments or oxidized surface layers less than 0.3 cm (0.1 inches) thick with little to no evidence of infaunal activity, then Tier 3 sampling will be initiated.

3.1.3 Tier 3 Physical/Biological Monitoring

> *Tier 3 Monitoring will be a chemical evaluation of the offsite dredged material layer and will consist of taking a minimum of 5 sediment samples in those areas determined from the SVPS image analysis to have impaired benthic recolonization. Samples will be appropriately stored and returned to an on-shore laboratory for chemical analysis and will follow the same evaluation hierarchy as detailed for onsite sediments starting in Tier 1 of the Chemical/Bioeffects Module (see Figure 1).*

If the results from the Tier 2 analysis of the SVPS images show impaired recolonization and there is knowledge that the sediments from the area of concern have not been placed at the site very recently (within the past week), then there is a chance that these sediments may have chemical concentrations that are preventing successful recruitment and reestablishment of the benthic community. In order to determine whether or not the delay in benthic recolonization/recovery is due to chemical vs. physical (disposal, trawling, etc.) or biological (competition, predation) disturbance, at least five sediment grab samples will be taken in the area of concern for bulk sediment chemistry analysis. The evaluation pathway will be the same as the one followed for on-site sediments (see next section).

3.2 Chemical/Bioeffects Module

Chemical/bioeffects monitoring focuses on the effects of dredged material deposition on the chemical characteristics of sediments within (and potentially adjacent to) the LA-2 or LA-3 disposal sites and potential effects of biological uptake of contaminants associated with the sediments. Routine monitoring of selected chemical constituents will be performed as part of compliance monitoring (to insure that adequate sediment characterization has been accomplished through the permitting process) and also as a conservative measure to evaluate the long-term potential for acute and chronic bioeffects from sediment contaminants. Two key components of evaluating the results from this module will be the Ocean Disposal Database maintained by the USACE Los Angeles District as well as the CSTF Sediment Quality Database; there will be a wealth of historical information in the latter database, not only on historical data collected from the site, but also on the chemical concentrations of sediments approved for disposal from the dredged material permitting process. As such, it will be important for both the USACE Los Angeles District or EPA Region IX to maintain the database and keep the information current so that comparisons with bulk sediment chemistry results from disposal site sampling will be accurate and reflect the most current information.

Sediments with highly elevated or toxic concentrations of chemical contaminants should not be disposed of at either the LA-2 or LA-3 sites; extensive pre-disposal testing and evaluation is used to identify sediments that meet the stringent ocean disposal criteria (EPA/USACE 1991). This sediment testing required as part of the permit processing should identify and exclude from ocean disposal any sediments that are toxic or pose an unacceptable risk of bioaccumulation to the marine environment. However, the SMMP recognizes that occasionally some small volumes of unsuitable material may be missed in the pre-dredging characterization studies, or that unintentional disposal of some excluded material could potentially occur in rare occasions. Direct chemical monitoring of the deposited sediments within the disposal site will accurately reflect the concentrations of material available to biological receptors as a back-up verification/validation of the permit characterization process. This ensures that decisions about the need for Management Action as described in Section 4 are based on more accurate knowledge about actual site conditions.

3.2.1 Tier 1 Onsite Chemical Monitoring

Tier 1 chemical monitoring shall consist of collecting, processing, and storing grab samples of surface sediments from at least 10 stations randomly located on the dredged material deposit (as determined from disposal location records, multibeam, or SVPS results) that will be analyzed for chemicals of concern and evaluated against known historical sediment chemistry values from both past disposal site surveys and dredged material characterization studies.

Tier 1 chemical monitoring is designed to address the following question: Do concentrations of chemicals of concern in dredged material actually deposited at either LA-2 or LA-3 significantly exceed the range of concentrations in the dredged material either already at the site or pre-approved by the EPA and USACE for disposal at the site?

Sediment samples will be collected at a minimum of 10 stations and analyzed for grain-size properties, total organic carbon (TOC), and, at a minimum, the suite of trace metals, chlorinated pesticides, polychlorinated biphenyls (PCB), polycyclic aromatic hydrocarbons (PAH), and other organic compounds/classes listed as part of the regional guidance for dredged material permit characterization. Compound- and metal-specific detection limits and other quality control requirements must be consistent with this regional guidance. Additional analytes may be added if information from bulk chemical characterizations of the material approved for disposal at LA-2 or LA-3 indicates a potential for cumulative effects in the disposal site sediments.

The top 10 cm (3.9 inches) of surface sediments will be removed from an acceptable grab or box core for chemical analysis. An acceptable grab or box core is one where:

- the sampler is not overfilled, which could be indicative of sample loss;
- overlying water is present indicating sample integrity;
- the sediment surface appears to be relatively undisturbed; and
- the desired sample depth has been achieved (ideally, at least 1 or 2 cm [0.4 – 0.8 inches] should remain at the bottom of the sampler after the upper layer has been subsampled).

If sample acceptability criteria are met, overlying water will be carefully siphoned off (if the water is turbid, it could be allowed to settle out for a short period). In order to remove sediments from the grab or box core for chemical analyses, a sample aliquot will be collected to the appropriate sediment depth (10 cm; 3.9 inches) and placed either in the appropriate sample jar or in a mixing container, such as a stainless steel bowl. It is recommended that sample aliquots be collected from the grab or box core with stainless steel utensils such as spoons, spatulas, or flat-bottomed hand trowels, although Teflon implements may be substituted. Sufficient sediment shall be collected for immediate post-cruise bulk chemical analyses as well as enough for potential bioassay/bioaccumulation tests, should they need to be performed later. This would also require collecting and archiving sediment from the site reference stations for later bioassay/bioaccumulation tests, should they need to be run.

Trigger levels that would initiate proceeding to Tier 2 evaluations (requiring testing of the remaining archived sediment from the initial cruise) would not be determined by comparing disposal site sediment chemistry results to reference site results (we would expect these to be different), but rather to existing site historical concentrations and concentrations of sediments permitted to go to the site. This would be done by multiple comparisons of site monitoring results to the recent (since the last monitoring event) pre-disposal testing concentration ranges (approved for ocean disposal) as well as a tolerance interval based on historical data. The tolerance interval would be constructed on the historical data to contain at least 80 percent of the population of background (historical) data with 95-percent confidence. The exact distribution of the historical data is unknown, so the tolerance interval is a random interval; that is, the tolerance bounds are random variables computed from the sample statistics derived from the observed historical data. A beta-content upper tolerance bound with 80-percent coverage and 95-percent confidence indicates that we have 95-percent confidence that 80 percent of the population will be less than the tolerance bound. If any of the disposal site samples exceed both the pre-disposal concentration ranges and this tolerance bound, we conclude that they are different from the historical population and warrant further investigation, as described in Tier 2 or Tier 3 monitoring. If concentrations are not elevated compared to these ranges, then no further chemical/bioeffects monitoring or Management Action is required. Because trigger levels will be derived from measurements taken for specific projects that have disposed material at either ODMDS up to the time of the monitoring event, these values (trigger levels) are expected to change on a year-to-year basis. Consequently, a table of specific trigger levels is not provided in this SMMP; the site monitoring reports, published separately, will report the trigger levels used for comparison during the period being covered.

3.2.2 Tier 2 Onsite Chemical/Bioeffects Monitoring

Tier 2 Chemical/Bioeffects monitoring shall consist of first evaluating the elevated chemical concentrations to see if they represent bioaccumulative compounds of concern (BCOCs). If BCOCs exceed pre-disposal testing concentration ranges, then sediments from both the dredged material layer as well as the ODMDS reference station(s) will be evaluated with bioaccumulation tests; if they do not, then sediments from both the dredged material layer as well as the ODMDS reference station(s) will be evaluated with acute toxicity testing.

Tier 2 chemical/bioeffects monitoring addresses the following question: Do the elevated chemical concentrations represent bioavailable contaminants that will adversely affect the marine environment?

Sediments collected during the Tier 1 activities should be stored at 4° C for up to 6 weeks in the event that acute or chronic bioeffects testing needs to be performed. If sufficient sediment for bioassay/bioaccumulation testing is not collected during the initial survey cruise or if there is a chance that holding times will be violated because of delays in laboratory scheduling for the Tier 1 analyses, then it will be necessary for EPA Region IX as part of their management strategy to shift the target of any ongoing disposal operations to another location within the site boundary so that that sediments characterized during Tier 1 are still available for Tier 2 evaluation and not covered by new material being placed at the site. Sufficient sediments would then have to be collected at areas of concern and the reference station(s) for either bioassay or bioaccumulation testing according to regional guidance and Green Book protocols.

If BCOCs are not present at elevated concentrations and the sediments pass the bioassay tests, while no Management Actions are required, a review of the management implications, *e.g.*, dredged material characterization permitting procedures or tolerance intervals of the historical database for Tier 1 evaluations, will be warranted given the desire to reduce the number of false positive triggers in future monitoring events. If the sediments fail the bioassay tests, then EPA Region IX and USACE Los Angeles District personnel will either require Tier 3 additional offsite investigations or need to implement the appropriate Management Actions (Section 4).

If BCOCs are present at elevated concentrations, either the remaining archived sediment from the initial Tier1 survey or newly collected sediments will be subjected to bioaccumulation testing according to regional guidance and Green Book protocols. If the sediments fail the bioaccumulation tests, then EPA Region IX and USACE Los Angeles District personnel will either require Tier 3 additional offsite investigations or need to implement the appropriate Management Actions (Section 4).

3.2.3 Tier 3 Offsite Monitoring

> *Tier 3 offsite monitoring and/or management activities shall be determined by EPA Region IX and USACE Los Angeles District personnel based on which results caused initiation of this level of activity.*

Tier 3 offsite monitoring addresses the following question: Do the adverse effects discovered within the disposal site affect any resources of concern outside the site?

Depending on the nature and extent of the adverse effects detected within the site, additional sampling outside the disposal site may or may not be required. For example, if sediments from just one or a few of the 10 locations sampled during Tier 1 activities showed adverse biological effects, regulatory personnel may determine that a management action such as directing future disposal activities to the area of concern would alleviate the problem by covering the affected sediment with a new layer of dredged material and effectively removing the source of exposure for any biological receptors. However, the concern for adverse impacts to biological resources may extend outside the site to either benthic invertebrates or higher trophic levels, and additional sampling activities may be required, such as:

- collection of benthic invertebrates outside the site to determine, if they have elevated tissue concentrations of contaminants of concern compared to organisms found at reference areas;
- collection of demersal fish species in the vicinity of the disposal site to determine, if they have elevated tissue concentrations of contaminants of concern;
- grabs or box cores for detailed benthic community analyses to determine, if there are population-level impacts from elevated chemical concentrations (Gray, 1979; Ferraro and Cole, 1997; Oug et al., 1998; Stark, 1998; Trannuma et al., 2004); and

- additional SVPS sampling to determine the nature and extent of gradients in sediment oxygen demand, organic loading, sediment type, or benthic population structure.

The precise design of the sampling program, including the location of organism collection sites, would be determined by the area of potential impact as defined in the monitoring tasks which led to this tier as well as the distribution of the dredged material footprint as determined by the Physical Monitoring module.

4.0 Management Actions

As shown in Figure 1, the results of any monitoring task that drop down to Tier 2 or 3 cause either a review of management implications or a management action. The review of management implications (triggered by either disposed material outside the site boundary in excess of 15 cm [5.9 inches] or bulk sediment chemistry values greater than pre-disposal test concentration ranges or the tolerance interval calculated from the historical data base) could mean one or more of the following problems exist:

- Control of disposal operations is not occurring as planned;
- Numerical modeling predictions are inaccurate (site boundary may be too small);
- Inadequate characterization of dredged material during the permitting process (material is either more heterogeneous than anticipated or sampling density for characterizing a specified volume is too low);
- The tolerance envelope calculated from the historical data is too narrow and needs to be expanded; or
- The tolerance envelope needs to be recalculated with different weighting factors applied to historical sampling data from the disposal site vs. permit characterization data (the two sources of data are not equivalent with respect to characterizing the mean and variability of contaminant concentrations on the disposal mound).

Depending on which path leads to the "Review Management Implications" box in Figure 1, further investigations would identify which of the above problems is most likely the cause of the false positive trigger and allow correction once EPA Region IX and USACE Los Angeles District personnel concur on the proper remedy and adjustment to the management plan. However, each agency is free to operate solely under its own authority as outlined in Table 1.

If, however, it is determined that the potential for risk to human health or the marine environment exists because of bioavailable contaminants being placed at the site, the potential management actions include any or all of the following actions:

- Review and revise the sediment characterization process as part of permit activity;

- Suspend or modify any further use of the site while the cause of the problem is being identified;
- Cap the affected area with a sufficient volume of clean sediments to ensure the bioavailable contaminants are permanently isolated from any biological receptors;
- Identify additional monitoring tasks that must be performed to better identify or delineate the source of the problem; and
- Permanently terminate use of the site, if this is the only means for eliminating the adverse environmental impacts

In general, any management action would be initiated only after consensus has been reached between EPA Region IX and USACE Los Angeles District. EPA and the USACE still retain their respective authority over the disposal site and dredging site, and may exercise their independent authority (i.e., enforcement) if appropriate and necessary for environmental protection in either area. Any changes to the SMMP will be published by EPA.

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APPENDIX B

Harbor/Facility	Disposal Economically Feasible LA-2	Disposal Economically Feasible LA-3	County of Origin	Volume per cycle (cy)	Maintenance Dredging Time Period for each cycle (years)	Volume per 10 years (cy)	Average Annual Volume (cy)
Regular Maintenance							
Los Angeles River Estuary	Yes	**No**	LA	75,000	4 - 5*	187,500	18,750
Los Angeles Harbor	Yes	Yes	LA	10,000	1	100,000	10,000
Long Beach Harbor	Yes	Yes	LA	38,000	1	380,000	38,000
Marina del Rey	Yes	**No**	LA	67,000	2	335,000	33,500
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	100,000	10,000
Newport Harbor	**No**	Yes	Orange	250,000	25	100,000	10,000
Dana Point Harbor	**No**	Yes	Orange	50,000	8	62,500	6,250
Upper Newport Bay	**No**	Yes	Orange	100,000	10	100,000	10,000
Anaheim Bay	Yes	**No**	Orange	150,000	10	150,000	15,000
						1,515,000	151,500
Capital Improvement							
Los Angeles Harbor	Yes	Yes	LA	263,000	20 - 25**	131,500	13,150
Long Beach Harbor	Yes	Yes	LA	263,000	20 - 25**	131,500	13,150
Upper Newport Bay***	**No**	Yes	Orange	2,120,000	2***	2,120,000	212,000
						2,383,000	238,300

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2 (cubic yards)	Alt 1 - No Action Worst Case Year LA-3 (cubic yards)	Alt 2 Worst Case Year LA-2 (cubic yards)	Alt 2 Worst Case Year LA-3 (cubic yards)	Alt 3 Worst Case Year LA-2 (cubic yards)	Alt 3 Worst Case Year LA-3 (cubic yards)	Alt 4 Worst Case Year LA-2 (cubic yards)	Alt 4 Worst Case Year LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	75,000	NA	75,000	NA	75,000	-	75,000	-
Los Angeles Harbor	10,000	NA	10,000	NA	10,000	-	-	10,000
Long Beach Harbor	38,000	NA	38,000	NA	38,000	-	-	38,000
Marina del Rey	67,000	NA	67,000	NA	67,000	-	67,000	-
Sunset/Huntington Harbor	100,000	NA	100,000	NA	-	100,000	-	100,000
Newport Harbor	-	NA	250,000	NA	-	250,000	-	250,000
Dana Point Harbor	-	NA	50,000	NA	-	50,000	-	50,000
Upper Newport Bay	-	NA	100,000	NA	-	100,000	-	100,000
Anaheim Bay	150,000	NA	150,000	NA	150,000	-	150,000	-
	440,000	NA	840,000	NA	340,000	500,000	292,000	548,000
Capital Improvement								
Los Angeles Harbor	263,000	NA	263,000	NA	263,000	-	-	263,000
Long Beach Harbor	263,000	NA	263,000	NA	263,000	-	-	263,000
Upper Newport Bay***	-	NA	1,060,000	NA	-	1,060,000	-	1,060,000
	526,000	NA	1,586,000	NA	526,000	1,060,000	-	1,586,000
Total	966,000	NA	2,426,000	NA	866,000	1,560,000	292,000	2,134,000
Increase by: 50%	**1,449,000**	NA	**3,639,000**	NA	**1,299,000**	**2,340,000**	**438,000**	**3,201,000**
Ratio Total 10 year volume/peak year	1.0	NA	1.1	NA	1.1	1.1	1.5	1.0

*for worst case annual average assume 4 year cycle
**for worst case annual average assume 20 year cycle
***Upper Newport Bay capital improvement project occurs over 2 years
Worst case year = 1060000 cy for capital improvement

Assume Period of Assessment = 10 years

Harbor/Facility	Alt 1 - No Action Annual Average LA-2 (cubic yards)	Alt 1 - No Action Annual Average LA-3 (cubic yards)	Alt 2 Annual Average LA-2 (cubic yards)	Alt 2 Annual Average LA-3 (cubic yards)	Alt 3 Annual Average LA-2 (cubic yards)	Alt 3 Annual Average LA-3 (cubic yards)	Alt 4 Annual Average LA-2 (cubic yards)	Alt 4 Annual Average LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	18,750	NA	18,750	NA	18,750	-	18,750	-
Los Angeles Harbor	10,000	NA	10,000	NA	10,000	-	-	10,000
Long Beach Harbor	38,000	NA	38,000	NA	38,000	-	-	38,000
Marina del Rey	33,500	NA	33,500	NA	33,500	-	33,500	-
Sunset/Huntington Harbor	10,000	NA	10,000	NA	-	10,000	-	10,000
Newport Harbor	-	NA	10,000	NA	-	10,000	-	10,000
Dana Point Harbor	-	NA	6,250	NA	-	6,250	-	6,250
Upper Newport Bay	-	NA	10,000	NA	-	10,000	-	10,000
Anaheim Bay	15,000	NA	15,000	NA	15,000	-	15,000	-
	125,250	NA	151,500	NA	115,250	36,250	67,250	84,250
Capital Improvement								
Los Angeles Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Long Beach Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Upper Newport Bay***	-	NA	212,000	NA	-	212,000	-	212,000
	26,300	NA	238,300	NA	26,300	212,000	-	236,300
Total	151,550		389,800	NA	141,550	248,250	67,250	322,550
Increase by: 0%	**151,550**	NA	**389,800**	NA	**141,550**	**248,250**	**67,250**	**322,550**

Harbor/Facility	Alt 1 - No Action 10 Year Total LA-2 (cubic yards)	Alt 1 - No Action 10 Year Total LA-3 (cubic yards)	Alt 2 10 Year Total LA-2 (cubic yards)	Alt 2 10 Year Total LA-3 (cubic yards)	Alt 3 10 Year Total LA-2 (cubic yards)	Alt 3 10 Year Total LA-3 (cubic yards)	Alt 4 10 Year Total LA-2 (cubic yards)	Alt 4 10 Year Total LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	187,500	NA	187,500	NA	187,500	-	187,500	-
Los Angeles Harbor	100,000	NA	100,000	NA	100,000	-	-	100,000
Long Beach Harbor	380,000	NA	380,000	NA	380,000	-	-	380,000
Marina del Rey	335,000	NA	335,000	NA	335,000	-	335,000	-
Sunset/Huntington Harbor	100,000	NA	100,000	NA	-	100,000	-	100,000
Newport Harbor	-	NA	100,000	NA	-	100,000	-	100,000
Dana Point Harbor	-	NA	62,500	NA	-	62,500	-	62,500
Upper Newport Bay	-	NA	100,000	NA	-	100,000	-	100,000
Anaheim Bay	150,000	NA	150,000	NA	150,000	-	150,000	-
	1,252,500	NA	1,515,000	NA	1,152,500	362,500	672,500	842,500
Capital Improvement								
Los Angeles Harbor	131,500	NA	131,500	NA	131,500	-	-	131,500
Long Beach Harbor	131,500	NA	131,500	NA	131,500	-	-	131,500
Upper Newport Bay***	-	NA	2,120,000	NA	-	2,120,000	-	2,120,000
	263,000	NA	2,383,000	NA	263,000	2,120,000	-	2,383,000
Total	1,515,500		3,898,000	NA	1,415,500	2,482,500	672,500	3,225,500
Increase by: 0%	**1,515,500**	NA	**3,898,000**	NA	**1,415,500**	**2,482,500**	**672,500**	**3,225,500**

Harbor/Facility	One-Way Trip Distance (Nautical Miles)		Round-Trip Distance (Nautical Miles)		One-Way Trip Distance (km)		Round-Trip Distance (km)	
	LA-2	LA-3	LA-2	LA-3	LA-2	LA-3	LA-2	LA-3
Regular Maintenance								
Los Angeles River Estuary	11	22	**23**	**43**	21	40	**42**	**80**
Los Angeles Harbor	8	23	**16**	**45**	14	42	**29**	**84**
Long Beach Harbor	10	22	**19**	**43**	18	40	**35**	**80**
Marina del Rey	25	46	**50**	**92**	47	85	**93**	**171**
Sunset/Huntington Harbor	15	20	**30**	**40**	27	37	**55**	**74**
Newport Harbor	23	6	**47**	**12**	43	11	**87**	**23**
Dana Point Harbor	33	12	**66**	**24**	61	23	**122**	**45**
Upper Newport Bay	23	6	**47**	**12**	43	11	**87**	**23**
Anaheim Bay	12	18	**24**	**36**	23	34	**45**	**68**
Capital Improvement								
Los Angeles Harbor	8	23	**16**	**45**	14	42	**29**	**84**
Long Beach Harbor	10	22	**19**	**43**	18	40	**35**	**80**
Upper Newport Bay***	23	6	**47**	**12**	43	11	**87**	**23**

Harbor/Facility	One-Way Trip Distance (Miles) LA-2	One-Way Trip Distance (Miles) LA-3	Round-Trip Distance (miles) LA-2	Round-Trip Distance (miles) LA-3	Alt 1 - No Action Worst Case Year Miles Traveled LA-2	Alt 1 - No Action Worst Case Year Miles Traveled LA-3	Alt 2 Worst Case Year Miles Traveled LA-2	Alt 2 Worst Case Year Miles Traveled LA-3	Alt 3 Worst Case Year Miles Traveled LA-2	Alt 3 Worst Case Year Miles Traveled LA-3	Alt 4 Worst Case Year Miles Traveled LA-2	Alt 4 Worst Case Year Miles Traveled LA-3
Regular Maintenance												
Los Angeles River Estuary	13	25	**26**	**50**	1,462.5	NA	1,462.5	NA	1,462.5	-	1,462.5	-
Los Angeles Harbor	9	26	**18**	**52**	135.0	NA	135.0	NA	135.0	-	-	390.0
Long Beach Harbor	11	25	**22**	**50**	627.0	NA	627.0	NA	627.0	-	-	1,425.0
Marina del Rey	29	53	**58**	**106**	2,914.5	NA	2,914.5	NA	2,914.5	-	2,914.5	-
Sunset/Huntington Harbor	17	23	**34**	**46**	2,550.0	NA	2,550.0	NA	-	3,450.0	-	3,450.0
Newport Harbor	27	7	**54**	**14**	-	NA	10,125.0	NA	-	2,625.0	-	2,625.0
Dana Point Harbor	38	14	**76**	**28**	-	NA	2,850.0	NA	-	1,050.0	-	1,050.0
Upper Newport Bay	27	7	**54**	**14**	-	NA	4,050.0	NA	-	1,050.0	-	1,050.0
Anaheim Bay	14	21	**28**	**42**	3,150.0	NA	3,150.0	NA	3,150.0	-	3,150.0	-
					10,839.0	NA	27,864.0	NA	8,289.0	8,175.0	7,527.0	9,990.0
Capital Improvement												
Los Angeles Harbor	9	26	**18**	**52**	3,550.5	NA	3,550.5	NA	3,550.5	-	-	10,257.0
Long Beach Harbor	11	25	**22**	**50**	4,339.5	NA	4,339.5	NA	4,339.5	-	-	9,862.5
Upper Newport Bay***	27	7	**54**	**14**	-	NA	42,930.0	NA	-	11,130.0	-	11,130.0
					7,890.0	NA	50,820.0	NA	7,890.0	11,130.0	-	31,249.5
Total					**18,729.0**	NA	**78,684.0**	NA	**16,179.0**	**19,305.0**	**7,527.0**	**41,239.5**

Harbor/Facility	Alt 1 - No Action Annual Average Miles Traveled LA-2	Alt 1 - No Action Annual Average Miles Traveled LA-3	Alt 2 Annual Average Miles Traveled LA-2	Alt 2 Annual Average Miles Traveled LA-3	Alt 3 Annual Average Miles Traveled LA-2	Alt 3 Annual Average Miles Traveled LA-3	Alt 4 Annual Average Miles Traveled LA-2	Alt 4 Annual Average Miles Traveled LA-3
Regular Maintenance								
Los Angeles River Estuary	243.8	NA	243.8	NA	243.8	-	243.8	-
Los Angeles Harbor	90.0	NA	90.0	NA	90.0	-	-	260.0
Long Beach Harbor	418.0	NA	418.0	NA	418.0	-	-	950.0
Marina del Rey	971.5	NA	971.5	NA	971.5	-	971.5	-
Sunset/Huntington Harbor	170.0	NA	170.0	NA	-	230.0	-	230.0
Newport Harbor	-	NA	270.0	NA	-	70.0	-	70.0
Dana Point Harbor	-	NA	237.5	NA	-	87.5	-	87.5
Upper Newport Bay	-	NA	270.0	NA	-	70.0	-	70.0
Anaheim Bay	210.0	NA	210.0	NA	210.0	-	210.0	-
	2,103.3	NA	2,880.8	NA	1,933.3	457.5	1,425.3	1,667.5
Capital Improvement								
Los Angeles Harbor	118.4	NA	118.4	NA	118.4	-	-	341.9
Long Beach Harbor	144.7	NA	144.7	NA	144.7	-	-	328.8
Upper Newport Bay***	-	NA	5,724.0	NA	-	1,484.0	-	1,484.0
	263.0	NA	5,987.0	NA	263.0	1,484.0	-	2,154.7
Total	**2,366.3**	NA	**8,867.8**	NA	**2,196.3**	**1,941.5**	**1,425.3**	**3,822.2**

Distance Adjustment = 1
Average Scow Capacity = 2000 cubic yards

Individual Disposal Volumes (Increased by 50 Percent)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2 (cubic yards)	Alt 1 - No Action Worst Case Year LA-3 (cubic yards)	Alt 2 Worst Case Year LA-2 (cubic yards)	Alt 2 Worst Case Year LA-3 (cubic yards)	Alt 3 Worst Case Year LA-2 (cubic yards)	Alt 3 Worst Case Year LA-3 (cubic yards)	Alt 4 Worst Case Year LA-2 (cubic yards)	Alt 4 Worst Case Year LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	112,500	NA	112,500	NA	112,500	-	112,500	-
Los Angeles Harbor	15,000	NA	15,000	NA	15,000	-	-	15,000
Long Beach Harbor	57,000	NA	57,000	NA	57,000	-	-	57,000
Marina del Rey	100,500	NA	100,500	NA	100,500	-	100,500	-
Sunset/Huntington Harbor	150,000	NA	150,000	NA	-	150,000	-	150,000
Newport Harbor	-	NA	375,000	NA	-	375,000	-	375,000
Dana Point Harbor	-	NA	75,000	NA	-	75,000	-	75,000
Upper Newport Bay	-	NA	150,000	NA	-	150,000	-	150,000
Anaheim Bay	225,000	NA	225,000	NA	225,000	-	225,000	-
	660,000		1,260,000		510,000	750,000	438,000	822,000
Capital Improvement								
Los Angeles Harbor	394,500	NA	394,500	NA	394,500	-	-	394,500
Long Beach Harbor	394,500	NA	394,500	NA	394,500	-	-	394,500
Upper Newport Bay***	-	NA	1,590,000	NA	-	1,590,000	-	1,590,000
	789,000		2,379,000		789,000	1,590,000	-	2,379,000
Total	**1,449,000**	NA	**3,639,000**	NA	**1,299,000**	**2,340,000**	**438,000**	**3,201,000**

Individual Disposal Volumes (Increased by 0 Percent)

Harbor/Facility	Alt 1 - No Action Annual Average LA-2 (cubic yards)	Alt 1 - No Action Annual Average LA-3 (cubic yards)	Alt 2 Annual Average LA-2 (cubic yards)	Alt 2 Annual Average LA-3 (cubic yards)	Alt 3 Annual Average LA-2 (cubic yards)	Alt 3 Annual Average LA-3 (cubic yards)	Alt 4 Annual Average LA-2 (cubic yards)	Alt 4 Annual Average LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	18,750	NA	18,750	NA	18,750	-	18,750	-
Los Angeles Harbor	10,000	NA	10,000	NA	10,000	-	-	10,000
Long Beach Harbor	38,000	NA	38,000	NA	38,000	-	-	38,000
Marina del Rey	33,500	NA	33,500	NA	33,500	-	33,500	-
Sunset/Huntington Harbor	10,000	NA	10,000	NA	-	10,000	-	10,000
Newport Harbor	-	NA	10,000	NA	-	10,000	-	10,000
Dana Point Harbor	-	NA	6,250	NA	-	6,250	-	6,250
Upper Newport Bay	-	NA	10,000	NA	-	10,000	-	10,000
Anaheim Bay	15,000	NA	15,000	NA	15,000	-	15,000	-
	125,250		151,500		115,250	36,250	67,250	84,250
Capital Improvement								
Los Angeles Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Long Beach Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Upper Newport Bay***	-	NA	212,000	NA	-	212,000	-	212,000
	26,300		238,300		26,300	212,000	-	238,300
Total	**151,550**	NA	**389,800**	NA	**141,550**	**248,250**	**67,250**	**322,550**

Round Trip Miles x Individual Disposal Volumes (Increased by 50 Percent)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2 (mile-cu yds)	Alt 1 - No Action Worst Case Year LA-3 (mile-cu yds)	Alt 2 Worst Case Year LA-2 (mile-cu yds)	Alt 2 Worst Case Year LA-3 (mile-cu yds)	Alt 3 Worst Case Year LA-2 (mile-cu yds)	Alt 3 Worst Case Year LA-3 (mile-cu yds)	Alt 4 Worst Case Year LA-2 (mile-cu yds)	Alt 4 Worst Case Year LA-3 (mile-cu yds)
Regular Maintenance								
Los Angeles River Estuary	2,925,000	NA	2,925,000	NA	2,925,000	-	2,925,000	-
Los Angeles Harbor	270,000	NA	270,000	NA	270,000	-	-	780,000
Long Beach Harbor	1,254,000	NA	1,254,000	NA	1,254,000	-	-	2,850,000
Marina del Rey	5,829,000	NA	5,829,000	NA	5,829,000	-	5,829,000	-
Sunset/Huntington Harbor	5,100,000	NA	5,100,000	NA	-	6,900,000	-	6,900,000
Newport Harbor	-	NA	20,250,000	NA	-	5,250,000	-	5,250,000
Dana Point Harbor	-	NA	5,700,000	NA	-	2,100,000	-	2,100,000
Upper Newport Bay	-	NA	8,100,000	NA	-	2,100,000	-	2,100,000
Anaheim Bay	6,300,000	NA	6,300,000	NA	6,300,000	-	6,300,000	-
	21,678,000	NA	55,728,000	NA	16,578,000	16,350,000	15,054,000	19,980,000
Capital Improvement								
Los Angeles Harbor	7,101,000	NA	7,101,000	NA	7,101,000	-	-	20,514,000
Long Beach Harbor	8,679,000	NA	8,679,000	NA	8,679,000	-	-	19,725,000
Upper Newport Bay***	-	NA	85,860,000	NA	-	22,260,000	-	22,260,000
	15,780,000	NA	101,640,000	NA	15,780,000	22,260,000	-	62,499,000
Total	37,458,000	NA	157,368,000	NA	32,358,000	38,610,000	15,054,000	82,479,000
Average Round Trip Length (miles) =	**25.9**	**NA**	**43.2**	**NA**	**24.9**	**16.5**	**34.4**	**25.8**
Average Number of Round Trips =	**725**	**NA**	**1,820**	**NA**	**650**	**1,170**	**219**	**1,601**
Average Round Trip Length (nautical miles) =	**22.5**	**NA**	**37.6**	**NA**	**21.6**	**14.3**	**29.9**	**22.4**
Assumed Tug Speed = 4 knots								
Average Round Trip Duration (hours) =	**5.6**	**NA**	**9.4**	**NA**	**5.4**	**3.6**	**7.5**	**5.6**
Required Trips per Day (365 day year) =	**2.0**	**NA**	**5.0**	**NA**	**1.8**	**3.2**	**0.6**	**4.4**
Required Trips per Day (260 day year) =	**2.8**	**NA**	**7.0**	**NA**	**2.5**	**4.5**	**0.8**	**6.2**

Round Trip Miles x Individual Disposal Volumes (Increased by 0 Percent)

Harbor/Facility	Alt 1 - No Action Annual Average LA-2 (mile-cu yds)	Alt 1 - No Action Annual Average LA-3 (mile-cu yds)	Alt 2 Annual Average LA-2 (mile-cu yds)	Alt 2 Annual Average LA-3 (mile-cu yds)	Alt 3 Annual Average LA-2 (mile-cu yds)	Alt 3 Annual Average LA-3 (mile-cu yds)	Alt 4 Annual Average LA-2 (mile-cu yds)	Alt 4 Annual Average LA-3 (mile-cu yds)
Regular Maintenance								
Los Angeles River Estuary	487,500	NA	487,500	NA	487,500	-	487,500	-
Los Angeles Harbor	180,000	NA	180,000	NA	180,000	-	-	520,000
Long Beach Harbor	836,000	NA	836,000	NA	836,000	-	-	1,900,000
Marina del Rey	1,943,000	NA	1,943,000	NA	1,943,000	-	1,943,000	-
Sunset/Huntington Harbor	340,000	NA	340,000	NA	-	460,000	-	460,000
Newport Harbor	-	NA	540,000	NA	-	140,000	-	140,000
Dana Point Harbor	-	NA	475,000	NA	-	175,000	-	175,000
Upper Newport Bay	-	NA	540,000	NA	-	140,000	-	140,000
Anaheim Bay	420,000	NA	420,000	NA	420,000	-	420,000	-
	4,206,500	NA	5,761,500	NA	3,866,500	915,000	2,850,500	3,335,000
Capital Improvement								
Los Angeles Harbor	236,700	NA	236,700	NA	236,700	-	-	683,800
Long Beach Harbor	289,300	NA	289,300	NA	289,300	-	-	657,500
Upper Newport Bay***	-	NA	11,448,000	NA	-	2,968,000	-	2,968,000
	526,000	NA	11,974,000	NA	526,000	2,968,000	-	4,309,300
Total	4,732,500	NA	17,735,500	NA	4,392,500	3,883,000	2,850,500	7,644,300
Average Round Trip Length (miles) =	**31.2**	**NA**	**45.5**	**NA**	**31.0**	**15.6**	**42.4**	**23.7**
Average Number of Round Trips =	**76**	**NA**	**195**	**NA**	**71**	**124**	**34**	**161**
Average Round Trip Length (nautical miles) =	**27.1**	**NA**	**39.5**	**NA**	**27.0**	**13.6**	**36.8**	**20.6**
Assumed Tug Speed = 4 knots								
Average Round Trip Duration (hours) =	**6.8**	**NA**	**9.9**	**NA**	**6.7**	**3.4**	**9.2**	**6.1**
Required Trips per Day (365 day year) =	**0.2**	**NA**	**0.5**	**NA**	**0.2**	**0.3**	**0.1**	**0.4**
Required Trips per Day (260 day year) =	**0.3**	**NA**	**0.7**	**NA**	**0.3**	**0.5**	**0.1**	**0.6**

Harbor/Facility	One-Way Trip Distance (Miles) LA-2	One-Way Trip Distance (Miles) LA-3	Round-Trip Distance (Miles) LA-2	Round-Trip Distance (Miles) LA-3	Duration of Cruise Portion of Round Trip (hours)* LA-2	Duration of Cruise Portion of Round Trip (hours)* LA-3	Total Time per Round Trip (hours) LA-2	Total Time per Round Trip (hours) LA-3
Regular Maintenance								
Los Angeles River Estuary	13	25	26	50	2.7	5.1	3.7	6.1
Los Angeles Harbor	8	26	16	52	1.8	5.3	2.8	6.3
Long Beach Harbor	11	25	22	50	2.2	5.1	3.2	6.1
Marina del Rey	29	53	58	106	5.9	10.8	6.9	11.8
Sunset/Huntington Harbor	17	23	34	46	3.5	4.7	4.5	5.7
Newport Harbor	27	7	54	14	5.5	1.4	6.5	2.4
Dana Point Harbor	38	14	76	28	7.8	2.9	8.8	3.9
Upper Newport Bay	27	7	54	14	5.5	1.4	6.5	2.4
Anaheim Bay	14	21	28	42	2.9	4.3	3.9	5.3
Capital Improvement								
Los Angeles Harbor	9	26	18	52	1.8	5.3	2.8	6.3
Long Beach Harbor	11	25	22	50	2.2	5.1	3.2	6.1
Upper Newport Bay***	27	7	54	14	5.5	1.4	6.5	2.4

Harbor/Facility	Alt 1 - No Action Worst Case Year Miles Traveled LA-2	Alt 1 Worst Case Year Miles Traveled LA-3	Alt 2 Worst Case Year Miles Traveled LA-2	Alt 2 Worst Case Year Miles Traveled LA-3	Alt 3 Worst Case Year Miles Traveled LA-2	Alt 3 Worst Case Year Miles Traveled LA-3	Alt 4 Worst Case Year Miles Traveled LA-2	Alt 4 Worst Case Year Miles Traveled LA-3
Regular Maintenance								
Los Angeles River Estuary	1,482	NA	1,482	NA	1,482	-	1,482	-
Los Angeles Harbor	144	NA	144	NA	144		-	415
Long Beach Harbor	638	NA	638	NA	638	-	-	1,450
Marina del Rey	2,958	NA	2,958	NA	2,958	-	2,958	-
Sunset/Huntington Harbor	2,550	NA	2,550	NA	-	3,450	-	3,450
Newport Harbor		NA	10,152	NA	-	2,632	-	2,632
Dana Point Harbor		NA	2,888	NA	-	1,064	-	1,064
Upper Newport Bay	-	NA	4,050	NA	-	1,050	-	1,050
Anaheim Bay	3,164	NA	3,164	NA	3,164	-	3,164	-
	10,936	NA	28,026	NA	8,386	8,196	7,604	10,062
Capital Improvement								
Los Angeles Harbor	3,564	NA	3,564	NA	3,564	-	-	10,296
Long Beach Harbor	4,356	NA	4,356	NA	4,356	-	-	9,900
Upper Newport Bay***	-	NA	42,930	NA	-	11,130	-	11,130
	7,920	NA	50,850	NA	7,920	11,130	-	31,326
Total	18,856	NA	78,876	NA	16,306	18,326	7,604	41,388

Harbor/Facility	Alt 1 - No Action Annual Average Miles Traveled LA-2	Alt 1 Annual Average Miles Traveled LA-3	Alt 2 Annual Average Miles Traveled LA-2	Alt 2 Annual Average Miles Traveled LA-3	Alt 3 Annual Average Miles Traveled LA-2	Alt 3 Annual Average Miles Traveled LA-3	Alt 4 Annual Average Miles Traveled LA-2	Alt 4 Annual Average Miles Traveled LA-3
Regular Maintenance								
Los Angeles River Estuary	260	NA	260	NA	260	-	260	-
Los Angeles Harbor	80	NA	80	NA	80	-	-	260
Long Beach Harbor	418	NA	418	NA	418	-	-	950
Marina del Rey	986	NA	986	NA	986	-	986	-
Sunset/Huntington Harbor	170	NA	170	NA	-	230	-	230
Newport Harbor	-	NA	270	NA	-	70	-	70
Dana Point Harbor	-	NA	304	NA	-	112	-	112
Upper Newport Bay	-	NA	270	NA	-	70	-	70
Anaheim Bay	224	NA	224	NA	224	-	224	-
	2,138	NA	2,982	NA	1,968	482	1,470	1,692
Capital Improvement								
Los Angeles Harbor	126	NA	126	NA	126	-	-	364
Long Beach Harbor	154	NA	154	NA	154	-	-	350
Upper Newport Bay***	-	NA	5,724	NA	-	1,484	-	1,484
	280	NA	6,004	NA	280	1,484	-	2,198
Total	2,418	NA	8,986	NA	2,248	1,966	1,470	3,890

Distance Adjustment = 1
Average Scow Capacity = 2000 cubic yards
Cruise Speed = 8.5 knots
Cruise Speed = 9.8 mph
Days per year for average daily emission 365 days
Hours in Workday = 10 hours
Hours per trip in addition to cruising = 1 hour
Assumed work days in a week = 6 days
Assumed work days in a year = 310 days

Harbor/Facility	Number of Round Trips per Day (10-Hour Day) LA-2	Number of Round Trips per Day (10-Hour Day) LA-3
Regular Maintenance		
Los Angeles River Estuary	2.0	1.0
Los Angeles Harbor	3.0	1.0
Long Beach Harbor	3.0	1.0
Marina del Rey	1.0	1.0
Sunset/Huntington Harbor	2.0	1.0
Newport Harbor	1.0	4.0
Dana Point Harbor	1.0	2.0
Upper Newport Bay	1.0	4.0
Anaheim Bay	2.0	1.0
Capital Improvement		
Los Angeles Harbor	3.0	1.0
Long Beach Harbor	3.0	1.0
Upper Newport Bay***	1.0	4.0

Individual Disposal Volumes (Increased by 50 Percent)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2 (cubic yards)	Alt 1 Worst Case Year LA-3 (cubic yards)	Alt 2 Worst Case Year LA-2 (cubic yards)	Alt 2 Worst Case Year LA-3 (cubic yards)	Alt 3 Worst Case Year LA-2 (cubic yards)	Alt 3 Worst Case Year LA-3 (cubic yards)	Alt 4 Worst Case Year LA-2 (cubic yards)	Alt 4 Worst Case Year LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	112,500	NA	112,500	NA	112,500	-	112,500	-
Los Angeles Harbor	15,000	NA	15,000	NA	15,000	-	-	15,000
Long Beach Harbor	57,000	NA	57,000	NA	57,000	-	-	57,000
Marina del Rey	100,500	NA	100,500	NA	100,500	-	100,500	
Sunset/Huntington Harbor	150,000	NA	150,000	NA	-	150,000	-	150,000
Newport Harbor	-	NA	375,000	NA	-	375,000		375,000
Dana Point Harbor	-	NA	75,000	NA	-	75,000		75,000
Upper Newport Bay	-	NA	150,000	NA		150,000		150,000
Anaheim Bay	225,000	NA	225,000	NA	225,000		225,000	-
	660,000	NA	1,260,000	NA	510,000	750,000	438,000	822,000
Capital Improvement								
Los Angeles Harbor	394,500	NA	394,500	NA	394,500	-	-	394,500
Long Beach Harbor	394,500	NA	394,500	NA	394,500	-	-	394,500
Upper Newport Bay***	-	NA	1,590,000	NA	-	1,590,000	-	1,590,000
	789,000	NA	2,379,000	NA	789,000	1,590,000	-	2,379,000
Total	1,449,000	NA	3,639,000	NA	1,299,000	2,340,000	438,000	3,201,000

Individual Disposal Volumes (Increased by 0 Percent)

Harbor/Facility	Alt 1 - No Action Annual Average LA-2 (cubic yards)	Alt 1 Annual Average LA-3 (cubic yards)	Alt 2 Annual Average LA-2 (cubic yards)	Alt 2 Annual Average LA-3 (cubic yards)	Alt 3 Annual Average LA-2 (cubic yards)	Alt 3 Annual Average LA-3 (cubic yards)	Alt 4 Annual Average LA-2 (cubic yards)	Alt 4 Annual Average LA-3 (cubic yards)
Regular Maintenance								
Los Angeles River Estuary	18,750	NA	18,750	NA	18,750	-	18,750	-
Los Angeles Harbor	10,000	NA	10,000	NA	10,000	-	-	10,000
Long Beach Harbor	38,000	NA	38,000	NA	38,000	-	-	38,000
Marina del Rey	33,500	NA	33,500	NA	33,500	-	33,500	-
Sunset/Huntington Harbor	10,000	NA	10,000	NA	-	10,000	-	10,000
Newport Harbor	-	NA	10,000	NA	-	10,000	-	10,000
Dana Point Harbor	-	NA	6,250	NA	-	6,250	-	6,250
Upper Newport Bay	-	NA	10,000	NA	-	10,000	-	10,000
Anaheim Bay	15,000	NA	15,000	NA	15,000	-	15,000	-
	125,250	NA	151,500	NA	115,250	36,250	67,250	84,250
Capital Improvement								
Los Angeles Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Long Beach Harbor	13,150	NA	13,150	NA	13,150	-	-	13,150
Upper Newport Bay***	-	NA	212,000	NA	-	212,000	-	212,000
	26,300	NA	238,300	NA	26,300	212,000	-	238,300
Total	151,550	NA	389,800	NA	141,550	248,250	67,250	322,550

Total Number of Barge Round Trips

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	57	NA	57	NA	57	0	57	0
Los Angeles Harbor	8	NA	8	NA	8	0	0	8
Long Beach Harbor	29	NA	29	NA	29	0	0	29
Marina del Rey	51	NA	51	NA	51	0	51	0
Sunset/Huntington Harbor	75	NA	75	NA	0	75	0	75
Newport Harbor	0	NA	188	NA	0	188	0	188
Dana Point Harbor	0	NA	38	NA	0	38	0	38
Upper Newport Bay	0	NA	75	NA	0	75	0	75
Anaheim Bay	113	NA	113	NA	113	0	113	0
	333	NA	634	NA	258	376	221	413
Capital Improvement								
Los Angeles Harbor	198	NA	198	NA	198	0	0	198
Long Beach Harbor	198	NA	198	NA	198	0	0	198
Upper Newport Bay***	0	NA	795	NA	0	795	0	795
	396	NA	1191	NA	396	795	0	1191
Total =	729	NA	1825	NA	654	1171	221	1604

Total Number of Barge Round Trips

Harbor/Facility	Alt 1 - No Action Annual Average LA-2	Alt 1 Annual Average LA-3	Alt 2 Annual Average LA-2	Alt 2 Annual Average LA-3	Alt 3 Annual Average LA-2	Alt 3 Annual Average LA-3	Alt 4 Annual Average LA-2	Alt 4 Annual Average LA-3
Regular Maintenance								
Los Angeles River Estuary	10	NA	10	NA	10	0	10	0
Los Angeles Harbor	5	NA	5	NA	5	0	0	5
Long Beach Harbor	19	NA	19	NA	19	0	0	19
Marina del Rey	17	NA	17	NA	17	0	17	0
Sunset/Huntington Harbor	5	NA	5	NA	0	5	0	5
Newport Harbor	0	NA	5	NA	0	5	0	5
Dana Point Harbor	0	NA	4	NA	0	4	0	4
Upper Newport Bay	0	NA	5	NA	0	5	0	5
Anaheim Bay	8	NA	8	NA	8	0	8	0
	64	NA	78	NA	59	19	35	43
Capital Improvement								
Los Angeles Harbor	7	NA	7	NA	7	0	0	7
Long Beach Harbor	7	NA	7	NA	7	0	0	7
Upper Newport Bay***	0	NA	106	NA	0	106	0	106
	14	NA	120	NA	14	106	0	120
Total	78	NA	198	NA	73	125	35	163

Required Minimum Number of Barge Round Trips Per Day to Complete Project in Year

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1	NA	1	NA	1	0	1	0
Los Angeles Harbor	1	NA	1	NA	1	0	0	1
Long Beach Harbor	1	NA	1	NA	1	0	0	1
Marina del Rey	1	NA	1	NA	1	0	1	0
Sunset/Huntington Harbor	1	NA	1	NA	0	1	0	1
Newport Harbor	0	NA	1	NA	0	1	0	1
Dana Point Harbor	0	NA	1	NA	0	1	0	1
Upper Newport Bay	0	NA	1	NA	0	1	0	1
Anaheim Bay	1	NA	1	NA	1	0	1	0
	6	NA	9	NA	5	4	3	6
Capital Improvement								
Los Angeles Harbor	1	NA	1	NA	1	0	0	1
Long Beach Harbor	1	NA	1	NA	1	0	0	1
Upper Newport Bay***	0	NA	3	NA	0	3	0	3
	2	NA	5	NA	2	3	0	5
Total =	8	NA	14	NA	7	7	3	11

Required Minimum Number of Barge Round Trips Per Day to Complete Project in Year

Harbor/Facility	Alt 1 - No Action Annual Average LA-2	Alt 1 Annual Average LA-3	Alt 2 Annual Average LA-2	Alt 2 Annual Average LA-3	Alt 3 Annual Average LA-2	Alt 3 Annual Average LA-3	Alt 4 Annual Average LA-2	Alt 4 Annual Average LA-3
Regular Maintenance								
Los Angeles River Estuary	1	NA	1	NA	1	0	1	0
Los Angeles Harbor	1	NA	1	NA	1	0	0	1
Long Beach Harbor	1	NA	1	NA	1	0	0	1
Marina del Rey	1	NA	1	NA	1	0	1	0
Sunset/Huntington Harbor	1	NA	1	NA	0	1	0	1
Newport Harbor	0	NA	1	NA	0	1	0	1
Dana Point Harbor	0	NA	1	NA	0	1	0	1
Upper Newport Bay	0	NA	1	NA	0	1	0	1
Anaheim Bay	1	NA	1	NA	1	0	1	0
	6	NA	9	NA	5	4	3	6
Capital Improvement								
Los Angeles Harbor	1	NA	1	NA	1	0	0	1
Long Beach Harbor	1	NA	1	NA	1	0	0	1
Upper Newport Bay***	0	NA	1	NA	0	1	0	1
	2	NA	3	NA	2	1	0	3
Total =	8	NA	12	NA	7	5	3	9

Worst-Case Number of Barge Round Trips Per Day (10-hour Day)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2	NA	2	NA	2	0	2	0
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Marina del Rey	1	NA	1	NA	1	0	1	0
Sunset/Huntington Harbor	2	NA	2	NA	0	1	0	1
Newport Harbor	0	NA	1	NA	0	4	0	4
Dana Point Harbor	0	NA	1	NA	0	2	0	2
Upper Newport Bay	0	NA	1	NA	0	4	0	4
Anaheim Bay	2	NA	2	NA	2	0	2	0
	13	NA	16	NA	11	11	5	13
Capital Improvement								
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Upper Newport Bay***	0	NA	3	NA	0	4	0	4
	6	NA	9	NA	6	4	0	6
Total =	19	NA	25	NA	17	15	5	19

Worst-Case Number of Barge Hours Per Day (10-hour Day)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	7.3	NA	7.3	NA	7.3	0.0	7.3	0.0
Los Angeles Harbor	8.5	NA	8.5	NA	8.5	0.0	0.0	6.3
Long Beach Harbor	9.7	NA	9.7	NA	9.7	0.0	0.0	6.1
Marina del Rey	6.9	NA	6.9	NA	6.9	0.0	6.9	0.0
Sunset/Huntington Harbor	9.0	NA	9.0	NA	0.0	5.7	0.0	5.7
Newport Harbor	0.0	NA	6.5	NA	0.0	9.7	0.0	9.7
Dana Point Harbor	0.0	NA	8.8	NA	0.0	7.7	0.0	7.7
Upper Newport Bay	0.0	NA	6.5	NA	0.0	9.7	0.0	9.7
Anaheim Bay	7.7	NA	7.7	NA	7.7	0.0	7.7	0.0
	49.2	NA	71.0	NA	40.2	32.9	22.0	45.3
Capital Improvement								
Los Angeles Harbor	8.5	NA	8.5	NA	8.5	0.0	0.0	6.3
Long Beach Harbor	9.7	NA	9.7	NA	9.7	0.0	0.0	6.1
Upper Newport Bay***	0.0	NA	19.6	NA	0.0	9.7	0.0	9.7
	18.3	NA	37.8	NA	18.3	9.7	0.0	22.2
Total =	67.5	NA	108.8	NA	58.5	42.6	22.0	67.5

Pollutant	Exponent (x)	Intercept (b)	Coefficient (a)
PM	1.5	0.2551	0.0059
NO_x	1.5	10.4496	0.1255
NO_2	1.5	15.5247	0.18865
SO_2	n/a	n/s	2.3735
CO	1	n/s	0.8378
HC	1.5	n/s	0.0667
CO_2	1	648.6	44.1

Vessel Power	2200	HP	Vessel Cruise Load Factor =	80%
Vessel Power	1640.54	kW	Vessel Manuvering Load Factor =	20%
Fuel Sulfur Content	1.49%	% by weight		
Number of Generators	2		Generator Load Factor =	100%
Generator Power (per)	75	kW		

Emission Factors (g/kW-hr)
Load Factor (%)

Pollutant	**20%**	**40%**	**60%**	**80%**	**100%**
PM	0.3211	0.2784	0.2678	0.2633	0.2610
NO_x	11.8527	10.9457	10.7196	10.6250	10.5751
NO_2	17.6339	16.2704	15.9306	15.7883	15.7134
SO_2	9.7720	8.5236	8.1075	7.8994	7.7746
CO	4.1890	2.0945	1.3963	1.0473	0.8378
HC	0.7457	0.2637	0.1435	0.0932	0.0667
CO_2	869.1000	758.8500	722.1000	703.7250	692.7000
Fuel Consumption (g/kW-hr)	276.3	241.0	229.3	223.4	219.8
Fuel Sulfur Flow (g/kW-hr)	4.12	3.59	3.42	3.33	3.28

		PM emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.2633
Vessel Manuvering Load Factor =	20%	0.3211
Generator Load Factor =	100%	0.2610

Worst-Case Main Engine PM Emiseions Per Day (10-hour Day) (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2048.1	NA	2048.1	NA	2048.1	0.0	2048.1	0.0
Los Angeles Harbor	2224.1	NA	2224.1	NA	2224.1	0.0	0.0	1942.7
Long Beach Harbor	2648.1	NA	2648.1	NA	2648.1	0.0	0.0	1872.0
Marina del Rey	2154.7	NA	2154.7	NA	2154.7	0.0	2154.7	0.0
Sunset/Huntington Harbor	2613.4	NA	2613.4	NA	0.0	1730.7	0.0	1730.7
Newport Harbor	0.0	NA	2013.4	NA	0.0	2400.1	0.0	2400.1
Dana Point Harbor	0.0	NA	2790.7	NA	0.0	2189.4	0.0	2189.4
Upper Newport Bay	0.0	NA	2013.4	NA	0.0	2400.1	0.0	2400.1
Anahelm Bay	2189.4	NA	2189.4	NA	2189.4	0.0	2189.4	0.0
	13877.7	NA	20695.1	NA	11264.3	8720.2	6392.1	12535.0
Capital Improvement								
Los Angeles Harbor	2224.1	NA	2224.1	NA	2224.1	0.0	0.0	1942.7
Long Beach Herbor	2648.1	NA	2648.1	NA	2648.1	0.0	0.0	1872.0
Upper Newport Bey***	0.0	NA	6040.1	NA	0.0	2400.1	0.0	2400.1
	4872.1	NA	10912.3	NA	4872.1	2400.1	0.0	6214.8
Total (grams) =	**18749.8**	**NA**	**31607.4**	**NA**	**16136.4**	**11120.3**	**6392.1**	**18749.8**
Total main engine both sites (grams) =	**18749.8**		**31607.4**		**27256.7**		**25142.0**	

Worst-Case Generator PM Emissions Per Day (10-hour Day) (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	286.4	NA	286.4	NA	286.4	0.0	286.4	0.0
	333.6	NA	333.6	NA	333.6	0.0	0.0	247.3
	381.6	NA	381.6	NA	381.6	0.0	0.0	239.3
	271.3	NA	271.3	NA	271.3	0.0	271.3	0.0
	350.5	NA	350.5	NA	0.0	223.3	0.0	223.3
	0.0	NA	255.3	NA	0.0	380.7	0.0	380.7
	0.0	NA	343.3	NA	0.0	302.4	0.0	302.4
	0.0	NA	255.3	NA	0.0	380.7	0.0	380.7
	302.4	NA	302.4	NA	302.4	0.0	302.4	0.0
	1925.8	NA	2779.7	NA	1575.3	1287.2	860.1	1773.7
	333.6	NA	333.6	NA	333.6	0.0	0.0	247.3
	381.6	NA	381.6	NA	381.6	0.0	0.0	239.3
	0.0	NA	765.8	NA	0.0	380.7	0.0	380.7
	715.2	NA	1481.0	NA	715.2	380.7	0.0	667.3
Total (grams) =	**2641.0**	**NA**	**4260.7**	**NA**	**2290.5**	**1667.9**	**860.1**	**2641.0**
Total generators both sites (grams) =	**2641.0**		**4260.7**		**3958.4**		**3501.1**	

Worst-Case Main Engine PM Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	4.5	NA	4.5	NA	4.5	0.0	4.5	0.0
Los Angeles Harbor	4.9	NA	4.9	NA	4.9	0.0	0.0	4.3
Long Beach Harbor	5.8	NA	5.8	NA	5.8	0.0	0.0	4.1
Marina del Rey	4.8	NA	4.8	NA	4.8	0.0	4.8	0.0
Sunset/Huntington Harbor	5.8	NA	5.8	NA	0.0	3.8	0.0	3.8
Newport Harbor	0.0	NA	4.4	NA	0.0	5.3	0.0	5.3
Dana Point Harbor	0.0	NA	6.2	NA	0.0	4.8	0.0	4.8
Upper Newport Bay	0.0	NA	4.4	NA	0.0	5.3	0.0	5.3
Anaheim Bay	4.8	NA	4.8	NA	4.8	0.0	4.8	0.0
	30.6	NA	45.6	NA	24.8	19.2	14.1	27.6
Capital Improvement								
Los Angeles Harbor	4.9	NA	4.9	NA	4.9	0.0	0.0	4.3
Long Beach Harbor	5.8	NA	5.8	NA	5.8	0.0	0.0	4.1
Upper Newport Bay***	0.0	NA	13.3	NA	0.0	5.3	0.0	5.3
	10.7	NA	24.1	NA	10.7	5.3	0.0	13.7
Total (pounds) =	**41.3**	**NA**	**69.7**	**NA**	**35.6**	**24.5**	**14.1**	**41.3**
Total main engine both sites (pounds) =	**41.3**		**69.7**		**60.1**		**55.4**	
Total main engine both sites (tons) =	**0.02**		**0.03**		**0.03**		**0.03**	

Worst-Case Generator PM Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Casa Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	0.6	NA	0.6	NA	0.6	0.0	0.6	0.0
	0.7	NA	0.7	NA	0.7	0.0	0.0	0.5
	0.8	NA	0.8	NA	0.8	0.0	0.0	0.5
	0.6	NA	0.6	NA	0.6	0.0	0.6	0.0
	0.8	NA	0.8	NA	0.0	0.5	0.0	0.5
	0.0	NA	0.6	NA	0.0	0.8	0.0	0.8
	0.0	NA	0.8	NA	0.0	0.7	0.0	0.7
	0.0	NA	0.6	NA	0.0	0.8	0.0	0.8
	0.7	NA	0.7	NA	0.7	0.0	0.7	0.0
	4.2	NA	6.1	NA	3.5	2.8	1.9	3.9
	0.7	NA	0.7	NA	0.7	0.0	0.0	0.5
	0.8	NA	0.8	NA	0.8	0.0	0.0	0.5
	0.0	NA	1.7	NA	0.0	0.8	0.0	0.8
	1.6	NA	3.3	NA	1.6	0.8	0.0	1.9
Total (pound) =	**5.8**	**NA**	**9.4**	**NA**	**5.0**	**3.7**	**1.9**	**5.6**
Total generators both sites (pounds) =	**5.8**		**9.4**		**8.7**		**7.7**	
Total generators both sites (tone) =	**0.003**		**0.005**		**0.004**		**0.004**	

Worst-Case Combined Mein Engine and Generators PM Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**47.2**		**79.1**		**68.8**		**63.1**	
Total main engine and generators (tons) =	**0.024**		**0.040**		**0.034**		**0.032**	

		NOx emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	10.6250
Vessel Manuvering Load Factor =	20%	11.8527
Generator Load Factor =	100%	10.5751

Worst-Case Main Engine NOx Emissions Per Day (10-hour Day) (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	81908.6	NA	81908.6	NA	81908.6	0.0	81908.6	0.0
Los Angeles Harbor	88648.7	NA	88648.7	NA	88648.7	0.0	0.0	78019.6
Long Beach Harbor	105755.8	NA	105755.8	NA	105755.8	0.0	0.0	75168.4
Marina del Rey	86573.2	NA	86573.2	NA	86573.2	0.0	86573.2	0.0
Sunset/Huntington Harbor	104718.0	NA	104718.0	NA	0.0	69466.1	0.0	69466.1
Newport Harbor	0.0	NA	80870.8	NA	0.0	95388.9	0.0	95388.9
Dana Point Harbor	0.0	NA	112233.8	NA	0.0	87610.9	0.0	87610.9
Upper Newport Bay	0.0	NA	80870.8	NA	0.0	95388.9	0.0	95388.9
Anaheim Bay	87610.9	NA	87610.9	NA	87610.9	0.0	87610.9	0.0
	555215.3	NA	829190.6	NA	450497.3	347854.8	256092.7	501042.9
Capital Improvement								
Los Angelas Harbor	88648.7	NA	88648.7	NA	88648.7	0.0	0.0	78019.6
Long Beach Harbor	105755.8	NA	105755.8	NA	105755.8	0.0	0.0	75168.4
Upper Newport Bay***	0.0	NA	242612.4	NA	0.0	95388.9	0.0	95388.9
	194404.6	NA	437016.9	NA	194404.6	95388.9	0.0	248577.0
Total (grams) =	**749619.8**	**NA**	**1266207.6**	**NA**	**644901.8**	**443243.7**	**256092.7**	**749619.8**
Total main engine both sites (grams) =	**749619.8**		**1266207.6**		**1088145.6**		**1005712.5**	

Worst-Case Generator NOx Emissions Per Day (10-hour Day) (grams)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	11605.3	NA	11605.3	NA	11605.3	0.0	11605.3	0.0
	13515.9	NA	13515.9	NA	13515.9	0.0	0.0	10019.0
	15461.9	NA	15461.9	NA	15461.9	0.0	0.0	9694.7
	10992.0	NA	10992.0	NA	10992.0	0.0	10992.0	0.0
	14199.9	NA	14199.9	NA	0.0	9046.0	0.0	9046.0
	0.0	NA	10343.3	NA	0.0	15426.5	0.0	15426.5
	0.0	NA	13911.0	NA	0.0	12253.9	0.0	12253.9
	0.0	NA	10343.3	NA	0.0	15426.5	0.0	15426.5
	12253.9	NA	12253.9	NA	12253.9	0.0	12253.9	0.0
	78028.9	NA	112626.5	NA	63828.9	52152.8	34851.2	71866.5
	13515.9	NA	13515.9	NA	13515.9	0.0	0.0	10019.0
	15461.9	NA	15461.9	NA	15461.9	0.0	0.0	9694.7
	0.0	NA	31030.0	NA	0.0	15426.5	0.0	15426.5
	28977.7	NA	60007.7	NA	28977.7	15426.5	0.0	35140.1
Total (grams) =	**107006.6**	**NA**	**172634.3**	**NA**	**92806.6**	**67579.3**	**34851.2**	**107006.6**
Total generators both sites (grams) =	**107006.6**		**172634.3**		**160385.9**		**141857.8**	

Worst-Case Main Engine NOx Emiseions Per Day (10-hour Day) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	180.6	NA	180.6	NA	180.6	0.0	180.6	0.0
Los Angeles Harbor	195.4	NA	195.4	NA	195.4	0.0	0.0	172.0
Long Beach Harbor	233.2	NA	233.2	NA	233.2	0.0	0.0	165.7
Marina del Rey	190.9	NA	190.9	NA	190.9	0.0	190.9	0.0
Sunset/Huntington Harbor	230.9	NA	230.9	NA	0.0	153.1	0.0	153.1
Newport Harbor	0.0	NA	178.3	NA	0.0	210.3	0.0	210.3
Dana Point Harbor	0.0	NA	247.4	NA	0.0	193.1	0.0	193.1
Upper Newport Bay	0.0	NA	178.3	NA	0.0	210.3	0.0	210.3
Anaheim Bay	193.1	NA	193.1	NA	193.1	0.0	193.1	0.0
	1224.0	NA	1828.1	NA	993.2	766.9	564.6	1104.6
Capital Improvement								
Los Angeles Harbor	195.4	NA	195.4	NA	195.4	0.0	0.0	172.0
Long Beach Harbor	233.2	NA	233.2	NA	233.2	0.0	0.0	165.7
Upper Newport Bay***	0.0	NA	534.9	NA	0.0	210.3	0.0	210.3
	428.6	NA	963.5	NA	428.6	210.3	0.0	548.0
Total (pounds) =	**1652.6**	**NA**	**2791.5**	**NA**	**1421.8**	**977.2**	**564.6**	**1652.6**
Total main engine both sites (pounds) =	**1652.6**		**2791.5**		**2399.0**		**2217.2**	
Total main engine both sites (tons) =	**0.83**		**1.40**		**1.20**		**1.11**	

Worst-Case Generator NOx Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	25.6	NA	25.6	NA	25.6	0.0	25.6	0.0
	29.8	NA	29.8	NA	29.8	0.0	0.0	22.1
	34.1	NA	34.1	NA	34.1	0.0	0.0	21.4
	24.2	NA	24.2	NA	24.2	0.0	24.2	0.0
	31.3	NA	31.3	NA	0.0	19.9	0.0	19.9
	0.0	NA	22.8	NA	0.0	34.0	0.0	34.0
	0.0	NA	30.7	NA	0.0	27.0	0.0	27.0
	0.0	NA	22.8	NA	0.0	34.0	0.0	34.0
	27.0	NA	27.0	NA	27.0	0.0	27.0	0.0
	172.0	NA	248.3	NA	140.7	115.0	76.8	158.4
	29.8	NA	29.8	NA	29.8	0.0	0.0	22.1
	34.1	NA	34.1	NA	34.1	0.0	0.0	21.4
	0.0	NA	68.4	NA	0.0	34.0	0.0	34.0
	63.9	NA	132.3	NA	63.9	34.0	0.0	77.5
Total (pounds) =	**235.9**	**NA**	**380.6**	**NA**	**204.6**	**149.0**	**76.8**	**235.9**
Total generators both sites (pounds) =	**235.9**		**380.6**		**353.6**		**312.7**	
Total generators both sites (tons) =	**0.118**		**0.190**		**0.177**		**0.156**	

Worst-Case Combined Main Engine and Generators NOx Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**1888.5**		**3172.1**		**2752.5**		**2530.0**	
Total main engine and generators (tons) =	**0.944**		**1.586**		**1.376**		**1.265**	

		NO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	15.7883
Vessel Manuvering Load Factor =	20%	17.6339
Generator Load Factor =	100%	15.7134

Worst-Case Main Engine NO2 Emissions Per Day (10-hour Day)
(grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	121727.0	NA	121727.0	NA	121727.0	0.0	121727.0	0.0
Los Angeles Harbor	131749.6	NA	131749.6	NA	131749.6	0.0	0.0	115941.2
Long Beach Harbor	157170.1	NA	157170.1	NA	157170.1	0.0	0.0	111704.5
Marina del Rey	128651.5	NA	128651.5	NA	128651.5	0.0	128651.5	0.0
Sunset/Huntington Harbor	155621.0	NA	155621.0	NA	0.0	103231.0	0.0	103231.0
Newport Harbor	0.0	NA	120178.0	NA	0.0	141772.2	0.0	141772.2
Dana Point Herbor	0.0	NA	166782.2	NA	0.0	130200.5	0.0	130200.5
Upper Newport Bay	0.0	NA	120178.0	NA	0.0	141772.2	0.0	141772.2
Anaheim Bay	130200.5	NA	130200.5	NA	130200.5	0.0	130200.5	0.0
	825119.7	NA	1232257.8	NA	669498.7	516975.8	380579.0	744621.5
Capital Improvement								
Los Angeles Harbor	131749.6	NA	131749.6	NA	131749.6	0.0	0.0	115941.2
Long Beach Harbor	157170.1	NA	157170.1	NA	157170.1	0.0	0.0	111704.5
Upper Newport Bay***	0.0	NA	360533.9	NA	0.0	141772.2	0.0	141772.2
	288919.7	NA	649453.5	NA	288919.7	141772.2	0.0	369417.8
Total (grams) =	**1114039.3**	**NA**	**1881711.3**	**NA**	**958418.3**	**658747.9**	**380579.0**	**1114039.3**
Total main engine both sites (grams) =	**1114039.3**		**1881711.3**		**1617166.3**		**1494618.3**	

Worst-Case Generator NO2 Emissions Per Day (10-hour Day)
(grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	17244.0	NA	17244.0	NA	17244.0	0.0	17244.0	0.0
	20083.0	NA	20083.0	NA	20083.0	0.0	0.0	14887.0
	22974.5	NA	22974.5	NA	22974.5	0.0	0.0	14405.1
	16332.8	NA	16332.8	NA	16332.8	0.0	16332.8	0.0
	21099.4	NA	21099.4	NA	0.0	13441.3	0.0	13441.3
	0.0	NA	15369.0	NA	0.0	22921.9	0.0	22921.9
	0.0	NA	20670.1	NA	0.0	18207.9	0.0	18207.9
	0.0	NA	15369.0	NA	0.0	22921.9	0.0	22921.9
	18207.9	NA	18207.9	NA	18207.9	0.0	18207.9	0.0
	115941.7	NA	167349.7	NA	94842.2	77493.0	51784.7	106765.1
	20083.0	NA	20083.0	NA	20083.0	0.0	0.0	14887.0
	22974.5	NA	22974.5	NA	22974.5	0.0	0.0	14405.1
	0.0	NA	46106.9	NA	0.0	22921.9	0.0	22921.9
	43057.5	NA	89164.4	NA	43057.5	22921.9	0.0	52214.1
Total (grams) =	**158999.2**	**NA**	**256514.1**	**NA**	**137859.7**	**100414.8**	**51784.7**	**158999.2**
Total generators both sites (grams) =	**158999.2**		**256514.1**		**238314.6**		**210783.9**	

Worst-Case Main Engine NO2 Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	268.4	NA	268.4	NA	268.4	0.0	268.4	0.0
Los Angeles Harbor	290.5	NA	290.5	NA	290.5	0.0	0.0	255.6
Long Beach Harbor	346.5	NA	346.5	NA	346.5	0.0	0.0	246.3
Marina del Rey	283.6	NA	283.6	NA	283.6	0.0	283.6	0.0
Sunset/Huntington Harbor	343.1	NA	343.1	NA	0.0	227.6	0.0	227.6
Newport Harbor	0.0	NA	264.9	NA	0.0	312.6	0.0	312.6
Dana Point Harbor	0.0	NA	367.7	NA	0.0	287.0	0.0	287.0
Upper Newport Bay	0.0	NA	264.9	NA	0.0	312.6	0.0	312.6
Anaheim Bay	287.0	NA	287.0	NA	287.0	0.0	287.0	0.0
	1819.1	NA	2716.7	NA	1476.0	1139.7	839.0	1641.6
Capital Improvement								
Los Angeles Harbor	290.5	NA	290.5	NA	290.5	0.0	0.0	255.6
Long Beach Harbor	346.5	NA	346.5	NA	346.5	0.0	0.0	246.3
Upper Newport Bay***	0.0	NA	794.8	NA	0.0	312.6	0.0	312.6
	637.0	NA	1431.8	NA	637.0	312.6	0.0	814.4
Total (pounds) =	**2456.0**	**NA**	**4148.5**	**NA**	**2113.0**	**1452.3**	**839.0**	**2456.0**
Total main engine both sites (pounds) =	**2456.0**		**4148.5**		**3565.2**		**3295.1**	
Total main engine both sites (tons) =	**1.23**		**2.07**		**1.78**		**1.65**	

Worst-Case Generator NO2 Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	38.0	NA	38.0	NA	38.0	0.0	38.0	0.0
	44.3	NA	44.3	NA	44.3	0.0	0.0	32.8
	50.7	NA	50.7	NA	50.7	0.0	0.0	31.8
	36.0	NA	36.0	NA	36.0	0.0	36.0	0.0
	46.5	NA	46.5	NA	0.0	29.6	0.0	29.6
	0.0	NA	33.9	NA	0.0	50.5	0.0	50.5
	0.0	NA	45.6	NA	0.0	40.1	0.0	40.1
	0.0	NA	33.9	NA	0.0	50.5	0.0	50.5
	40.1	NA	40.1	NA	40.1	0.0	40.1	0.0
	255.6	NA	368.9	NA	209.1	170.8	114.2	235.4
	44.3	NA	44.3	NA	44.3	0.0	0.0	32.8
	50.7	NA	50.7	NA	50.7	0.0	0.0	31.8
	0.0	NA	101.6	NA	0.0	50.5	0.0	50.5
	94.9	NA	196.6	NA	94.9	50.5	0.0	115.1
Total (pounds) =	**350.5**	**NA**	**565.5**	**NA**	**304.0**	**221.4**	**114.2**	**350.5**
Total generators both sites (pounds) =	**350.5**		**565.5**		**525.4**		**464.7**	
Total generators both sites (tons) =	**0.175**		**0.283**		**0.263**		**0.232**	

Worst-Case Combined Main Engine and Generators NO2 Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**2806.6**		**4714.0**		**4090.6**		**3759.8**	
Total main engine and generators (tons) =	**1.403**		**2.357**		**2.045**		**1.880**	

		SO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	7.8994
Vessel Manuvering Load Factor =	20%	9.7720
Generator Load Factor =	100%	7.7746

Worst-Case Main Engine SO2 Emissions Per Day (10-hour Day) (grams)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	61526.8	NA	61526.8	NA	61526.8	0.0	61526.8	0.0
Los Angeles Harbor	66852.8	NA	66852.8	NA	66852.8	0.0	0.0	58320.5
Long Beach Harbor	79571.5	NA	79571.5	NA	79571.5	0.0	0.0	56200.7
Marina del Rey	64679.8	NA	64679.8	NA	64879.8	0.0	64679.8	0.0
Sunset/Huntington Harbor	78485.0	NA	78485.0	NA	0.0	51961.2	0.0	51961.2
Newport Harbor	0.0	NA	60440.3	NA	0.0	72178.9	0.0	72178.9
Dana Point Harbor	0.0	NA	83757.8	NA	0.0	65766.3	0.0	65766.3
Upper Newport Bay	0.0	NA	60440.3	NA	0.0	72178.9	0.0	72178.9
Anaheim Bay	65766.3	NA	65766.3	NA	65766.3	0.0	65766.3	0.0
	416882.1	NA	621520.5	NA	338397.2	282085.2	191972.9	376606.4
Capital Improvement								
Los Angeles Harbor	66852.8	NA	66852.8	NA	66852.8	0.0	0.0	58320.5
Long Beach Harbor	79571.5	NA	79571.5	NA	79571.5	0.0	0.0	56200.7
Upper Newport Bay***	0.0	NA	181320.8	NA	0.0	72178.9	0.0	72178.9
	146424.3	NA	327745.1	NA	146424.3	72178.9	0.0	186700.1
Total (grams) =	**563306.4**	**NA**	**949265.6**	**NA**	**484821.4**	**334284.0**	**191972.9**	**563306.4**
Total main engine both sites (grams) =	**563306.4**		**949265.6**		**819085.5**		**755279.3**	

Worst-Case Generator SO2 Emissions Per Day (10-hour Day) (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	8531.9	NA	8531.9	NA	8531.9	0.0	8531.9	0.0
	9936.5	NA	9936.5	NA	9936.5	0.0	0.0	7365.7
	11367.2	NA	11367.2	NA	11367.2	0.0	0.0	7127.3
	8081.1	NA	8081.1	NA	8081.1	0.0	8081.1	0.0
	10439.5	NA	10439.5	NA	0.0	6650.4	0.0	6650.4
	0.0	NA	7604.2	NA	0.0	11341.2	0.0	11341.2
	0.0	NA	10227.1	NA	0.0	9008.8	0.0	9008.8
	0.0	NA	7604.2	NA	0.0	11341.2	0.0	11341.2
	9008.8	NA	9008.8	NA	9008.8	0.0	9008.8	0.0
	57365.0	NA	82800.4	NA	46925.5	38341.6	25621.8	52834.6
	9936.5	NA	9936.5	NA	9936.5	0.0	0.0	7365.7
	11367.2	NA	11367.2	NA	11367.2	0.0	0.0	7127.3
	0.0	NA	22812.5	NA	0.0	11341.2	0.0	11341.2
	21303.8	NA	44116.3	NA	21303.8	11341.2	0.0	25834.2
Total (grams) =	**78668.8**	**NA**	**126916.7**	**NA**	**68229.3**	**49662.7**	**25621.8**	**78668.8**
Total generators both sites (grams) =	**78668.8**		**126916.7**		**117912.0**		**104290.6**	

Worst-Case Main Engine SO2 Emissions Per Day (10-hour Day) (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	135.6	NA	135.6	NA	135.6	0.0	135.6	0.0
Los Angeles Harbor	147.4	NA	147.4	NA	147.4	0.0	0.0	128.6
Long Beach Harbor	175.4	NA	175.4	NA	175.4	0.0	0.0	123.9
Marine del Rey	142.6	NA	142.6	NA	142.6	0.0	142.6	0.0
Sunset/Huntington Harbor	173.0	NA	173.0	NA	0.0	114.6	0.0	114.6
Newport Harbor	0.0	NA	133.2	NA	0.0	159.1	0.0	159.1
Dana Point Harbor	0.0	NA	184.7	NA	0.0	145.0	0.0	145.0
Upper Newport Bay	0.0	NA	133.2	NA	0.0	159.1	0.0	159.1
Anaheim Bay	145.0	NA	145.0	NA	145.0	0.0	145.0	0.0
	919.1	NA	1370.2	NA	746.0	577.8	423.2	830.3
Capital Improvement								
Los Angeles Harbor	147.4	NA	147.4	NA	147.4	0.0	0.0	128.6
Long Beach Harbor	175.4	NA	175.4	NA	175.4	0.0	0.0	123.9
Upper Newport Bay***	0.0	NA	399.7	NA	0.0	159.1	0.0	159.1
	322.8	NA	722.6	NA	322.8	159.1	0.0	411.6
Total (pounds) =	**1241.9**	**NA**	**2092.8**	**NA**	**1068.8**	**736.9**	**423.2**	**1241.9**
Total main engine both sites (pounds) =	**1241.9**		**2092.8**		**1805.8**		**1665.1**	
Total main engine both sites (tons) =	**0.62**		**1.05**		**0.90**		**0.83**	

Worst-Case Generator SO2 Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	18.8	NA	18.8	NA	18.8	0.0	18.8	0.0
	21.9	NA	21.9	NA	21.9	0.0	0.0	16.2
	25.1	NA	25.1	NA	25.1	0.0	0.0	15.7
	17.8	NA	17.8	NA	17.8	0.0	17.8	0.0
	23.0	NA	23.0	NA	0.0	14.7	0.0	14.7
	0.0	NA	16.8	NA	0.0	25.0	0.0	25.0
	0.0	NA	22.5	NA	0.0	19.9	0.0	19.9
	0.0	NA	16.8	NA	0.0	25.0	0.0	25.0
	19.9	NA	19.9	NA	19.9	0.0	19.9	0.0
	126.5	NA	182.5	NA	103.5	84.5	56.5	116.5
	21.9	NA	21.9	NA	21.9	0.0	0.0	16.2
	25.1	NA	25.1	NA	25.1	0.0	0.0	15.7
	0.0	NA	50.3	NA	0.0	25.0	0.0	25.0
	47.0	NA	97.3	NA	47.0	25.0	0.0	57.0
Total (pounds) =	**173.4**	**NA**	**279.8**	**NA**	**150.4**	**109.5**	**56.5**	**173.4**
Total generators both sites (pounds) =	**173.4**		**279.8**		**260.0**		**229.9**	
Total generators both sites (tons) =	**0.087**		**0.140**		**0.130**		**0.115**	

Worst-Case Combined Main Engine and Generators SO2 Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**1415.3**		**2372.6**		**2065.7**		**1895.0**	
Total main engine and generators (tons) =	**0.708**		**1.186**		**1.033**		**0.948**	

		CO emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	1.0473
Vessel Manuvering Load Factor =	20%	4.1890
Generator Load Factor =	100%	0.6378

Worst-Case Main Engine CO Emissions Per Day (10-hour Day)
(grams)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	10055.6	NA	10055.6	NA	10055.6	0.0	10055.6	0.0
Los Angeles Harbor	11711.0	NA	11711.0	NA	11711.0	0.0	0.0	8881.1
Long Beach Harbor	13397.2	NA	13397.2	NA	13397.2	0.0	0.0	8400.1
Marina del Rey	9524.2	NA	9524.2	NA	9524.2	0.0	9524.2	0.0
Sunset/Huntington Harbor	12303.8	NA	12303.8	NA	0.0	7838.0	0.0	7838.0
Newport Harbor	0.0	NA	8962.1	NA	0.0	13366.5	0.0	13366.5
Dana Point Harbor	0.0	NA	12053.4	NA	0.0	10617.6	0.0	10617.6
Upper Newport Bay	0.0	NA	8962.1	NA	0.0	13366.5	0.0	13366.5
Anaheim Bay	10617.6	NA	10617.6	NA	10617.6	0.0	10617.6	0.0
	67609.3	NA	97587.0	NA	55305.6	45188.6	30197.4	62269.9
Capital Improvement								
Los Angeles Harbor	11711.0	NA	11711.0	NA	11711.0	0.0	0.0	8881.1
Long Beach Harbor	13397.2	NA	13397.2	NA	13397.2	0.0	0.0	8400.1
Upper Newport Bay***	0.0	NA	26886.4	NA	0.0	13366.5	0.0	13366.5
	25108.2	NA	51994.6	NA	25108.2	13366.5	0.0	30447.7
Total (grams) =	**92717.6**	**NA**	**149581.7**	**NA**	**80413.3**	**58555.1**	**30197.4**	**92717.6**
Total main engine both sites (grams) =	**92717.6**		**149581.7**		**138968.9**		**122914.9**	

Worst-Case Generator CO Emissions Per Day (10-hour Day)
(grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	919.4	NA	919.4	NA	919.4	0.0	919.4	0.0
	1070.8	NA	1070.8	NA	1070.8	0.0	0.0	793.7
	1224.9	NA	1224.9	NA	1224.9	0.0	0.0	768.0
	870.8	NA	870.8	NA	870.8	0.0	870.8	0.0
	1125.0	NA	1125.0	NA	0.0	716.7	0.0	716.7
	0.0	NA	819.4	NA	0.0	1222.1	0.0	1222.1
	0.0	NA	1102.1	NA	0.0	970.8	0.0	970.8
	0.0	NA	819.4	NA	0.0	1222.1	0.0	1222.1
	970.8	NA	970.8	NA	970.8	0.0	970.8	0.0
	6181.7	NA	8922.7	NA	5056.8	4131.7	2761.0	5693.5
	1070.8	NA	1070.8	NA	1070.8	0.0	0.0	793.7
	1224.9	NA	1224.9	NA	1224.9	0.0	0.0	768.0
	0.0	NA	2458.3	NA	0.0	1222.1	0.0	1222.1
	2295.7	NA	4754.0	NA	2295.7	1222.1	0.0	2783.9
Total (grams) =	**8477.5**	**NA**	**13676.7**	**NA**	**7352.5**	**5353.9**	**2761.0**	**8477.5**
Total generators both sites (grams) =	**8477.5**		**13676.7**		**12706.4**		**11236.5**	

Worst-Case Main Engine CO Emissions Per Day (10-hour Day)
(pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	22.2	NA	22.2	NA	22.2	0.0	22.2	0.0
Los Angeles Harbor	25.8	NA	25.8	NA	25.8	0.0	0.0	19.1
Long Beach Harbor	29.5	NA	29.5	NA	29.5	0.0	0.0	18.5
Marina del Rey	21.0	NA	21.0	NA	21.0	0.0	21.0	0.0
Sunset/Huntington Harbor	27.1	NA	27.1	NA	0.0	17.3	0.0	17.3
Newport Harbor	0.0	NA	19.8	NA	0.0	29.5	0.0	29.5
Dana Point Harbor	0.0	NA	26.6	NA	0.0	23.4	0.0	23.4
Upper Newport Bay	0.0	NA	19.8	NA	0.0	29.5	0.0	29.5
Anaheim Bay	23.4	NA	23.4	NA	23.4	0.0	23.4	0.0
	149.1	NA	215.1	NA	121.9	99.6	66.6	137.3
Capital Improvement								
Los Angeles Harbor	25.8	NA	25.8	NA	25.8	0.0	0.0	19.1
Long Beach Harbor	29.5	NA	29.5	NA	29.5	0.0	0.0	18.5
Upper Newport Bay***	0.0	NA	59.3	NA	0.0	29.5	0.0	29.5
	55.4	NA	114.6	NA	55.4	29.5	0.0	67.1
Total (pounds) =	**204.4**	**NA**	**329.8**	**NA**	**177.3**	**129.1**	**66.6**	**204.4**
Total main engine both sites (pounds) =	**204.4**		**329.8**		**306.4**		**271.0**	
Total main engine both sites (tons) =	**0.10**		**0.16**		**0.15**		**0.14**	

Worst-Case Generator CO Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	2.0	NA	2.0	NA	2.0	0.0	2.0	0.0
	2.4	NA	2.4	NA	2.4	0.0	0.0	1.7
	2.7	NA	2.7	NA	2.7	0.0	0.0	1.7
	1.9	NA	1.9	NA	1.9	0.0	1.9	0.0
	2.5	NA	2.5	NA	0.0	1.6	0.0	1.6
	0.0	NA	1.8	NA	0.0	2.7	0.0	2.7
	0.0	NA	2.4	NA	0.0	2.1	0.0	2.1
	0.0	NA	1.8	NA	0.0	2.7	0.0	2.7
	2.1	NA	2.1	NA	2.1	0.0	2.1	0.0
	13.6	NA	19.7	NA	11.1	9.1	6.1	12.6
	2.4	NA	2.4	NA	2.4	0.0	0.0	1.7
	2.7	NA	2.7	NA	2.7	0.0	0.0	1.7
	0.0	NA	5.4	NA	0.0	2.7	0.0	2.7
	5.1	NA	10.5	NA	5.1	2.7	0.0	6.1
Total (pounds) =	**18.7**	**NA**	**30.2**	**NA**	**16.2**	**11.8**	**6.1**	**18.7**
Total generators both sites (pounds) =	**18.7**		**30.2**		**28.0**		**24.8**	
Total generators both sites (tons) =	**0.009**		**0.015**		**0.014**		**0.012**	

Worst-Case Combined Main Engine and Generators CO Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**223.1**		**359.9**		**334.4**		**295.8**	
Total main engine and generators (tons) =	**0.112**		**0.180**		**0.167**		**0.148**	

		HC emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.0932
Vessel Manuvering Load Factor =	20%	0.7457
Generator Load Factor =	100%	0.0667

Worst-Case Main Engine HC Emissions Per Day (10-hour Day) (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1139.7	NA	1139.7	NA	1139.7	0.0	1139.7	0.0
Los Angeles Harbor	1409.4	NA	1409.4	NA	1409.4	0.0	0.0	895.0
Long Beach Harbor	1559.5	NA	1559.5	NA	1559.5	0.0	0.0	870.0
Marina del Rey	970.1	NA	970.1	NA	970.1	0.0	970.1	0.0
Sunset/Huntington Harbor	1339.8	NA	1339.8	NA	0.0	820.0	0.0	820.0
Newport Harbor	0.0	NA	920.1	NA	0.0	1679.1	0.0	1679.1
Dana Point Harbor	0.0	NA	1195.2	NA	0.0	1189.8	0.0	1189.8
Upper Newport Bay	0.0	NA	920.1	NA	0.0	1679.1	0.0	1679.1
Anaheim Bay	1189.8	NA	1189.8	NA	1189.8	0.0	1189.8	0.0
	7608.3	NA	10643.7	NA	6268.5	5368.0	3299.6	7133.1
Capital Improvement								
Los Angeles Harbor	1409.4	NA	1409.4	NA	1409.4	0.0	0.0	895.0
Long Beach Harbor	1559.5	NA	1559.5	NA	1559.5	0.0	0.0	870.0
Upper Newport Bay***	0.0	NA	2760.2	NA	0.0	1679.1	0.0	1679.1
	2968.9	NA	5729.1	NA	2968.9	1679.1	0.0	3444.2
Total (grams) =	**10577.3**	**NA**	**16372.8**	**NA**	**9237.4**	**7047.1**	**3299.6**	**10577.3**
Total main engine both sites (grams) =	**10577.3**		**16372.8**		**16284.5**		**13876.9**	

Worst-Case Generator HC Emissions Per Day (10-hour Day) (grams)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	73.2	NA	73.2	NA	73.2	0.0	73.2	0.0
	85.2	NA	85.2	NA	85.2	0.0	0.0	63.2
	97.5	NA	97.5	NA	97.5	0.0	0.0	61.1
	69.3	NA	69.3	NA	69.3	0.0	69.3	0.0
	89.6	NA	89.6	NA	0.0	57.1	0.0	57.1
	0.0	NA	65.2	NA	0.0	97.3	0.0	97.3
	0.0	NA	87.7	NA	0.0	77.3	0.0	77.3
	0.0	NA	65.2	NA	0.0	97.3	0.0	97.3
	77.3	NA	77.3	NA	77.3	0.0	77.3	0.0
	492.1	NA	710.4	NA	402.6	328.9	219.8	453.3
	85.2	NA	85.2	NA	85.2	0.0	0.0	63.2
	97.5	NA	97.5	NA	97.5	0.0	0.0	61.1
	0.0	NA	195.7	NA	0.0	97.3	0.0	97.3
	182.8	NA	378.5	NA	182.8	97.3	0.0	221.6
Total (grams) =	**674.9**	**NA**	**1088.9**	**NA**	**585.4**	**426.2**	**219.8**	**674.9**
Total generators both sites (grams) =	**674.9**		**1088.9**		**1011.6**		**894.7**	

Worst-Case Main Engine HC Emissions Per Day (10-hour Day) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2.5	NA	2.5	NA	2.5	0.0	2.5	0.0
Los Angeles Harbor	3.1	NA	3.1	NA	3.1	0.0	0.0	2.0
Long Beach Harbor	3.4	NA	3.4	NA	3.4	0.0	0.0	1.9
Marina del Rey	2.1	NA	2.1	NA	2.1	0.0	2.1	0.0
Sunset/Huntington Harbor	3.0	NA	3.0	NA	0.0	1.8	0.0	1.8
Newport Harbor	0.0	NA	2.0	NA	0.0	3.7	0.0	3.7
Dana Point Harbor	0.0	NA	2.6	NA	0.0	2.6	0.0	2.6
Upper Newport Bay	0.0	NA	2.0	NA	0.0	3.7	0.0	3.7
Anaheim Bay	2.6	NA	2.6	NA	2.6	0.0	2.6	0.0
	16.8	NA	23.5	NA	13.8	11.8	7.3	15.7
Capital Improvement								
Los Angeles Harbor	3.1	NA	3.1	NA	3.1	0.0	0.0	2.0
Long Beach Harbor	3.4	NA	3.4	NA	3.4	0.0	0.0	1.9
Upper Newport Bay***	0.0	NA	6.1	NA	0.0	3.7	0.0	3.7
	6.5	NA	12.6	NA	6.5	3.7	0.0	7.6
Total (pounds) =	**23.3**	**NA**	**36.1**	**NA**	**20.4**	**15.5**	**7.3**	**23.3**
Total main engine both sites (pounds) =	**23.3**		**36.1**		**35.9**		**30.6**	
Total main engine both sites (tons) =	**0.01**		**0.02**		**0.02**		**0.02**	

Worst-Case Generator HC Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	0.2	NA	0.2	NA	0.2	0.0	0.0	0.1
	0.2	NA	0.2	NA	0.2	0.0	0.0	0.1
	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	0.2	NA	0.2	NA	0.0	0.1	0.0	0.1
	0.0	NA	0.1	NA	0.0	0.2	0.0	0.2
	0.0	NA	0.2	NA	0.0	0.2	0.0	0.2
	0.0	NA	0.1	NA	0.0	0.2	0.0	0.2
	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	1.1	NA	1.6	NA	0.9	0.7	0.5	1.0
	0.2	NA	0.2	NA	0.2	0.0	0.0	0.1
	0.2	NA	0.2	NA	0.2	0.0	0.0	0.1
	0.0	NA	0.4	NA	0.0	0.2	0.0	0.2
	0.4	NA	0.8	NA	0.4	0.2	0.0	0.5
Total (pounds) =	**1.5**	**NA**	**2.4**	**NA**	**1.3**	**0.9**	**0.5**	**1.5**
Total generators both sites (pounds) =	**1.5**		**2.4**		**2.2**		**2.0**	
Total generators both sites (tons) =	**0.001**		**0.001**		**0.001**		**0.001**	

Worst-Case Combined Main Engine and Generators HC Emissions Per Day (10-hour Day) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**24.8**		**38.5**		**38.1**		**32.6**	
Total main engine and generators (tons) =	**0.012**		**0.019**		**0.019**		**0.016**	

		CO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	703.7250
Vessel Manuvering Load Factor =	20%	869.1000
Generator Load Factor =	100%	692.7000

Worst-Case Main Engine CO2 Emissions Per Day (10-hour Day)
(grams)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	5480211.5	NA	5480211.5	NA	5480211.5	0.0	5480211.5	0.0
Los Angeles Harbor	5954212.2	NA	5954212.2	NA	5954212.2	0.0	0.0	5195052.8
Long Beach Harbor	7087264.7	NA	7087264.7	NA	7087264.7	0.0	0.0	5006210.7
Marina del Rey	5761579.1	NA	5761579.1	NA	5761579.1	0.0	5761579.1	0.0
Sunset/Huntington Harbor	6990948.1	NA	6990948.1	NA	0.0	4628526.6	0.0	4628526.6
Newport Harbor	0.0	NA	5383894.9	NA	0.0	6428213.0	0.0	6428213.0
Dana Point Harbor	0.0	NA	7461157.8	NA	0.0	5857895.6	0.0	5857895.6
Upper Newport Bay	0.0	NA	5383894.9	NA	0.0	6428213.0	0.0	6428213.0
Anaheim Bay	5857895.6	NA	5857895.6	NA	5857895.6	0.0	5857895.6	0.0
	37132111.3	NA	55361058.9	NA	30141163.1	23342848.1	17099686.2	33544111.7
Capital Improvement								
Los Angeles Harbor	5954212.2	NA	5954212.2	NA	5954212.2	0.0	0.0	5195052.8
Long Beach Harbor	7087264.7	NA	7087264.7	NA	7087264.7	0.0	0.0	5006210.7
Upper Newport Bay***	0.0	NA	16151684.7	NA	0.0	6428213.0	0.0	6428213.0
	13041476.9	NA	29193161.6	NA	13041476.9	6428213.0	0.0	16629476.5
Total (grams) =	**50173588.2**	**NA**	**84554220.5**	**NA**	**43182640.1**	**29771061.1**	**17099686.2**	**50173588.2**
Total main engine both sites (grams) =	**50173588.2**		**84554220.5**		**72953701.2**		**67273274.4**	

Worst-Case Generator CO2 Emissions Per Day (10-hour Day)
(grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	760178.3	NA	760178.3	NA	760178.3	0.0	760178.3	0.0
	885328.3	NA	885328.3	NA	885328.3	0.0	0.0	656273.3
	1012797.9	NA	1012797.9	NA	1012797.9	0.0	0.0	635028.4
	720008.2	NA	720008.2	NA	720008.2	0.0	720008.2	0.0
	930137.8	NA	930137.8	NA	0.0	592538.5	0.0	592538.5
	0.0	NA	677518.3	NA	0.0	1010478.2	0.0	1010478.2
	0.0	NA	911212.6	NA	0.0	802668.2	0.0	802668.2
	0.0	NA	677518.3	NA	0.0	1010478.2	0.0	1010478.2
	802668.2	NA	802668.2	NA	802668.2	0.0	802668.2	0.0
	5111118.8	NA	7377367.9	NA	4180980.9	3416163.2	2282854.7	4707465.0
	885328.3	NA	885328.3	NA	885328.3	0.0	0.0	656273.3
	1012797.9	NA	1012797.9	NA	1012797.9	0.0	0.0	635028.4
	0.0	NA	2032554.9	NA	0.0	1010478.2	0.0	1010478.2
	1898126.2	NA	3930681.0	NA	1898126.2	1010478.2	0.0	2301780.0
Total (grams) =	**7009245.0**	**NA**	**11308049.0**	**NA**	**6079107.1**	**4426641.4**	**2282854.7**	**7009245.0**
Total generators both sites (grams) =	**7009245.0**		**11308049.0**		**10505748.5**		**9292099.7**	

Worst-Case Main Engine CO2 Emissions Per Day (10-hour Day)
(pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	12081.8	NA	12081.8	NA	12081.8	0.0	12081.8	0.0
Los Angeles Harbor	13126.8	NA	13126.8	NA	13126.8	0.0	0.0	11453.1
Long Beach Harbor	15624.7	NA	15624.7	NA	15624.7	0.0	0.0	11036.8
Marina del Rey	12702.1	NA	12702.1	NA	12702.1	0.0	12702.1	0.0
Sunset/Huntington Harbor	15412.4	NA	15412.4	NA	0.0	10204.2	0.0	10204.2
Newport Harbor	0.0	NA	11869.5	NA	0.0	14171.8	0.0	14171.8
Dana Point Harbor	0.0	NA	16449.0	NA	0.0	12914.4	0.0	12914.4
Upper Newport Bay	0.0	NA	11869.5	NA	0.0	14171.8	0.0	14171.8
Anaheim Bay	12914.4	NA	12914.4	NA	12914.4	0.0	12914.4	0.0
	81862.3	NA	122050.2	NA	66449.9	51462.2	37698.4	73952.1
Capital Improvement								
Los Angeles Harbor	13126.8	NA	13126.8	NA	13126.8	0.0	0.0	11453.1
Long Beach Harbor	15624.7	NA	15624.7	NA	15624.7	0.0	0.0	11036.8
Upper Newport Bay***	0.0	NA	35608.4	NA	0.0	14171.8	0.0	14171.8
	28751.5	NA	64359.9	NA	28751.5	14171.8	0.0	36661.7
Total (pounds) =	**110613.8**	**NA**	**186410.1**	**NA**	**95201.4**	**65634.0**	**37698.4**	**110613.8**
Total main engine both sites (pounds) =	**110613.8**		**186410.1**		**160835.4**		**148312.2**	
Total main engine both sites (tons) =	**55.31**		**93.21**		**80.42**		**74.16**	

Worst-Case Generator CO2 Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	1675.9	NA	1675.9	NA	1675.9	0.0	1675.9	0.0
	1951.8	NA	1951.8	NA	1951.8	0.0	0.0	1446.8
	2232.8	NA	2232.8	NA	2232.8	0.0	0.0	1400.0
	1587.3	NA	1587.3	NA	1587.3	0.0	1587.3	0.0
	2050.6	NA	2050.6	NA	0.0	1306.3	0.0	1306.3
	0.0	NA	1493.7	NA	0.0	2227.7	0.0	2227.7
	0.0	NA	2008.9	NA	0.0	1769.6	0.0	1769.6
	0.0	NA	1493.7	NA	0.0	2227.7	0.0	2227.7
	1769.6	NA	1769.6	NA	1769.6	0.0	1769.6	0.0
	11268.1	NA	16264.3	NA	9217.5	7531.4	5032.8	10378.2
	1951.8	NA	1951.8	NA	1951.8	0.0	0.0	1446.8
	2232.8	NA	2232.8	NA	2232.8	0.0	0.0	1400.0
	0.0	NA	4481.0	NA	0.0	2227.7	0.0	2227.7
	4184.7	NA	8665.7	NA	4184.7	2227.7	0.0	5074.6
Total (pounds) =	**15452.7**	**NA**	**24930.0**	**NA**	**13402.1**	**9759.1**	**5032.8**	**15452.7**
Total generators both sites (pounds) =	**15452.7**		**24930.0**		**23161.2**		**20485.6**	
Total generators both sites (tons) =	**7.726**		**12.465**		**11.581**		**10.243**	

Worst-Case Combined Main Engine and Generators CO2 Emissions Per Day (10-hour Day)
(pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**126066.5**		**211340.1**		**183996.6**		**168797.8**	
Total main engine and generators (tons) =	**63.033**		**105.670**		**91.998**		**84.399**	

		Fuel consumption factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	223.3670
Vessel Manuvering Load Factor =	20%	276.3170
Generator Load Factor =	100%	219.8370

Worst-Case Main Engine Fuel Consumption Per Day (10-hour Day) (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1739756.7	NA	1739756.7	NA	1739756.7	0.0	1739756.7	0.0
Los Angeles Harbor	1890358.3	NA	1890358.3	NA	1890358.3	0.0	0.0	1649094.9
Long Beach Harbor	2249996.7	NA	2249996.7	NA	2249996.7	0.0	0.0	1589155.2
Marina del Rey	1828914.1	NA	1828914.1	NA	1828914.1	0.0	1828914.1	0.0
Sunset/Huntington Harbor	2219274.6	NA	2219274.6	NA	0.0	1469275.7	0.0	1469275.7
Newport Harbor	0.0	NA	1709034.6	NA	0.0	2040959.8	0.0	2040959.8
Dana Point Harbor	0.0	NA	2368371.7	NA	0.0	1859636.2	0.0	1859636.2
Upper Newport Bay	0.0	NA	1709034.6	NA	0.0	2040959.8	0.0	2040959.8
Anaheim Bay	1859636.2	NA	1859636.2	NA	1859636.2	0.0	1859636.2	0.0
	11787936.6	NA	17574377.6	NA	9568662.0	7410831.6	5428307.0	10649081.6
Capital Improvement								
Los Angeles Harbor	1890358.3	NA	1890358.3	NA	1890358.3	0.0	0.0	1649094.9
Long Beach Harbor	2249996.7	NA	2249996.7	NA	2249996.7	0.0	0.0	1589155.2
Upper Newport Bay***	0.0	NA	5127103.9	NA	0.0	2040959.8	0.0	2040959.8
	4140355.0	NA	9267458.9	NA	4140355.0	2040959.8	0.0	5279209.9
Total (grams) =	**15928291.6**	**NA**	**26841836.5**	**NA**	**13709017.0**	**9451791.4**	**5428307.0**	**15928291.6**
Total main engine both sites (grams) =	**15928291.6**		**26841836.5**		**23160808.4**		**21356598.6**	

Worst-Case Generator Fuel Consumption Per Day (10-hour Day) (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	241252.1	NA	241252.1	NA	241252.1	0.0	241252.1	0.0
	280970.0	NA	280970.0	NA	280970.0	0.0	0.0	208276.5
	321424.1	NA	321424.1	NA	321424.1	0.0	0.0	201534.2
	228503.6	NA	228503.6	NA	228503.6	0.0	228503.6	0.0
	295190.9	NA	295190.9	NA	0.0	188049.5	0.0	188049.5
	0.0	NA	215018.9	NA	0.0	320687.9	0.0	320687.9
	0.0	NA	289184.7	NA	0.0	254736.8	0.0	254736.8
	0.0	NA	215018.9	NA	0.0	320687.9	0.0	320687.9
	254736.8	NA	254736.8	NA	254736.8	0.0	254736.8	0.0
	1622077.4	NA	2341299.9	NA	1326886.5	1064162.1	724492.5	1493972.8
	280970.0	NA	280970.0	NA	280970.0	0.0	0.0	208276.5
	321424.1	NA	321424.1	NA	321424.1	0.0	0.0	201534.2
	0.0	NA	645056.7	NA	0.0	320687.9	0.0	320687.9
	602394.1	NA	1247450.7	NA	602394.1	320687.9	0.0	730498.6
Total (grams) =	**2224471.5**	**NA**	**3588750.6**	**NA**	**1929280.6**	**1404850.0**	**724492.5**	**2224471.5**
Total generators both sites (grams) =	**2224471.5**		**3588750.6**		**3334130.6**		**2948963.9**	

Worst-Case Main Engine Fuel Consumption Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
Harbor/Facility	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3835.5	NA	3835.5	NA	3835.5	0.0	3835.5	0.0
Los Angeles Harbor	4167.5	NA	4167.5	NA	4167.5	0.0	0.0	3635.6
Long Beach Harbor	4960.4	NA	4960.4	NA	4960.4	0.0	0.0	3503.5
Marina del Rey	4032.1	NA	4032.1	NA	4032.1	0.0	4032.1	0.0
Sunset/Huntington Harbor	4892.7	NA	4892.7	NA	0.0	3239.2	0.0	3239.2
Newport Harbor	0.0	NA	3767.8	NA	0.0	4499.5	0.0	4499.5
Dana Point Harbor	0.0	NA	5221.4	NA	0.0	4099.8	0.0	4099.8
Upper Newport Bay	0.0	NA	3767.8	NA	0.0	4499.5	0.0	4499.5
Anaheim Bay	4099.8	NA	4099.8	NA	4099.8	0.0	4099.8	0.0
	25988.0	NA	38744.9	NA	21095.3	16338.1	11967.4	23477.2
Capital Improvement								
Los Angeles Harbor	4167.5	NA	4167.5	NA	4167.5	0.0	0.0	3635.6
Long Beach Harbor	4960.4	NA	4960.4	NA	4960.4	0.0	0.0	3503.5
Upper Newport Bay***	0.0	NA	11303.3	NA	0.0	4499.5	0.0	4499.5
	9127.9	NA	20431.2	NA	9127.9	4499.5	0.0	11638.7
Total (pounds) =	**35115.9**	**NA**	**59176.1**	**NA**	**30223.2**	**20837.6**	**11967.4**	**35115.9**
Total main engine both sites (pounds) =	**35115.9**		**59176.1**		**51060.8**		**47083.2**	
Total main engine both sites (tons) =	**17.56**		**29.59**		**25.53**		**23.54**	

Worst-Case Generator Fuel Consumption Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	531.9	NA	531.9	NA	531.9	0.0	531.9	0.0
	619.4	NA	619.4	NA	619.4	0.0	0.0	459.2
	708.6	NA	708.6	NA	708.6	0.0	0.0	444.3
	503.8	NA	503.8	NA	503.8	0.0	503.8	0.0
	650.8	NA	650.8	NA	0.0	414.6	0.0	414.6
	0.0	NA	474.0	NA	0.0	707.0	0.0	707.0
	0.0	NA	637.5	NA	0.0	561.6	0.0	561.6
	0.0	NA	474.0	NA	0.0	707.0	0.0	707.0
	561.6	NA	561.6	NA	561.6	0.0	561.6	0.0
	3576.1	NA	5161.7	NA	2925.3	2390.2	1597.2	3293.6
	619.4	NA	619.4	NA	619.4	0.0	0.0	459.2
	708.6	NA	708.6	NA	708.6	0.0	0.0	444.3
	0.0	NA	1422.1	NA	0.0	707.0	0.0	707.0
	1328.1	NA	2750.2	NA	1328.1	707.0	0.0	1610.5
Total (pounds) =	**4904.1**	**NA**	**7911.8**	**NA**	**4253.3**	**3097.2**	**1597.2**	**4904.1**
Total generators both sites (pounds) =	**4904.1**		**7911.8**		**7350.5**		**6501.4**	
Total generators both sites (tons) =	**2.452**		**3.956**		**3.675**		**3.251**	

Worst-Case Combined Main Engine and Generators Fuel Consumption Per Day (10-hour Day) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**40020.0**		**67088.0**		**58411.3**		**53584.6**	
Total main engine and generators (tons) =	**20.010**		**33.544**		**29.206**		**26.792**	

		PM emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.2633
Vessel Maneuvering Load Factor =	20%	0.3211
Generator Load Factor	100%	0.2610

Total Average Annual Main Engine PM Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	10240.3	NA	10240.3	NA	10240.3	0.0	10240.3	0.0
Los Angeles Harbor	3706.8	NA	3706.8	NA	3706.8	0.0	0.0	9713.5
Long Beach Harbor	16771.1	NA	16771.1	NA	16771.1	0.0	0.0	35558.7
Marina del Rey	36630.1	NA	36630.1	NA	36630.1	0.0	36630.1	0.0
Sunset/Huntington Harbor	6533.5	NA	6533.5	NA	0.0	8653.5	0.0	8653.5
Newport Harbor	0.0	NA	10066.9	NA	0.0	3000.1	0.0	3000.1
Dana Point Harbor	0.0	NA	11162.9	NA	0.0	4378.8	0.0	4378.8
Upper Newport Bay	0.0	NA	10066.9	NA	0.0	3000.1	0.0	3000.1
Anaheim Bay	8757.5	NA	8757.5	NA	8757.5	0.0	8757.5	0.0
	82639.2	NA	113936.0	NA	76105.8	19032.5	55627.9	64314.8
Capital Improvement								
Los Angeles Harbor	5189.5	NA	5189.5	NA	5189.5	0.0	0.0	13598.9
Long Beach Harbor	6178.8	NA	6178.8	NA	6178.8	0.0	0.0	13104.3
Upper Newport Bay***	0.0	NA	213417.7	NA	0.0	63602.0	0.0	63602.0
	11368.3	NA	224786.0	NA	11368.3	63602.0	0.0	90305.2
Total (grams) =	**94007.5**	**NA**	**338721.9**	**NA**	**87474.1**	**82634.4**	**55627.9**	**154619.9**
Total main engine both sites (grams) =	**94007.5**		**338721.9**		**170108.5**		**210247.8**	

Total Average Annual Generator PM Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1432.1	NA	1432.1	NA	1432.1	0.0	1432.1	0.0
Los Angeles Harbor	556.0	NA	556.0	NA	556.0	0.0	0.0	1230.4
Long Beach Harbor	2416.9	NA	2416.9	NA	2416.9	0.0	0.0	4546.1
Marina del Rey	4611.9	NA	4611.9	NA	4611.9	0.0	4611.9	0.0
Sunset/Huntington Harbor	876.2	NA	876.2	NA	0.0	1116.3	0.0	1116.3
Newport Harbor	0.0	NA	1276.4	NA	0.0	475.9	0.0	475.9
Dana Point Harbor	0.0	NA	1373.3	NA	0.0	604.9	0.0	604.9
Upper Newport Bay	0.0	NA	1276.4	NA	0.0	475.9	0.0	475.9
Anaheim Bay	1209.7	NA	1209.7	NA	1209.7	0.0	1209.7	0.0
	11102.8	NA	15028.9	NA	10226.6	2673.0	7253.8	8455.5
Capital Improvement								
Los Angeles Harbor	778.4	NA	778.4	NA	778.4	0.0	0.0	1730.9
Long Beach Harbor	890.4	NA	890.4	NA	890.4	0.0	0.0	1674.9
Upper Newport Bay***	0.0	NA	27059.7	NA	0.0	10069.5	0.0	10069.5
	1668.8	NA	28728.4	NA	1668.8	10069.5	0.0	13495.3
Total (grams) =	**12771.5**	**NA**	**43757.3**	**NA**	**11895.4**	**12742.5**	**7253.8**	**21950.8**
Total generators both sites (grams) =	**12771.5**		**43757.3**		**24637.9**		**29204.6**	

Total Average Annual Main Engine PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	22.6	NA	22.6	NA	22.6	0.0	22.6	0.0
Los Angeles Harbor	8.2	NA	8.2	NA	8.2	0.0	0.0	21.4
Long Beach Harbor	37.0	NA	37.0	NA	37.0	0.0	0.0	78.4
Marina del Rey	80.8	NA	80.8	NA	80.8	0.0	80.8	0.0
Sunset/Huntington Harbor	14.4	NA	14.4	NA	0.0	19.1	0.0	19.1
Newport Harbor	0.0	NA	22.2	NA	0.0	6.6	0.0	6.6
Dana Point Harbor	0.0	NA	24.6	NA	0.0	9.7	0.0	9.7
Upper Newport Bay	0.0	NA	22.2	NA	0.0	6.6	0.0	6.6
Anaheim Bay	19.3	NA	19.3	NA	19.3	0.0	19.3	0.0
	182.2	NA	251.2	NA	167.8	42.0	122.6	141.8
Capital Improvement								
Los Angeles Harbor	11.4	NA	11.4	NA	11.4	0.0	0.0	30.0
Long Beach Harbor	13.6	NA	13.6	NA	13.6	0.0	0.0	28.9
Upper Newport Bay***	0.0	NA	470.5	NA	0.0	140.2	0.0	140.2
	25.1	NA	495.6	NA	25.1	140.2	0.0	199.1
Total (pounds) =	**207.3**	**NA**	**746.8**	**NA**	**192.8**	**182.2**	**122.6**	**340.9**
Total main engine both sites (pounds) =	**207.3**		**746.8**		**375.0**		**463.5**	
Total main engine both sites (tons) =	**0.10**		**0.37**		**0.19**		**0.23**	

Total Average Annual Generator PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3.2	NA	3.2	NA	3.2	0.0	3.2	0.0
Los Angeles Harbor	1.2	NA	1.2	NA	1.2	0.0	0.0	2.7
Long Beach Harbor	5.3	NA	5.3	NA	5.3	0.0	0.0	10.0
Marina del Rey	10.2	NA	10.2	NA	10.2	0.0	10.2	0.0
Sunset/Huntington Harbor	1.9	NA	1.9	NA	0.0	2.5	0.0	2.5
Newport Harbor	0.0	NA	2.8	NA	0.0	1.0	0.0	1.0
Dana Point Harbor	0.0	NA	3.0	NA	0.0	1.3	0.0	1.3
Upper Newport Bay	0.0	NA	2.8	NA	0.0	1.0	0.0	1.0
Anaheim Bay	2.7	NA	2.7	NA	2.7	0.0	2.7	0.0
	24.5	NA	33.1	NA	22.5	5.9	16.0	18.6
Capital Improvement								
Los Angeles Harbor	1.7	NA	1.7	NA	1.7	0.0	0.0	3.8
Long Beach Harbor	2.0	NA	2.0	NA	2.0	0.0	0.0	3.7
Upper Newport Bay***	0.0	NA	59.7	NA	0.0	22.2	0.0	22.2
	3.7	NA	63.3	NA	3.7	22.2	0.0	29.8
Total (pounds) =	**28.2**	**NA**	**96.5**	**NA**	**26.2**	**28.1**	**16.0**	**48.4**
Total generators both sites (pounds) =	**28.2**		**96.5**		**54.4**		**64.4**	
Total generators both sites (tons) =	**0.014**		**0.048**		**0.027**		**0.032**	

Average Quarterly Main Engine PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	5.6	NA	5.6	NA	5.6	0.0	5.6	0.0
Los Angeles Harbor	2.0	NA	2.0	NA	2.0	0.0	0.0	5.4
Long Beach Harbor	9.2	NA	9.2	NA	9.2	0.0	0.0	19.6
Marina del Rey	20.2	NA	20.2	NA	20.2	0.0	20.2	0.0
Sunset/Huntington Harbor	3.6	NA	3.6	NA	0.0	4.8	0.0	4.8
Newport Harbor	0.0	NA	5.5	NA	0.0	1.7	0.0	1.7
Dana Point Harbor	0.0	NA	6.2	NA	0.0	2.4	0.0	2.4
Upper Newport Bay	0.0	NA	5.5	NA	0.0	1.7	0.0	1.7
Anaheim Bay	4.8	NA	4.8	NA	4.8	0.0	4.8	0.0
	45.5	NA	62.8	NA	41.9	10.5	30.7	35.4
Capital Improvement								
Los Angeles Harbor	2.9	NA	2.9	NA	2.9	0.0	0.0	7.5
Long Beach Harbor	3.4	NA	3.4	NA	3.4	0.0	0.0	7.2
Upper Newport Bay***	0.0	NA	117.6	NA	0.0	35.1	0.0	35.1
	6.3	NA	123.9	NA	6.3	35.1	0.0	49.8
Total (pounds) =	**51.8**	**NA**	**186.7**	**NA**	**48.2**	**45.6**	**30.7**	**85.2**
Total main engine both sites (pounds) =	**51.8**		**186.7**		**93.8**		**115.9**	
Total main engine both sites (tons) =	**0.03**		**0.09**		**0.05**		**0.06**	

Average Quarterly Generator PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.8	NA	0.8	NA	0.8	0.0	0.8	0.0
Los Angeles Harbor	0.3	NA	0.3	NA	0.3	0.0	0.0	0.7
Long Beach Harbor	1.3	NA	1.3	NA	1.3	0.0	0.0	2.5
Marina del Rey	2.5	NA	2.5	NA	2.5	0.0	2.5	0.0
Sunset/Huntington Harbor	0.5	NA	0.5	NA	0.0	0.6	0.0	0.6
Newport Harbor	0.0	NA	0.7	NA	0.0	0.3	0.0	0.3
Dana Point Harbor	0.0	NA	0.8	NA	0.0	0.3	0.0	0.3
Upper Newport Bay	0.0	NA	0.7	NA	0.0	0.3	0.0	0.3
Anaheim Bay	0.7	NA	0.7	NA	0.7	0.0	0.7	0.0
	6.1	NA	8.3	NA	5.6	1.5	4.0	4.7
Capital Improvement								
Los Angeles Harbor	0.4	NA	0.4	NA	0.4	0.0	0.0	1.0
Long Beach Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	0.9
Upper Newport Bay***	0.0	NA	14.9	NA	0.0	5.6	0.0	5.6
	0.9	NA	15.8	NA	0.9	5.6	0.0	7.4
Total (pounds) =	**7.0**	**NA**	**24.1**	**NA**	**6.6**	**7.0**	**4.0**	**12.1**
Total generators both sites (pounds) =	**7.0**		**24.1**		**13.6**		**16.1**	
Total generators both sites (tons) =	**0.00**		**0.01**		**0.01**		**0.01**	

Average Daily Main Engine PM Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Long Beach Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Marina del Rey	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.1	0.0	0.1
Newport Harbor	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
	0.5	NA	0.7	NA	0.5	0.1	0.3	0.4
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Upper Newport Bay***	0.0	NA	1.3	NA	0.0	0.4	0.0	0.4
	0.1	NA	1.4	NA	0.1	0.4	0.0	0.5
Total (pounds) =	**0.6**	**NA**	**2.0**	**NA**	**0.5**	**0.5**	**0.3**	**0.9**
Total main engine both sites (pounds) =	**0.6**		**2.0**		**1.0**		**1.3**	
Total main engine both sites (tons) =	**0.0003**		**0.0010**		**0.0005**		**0.0006**	

Average Daily Generator PM Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Marina del Rey	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Newport Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.1	NA	0.1	NA	0.1	0.0	0.0	0.1
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay***	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Total (pounds) =	**0.1**	**NA**	**0.3**	**NA**	**0.1**	**0.1**	**0.0**	**0.1**
Total generators both sites (pounds) =	**0.1**		**0.3**		**0.1**		**0.2**	
Total generators both sites (tons) =	**0.0000**		**0.0001**		**0.0001**		**0.0001**	

Total Average Annual Combined Main Engine and Generators PM Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**235.4**		**843.2**		**429.4**		**527.9**	
Total main engine and generators (tons) =	**0.118**		**0.422**		**0.215**		**0.264**	

Total Average Quarterly Combined Main Engine and Generators PM Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	58.9		210.8		107.3		132.0	
Total main engine and generators (tons) =	0.029		0.105		0.054		0.066	

Total Average Daily Combined Main Engine and Generators PM Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	0.6		2.3		1.2		1.4	
Total main engine and generators (tons) =	0.0003		0.0012		0.0006		0.0007	

		NO_x emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	10.6250
Vessel Maneuvering Load Factor =	20%	11.8527
Generator Load Factor =	100%	10.5751

Total Average Annual Main Engine NOx Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	409543.0	NA	409543.0	NA	409543.0	0.0	409543.0	0.0
Los Angeles Harbor	147747.9	NA	147747.9	NA	147747.9	0.0	0.0	390096.1
Long Beach Harbor	669786.8	NA	669786.8	NA	669786.8	0.0	0.0	1428200.3
Marina del Rey	1471743.6	NA	1471743.6	NA	1471743.6	0.0	1471743.6	0.0
Sunset/Huntington Harbor	261795.0	NA	261795.0	NA	0.0	347330.4	0.0	347330.4
Newport Harbor	0.0	NA	404354.0	NA	0.0	119236.1	0.0	119236.1
Dana Point Harbor	0.0	NA	448695.0	NA	0.0	175221.9	0.0	175221.9
Upper Newport Bay	0.0	NA	404354.0	NA	0.0	119236.1	0.0	119236.1
Anaheim Bay	350443.8	NA	350443.8	NA	350443.8	0.0	350443.8	0.0
	3311060.1	NA	4568760.1	NA	3049265.1	761024.6	2231730.3	2579222.9
Capital Improvement								
Los Angeles Harbor	206847.1	NA	206847.1	NA	206847.1	0.0	0.0	546137.3
Long Beach Harbor	246763.6	NA	246763.6	NA	246763.6	0.0	0.0	526179.1
Upper Newport Bay***	0.0	NA	8572904.2	NA	0.0	2527805.9	0.0	2527805.9
	453610.6	NA	9025914.6	NA	453610.6	2527805.9	0.0	3600122.3
Total =	**3764670.8**	**NA**	**13594617.9**	**NA**	**3502875.7**	**3288830.4**	**2231730.3**	**6179445.2**
Total both sites =	**3764670.8**		**13594617.9**		**6791706.2**		**8411175.5**	

Total Average Annual Generator NOx Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	58026.3	NA	58026.3	NA	58026.3	0.0	58026.3	0.0
Los Angeles Harbor	22526.4	NA	22526.4	NA	22526.4	0.0	0.0	50095.0
Long Beach Harbor	97925.2	NA	97925.2	NA	97925.2	0.0	0.0	184198.5
Marina del Rey	186864.0	NA	186864.0	NA	186864.0	0.0	186864.0	0.0
Sunset/Huntington Harbor	35499.9	NA	35499.9	NA	0.0	45220.9	0.0	45220.9
Newport Harbor	0.0	NA	51716.6	NA	0.0	19283.1	0.0	19283.1
Dana Point Harbor	0.0	NA	55644.1	NA	0.0	24507.9	0.0	24507.9
Upper Newport Bay	0.0	NA	51716.6	NA	0.0	19283.1	0.0	19283.1
Anaheim Bay	49015.7	NA	49015.7	NA	49015.7	0.0	49015.7	0.0
	449857.5	NA	608334.9	NA	414357.6	108303.9	293906.0	342597.4
Capital Improvement								
Los Angeles Harbor	31537.0	NA	31537.0	NA	31537.0	0.0	0.0	70132.9
Long Beach Harbor	36077.7	NA	36077.7	NA	36077.7	0.0	0.0	67862.6
Upper Newport Bay***	0.0	NA	1096302.9	NA	0.0	408801.2	0.0	408801.2
	67614.7	NA	1164007.5	NA	67614.7	408801.2	0.0	546796.7
Total (grams) =	**517472.2**	**NA**	**1772342.4**	**NA**	**481972.3**	**517105.1**	**293906.0**	**889394.1**
Total generators both sites (grams) =	**517472.2**		**1772342.4**		**999077.4**		**1183300.1**	

Total Average Annual Main Engine NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	902.9	NA	902.9	NA	902.9	0.0	902.9	0.0
Los Angeles Harbor	325.7	NA	325.7	NA	325.7	0.0	0.0	860.0
Long Beach Harbor	1476.6	NA	1476.6	NA	1476.6	0.0	0.0	3148.6
Marina del Rey	3244.6	NA	3244.6	NA	3244.6	0.0	3244.6	0.0
Sunset/Huntington Harbor	577.2	NA	577.2	NA	0.0	765.7	0.0	765.7
Newport Harbor	0.0	NA	891.4	NA	0.0	262.9	0.0	262.9
Dana Point Harbor	0.0	NA	989.7	NA	0.0	386.3	0.0	386.3
Upper Newport Bay	0.0	NA	891.4	NA	0.0	262.9	0.0	262.9
Anaheim Bay	772.6	NA	772.6	NA	772.6	0.0	772.6	0.0
	7299.6	NA	10072.3	NA	6722.5	1677.8	4920.1	5686.4
Capital Improvement								
Los Angeles Harbor	456.0	NA	456.0	NA	456.0	0.0	0.0	1204.0
Long Beach Harbor	544.0	NA	544.0	NA	544.0	0.0	0.0	1160.0
Upper Newport Bay***	0.0	NA	18898.7	NA	0.0	5572.9	0.0	5572.9
	1000.0	NA	19898.7	NA	1000.0	5572.9	0.0	7936.9
Total =	**8299.7**	**NA**	**29971.0**	**NA**	**7722.5**	**7250.6**	**4920.1**	**13623.3**
Total both sites =	**8299.7**		**29971.0**		**14973.1**		**18543.5**	
Total both sites (tons) =	**4.15**		**14.99**		**7.49**		**9.27**	

Total Average Annual Generator NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	127.9	NA	127.9	NA	127.9	0.0	127.9	0.0
Los Angeles Harbor	49.7	NA	49.7	NA	49.7	0.0	0.0	110.4
Long Beach Harbor	215.9	NA	215.9	NA	215.9	0.0	0.0	406.1
Marina del Rey	412.0	NA	412.0	NA	412.0	0.0	412.0	0.0
Sunset/Huntington Harbor	78.3	NA	78.3	NA	0.0	99.7	0.0	99.7
Newport Harbor	0.0	NA	114.0	NA	0.0	42.5	0.0	42.5
Dana Point Harbor	0.0	NA	122.7	NA	0.0	54.0	0.0	54.0
Upper Newport Bay	0.0	NA	114.0	NA	0.0	42.5	0.0	42.5
Anaheim Bay	108.1	NA	108.1	NA	108.1	0.0	108.1	0.0
	991.8	NA	1342.5	NA	913.5	238.8	648.0	755.3
Capital Improvement								
Los Angeles Harbor	69.5	NA	69.5	NA	69.5	0.0	0.0	154.6
Long Beach Harbor	79.5	NA	79.5	NA	79.5	0.0	0.0	149.6
Upper Newport Bay***	0.0	NA	2417.1	NA	0.0	901.3	0.0	901.3
	149.1	NA	2566.2	NA	149.1	901.3	0.0	1205.5
Total (pounds) =	**1140.6**	**NA**	**3908.7**	**NA**	**1062.6**	**1140.0**	**648.0**	**1960.8**
Total generators both sites (pounds) =	**1140.6**		**3908.7**		**2202.6**		**2608.7**	
Total generators both sites (tons) =	**0.570**		**1.954**		**1.101**		**1.304**	

Average Quarterly Main Engine NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	225.7	NA	225.7	NA	225.7	0.0	225.7	0.0
Los Angeles Harbor	81.4	NA	81.4	NA	81.4	0.0	0.0	215.0
Long Beach Harbor	369.2	NA	369.2	NA	369.2	0.0	0.0	787.2
Marina del Rey	811.2	NA	811.2	NA	811.2	0.0	811.2	0.0
Sunset/Huntington Harbor	144.3	NA	144.3	NA	0.0	191.4	0.0	191.4
Newport Harbor	0.0	NA	222.9	NA	0.0	65.7	0.0	65.7
Dana Point Harbor	0.0	NA	247.4	NA	0.0	96.6	0.0	96.6
Upper Newport Bay	0.0	NA	222.9	NA	0.0	65.7	0.0	65.7
Anaheim Bay	193.1	NA	193.1	NA	193.1	0.0	193.1	0.0
	1824.9	NA	2518.1	NA	1680.6	419.4	1230.0	1421.6
Capital Improvement								
Los Angeles Harbor	114.0	NA	114.0	NA	114.0	0.0	0.0	301.0
Long Beach Harbor	136.0	NA	136.0	NA	136.0	0.0	0.0	290.0
Upper Newport Bay***	0.0	NA	4724.7	NA	0.0	1393.2	0.0	1393.2
	250.0	NA	4974.7	NA	250.0	1393.2	0.0	1984.2
Total =	**2074.9**	**NA**	**7492.8**	**NA**	**1930.6**	**1612.7**	**1230.0**	**3405.8**
Total both sites =	**2074.9**		**7492.8**		**3743.3**		**4635.8**	
Total both sites (tons) =	**1.04**		**3.75**		**1.87**		**2.32**	

Average Quarterly Generator NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	32.0	NA	32.0	NA	32.0	0.0	32.0	0.0
Los Angeles Harbor	12.4	NA	12.4	NA	12.4	0.0	0.0	27.6
Long Beach Harbor	54.0	NA	54.0	NA	54.0	0.0	0.0	101.5
Marina del Rey	103.0	NA	103.0	NA	103.0	0.0	103.0	0.0
Sunset/Huntington Harbor	19.6	NA	19.6	NA	0.0	24.9	0.0	24.9
Newport Harbor	0.0	NA	28.5	NA	0.0	10.6	0.0	10.6
Dana Point Harbor	0.0	NA	30.7	NA	0.0	13.5	0.0	13.5
Upper Newport Bay	0.0	NA	28.5	NA	0.0	10.6	0.0	10.6
Anaheim Bay	27.0	NA	27.0	NA	27.0	0.0	27.0	0.0
	247.9	NA	335.6	NA	228.4	59.7	162.0	188.8
Capital Improvement								
Los Angeles Harbor	17.4	NA	17.4	NA	17.4	0.0	0.0	38.7
Long Beach Harbor	19.9	NA	19.9	NA	19.9	0.0	0.0	37.4
Upper Newport Bay***	0.0	NA	604.3	NA	0.0	225.3	0.0	225.3
	37.3	NA	641.5	NA	37.3	225.3	0.0	301.4
Total (pounds) =	**265.2**	**NA**	**977.2**	**NA**	**265.6**	**285.0**	**162.0**	**490.2**
Total generators both sites (pounds) =	**265.2**		**977.2**		**550.6**		**652.2**	
Total generators both sites (tons) =	**0.14**		**0.49**		**0.28**		**0.33**	

Average Daily Main Engine NOx Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2.5	NA	2.5	NA	2.5	0.0	2.5	0.0
Los Angeles Harbor	0.9	NA	0.9	NA	0.9	0.0	0.0	2.4
Long Beach Harbor	4.0	NA	4.0	NA	4.0	0.0	0.0	8.6
Marina del Rey	8.9	NA	8.9	NA	8.9	0.0	8.9	0.0
Sunset/Huntington Harbor	1.6	NA	1.6	NA	0.0	2.1	0.0	2.1
Newport Harbor	0.0	NA	2.4	NA	0.0	0.7	0.0	0.7
Dana Point Harbor	0.0	NA	2.7	NA	0.0	1.1	0.0	1.1
Upper Newport Bay	0.0	NA	2.4	NA	0.0	0.7	0.0	0.7
Anaheim Bay	2.1	NA	2.1	NA	2.1	0.0	2.1	0.0
	20.0	NA	27.6	NA	18.4	4.6	13.5	15.6
Capital Improvement								
Los Angeles Harbor	1.2	NA	1.2	NA	1.2	0.0	0.0	3.3
Long Beach Harbor	1.5	NA	1.5	NA	1.5	0.0	0.0	3.2
Upper Newport Bay***	0.0	NA	51.8	NA	0.0	15.3	0.0	15.3
	2.7	NA	54.5	NA	2.7	15.3	0.0	21.7
Total =	**22.7**	**NA**	**82.1**	**NA**	**21.2**	**19.9**	**13.5**	**37.3**
Total both sites =	**22.7**		**82.1**		**41.0**		**50.8**	
Total both sites (tons) =	**0.0114**		**0.0411**		**0.0205**		**0.0254**	

Average Daily Generator NOx Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.4	NA	0.4	NA	0.4	0.0	0.4	0.0
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.3
Long Beach Harbor	0.6	NA	0.6	NA	0.6	0.0	0.0	1.1
Marina del Rey	1.1	NA	1.1	NA	1.1	0.0	1.1	0.0
Sunset/Huntington Harbor	0.2	NA	0.2	NA	0.0	0.3	0.0	0.3
Newport Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Dana Point Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Upper Newport Bay	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Anaheim Bay	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
	2.7	NA	3.7	NA	2.5	0.7	1.8	2.1
Capital Improvement								
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Long Beach Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Upper Newport Bay***	0.0	NA	6.6	NA	0.0	2.5	0.0	2.5
	0.4	NA	7.0	NA	0.4	2.5	0.0	3.3
Total (pounds) =	**3.1**	**NA**	**10.7**	**NA**	**2.9**	**3.1**	**1.8**	**5.4**
Total generators both sites (pounds) =	**3.1**		**10.7**		**6.0**		**7.1**	
Total generators both sites (tons) =	**0.0016**		**0.0054**		**0.0030**		**0.0036**	

Total Average Annual Combined Main Engine and Generators NOx Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	9440.5		33879.7		17175.7		21152.2	
Total main engine and generators (tons) =	4.720		16.940		8.588		10.576	

Total Average Quarterly Combined Main Engine and Generators NOx Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	2360.1		8469.9		4293.9		5288.0	
Total main engine and generators (tons) =	1.180		4.235		2.147		2.644	

Total Average Daily Combined Main Engine and Generators NOx Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	25.9		92.8		47.1		58.0	
Total main engine and generators (tons) =	0.0129		0.0464		0.0235		0.0290	

		NO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	15.7883
Vessel Manuvering Load Factor =	20%	17.6339
Generator Load Factor =	100%	15.7134

Total Average Annual Main Engine NO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	608635.1	NA	608635.1	NA	608635.1	0.0	608635.1	0.0
Los Angeles Harbor	219582.6	NA	219582.6	NA	219582.6	0.0	0.0	579706.1
Long Beach Harbor	995410.4	NA	995410.4	NA	995410.4	0.0	0.0	2122384.9
Marina del Rey	2187074.7	NA	2187074.7	NA	2187074.7	0.0	2187074.7	0.0
Sunset/Huntington Harbor	389052.5	NA	389052.5	NA	0.0	516154.9	0.0	516154.9
Newport Harbor	0.0	NA	600889.8	NA	0.0	177215.2	0.0	177215.2
Dana Point Harbor	0.0	NA	667126.7	NA	0.0	260401.0	0.0	260401.0
Upper Newport Bay	0.0	NA	600889.8	NA	0.0	177215.2	0.0	177215.2
Anaheim Bay	520802.1	NA	520802.1	NA	520802.1	0.0	520802.1	0.0
	4920557.5	NA	6789465.8	NA	4531505.0	1130986.3	3316511.9	3833077.3
Capital Improvement								
Los Angeles Harbor	307415.7	NA	307415.7	NA	307415.7	0.0	0.0	811588.5
Long Beach Harbor	366730.2	NA	366730.2	NA	366730.2	0.0	0.0	781931.3
Upper Newport Bay***	0.0	NA	12738863.9	NA	0.0	3756962.0	0.0	3756962.0
	674145.9	NA	13413009.8	NA	674145.9	3756962.0	0.0	5350481.8
Total =	**5594703.4**	**NA**	**20202475.6**	**NA**	**5205650.9**	**4887948.3**	**3316511.9**	**9183559.1**
Total both sites =	**5594703.4**		**20202475.6**		**10093599.2**		**12500071.0**	

Total Average Annual Generator NO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	86220.2	NA	86220.2	NA	86220.2	0.0	86220.2	0.0
Los Angeles Harbor	33471.6	NA	33471.6	NA	33471.6	0.0	0.0	74435.2
Long Beach Harbor	145505.3	NA	145505.3	NA	145505.3	0.0	0.0	273697.2
Marina del Rey	277657.8	NA	277657.8	NA	277657.8	0.0	277657.8	0.0
Sunset/Huntington Harbor	52748.6	NA	52748.6	NA	0.0	67206.3	0.0	67206.3
Newport Harbor	0.0	NA	76844.8	NA	0.0	28652.4	0.0	28652.4
Dana Point Harbor	0.0	NA	82680.5	NA	0.0	36415.8	0.0	36415.8
Upper Newport Bay	0.0	NA	76844.8	NA	0.0	28652.4	0.0	28652.4
Anaheim Bay	72831.6	NA	72831.6	NA	72831.6	0.0	72831.6	0.0
	668435.1	NA	904805.3	NA	615686.5	160926.9	436709.6	509059.3
Capital Improvement								
Los Angeles Harbor	46860.3	NA	46860.3	NA	46860.3	0.0	0.0	104209.3
Long Beach Harbor	53607.2	NA	53607.2	NA	53607.2	0.0	0.0	100835.8
Upper Newport Bay***	0.0	NA	1629110.3	NA	0.0	607430.3	0.0	607430.3
	100467.5	NA	1729577.7	NA	100467.5	607430.3	0.0	812475.4
Total (grams) =	**768902.6**	**NA**	**2634383.0**	**NA**	**716154.0**	**768357.1**	**436709.6**	**1321634.6**
Total generators both sites (grams) =	**768902.6**		**2634383.0**		**1484511.1**		**1758344.2**	

Total Average Annual Main Engine NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1341.8	NA	1341.8	NA	1341.8	0.0	1341.8	0.0
Los Angeles Harbor	484.1	NA	484.1	NA	484.1	0.0	0.0	1278.0
Long Beach Harbor	2194.5	NA	2194.5	NA	2194.5	0.0	0.0	4679.1
Marina del Rey	4821.7	NA	4821.7	NA	4821.7	0.0	4821.7	0.0
Sunset/Huntington Harbor	857.7	NA	857.7	NA	0.0	1137.9	0.0	1137.9
Newport Harbor	0.0	NA	1324.7	NA	0.0	390.7	0.0	390.7
Dana Point Harbor	0.0	NA	1470.8	NA	0.0	574.1	0.0	574.1
Upper Newport Bay	0.0	NA	1324.7	NA	0.0	390.7	0.0	390.7
Anaheim Bay	1148.2	NA	1148.2	NA	1148.2	0.0	1148.2	0.0
	10848.0	NA	14968.2	NA	9990.3	2493.4	7311.7	8450.5
Capital Improvement								
Los Angeles Harbor	677.7	NA	677.7	NA	677.7	0.0	0.0	1789.2
Long Beach Harbor	808.5	NA	808.5	NA	808.5	0.0	0.0	1723.9
Upper Newport Bay***	0.0	NA	28084.4	NA	0.0	8282.7	0.0	8282.7
	1486.2	NA	29570.6	NA	1486.2	8282.7	0.0	11795.8
Total =	**12334.2**	**NA**	**44538.6**	**NA**	**11476.5**	**10776.1**	**7311.7**	**20246.3**
Total both sites =	**12334.2**		**44538.6**		**22252.6**		**27557.9**	
Total both sites (tons) =	**6.17**		**22.27**		**11.13**		**13.78**	

Total Average Annual Generator NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	190.1	NA	190.1	NA	190.1	0.0	190.1	0.0
Los Angeles Harbor	73.8	NA	73.8	NA	73.8	0.0	0.0	164.1
Long Beach Harbor	320.8	NA	320.8	NA	320.8	0.0	0.0	603.4
Marina del Rey	612.1	NA	612.1	NA	612.1	0.0	612.1	0.0
Sunset/Huntington Harbor	116.3	NA	116.3	NA	0.0	148.2	0.0	148.2
Newport Harbor	0.0	NA	169.4	NA	0.0	63.2	0.0	63.2
Dana Point Harbor	0.0	NA	182.3	NA	0.0	80.3	0.0	80.3
Upper Newport Bay	0.0	NA	169.4	NA	0.0	63.2	0.0	63.2
Anaheim Bay	160.6	NA	160.6	NA	160.6	0.0	160.6	0.0
	1473.6	NA	1994.8	NA	1357.4	354.8	962.8	1122.3
Capital Improvement								
Los Angeles Harbor	103.3	NA	103.3	NA	103.3	0.0	0.0	229.7
Long Beach Harbor	118.2	NA	118.2	NA	118.2	0.0	0.0	222.3
Upper Newport Bay***	0.0	NA	3591.6	NA	0.0	1339.2	0.0	1339.2
	221.5	NA	3813.1	NA	221.5	1339.2	0.0	1791.2
Total (pounds) =	**1695.1**	**NA**	**5807.9**	**NA**	**1578.9**	**1693.9**	**962.8**	**2913.5**
Total generators both sites (pounds) =	**1695.1**		**5807.9**		**3272.8**		**3876.3**	
Total generators both sites (tons) =	**0.848**		**2.904**		**1.636**		**1.938**	

Average Quarterly Main Engine NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	335.5	NA	335.5	NA	335.5	0.0	335.5	0.0
Los Angeles Harbor	121.0	NA	121.0	NA	121.0	0.0	0.0	319.5
Long Beach Harbor	548.6	NA	548.6	NA	548.6	0.0	0.0	1169.8
Marina del Rey	1205.4	NA	1205.4	NA	1205.4	0.0	1205.4	0.0
Sunset/Huntington Harbor	214.4	NA	214.4	NA	0.0	284.5	0.0	284.5
Newport Harbor	0.0	NA	331.2	NA	0.0	97.7	0.0	97.7
Dana Point Harbor	0.0	NA	367.7	NA	0.0	143.5	0.0	143.5
Upper Newport Bay	0.0	NA	331.2	NA	0.0	97.7	0.0	97.7
Anaheim Bay	287.0	NA	287.0	NA	287.0	0.0	287.0	0.0
	2712.0	NA	3742.1	NA	2497.6	623.3	1827.9	2112.6
Capital Improvement								
Los Angeles Harbor	169.4	NA	169.4	NA	169.4	0.0	0.0	447.3
Long Beach Harbor	202.1	NA	202.1	NA	202.1	0.0	0.0	431.0
Upper Newport Bay***	0.0	NA	7021.1	NA	0.0	2070.7	0.0	2070.7
	371.6	NA	7392.7	NA	371.6	2070.7	0.0	2948.9
Total =	**3083.6**	**NA**	**11134.7**	**NA**	**2869.1**	**2694.0**	**1827.9**	**5061.6**
Total both sites =	**3083.6**		**11134.7**		**5563.1**		**6889.5**	
Total both sites (tons) =	**1.54**		**5.57**		**2.78**		**3.44**	

Average Quarterly Generator NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	47.5	NA	47.5	NA	47.5	0.0	47.5	0.0
Los Angeles Harbor	18.4	NA	18.4	NA	18.4	0.0	0.0	41.0
Long Beach Harbor	80.2	NA	80.2	NA	80.2	0.0	0.0	150.8
Marina del Rey	153.0	NA	153.0	NA	153.0	0.0	153.0	0.0
Sunset/Huntington Harbor	29.1	NA	29.1	NA	0.0	37.0	0.0	37.0
Newport Harbor	0.0	NA	42.4	NA	0.0	15.8	0.0	15.8
Dana Point Harbor	0.0	NA	45.6	NA	0.0	20.1	0.0	20.1
Upper Newport Bay	0.0	NA	42.4	NA	0.0	15.8	0.0	15.8
Anaheim Bay	40.1	NA	40.1	NA	40.1	0.0	40.1	0.0
	368.4	NA	498.7	NA	339.3	88.7	240.7	280.6
Capital Improvement								
Los Angeles Harbor	25.8	NA	25.8	NA	25.8	0.0	0.0	57.4
Long Beach Harbor	29.5	NA	29.5	NA	29.5	0.0	0.0	55.6
Upper Newport Bay***	0.0	NA	897.9	NA	0.0	334.8	0.0	334.8
	55.4	NA	953.3	NA	55.4	334.8	0.0	447.8
Total (pounds) =	**423.8**	**NA**	**1452.0**	**NA**	**394.7**	**423.5**	**240.7**	**728.4**
Total generators both sites (pounds) =	**423.8**		**1452.0**		**818.2**		**969.1**	
Total generators both sites (tons) =	**0.21**		**0.73**		**0.41**		**0.48**	

Average Daily Main Engine NO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3.7	NA	3.7	NA	3.7	0.0	3.7	0.0
Los Angeles Harbor	1.3	NA	1.3	NA	1.3	0.0	0.0	3.5
Long Beach Harbor	6.0	NA	6.0	NA	6.0	0.0	0.0	12.8
Marina del Rey	13.2	NA	13.2	NA	13.2	0.0	13.2	0.0
Sunset/Huntington Harbor	2.3	NA	2.3	NA	0.0	3.1	0.0	3.1
Newport Harbor	0.0	NA	3.6	NA	0.0	1.1	0.0	1.1
Dana Point Harbor	0.0	NA	4.0	NA	0.0	1.6	0.0	1.6
Upper Newport Bay	0.0	NA	3.6	NA	0.0	1.1	0.0	1.1
Anaheim Bay	3.1	NA	3.1	NA	3.1	0.0	3.1	0.0
	29.7	NA	41.0	NA	27.4	6.8	20.0	23.2
Capital Improvement								
Los Angeles Harbor	1.9	NA	1.9	NA	1.9	0.0	0.0	4.9
Long Beach Harbor	2.2	NA	2.2	NA	2.2	0.0	0.0	4.7
Upper Newport Bay***	0.0	NA	76.9	NA	0.0	22.7	0.0	22.7
	4.1	NA	81.0	NA	4.1	22.7	0.0	32.3
Total =	**33.8**	**NA**	**122.0**	**NA**	**31.4**	**29.5**	**20.0**	**55.5**
Total both sites =	**33.8**		**122.0**		**61.0**		**75.5**	
Total both sites (tons) =	**0.0169**		**0.0610**		**0.0305**		**0.0378**	

Average Daily Generator NO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.5	NA	0.5	NA	0.5	0.0	0.5	0.0
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Long Beach Harbor	0.9	NA	0.9	NA	0.9	0.0	0.0	1.7
Marina del Rey	1.7	NA	1.7	NA	1.7	0.0	1.7	0.0
Sunset/Huntington Harbor	0.3	NA	0.3	NA	0.0	0.4	0.0	0.4
Newport Harbor	0.0	NA	0.5	NA	0.0	0.2	0.0	0.2
Dana Point Harbor	0.0	NA	0.5	NA	0.0	0.2	0.0	0.2
Upper Newport Bay	0.0	NA	0.5	NA	0.0	0.2	0.0	0.2
Anaheim Bay	0.4	NA	0.4	NA	0.4	0.0	0.4	0.0
	4.0	NA	5.5	NA	3.7	1.0	2.6	3.1
Capital Improvement								
Los Angeles Harbor	0.3	NA	0.3	NA	0.3	0.0	0.0	0.6
Long Beach Harbor	0.3	NA	0.3	NA	0.3	0.0	0.0	0.6
Upper Newport Bay***	0.0	NA	9.8	NA	0.0	3.7	0.0	3.7
	0.6	NA	10.4	NA	0.6	3.7	0.0	4.9
Total (pounds) =	**4.6**	**NA**	**15.9**	**NA**	**4.3**	**4.6**	**2.6**	**8.0**
Total generators both sites (pounds) =	**4.6**		**15.9**		**9.0**		**10.6**	
Total generators both sites (tons) =	**0.0023**		**0.0080**		**0.0045**		**0.0053**	

Total Average Annual Combined Main Engine and Generators NO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**14029.3**		**50346.7**		**25525.4**		**31434.2**	
Total main engine and generators (tons) =	7.015		25.173		12.763		15.717	

Total Average Quarterly Combined Main Engine and Generators NO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**3507.3**		**12586.7**		**6381.3**		**7858.6**	
Total main engine and generators (tons) =	**1.754**		**6.293**		**3.191**		**3.929**	

Total Average Daily Combined Main Engine and Generators NO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**38.4**		**137.9**		**69.9**		**86.1**	
Total main engine and generators (tons) =	**0.0192**		**0.0690**		**0.0350**		**0.0431**	

		SO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	7.8994
Vessel Manuvering Load Factor	20%	9.7720
Generator Load Factor =	100%	7.7746

Total Average Annual Main Engine SO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	307633.8	NA	307633.8	NA	307633.8	0.0	307633.8	0.0
Los Angeles Harbor	111421.3	NA	111421.3	NA	111421.3	0.0	0.0	291602.4
Long Beach Harbor	503952.6	NA	503952.6	NA	503952.6	0.0	0.0	1067613.5
Marina del Rey	1099557.0	NA	1099557.0	NA	1099557.0	0.0	1099557.0	0.0
Sunset/Huntington Harbor	196212.4	NA	196212.4	NA	0.0	259805.8	0.0	259805.8
Newport Harbor	0.0	NA	302201.3	NA	0.0	90223.6	0.0	90223.6
Dana Point Harbor	0.0	NA	335031.3	NA	0.0	131532.6	0.0	131532.6
Upper Newport Bay	0.0	NA	302201.3	NA	0.0	90223.6	0.0	90223.6
Anaheim Bay	263065.3	NA	263065.3	NA	263065.3	0.0	263065.3	0.0
	2481842.4	NA	3421276.4	NA	2285630.0	571785.5	1670256.0	1931201.5
Capital Improvement								
Los Angeles Harbor	155989.9	NA	155989.9	NA	155989.9	0.0	0.0	408243.4
Long Beach Harbor	185666.8	NA	185666.8	NA	185666.8	0.0	0.0	393405.0
Upper Newport Bay***	0.0	NA	6406668.2	NA	0.0	1912739.5	0.0	1912739.5
	341656.6	NA	6748324.9	NA	341656.6	1912739.5	0.0	2714387.9
Total =	**2823499.1**	**NA**	**10169601.3**	**NA**	**2627286.6**	**2484525.1**	**1670256.0**	**4645589.4**
Total both sites =	**2823499.1**		**10169601.3**		**5111811.7**		**6315845.4**	

Total Average Annual Generator SO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	42659.6	NA	42659.6	NA	42659.6	0.0	42659.6	0.0
Los Angeles Harbor	16560.9	NA	16560.9	NA	16560.9	0.0	0.0	36828.7
Long Beach Harbor	71992.3	NA	71992.3	NA	71992.3	0.0	0.0	135418.5
Marina del Rey	137378.1	NA	137378.1	NA	137378.1	0.0	137378.1	0.0
Sunset/Huntington Harbor	26098.7	NA	26098.7	NA	0.0	33252.0	0.0	33252.0
Newport Harbor	0.0	NA	38020.9	NA	0.0	14176.5	0.0	14176.5
Dana Point Harbor	0.0	NA	40908.2	NA	0.0	18017.6	0.0	18017.6
Upper Newport Bay	0.0	NA	38020.9	NA	0.0	14176.5	0.0	14176.5
Anaheim Bay	36035.2	NA	36035.2	NA	36035.2	0.0	36035.2	0.0
	330724.8	NA	447674.8	NA	304626.1	79622.5	216072.9	251869.7
Capital Improvement								
Los Angeles Harbor	23185.3	NA	23185.3	NA	23185.3	0.0	0.0	51560.1
Long Beach Harbor	26523.5	NA	26523.5	NA	26523.5	0.0	0.0	49891.0
Upper Newport Bay***	0.0	NA	806042.6	NA	0.0	300541.1	0.0	300541.1
	49708.8	NA	855751.4	NA	49708.8	300541.1	0.0	401992.3
Total (grams) =	**380433.5**	**NA**	**1303426.2**	**NA**	**354334.9**	**380153.7**	**216072.9**	**653861.9**
Total generators both sites (grams) =	**380433.6**		**1303426.2**		**734488.6**		**869934.8**	

Total Average Annual Main Engine SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	678.2	NA	678.2	NA	678.2	0.0	678.2	0.0
Los Angeles Harbor	245.6	NA	245.6	NA	245.6	0.0	0.0	642.9
Long Beach Harbor	1111.0	NA	1111.0	NA	1111.0	0.0	0.0	2354.1
Marina del Rey	2424.1	NA	2424.1	NA	2424.1	0.0	2424.1	0.0
Sunset/Huntington Harbor	432.6	NA	432.6	NA	0.0	572.8	0.0	572.8
Newport Harbor	0.0	NA	666.2	NA	0.0	198.9	0.0	198.9
Dana Point Harbor	0.0	NA	738.6	NA	0.0	290.0	0.0	290.0
Upper Newport Bay	0.0	NA	666.2	NA	0.0	198.9	0.0	198.9
Anaheim Bay	580.0	NA	580.0	NA	580.0	0.0	580.0	0.0
	5471.5	NA	7542.6	NA	5039.0	1260.6	3682.3	4257.6
Capital Improvement								
Los Angeles Harbor	343.9	NA	343.9	NA	343.9	0.0	0.0	900.0
Long Beach Harbor	409.3	NA	409.3	NA	409.3	0.0	0.0	867.3
Upper Newport Bay***	0.0	NA	14124.3	NA	0.0	4216.9	0.0	4216.9
	753.2	NA	14877.5	NA	753.2	4216.9	0.0	5984.2
Total =	**6224.7**	**NA**	**22420.1**	**NA**	**5792.2**	**5477.4**	**3682.3**	**10241.5**
Total both sites =	**6224.7**		**22420.1**		**11269.6**		**13924.1**	
Total both sites (tons) =	**3.11**		**11.21**		**5.63**		**6.96**	

Total Average Annual Generator SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	94.0	NA	94.0	NA	94.0	0.0	94.0	0.0
Los Angeles Harbor	36.5	NA	36.5	NA	36.5	0.0	0.0	81.2
Long Beach Harbor	158.7	NA	158.7	NA	158.7	0.0	0.0	298.5
Marina del Rey	302.9	NA	302.9	NA	302.9	0.0	302.9	0.0
Sunset/Huntington Harbor	57.5	NA	57.5	NA	0.0	73.3	0.0	73.3
Newport Harbor	0.0	NA	83.8	NA	0.0	31.3	0.0	31.3
Dana Point Harbor	0.0	NA	90.2	NA	0.0	39.7	0.0	39.7
Upper Newport Bay	0.0	NA	83.8	NA	0.0	31.3	0.0	31.3
Anaheim Bay	79.4	NA	79.4	NA	79.4	0.0	79.4	0.0
	729.1	NA	987.0	NA	671.6	175.5	476.4	555.3
Capital Improvement								
Los Angeles Harbor	51.1	NA	51.1	NA	51.1	0.0	0.0	113.7
Long Beach Harbor	58.5	NA	58.5	NA	58.5	0.0	0.0	110.0
Upper Newport Bay***	0.0	NA	1777.0	NA	0.0	662.6	0.0	662.6
	109.6	NA	1886.6	NA	109.6	662.6	0.0	886.2
Total (pounds) =	**838.7**	**NA**	**2873.6**	**NA**	**781.2**	**838.1**	**476.4**	**1441.5**
Total generators both sites (pounds) =	**838.7**		**2873.6**		**1619.3**		**1917.9**	
Total generators both sites (tons) =	**0.419**		**1.437**		**0.810**		**0.959**	

Average Quarterly Main Engine SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	169.6	NA	169.6	NA	169.6	0.0	169.6	0.0
Los Angeles Harbor	61.4	NA	61.4	NA	61.4	0.0	0.0	160.7
Long Beach Harbor	277.8	NA	277.8	NA	277.8	0.0	0.0	588.5
Marina del Rey	606.0	NA	606.0	NA	606.0	0.0	606.0	0.0
Sunset/Huntington Harbor	108.1	NA	108.1	NA	0.0	143.2	0.0	143.2
Newport Harbor	0.0	NA	166.6	NA	0.0	49.7	0.0	49.7
Dana Point Harbor	0.0	NA	184.7	NA	0.0	72.5	0.0	72.5
Upper Newport Bay	0.0	NA	166.6	NA	0.0	49.7	0.0	49.7
Anaheim Bay	145.0	NA	145.0	NA	145.0	0.0	145.0	0.0
	1367.9	NA	1885.7	NA	1259.7	315.1	920.6	1064.4
Capital Improvement								
Los Angeles Harbor	86.0	NA	86.0	NA	86.0	0.0	0.0	225.0
Long Beach Harbor	102.3	NA	102.3	NA	102.3	0.0	0.0	216.8
Upper Newport Bay***	0.0	NA	3531.1	NA	0.0	1054.2	0.0	1054.2
	188.3	NA	3719.4	NA	188.3	1054.2	0.0	1496.1
Total =	**1556.2**	**NA**	**5605.0**	**NA**	**1448.0**	**1369.4**	**920.6**	**2560.4**
Total both sites =	**1556.2**		**5605.0**		**2817.4**		**3481.0**	
Total both sites (tons) =	**0.78**		**2.80**		**1.41**		**1.74**	

Average Quarterly Generator SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	23.5	NA	23.5	NA	23.5	0.0	23.5	0.0
Los Angeles Harbor	9.1	NA	9.1	NA	9.1	0.0	0.0	20.3
Long Beach Harbor	39.7	NA	39.7	NA	39.7	0.0	0.0	74.6
Marina del Rey	75.7	NA	75.7	NA	75.7	0.0	75.7	0.0
Sunset/Huntington Harbor	14.4	NA	14.4	NA	0.0	18.3	0.0	18.3
Newport Harbor	0.0	NA	21.0	NA	0.0	7.8	0.0	7.8
Dana Point Harbor	0.0	NA	22.5	NA	0.0	9.9	0.0	9.9
Upper Newport Bay	0.0	NA	21.0	NA	0.0	7.8	0.0	7.8
Anaheim Bay	19.9	NA	19.9	NA	19.9	0.0	19.9	0.0
	182.3	NA	246.7	NA	167.9	43.9	119.1	138.8
Capital Improvement								
Los Angeles Harbor	12.8	NA	12.8	NA	12.8	0.0	0.0	28.4
Long Beach Harbor	14.6	NA	14.6	NA	14.6	0.0	0.0	27.5
Upper Newport Bay***	0.0	NA	444.3	NA	0.0	165.6	0.0	165.6
	27.4	NA	471.7	NA	27.4	165.6	0.0	221.6
Total (pounds) =	**209.7**	**NA**	**718.4**	**NA**	**195.3**	**209.5**	**119.1**	**360.4**
Total generators both sites (pounds) =	**209.7**		**718.4**		**404.8**		**479.5**	
Total generators both sites (tons) =	**0.10**		**0.36**		**0.20**		**0.24**	

Average Daily Main Engine SO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1.9	NA	1.9	NA	1.9	0.0	1.9	0.0
Los Angeles Harbor	0.7	NA	0.7	NA	0.7	0.0	0.0	1.8
Long Beach Harbor	3.0	NA	3.0	NA	3.0	0.0	0.0	6.4
Marina del Rey	6.6	NA	6.6	NA	6.6	0.0	6.6	0.0
Sunset/Huntington Harbor	1.2	NA	1.2	NA	0.0	1.6	0.0	1.6
Newport Harbor	0.0	NA	1.8	NA	0.0	0.5	0.0	0.5
Dana Point Harbor	0.0	NA	2.0	NA	0.0	0.8	0.0	0.8
Upper Newport Bay	0.0	NA	1.8	NA	0.0	0.5	0.0	0.5
Anaheim Bay	1.6	NA	1.6	NA	1.6	0.0	1.6	0.0
	15.0	NA	20.7	NA	13.8	3.5	10.1	11.7
Capital Improvement								
Los Angeles Harbor	0.9	NA	0.9	NA	0.9	0.0	0.0	2.5
Long Beach Harbor	1.1	NA	1.1	NA	1.1	0.0	0.0	2.4
Upper Newport Bay***	0.0	NA	38.7	NA	0.0	11.6	0.0	11.6
	2.1	NA	40.8	NA	2.1	11.6	0.0	16.4
Total =	**17.1**	**NA**	**61.4**	**NA**	**15.9**	**15.0**	**10.1**	**28.1**
Total both sites =	**17.1**		**61.4**		**30.9**		**38.1**	
Total both sites (tons) =	**0.0085**		**0.0307**		**0.0154**		**0.0191**	

Average Daily Generator SO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Long Beach Harbor	0.4	NA	0.4	NA	0.4	0.0	0.0	0.8
Marina del Rey	0.8	NA	0.8	NA	0.8	0.0	0.8	0.0
Sunset/Huntington Harbor	0.2	NA	0.2	NA	0.0	0.2	0.0	0.2
Newport Harbor	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Dana Point Harbor	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Upper Newport Bay	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Anaheim Bay	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	2.0	NA	2.7	NA	1.8	0.5	1.3	1.5
Capital Improvement								
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.3
Long Beach Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.3
Upper Newport Bay***	0.0	NA	4.9	NA	0.0	1.8	0.0	1.8
	0.3	NA	5.2	NA	0.3	1.8	0.0	2.4
Total (pounds) =	**2.3**	**NA**	**7.9**	**NA**	**2.1**	**2.3**	**1.3**	**3.8**
Total generators both sites (pounds) =	**2.3**		**7.9**		**4.4**		**5.3**	
Total generators both sites (tons) =	**0.0011**		**0.0039**		**0.0022**		**0.0026**	

Total Average Annual Combined Main Engine and Generators SO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**7063.5**		**25293.7**		**12888.9**		**15841.9**	
Total main engine and generators (tons) =	**3.532**		**12.647**		**6.444**		**7.921**	

Total Average Quarterly Combined Main Engine and Generators SO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**1765.9**		**6323.4**		**3222.2**		**3960.5**	
Total main engine and generators (tons) =	**0.883**		**3.162**		**1.611**		**1.980**	

Total Average Daily Combined Main Engine and Generators SO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**19.4**		**69.3**		**35.3**		**43.4**	
Total main engine and generators (tons) =	**0.0097**		**0.0346**		**0.0177**		**0.0217**	

		CO emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	1.0473
Vessel Manuvering Load Factor =	20%	4.1890
Generator Load Factor =	100%	0.8376

Total Average Annual Main Engine CO Emissions (grams)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	50277.8	NA	50277.8	NA	50277.8	0.0	50277.8	0.0
Los Angeles Harbor	19518.4	NA	19518.4	NA	19518.4	0.0	0.0	43405.6
Long Beach Harbor	84848.8	NA	84848.8	NA	84848.8	0.0	0.0	159601.7
Marina del Rey	161911.3	NA	161911.3	NA	161911.3	0.0	161911.3	0.0
Sunset/Huntington Harbor	30759.4	NA	30759.4	NA	0.0	39190.2	0.0	39190.2
Newport Harbor	0.0	NA	44810.7	NA	0.0	16708.1	0.0	16708.1
Dana Point Harbor	0.0	NA	48213.7	NA	0.0	21235.2	0.0	21235.2
Upper Newport Bay	0.0	NA	44810.7	NA	0.0	16708.1	0.0	16708.1
Anaheim Bay	42470.4	NA	42470.4	NA	42470.4	0.0	42470.4	0.0
	389786.1	NA	527621.2	NA	359026.7	93841.7	254659.5	296848.9
Capital Improvement								
Los Angeles Harbor	27325.7	NA	27325.7	NA	27325.7	0.0	0.0	60767.8
Long Beach Harbor	31260.1	NA	31260.1	NA	31260.1	0.0	0.0	58800.6
Upper Newport Bay***	0.0	NA	949986.9	NA	0.0	354212.2	0.0	354212.2
	58585.8	NA	1008572.7	NA	58585.8	354212.2	0.0	473780.7
Total =	**448372.0**	**NA**	**1536194.0**	**NA**	**417612.6**	**448053.9**	**254659.5**	**770629.6**
Total both sites =	**448372.0**		**1536194.0**		**865666.5**		**1025289.1**	

Total Average Annual Generator CO Emissions (grams)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	4597.1	NA	4597.1	NA	4597.1	0.0	4597.1	0.0
Los Angeles Harbor	1784.6	NA	1784.6	NA	1784.6	0.0	0.0	3968.7
Long Beach Harbor	7758.0	NA	7758.0	NA	7758.0	0.0	0.0	14592.9
Marina del Rey	14804.1	NA	14804.1	NA	14804.1	0.0	14804.1	0.0
Sunset/Huntington Harbor	2812.4	NA	2812.4	NA	0.0	3583.3	0.0	3583.3
Newport Harbor	0.0	NA	4097.2	NA	0.0	1527.7	0.0	1527.7
Dana Point Harbor	0.0	NA	4408.3	NA	0.0	1941.6	0.0	1941.6
Upper Newport Bay	0.0	NA	4097.2	NA	0.0	1527.7	0.0	1527.7
Anaheim Bay	3883.2	NA	3883.2	NA	3883.2	0.0	3883.2	0.0
	35639.4	NA	48242.2	NA	32827.0	8580.3	23284.4	27141.9
Capital Improvement								
Los Angeles Harbor	2498.5	NA	2498.5	NA	2498.5	0.0	0.0	5556.2
Long Beach Harbor	2858.2	NA	2858.2	NA	2858.2	0.0	0.0	5376.3
Upper Newport Bay***	0.0	NA	86860.4	NA	0.0	32386.8	0.0	32386.8
	5356.7	NA	92217.1	NA	5356.7	32386.8	0.0	43319.3
Total (grams) =	**40996.1**	**NA**	**140459.3**	**NA**	**38183.7**	**40967.1**	**23284.4**	**70461.2**
Total generators both sites (grams) =	**40996.1**		**140459.3**		**79150.7**		**93745.6**	

Total Average Annual Main Engine CO Emissions (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	110.8	NA	110.8	NA	110.8	0.0	110.8	0.0
Los Angeles Harbor	43.0	NA	43.0	NA	43.0	0.0	0.0	95.7
Long Beach Harbor	187.1	NA	187.1	NA	187.1	0.0	0.0	351.9
Marina del Rey	357.0	NA	357.0	NA	357.0	0.0	357.0	0.0
Sunset/Huntington Harbor	67.8	NA	67.8	NA	0.0	86.4	0.0	86.4
Newport Harbor	0.0	NA	98.8	NA	0.0	36.8	0.0	36.8
Dana Point Harbor	0.0	NA	106.3	NA	0.0	46.8	0.0	46.8
Upper Newport Bay	0.0	NA	98.8	NA	0.0	36.8	0.0	36.8
Anaheim Bay	93.6	NA	93.6	NA	93.6	0.0	93.6	0.0
	859.3	NA	1163.2	NA	791.5	206.9	561.4	654.4
Capital Improvement								
Los Angeles Harbor	60.2	NA	60.2	NA	60.2	0.0	0.0	134.0
Long Beach Harbor	68.9	NA	68.9	NA	68.9	0.0	0.0	129.6
Upper Newport Bay***	0.0	NA	2094.4	NA	0.0	780.9	0.0	780.9
	129.2	NA	2223.5	NA	129.2	780.9	0.0	1044.5
Total =	**988.5**	**NA**	**3386.7**	**NA**	**920.7**	**987.8**	**561.4**	**1698.9**
Total both sites =	**988.5**		**3386.7**		**1908.5**		**2260.4**	
Total both sites (tons) =	**0.49**		**1.69**		**0.95**		**1.13**	

Total Average Annual Generator CO Emissions (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	10.1	NA	10.1	NA	10.1	0.0	10.1	0.0
Los Angeles Harbor	3.9	NA	3.9	NA	3.9	0.0	0.0	8.7
Long Beach Harbor	17.1	NA	17.1	NA	17.1	0.0	0.0	32.2
Marina del Rey	32.6	NA	32.6	NA	32.6	0.0	32.6	0.0
Sunset/Huntington Harbor	6.2	NA	6.2	NA	0.0	7.9	0.0	7.9
Newport Harbor	0.0	NA	9.0	NA	0.0	3.4	0.0	3.4
Dana Point Harbor	0.0	NA	9.7	NA	0.0	4.3	0.0	4.3
Upper Newport Bay	0.0	NA	9.0	NA	0.0	3.4	0.0	3.4
Anaheim Bay	8.6	NA	8.6	NA	8.6	0.0	8.6	0.0
	78.6	NA	106.4	NA	72.4	18.9	51.3	59.8
Capital Improvement								
Los Angeles Harbor	5.5	NA	5.5	NA	5.5	0.0	0.0	12.2
Long Beach Harbor	6.3	NA	6.3	NA	6.3	0.0	0.0	11.9
Upper Newport Bay***	0.0	NA	191.5	NA	0.0	71.4	0.0	71.4
	11.8	NA	203.3	NA	11.8	71.4	0.0	95.5
Total (pounds) =	**90.4**	**NA**	**309.7**	**NA**	**84.2**	**90.3**	**51.3**	**155.3**
Total generators both sites (pounds) =	**90.4**		**309.7**		**174.5**		**206.7**	
Total generators both sites (tons) =	**0.045**		**0.155**		**0.087**		**0.103**	

Average Quarterly Main Engine CO Emissions (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	27.7	NA	27.7	NA	27.7	0.0	27.7	0.0
Los Angeles Harbor	10.8	NA	10.8	NA	10.8	0.0	0.0	23.9
Long Beach Harbor	46.8	NA	46.8	NA	46.8	0.0	0.0	88.0
Marina del Rey	89.2	NA	89.2	NA	89.2	0.0	89.2	0.0
Sunset/Huntington Harbor	17.0	NA	17.0	NA	0.0	21.6	0.0	21.6
Newport Harbor	0.0	NA	24.7	NA	0.0	9.2	0.0	9.2
Dana Point Harbor	0.0	NA	26.6	NA	0.0	11.7	0.0	11.7
Upper Newport Bay	0.0	NA	24.7	NA	0.0	9.2	0.0	9.2
Anaheim Bay	23.4	NA	23.4	NA	23.4	0.0	23.4	0.0
	214.8	NA	290.8	NA	197.9	51.7	140.4	163.6
Capital Improvement								
Los Angeles Harbor	15.1	NA	15.1	NA	15.1	0.0	0.0	33.5
Long Beach Harbor	17.2	NA	17.2	NA	17.2	0.0	0.0	32.4
Upper Newport Bay***	0.0	NA	523.6	NA	0.0	195.2	0.0	195.2
	32.3	NA	555.9	NA	32.3	195.2	0.0	261.1
Total =	**247.1**	**NA**	**846.7**	**NA**	**230.2**	**246.9**	**140.4**	**424.7**
Total both sites =	**247.1**		**846.7**		**477.1**		**565.1**	
Total both sites (tons) =	**0.12**		**0.42**		**0.24**		**0.28**	

Average Quarterly Generator CO Emissions (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2.5	NA	2.5	NA	2.5	0.0	2.5	0.0
Los Angeles Harbor	1.0	NA	1.0	NA	1.0	0.0	0.0	2.2
Long Beach Harbor	4.3	NA	4.3	NA	4.3	0.0	0.0	8.0
Marina del Rey	8.2	NA	8.2	NA	8.2	0.0	8.2	0.0
Sunset/Huntington Harbor	1.6	NA	1.6	NA	0.0	2.0	0.0	2.0
Newport Harbor	0.0	NA	2.3	NA	0.0	0.8	0.0	0.8
Dana Point Harbor	0.0	NA	2.4	NA	0.0	1.1	0.0	1.1
Upper Newport Bay	0.0	NA	2.3	NA	0.0	0.8	0.0	0.8
Anaheim Bay	2.1	NA	2.1	NA	2.1	0.0	2.1	0.0
	19.6	NA	26.6	NA	18.1	4.7	12.8	15.0
Capital Improvement								
Los Angeles Harbor	1.4	NA	1.4	NA	1.4	0.0	0.0	3.1
Long Beach Harbor	1.6	NA	1.6	NA	1.6	0.0	0.0	3.0
Upper Newport Bay***	0.0	NA	47.9	NA	0.0	17.9	0.0	17.9
	3.0	NA	50.8	NA	3.0	17.9	0.0	23.9
Total (pounds) =	**22.6**	**NA**	**77.4**	**NA**	**21.0**	**22.6**	**12.8**	**38.8**
Total generators both sites (pounds) =	**22.6**		**77.4**		**43.6**		**51.7**	
Total generators both sites (tons) =	**0.01**		**0.04**		**0.02**		**0.03**	

Average Daily Main Engine CO Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.3
Long Beach Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	1.0
Marina del Rey	1.0	NA	1.0	NA	1.0	0.0	1.0	0.0
Sunset/Huntington Harbor	0.2	NA	0.2	NA	0.0	0.2	0.0	0.2
Newport Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Dana Point Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Upper Newport Bay	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Anaheim Bay	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
	2.4	NA	3.2	NA	2.2	0.6	1.5	1.8
Capital Improvement								
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Long Beach Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Upper Newport Bay***	0.0	NA	5.7	NA	0.0	2.1	0.0	2.1
	0.4	NA	6.1	NA	0.4	2.1	0.0	2.9
Total =	**2.7**	**NA**	**9.3**	**NA**	**2.5**	**2.7**	**1.5**	**4.7**
Total both sites =	**2.7**		**9.3**		**5.2**		**6.2**	
Total both sites (tons) =	**0.0014**		**0.0046**		**0.0026**		**0.0031**	

Average Daily Generator CO Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Marina del Rey	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Newport Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.2	NA	0.3	NA	0.2	0.1	0.1	0.2
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay***	0.0	NA	0.5	NA	0.0	0.2	0.0	0.2
	0.0	NA	0.6	NA	0.0	0.2	0.0	0.3
Total (pounds) =	**0.2**	**NA**	**0.8**	**NA**	**0.2**	**0.2**	**0.1**	**0.4**
Total generators both sites (pounds) =	**0.2**		**0.8**		**0.5**		**0.6**	
Total generators both sites (tons) =	**0.0001**		**0.0004**		**0.0002**		**0.0003**	

Total Average Annual Combined Main Engine and Generators CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Total main engine and generators (pounds) =	**1078.9**		**3696.4**		**2083.0**		**2467.0**	
Total main engine and generators (tons) =	**0.539**		**1.848**		**1.041**		**1.234**	

Total Average Quarterly Combined Main Engine and Generators CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Total main engine and generators (pounds) =	**269.7**		**924.1**		**520.7**		**616.8**	
Total main engine and generators (tons) =	**0.135**		**0.462**		**0.260**		**0.308**	

Total Average Daily Combined Main Engine and Generators CO Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3	Average Year LA-2	Average Year LA-3
Total main engine and generators (pounds) =	**3.0**		**10.1**		**5.7**		**6.8**	
Total main engine and generators (tons) =	**0.0015**		**0.0051**		**0.0029**		**0.0034**	

		HC emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.0932
Vessel Manuvering Load Factor =	20%	0.7457
Generator Load Factor =	100%	0.0667

Total Average Annual Main Engine HC Emissions
(grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	5698.6	NA	5698.6	NA	5698.6	0.0	5698.6	0.0
Los Angeles Harbor	2349.0	NA	2349.0	NA	2349.0	0.0	0.0	4475.2
Long Beach Harbor	9876.9	NA	9876.9	NA	9876.9	0.0	0.0	16530.7
Marina del Rey	16491.6	NA	16491.6	NA	16491.6	0.0	16491.6	0.0
Sunset/Huntington Harbor	3349.6	NA	3349.6	NA	0.0	4100.0	0.0	4100.0
Newport Harbor	0.0	NA	4600.3	NA	0.0	2098.9	0.0	2098.9
Dana Point Harbor	0.0	NA	4760.9	NA	0.0	2379.5	0.0	2379.5
Upper Newport Bay	0.0	NA	4600.3	NA	0.0	2098.9	0.0	2098.9
Anaheim Bay	4759.0	NA	4759.0	NA	4759.0	0.0	4759.0	0.0
	42524.7	NA	56506.3	NA	39175.1	10677.3	26949.2	31683.2
Capital Improvement								
Los Angeles Harbor	3288.7	NA	3288.7	NA	3288.7	0.0	0.0	6265.3
Long Beach Harbor	3638.9	NA	3638.9	NA	3638.9	0.0	0.0	6090.2
Upper Newport Bay***	0.0	NA	97526.7	NA	0.0	44496.6	0.0	44496.6
	6927.5	NA	104454.2	NA	6927.5	44496.6	0.0	56852.2
Total =	**49452.2**	**NA**	**160960.4**	**NA**	**46102.6**	**55173.9**	**26949.2**	**88535.4**
Total both sites =	**49452.2**		**160960.4**		**101276.5**		**115484.6**	

Total Average Annual Generator HC Emissions
(grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	366.0	NA	366.0	NA	366.0	0.0	366.0	0.0
Los Angeles Harbor	142.1	NA	142.1	NA	142.1	0.0	0.0	316.0
Long Beach Harbor	617.6	NA	617.6	NA	617.6	0.0	0.0	1161.8
Marina del Rey	1178.6	NA	1178.6	NA	1178.6	0.0	1178.6	0.0
Sunset/Huntington Harbor	223.9	NA	223.9	NA	0.0	265.3	0.0	265.3
Newport Harbor	0.0	NA	326.2	NA	0.0	121.6	0.0	121.6
Dana Point Harbor	0.0	NA	351.0	NA	0.0	154.6	0.0	154.6
Upper Newport Bay	0.0	NA	326.2	NA	0.0	121.6	0.0	121.6
Anaheim Bay	309.2	NA	309.2	NA	309.2	0.0	309.2	0.0
	2837.4	NA	3840.7	NA	2613.5	663.1	1853.7	2160.9
Capital Improvement								
Los Angeles Harbor	198.9	NA	198.9	NA	198.9	0.0	0.0	442.3
Long Beach Harbor	227.6	NA	227.6	NA	227.6	0.0	0.0	428.0
Upper Newport Bay***	0.0	NA	6915.2	NA	0.0	2578.4	0.0	2578.4
	426.5	NA	7341.7	NA	426.5	2578.4	0.0	3448.6
Total (grams) =	**3263.8**	**NA**	**11182.4**	**NA**	**3039.9**	**3261.5**	**1853.7**	**5609.5**
Total generators both sites (grams) =	**3263.8**		**11182.4**		**6301.5**		**7463.4**	

Total Average Annual Main Engine HC Emissions
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	12.6	NA	12.6	NA	12.6	0.0	12.6	0.0
Los Angeles Harbor	5.2	NA	5.2	NA	5.2	0.0	0.0	9.9
Long Beach Harbor	21.8	NA	21.8	NA	21.8	0.0	0.0	36.4
Marina del Rey	36.4	NA	36.4	NA	36.4	0.0	36.4	0.0
Sunset/Huntington Harbor	7.4	NA	7.4	NA	0.0	9.0	0.0	9.0
Newport Harbor	0.0	NA	10.1	NA	0.0	4.6	0.0	4.6
Dana Point Harbor	0.0	NA	10.5	NA	0.0	5.2	0.0	5.2
Upper Newport Bay	0.0	NA	10.1	NA	0.0	4.6	0.0	4.6
Anaheim Bay	10.5	NA	10.5	NA	10.5	0.0	10.5	0.0
	93.8	NA	124.6	NA	86.4	23.5	59.4	69.8
Capital Improvement								
Los Angeles Harbor	7.3	NA	7.3	NA	7.3	0.0	0.0	13.8
Long Beach Harbor	8.0	NA	8.0	NA	8.0	0.0	0.0	13.4
Upper Newport Bay***	0.0	NA	215.0	NA	0.0	98.1	0.0	98.1
	15.3	NA	230.3	NA	15.3	98.1	0.0	125.3
Total =	**109.0**	**NA**	**354.9**	**NA**	**101.6**	**121.6**	**59.4**	**185.2**
Total both sites =	**109.0**		**354.9**		**223.3**		**254.6**	
Total both sites (tons) =	**0.05**		**0.18**		**0.11**		**0.13**	

Total Average Annual Generator HC Emissions
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.8	NA	0.8	NA	0.8	0.0	0.8	0.0
Los Angeles Harbor	0.3	NA	0.3	NA	0.3	0.0	0.0	0.7
Long Beach Harbor	1.4	NA	1.4	NA	1.4	0.0	0.0	2.6
Marina del Rey	2.6	NA	2.6	NA	2.6	0.0	2.6	0.0
Sunset/Huntington Harbor	0.5	NA	0.5	NA	0.0	0.6	0.0	0.6
Newport Harbor	0.0	NA	0.7	NA	0.0	0.3	0.0	0.3
Dana Point Harbor	0.0	NA	0.8	NA	0.0	0.3	0.0	0.3
Upper Newport Bay	0.0	NA	0.7	NA	0.0	0.3	0.0	0.3
Anaheim Bay	0.7	NA	0.7	NA	0.7	0.0	0.7	0.0
	6.3	NA	8.5	NA	5.8	1.5	4.1	4.8
Capital Improvement								
Los Angeles Harbor	0.4	NA	0.4	NA	0.4	0.0	0.0	1.0
Long Beach Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	0.9
Upper Newport Bay***	0.0	NA	15.2	NA	0.0	5.7	0.0	5.7
	0.9	NA	16.2	NA	0.9	5.7	0.0	7.6
Total (pounds) =	**7.2**	**NA**	**24.7**	**NA**	**6.7**	**7.2**	**4.1**	**12.4**
Total generators both sites (pounds) =	**7.2**		**24.7**		**13.9**		**16.5**	
Total generators both sites (tons) =	**0.004**		**0.012**		**0.007**		**0.008**	

Average Quarterly Main Engine HC Emissions
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3.1	NA	3.1	NA	3.1	0.0	3.1	0.0
Los Angeles Harbor	1.3	NA	1.3	NA	1.3	0.0	0.0	2.5
Long Beach Harbor	5.4	NA	5.4	NA	5.4	0.0	0.0	9.1
Marina del Rey	9.1	NA	9.1	NA	9.1	0.0	9.1	0.0
Sunset/Huntington Harbor	1.8	NA	1.8	NA	0.0	2.3	0.0	2.3
Newport Harbor	0.0	NA	2.5	NA	0.0	1.2	0.0	1.2
Dana Point Harbor	0.0	NA	2.6	NA	0.0	1.3	0.0	1.3
Upper Newport Bay	0.0	NA	2.5	NA	0.0	1.2	0.0	1.2
Anaheim Bay	2.6	NA	2.6	NA	2.6	0.0	2.6	0.0
	23.4	NA	31.1	NA	21.6	5.9	14.9	17.5
Capital Improvement								
Los Angeles Harbor	1.8	NA	1.8	NA	1.8	0.0	0.0	3.5
Long Beach Harbor	2.0	NA	2.0	NA	2.0	0.0	0.0	3.4
Upper Newport Bay***	0.0	NA	53.8	NA	0.0	24.5	0.0	24.5
	3.8	NA	57.6	NA	3.8	24.5	0.0	31.3
Total =	**27.3**	**NA**	**88.7**	**NA**	**25.4**	**30.4**	**14.9**	**48.8**
Total both sites =	**27.3**		**88.7**		**55.8**		**63.6**	
Total both sites (tons) =	**0.01**		**0.04**		**0.03**		**0.03**	

Average Quarterly Generator HC Emissions
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Long Beach Harbor	0.3	NA	0.3	NA	0.3	0.0	0.0	0.6
Marina del Rey	0.6	NA	0.6	NA	0.6	0.0	0.6	0.0
Sunset/Huntington Harbor	0.1	NA	0.1	NA	0.0	0.2	0.0	0.2
Newport Harbor	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Dana Point Harbor	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Upper Newport Bay	0.0	NA	0.2	NA	0.0	0.1	0.0	0.1
Anaheim Bay	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	1.6	NA	2.1	NA	1.4	0.4	1.0	1.2
Capital Improvement								
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Long Beach Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Upper Newport Bay***	0.0	NA	3.8	NA	0.0	1.4	0.0	1.4
	0.2	NA	4.0	NA	0.2	1.4	0.0	1.9
Total (pounds) =	**1.8**	**NA**	**6.2**	**NA**	**1.7**	**1.8**	**1.0**	**3.1**
Total generators both sites (pounds) =	**1.8**		**6.2**		**3.5**		**4.1**	
Total generators both sites (tons) =	**0.00**		**0.00**		**0.00**		**0.00**	

Average Daily Main Engine HC Emissions (based on a 365 day year)
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.1
Marina del Rey	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Newport Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.3	NA	0.3	NA	0.2	0.1	0.2	0.2
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay***	0.0	NA	0.6	NA	0.0	0.3	0.0	0.3
	0.0	NA	0.6	NA	0.0	0.3	0.0	0.3
Total =	**0.3**	**NA**	**1.0**	**NA**	**0.3**	**0.3**	**0.2**	**0.5**
Total both sites =	**0.3**		**1.0**		**0.6**		**0.7**	
Total both sites (tons) =	**0.0001**		**0.0005**		**0.0003**		**0.0003**	

Average Daily Generator HC Emissions (based on a 365 day year)
(pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Marina del Rey	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Newport Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay***	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Total (pounds) =	**0.0**	**NA**	**0.1**	**NA**	**0.0**	**0.0**	**0.0**	**0.0**
Total generators both sites (pounds) =	**0.0**		**0.1**		**0.0**		**0.0**	
Total generators both sites (tons) =	**0.0000**		**0.0000**		**0.0000**		**0.0000**	

Total Average Annual Combined Main Engine and Generators HC Emissions
(pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**116.2**		**379.5**		**237.2**		**271.1**	
Total main engine and generators (tons) =	**0.058**		**0.190**		**0.119**		**0.136**	

Total Average Quarterly Combined Main Engine and Generators HC Emissions
(pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**29.1**		**94.9**		**59.3**		**67.8**	
Total main engine and generators (tons) =	**0.015**		**0.047**		**0.030**		**0.034**	

Total Average Daily Combined Main Engine and Generators HC Emissions (based on a 365 day year)
(pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**0.3**		**1.0**		**0.6**		**0.7**	
Total main engine and generators (tons) =	**0.0002**		**0.0005**		**0.0003**		**0.0004**	

		CO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	703.7250
Vessel Manuvering Load Factor =	20%	660.1000
Generator Load Factor =	100%	692.7000

Total Average Annual Main Engine CO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	27401057.4	NA	27401057.4	NA	27401057.4	0.0	27401057.4	0.0
Los Angeles Harbor	9923687.0	NA	9923687.0	NA	9923687.0	0.0	0.0	25975264.1
Long Beach Harbor	44886009.9	NA	44886009.9	NA	44886009.9	0.0	0.0	95116003.9
Marina del Rey	97946844.0	NA	97946844.0	NA	97946844.0	0.0	97946844.0	0.0
Sunset/Huntington Harbor	17477370.3	NA	17477370.3	NA	0.0	23142632.8	0.0	23142632.8
Newport Harbor	0.0	NA	26919474.5	NA	0.0	8035266.2	0.0	8035266.2
Dana Point Harbor	0.0	NA	29844631.2	NA	0.0	11715791.3	0.0	11715791.3
Upper Newport Bay	0.0	NA	26919474.5	NA	0.0	8035266.2	0.0	8035266.2
Anaheim Bay	23431582.6	NA	23431582.6	NA	23431582.6	0.0	23431582.6	0.0
	221066551.2	NA	304750131.4	NA	203589180.9	50928956.5	148779484.0	172022224.5
Capital Improvement								
Los Angeles Harbor	13893161.9	NA	13893161.9	NA	13893161.9	0.0	0.0	36365369.7
Long Beach Harbor	16536951.0	NA	16536951.0	NA	16536951.0	0.0	0.0	35043475.1
Upper Newport Bay***	0.0	NA	570692859.0	NA	0.0	170347643.6	0.0	170347643.6
	30430112.9	NA	601122971.8	NA	30430112.9	170347643.6	0.0	241756488.4
Total =	251496664.1	NA	905873103.3	NA	234019293.8	221276600.2	148779484.0	413778712.9
Total both sites =	251496664.1		905873103.3		455295893.9		562558196.9	

Total Average Annual Generator CO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3800891.7	NA	3800891.7	NA	3800891.7	0.0	3800891.7	0.0
Los Angeles Harbor	1475547.1	NA	1475547.1	NA	1475547.1	0.0	0.0	3281366.7
Long Beach Harbor	6414386.7	NA	6414386.7	NA	6414386.7	0.0	0.0	12065539.8
Marina del Rey	12240138.7	NA	12240138.7	NA	12240138.7	0.0	12240138.7	0.0
Sunset/Huntington Harbor	2325344.6	NA	2325344.6	NA	0.0	2962692.7	0.0	2962692.7
Newport Harbor	0.0	NA	3387591.4	NA	0.0	1263097.8	0.0	1263097.8
Dana Point Harbor	0.0	NA	3644850.4	NA	0.0	1605336.4	0.0	1605336.4
Upper Newport Bay	0.0	NA	3387591.4	NA	0.0	1263097.8	0.0	1263097.8
Anaheim Bay	3210672.9	NA	3210672.9	NA	3210672.9	0.0	3210672.9	0.0
	29466981.8	NA	39887015.0	NA	27141637.2	7094224.7	19251703.3	22441131.3
Capital Improvement								
Los Angeles Harbor	2065766.0	NA	2065766.0	NA	2065766.0	0.0	0.0	4593913.4
Long Beach Harbor	2363195.1	NA	2363195.1	NA	2363195.1	0.0	0.0	4445198.9
Upper Newport Bay***	0.0	NA	71816938.3	NA	0.0	26777672.9	0.0	26777672.9
	4428961.1	NA	76245899.4	NA	4428961.1	26777672.9	0.0	35816785.2
Total (grams) =	33895942.9	NA	116132914.4	NA	31570598.3	33871897.6	19251703.3	58257916.5
Total generators both sites (grams) =	33895942.9		116132914.4		65442495.9		77509619.9	

Total Average Annual Main Engine CO2- Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	60409.0	NA	60409.0	NA	60409.0	0.0	60409.0	0.0
Los Angeles Harbor	21878.0	NA	21878.0	NA	21878.0	0.0	0.0	57265.7
Long Beach Harbor	98956.7	NA	98956.7	NA	98956.7	0.0	0.0	209699.3
Marina del Rey	215935.8	NA	215935.8	NA	215935.8	0.0	215935.8	0.0
Sunset/Huntington Harbor	38531.0	NA	38531.0	NA	0.0	51020.8	0.0	51020.8
Newport Harbor	0.0	NA	59347.3	NA	0.0	17714.7	0.0	17714.7
Dana Point Harbor	0.0	NA	65796.1	NA	0.0	25828.9	0.0	25828.9
Upper Newport Bay	0.0	NA	59347.3	NA	0.0	17714.7	0.0	17714.7
Anaheim Bay	51657.8	NA	51657.8	NA	51657.8	0.0	51657.8	0.0
	487368.3	NA	671859.0	NA	448837.3	112279.1	328002.6	379244.1
Capital Improvement								
Los Angeles Harbor	30629.2	NA	30629.2	NA	30629.2	0.0	0.0	80171.9
Long Beach Harbor	36457.7	NA	36457.7	NA	36457.7	0.0	0.0	77257.6
Upper Newport Bay***	0.0	NA	1258162.4	NA	0.0	375552.3	0.0	375552.3
	67086.9	NA	1325249.3	NA	67086.9	375552.3	0.0	532981.8
Total =	554455.2	NA	1997108.3	NA	515924.2	487831.4	328002.6	912225.9
Total both sites =	554455.2		1997108.3		1003755.6		1240228.5	
Total both sites (tons) =	277.23		998.56		501.88		620.11	

Total Average Annual Generator CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	8379.5	NA	8379.5	NA	8379.5	0.0	8379.5	0.0
Los Angeles Harbor	3253.0	NA	3253.0	NA	3253.0	0.0	0.0	7234.2
Long Beach Harbor	14141.3	NA	14141.3	NA	14141.3	0.0	0.0	26600.0
Marina del Rey	26984.9	NA	26984.9	NA	26984.9	0.0	26984.9	0.0
Sunset/Huntington Harbor	5126.5	NA	5126.5	NA	0.0	6531.6	0.0	6531.6
Newport Harbor	0.0	NA	7468.4	NA	0.0	2784.7	0.0	2784.7
Dana Point Harbor	0.0	NA	8035.5	NA	0.0	3539.2	0.0	3539.2
Upper Newport Bay	0.0	NA	7468.4	NA	0.0	2784.7	0.0	2784.7
Anaheim Bay	7078.3	NA	7078.3	NA	7078.3	0.0	7078.3	0.0
	64963.6	NA	87935.8	NA	59837.1	15640.1	42442.7	49474.2
Capital Improvement								
Los Angeles Harbor	4554.2	NA	4554.2	NA	4554.2	0.0	0.0	10127.8
Long Beach Harbor	5210.0	NA	5210.0	NA	5210.0	0.0	0.0	9800.0
Upper Newport Bay***	0.0	NA	158329.2	NA	0.0	59034.7	0.0	59034.7
	9764.2	NA	168093.4	NA	9764.2	59034.7	0.0	78962.5
Total (pounds) =	74727.8	NA	256029.3	NA	69601.3	74674.8	42442.7	128436.7
Total generators both sites (pounds) =	74727.8		256029.3		144276.0		170879.5	
Total generators both sites (tons) =	37.364		128.015		72.138		85.440	

Average Quarterly Main Engine CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	15102.2	NA	15102.2	NA	15102.2	0.0	15102.2	0.0
Los Angeles Harbor	5469.5	NA	5469.5	NA	5469.5	0.0	0.0	14316.4
Long Beach Harbor	24739.2	NA	24739.2	NA	24739.2	0.0	0.0	52424.8
Marina del Rey	53984.0	NA	53984.0	NA	53984.0	0.0	53984.0	0.0
Sunset/Huntington Harbor	9632.8	NA	9632.8	NA	0.0	12755.2	0.0	12755.2
Newport Harbor	0.0	NA	14836.8	NA	0.0	4428.7	0.0	4428.7
Dana Point Harbor	0.0	NA	16449.0	NA	0.0	6457.2	0.0	6457.2
Upper Newport Bay	0.0	NA	14836.8	NA	0.0	4428.7	0.0	4428.7
Anaheim Bay	12914.4	NA	12914.4	NA	12914.4	0.0	12914.4	0.0
	121842.1	NA	167964.8	NA	112209.3	28069.8	82000.7	94811.0
Capital Improvement								
Los Angeles Harbor	7657.3	NA	7657.3	NA	7657.3	0.0	0.0	20043.0
Long Beach Harbor	9114.4	NA	9114.4	NA	9114.4	0.0	0.0	19314.4
Upper Newport Bay***	0.0	NA	314540.6	NA	0.0	93888.1	0.0	93888.1
	16771.7	NA	331312.3	NA	16771.7	93888.1	0.0	133245.5
Total =	138613.8	NA	499277.1	NA	128981.1	121957.8	82000.7	228056.5
Total both sites =	138613.8		499277.1		250938.9		310057.1	
Total both sites (tons) =	69.31		249.64		125.47		155.03	

Average Quarterly Generator CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2094.9	NA	2094.9	NA	2094.9	0.0	2094.9	0.0
Los Angeles Harbor	813.3	NA	813.3	NA	813.3	0.0	0.0	1808.5
Long Beach Harbor	3535.3	NA	3535.3	NA	3535.3	0.0	0.0	6650.0
Marina del Rey	6746.2	NA	6746.2	NA	6746.2	0.0	6746.2	0.0
Sunset/Huntington Harbor	1281.6	NA	1281.6	NA	0.0	1632.9	0.0	1632.9
Newport Harbor	0.0	NA	1867.1	NA	0.0	696.2	0.0	696.2
Dana Point Harbor	0.0	NA	2008.9	NA	0.0	884.8	0.0	884.8
Upper Newport Bay	0.0	NA	1867.1	NA	0.0	696.2	0.0	696.2
Anaheim Bay	1769.6	NA	1769.6	NA	1769.6	0.0	1769.6	0.0
	16240.9	NA	21984.0	NA	14959.3	3910.0	10610.7	12368.6
Capital Improvement								
Los Angeles Harbor	1138.6	NA	1138.6	NA	1138.6	0.0	0.0	2532.0
Long Beach Harbor	1302.5	NA	1302.5	NA	1302.5	0.0	0.0	2450.0
Upper Newport Bay***	0.0	NA	39582.3	NA	0.0	14758.7	0.0	14758.7
	2441.0	NA	42023.4	NA	2441.0	14758.7	0.0	19740.6
Total (pounds) =	18681.9	NA	64007.3	NA	17400.3	18668.7	10610.7	32109.2
Total generators both sites (pounds) =	18681.9		64007.3		36069.0		42719.9	
Total generators both sites (tons) =	9.34		32.00		18.03		21.36	

Average Daily Main Engine CO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	165.5	NA	165.5	NA	165.5	0.0	165.5	0.0
Los Angeles Harbor	59.9	NA	59.9	NA	59.9	0.0	0.0	156.9
Long Beach Harbor	271.1	NA	271.1	NA	271.1	0.0	0.0	574.5
Marina del Rey	591.6	NA	591.6	NA	591.6	0.0	591.6	0.0
Sunset/Huntington Harbor	105.6	NA	105.6	NA	0.0	139.8	0.0	139.8
Newport Harbor	0.0	NA	162.6	NA	0.0	48.5	0.0	48.5
Dana Point Harbor	0.0	NA	180.3	NA	0.0	70.8	0.0	70.8
Upper Newport Bay	0.0	NA	162.6	NA	0.0	48.5	0.0	48.5
Anaheim Bay	141.5	NA	141.5	NA	141.5	0.0	141.5	0.0
	1335.3	NA	1840.7	NA	1229.7	307.6	898.6	1039.0
Capital Improvement								
Los Angeles Harbor	83.9	NA	83.9	NA	83.9	0.0	0.0	219.6
Long Beach Harbor	99.9	NA	99.9	NA	99.9	0.0	0.0	211.7
Upper Newport Bay***	0.0	NA	3447.0	NA	0.0	1028.9	0.0	1028.9
	183.8	NA	3630.8	NA	183.8	1028.9	0.0	1460.2
Total =	1519.1	NA	5471.5	NA	1413.5	1336.5	898.6	2499.2
Total both sites =	1519.1		5471.5		2750.0		3397.9	
Total both sites (tons) =	0.7595		2.7358		1.3750		1.6989	

Average Daily Generator CO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	23.0	NA	23.0	NA	23.0	0.0	23.0	0.0
Los Angeles Harbor	8.9	NA	8.9	NA	8.9	0.0	0.0	19.8
Long Beach Harbor	38.7	NA	38.7	NA	38.7	0.0	0.0	72.9
Marina del Rey	73.9	NA	73.9	NA	73.9	0.0	73.9	0.0
Sunset/Huntington Harbor	14.0	NA	14.0	NA	0.0	17.9	0.0	17.9
Newport Harbor	0.0	NA	20.5	NA	0.0	7.6	0.0	7.6
Dana Point Harbor	0.0	NA	22.0	NA	0.0	9.7	0.0	9.7
Upper Newport Bay	0.0	NA	20.5	NA	0.0	7.6	0.0	7.6
Anaheim Bay	19.4	NA	19.4	NA	19.4	0.0	19.4	0.0
	178.0	NA	240.9	NA	163.9	42.8	116.3	135.5
Capital Improvement								
Los Angeles Harbor	12.5	NA	12.5	NA	12.5	0.0	0.0	27.7
Long Beach Harbor	14.3	NA	14.3	NA	14.3	0.0	0.0	26.8
Upper Newport Bay***	0.0	NA	433.8	NA	0.0	161.7	0.0	161.7
	26.8	NA	460.5	NA	26.8	161.7	0.0	216.3
Total (pounds) =	204.7	NA	701.5	NA	190.7	204.6	116.3	351.9
Total generators both sites (pounds) =	204.7		701.5		395.3		468.2	
Total generators both sites (tons) =	0.1024		0.3507		0.1976		0.2341	

Total Average Annual Combined Main Engine and Generators CO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	629183.0		2253137.6		1148031.6		1411108.0	
Total main engine and generators (tons) =	314.591		1126.569		574.016		705.554	

Total Average Quarterly Combined Main Engine and Generators CO2 Emissions (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	157295.7		563284.4		287007.9		352777.0	
Total main engine and generators (tons) =	78.648		281.642		143.504		176.388	

Total Average Daily Combined Main Engine and Generators CO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	1723.8		6173.0		3145.3		3866.0	
Total main engine and generators (tons) =	0.8619		3.0865		1.5726		1.9330	

		Fuel consumption factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	220.3670
Vessel Maneuvering Load Factor =	20%	276.3170
Generator Load Factor =	100%	219.8370

Total Average Annual Main Engine Fuel Consumption (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	8698783.6	NA	8698783.6	NA	8698783.6	0.0	8698783.6	0.0
Los Angeles Harbor	3150597.1	NA	3150597.1	NA	3150597.1	0.0	0.0	8245474.5
Long Beach Harbor	14249979.0	NA	14249979.0	NA	14249979.0	0.0	0.0	30193948.3
Marina del Rey	31091539.9	NA	31091539.9	NA	31091539.9	0.0	31091539.9	0.0
Sunset/Huntington Harbor	5548186.5	NA	5548186.5	NA	0.0	7346378.5	0.0	7346378.5
Newport Harbor	0.0	NA	8545173.2	NA	0.0	2551199.8	0.0	2551199.8
Dana Point Harbor	0.0	NA	9473488.9	NA	0.0	3719272.4	0.0	3719272.4
Upper Newport Bay	0.0	NA	8545173.2	NA	0.0	2551199.8	0.0	2551199.8
Anaheim Bay	7438544.8	NA	7438544.8	NA	7438544.8	0.0	7438544.8	0.0
	70177631.0	NA	96741464.3	NA	64629444.5	16168050.5	47228868.3	54607473.4
Capital Improvement								
Los Angeles Harbor	4410836.0	NA	4410836.0	NA	4410836.0	0.0	0.0	11543664.4
Long Beach Harbor	5249992.3	NA	5249992.3	NA	5249992.3	0.0	0.0	11124086.2
Upper Newport Bay***	0.0	NA	181157672.2	NA	0.0	54085435.6	0.0	54085435.6
	9660828.3	NA	190818500.4	NA	9660828.3	54085435.6	0.0	76753186.1
Total =	**79838459.2**	**NA**	**287559964.7**	**NA**	**74290272.7**	**70253486.1**	**47228868.3**	**131360659.5**
Total both sites =	**79838459.2**		**287559964.7**		**144543758.8**		**178589527.8**	

Total Average Annual Generator Fuel Consumption (grams)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1206260.5	NA	1206260.5	NA	1206260.5	0.0	1206260.5	0.0
Los Angeles Harbor	468283.3	NA	468283.3	NA	468283.3	0.0	0.0	1041062.7
Long Beach Harbor	2035685.8	NA	2035685.8	NA	2035685.8	0.0	0.0	3829149.8
Marina del Rey	3884561.0	NA	3884561.0	NA	3884561.0	0.0	3884561.0	0.0
Sunset/Huntington Harbor	737977.2	NA	737977.2	NA	0.0	940247.5	0.0	940247.5
Newport Harbor	0.0	NA	1075094.5	NA	0.0	400859.9	0.0	400859.9
Dana Point Harbor	0.0	NA	1156738.8	NA	0.0	509473.6	0.0	509473.6
Upper Newport Bay	0.0	NA	1075094.5	NA	0.0	400859.9	0.0	400859.9
Anaheim Bay	1018947.2	NA	1018947.2	NA	1018947.2	0.0	1018947.2	0.0
	9351714.9	NA	12658642.6	NA	8613737.7	2251440.8	6109768.6	7121973.4
Capital Improvement								
Los Angeles Harbor	655596.7	NA	655596.7	NA	655596.7	0.0	0.0	1457935.8
Long Beach Harbor	749989.5	NA	749989.5	NA	749989.5	0.0	0.0	1410739.4
Upper Newport Bay***	0.0	NA	22792009.7	NA	0.0	8498229.1	0.0	8498229.1
	1405586.1	NA	24197588.8	NA	1405586.1	8498229.1	0.0	11366904.3
Total (grams) =	**10757301.0**	**NA**	**36856231.4**	**NA**	**10019323.8**	**10749669.5**	**6109768.6**	**18488877.7**
Total generators both sites (grams) =	**10757301.0**		**36856231.4**		**20768993.3**		**24598646.3**	

Total Average Annual Main Engine Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	19177.5	NA	19177.5	NA	19177.5	0.0	19177.5	0.0
Los Angeles Harbor	6945.9	NA	6945.9	NA	6945.9	0.0	0.0	18178.2
Long Beach Harbor	31415.8	NA	31415.8	NA	31415.8	0.0	0.0	66566.3
Marina del Rey	68545.1	NA	68545.1	NA	68545.1	0.0	68545.1	0.0
Sunset/Huntington Harbor	12231.7	NA	12231.7	NA	0.0	16196.0	0.0	16196.0
Newport Harbor	0.0	NA	18838.9	NA	0.0	5624.4	0.0	5624.4
Dana Point Harbor	0.0	NA	20885.5	NA	0.0	8199.6	0.0	8199.6
Upper Newport Bay	0.0	NA	18838.9	NA	0.0	5624.4	0.0	5624.4
Anaheim Bay	16399.2	NA	16399.2	NA	16399.2	0.0	16399.2	0.0
	154715.2	NA	213278.4	NA	142483.5	35644.4	104121.8	120388.9
Capital Improvement								
Los Angeles Harbor	9724.2	NA	9724.2	NA	9724.2	0.0	0.0	25449.4
Long Beach Harbor	11574.3	NA	11574.3	NA	11574.3	0.0	0.0	24524.4
Upper Newport Bay***	0.0	NA	399384.3	NA	0.0	119238.0	0.0	119238.0
	21298.5	NA	420682.8	NA	21298.5	119238.0	0.0	169211.8
Total =	**176013.7**	**NA**	**633961.2**	**NA**	**163782.0**	**154882.4**	**104121.8**	**289600.7**
Total both sites =	**176013.7**		**633961.2**		**318664.4**		**393722.5**	
Total both sites (tons) =	**88.01**		**316.98**		**159.33**		**196.86**	

Total Average Annual Generator Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2659.3	NA	2659.3	NA	2659.3	0.0	2659.3	0.0
Los Angeles Harbor	1032.4	NA	1032.4	NA	1032.4	0.0	0.0	2295.9
Long Beach Harbor	4487.9	NA	4487.9	NA	4487.9	0.0	0.0	8441.8
Marina del Rey	8564.0	NA	8564.0	NA	8564.0	0.0	8564.0	0.0
Sunset/Huntington Harbor	1627.0	NA	1627.0	NA	0.0	2072.9	0.0	2072.9
Newport Harbor	0.0	NA	2370.2	NA	0.0	883.7	0.0	883.7
Dana Point Harbor	0.0	NA	2550.2	NA	0.0	1123.2	0.0	1123.2
Upper Newport Bay	0.0	NA	2370.2	NA	0.0	883.7	0.0	883.7
Anaheim Bay	2246.4	NA	2246.4	NA	2246.4	0.0	2246.4	0.0
	20617.0	NA	27907.5	NA	18990.0	4963.6	13469.7	15701.3
Capital Improvement								
Los Angeles Harbor	1445.3	NA	1445.3	NA	1445.3	0.0	0.0	3214.2
Long Beach Harbor	1653.4	NA	1653.4	NA	1653.4	0.0	0.0	3110.1
Upper Newport Bay***	0.0	NA	50247.9	NA	0.0	18735.4	0.0	18735.4
	3098.8	NA	53346.6	NA	3098.8	18735.4	0.0	25059.7
Total (pounds) =	**23715.8**	**NA**	**81254.1**	**NA**	**22088.8**	**23699.0**	**13469.7**	**40761.0**
Total generators both sites (pounds) =	**23715.8**		**81254.1**		**45787.8**		**54230.7**	
Total generators both sites (tons) =	**11.858**		**40.627**		**22.894**		**27.115**	

Average Quarterly Main Engine Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	4794.4	NA	4794.4	NA	4794.4	0.0	4794.4	0.0
Los Angeles Harbor	1736.5	NA	1736.5	NA	1736.5	0.0	0.0	4544.5
Long Beach Harbor	7854.0	NA	7854.0	NA	7854.0	0.0	0.0	16641.6
Marina del Rey	17136.3	NA	17136.3	NA	17136.3	0.0	17136.3	0.0
Sunset/Huntington Harbor	3057.9	NA	3057.9	NA	0.0	4049.0	0.0	4049.0
Newport Harbor	0.0	NA	4709.7	NA	0.0	1406.1	0.0	1406.1
Dana Point Harbor	0.0	NA	5221.4	NA	0.0	2049.9	0.0	2049.9
Upper Newport Bay	0.0	NA	4709.7	NA	0.0	1406.1	0.0	1406.1
Anaheim Bay	4099.8	NA	4099.8	NA	4099.8	0.0	4099.8	0.0
	38678.6	NA	53319.6	NA	35620.9	8911.1	26030.5	30097.2
Capital Improvement								
Los Angeles Harbor	2431.1	NA	2431.1	NA	2431.1	0.0	0.0	6362.4
Long Beach Harbor	2893.6	NA	2893.6	NA	2893.6	0.0	0.0	6131.1
Upper Newport Bay***	0.0	NA	99846.1	NA	0.0	29809.5	0.0	29809.5
	5324.6	NA	105170.7	NA	5324.6	29809.5	0.0	42303.0
Total =	**44003.4**	**NA**	**158490.3**	**NA**	**40945.5**	**38720.6**	**26030.5**	**72400.2**
Total both sites =	**44003.4**		**158490.3**		**79666.1**		**98430.6**	
Total both sites (tons) =	**22.00**		**79.25**		**39.83**		**49.22**	

Average Quarterly Generator Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	664.8	NA	664.8	NA	664.8	0.0	664.8	0.0
Los Angeles Harbor	258.1	NA	258.1	NA	258.1	0.0	0.0	574.0
Long Beach Harbor	1122.0	NA	1122.0	NA	1122.0	0.0	0.0	2110.5
Marina del Rey	2141.0	NA	2141.0	NA	2141.0	0.0	2141.0	0.0
Sunset/Huntington Harbor	406.7	NA	406.7	NA	0.0	518.2	0.0	518.2
Newport Harbor	0.0	NA	592.5	NA	0.0	220.9	0.0	220.9
Dana Point Harbor	0.0	NA	637.5	NA	0.0	280.8	0.0	280.8
Upper Newport Bay	0.0	NA	592.5	NA	0.0	220.9	0.0	220.9
Anaheim Bay	561.6	NA	561.6	NA	561.6	0.0	561.6	0.0
	5154.3	NA	6976.9	NA	4747.5	1240.9	3367.4	3925.3
Capital Improvement								
Los Angeles Harbor	361.3	NA	361.3	NA	361.3	0.0	0.0	803.5
Long Beach Harbor	413.4	NA	413.4	NA	413.4	0.0	0.0	777.5
Upper Newport Bay***	0.0	NA	12561.9	NA	0.0	4683.8	0.0	4683.8
	774.7	NA	13335.6	NA	774.7	4683.8	0.0	6264.9
Total (pounds) =	**5926.9**	**NA**	**20313.5**	**NA**	**5522.2**	**5924.7**	**3367.4**	**10190.2**
Total generators both sites (pounds) =	**5926.9**		**20313.5**		**11446.9**		**13557.7**	
Total generators both sites (tons) =	**2.96**		**10.16**		**5.72**		**6.78**	

Average Daily Main Engine Fuel Consumption (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	52.5	NA	52.5	NA	52.5	0.0	52.5	0.0
Los Angeles Harbor	19.0	NA	19.0	NA	19.0	0.0	0.0	49.8
Long Beach Harbor	86.1	NA	86.1	NA	86.1	0.0	0.0	182.4
Marina del Rey	187.8	NA	187.8	NA	187.8	0.0	187.8	0.0
Sunset/Huntington Harbor	33.5	NA	33.5	NA	0.0	44.4	0.0	44.4
Newport Harbor	0.0	NA	51.6	NA	0.0	15.4	0.0	15.4
Dana Point Harbor	0.0	NA	57.2	NA	0.0	22.5	0.0	22.5
Upper Newport Bay	0.0	NA	51.6	NA	0.0	15.4	0.0	15.4
Anaheim Bay	44.9	NA	44.9	NA	44.9	0.0	44.9	0.0
	423.9	NA	584.3	NA	390.4	97.7	285.3	329.8
Capital Improvement								
Los Angeles Harbor	26.6	NA	26.6	NA	26.6	0.0	0.0	69.7
Long Beach Harbor	31.7	NA	31.7	NA	31.7	0.0	0.0	67.2
Upper Newport Bay***	0.0	NA	1094.2	NA	0.0	326.7	0.0	326.7
	58.4	NA	1152.6	NA	58.4	326.7	0.0	463.6
Total =	**482.2**	**NA**	**1736.9**	**NA**	**448.7**	**424.3**	**285.3**	**793.4**
Total both sites =	**482.2**		**1736.9**		**873.1**		**1078.7**	
Total both sites (tons) =	**0.2411**		**0.8684**		**0.4366**		**0.5393**	

Average Daily Generator Fuel Consumption (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Regular Maintenance								
Los Angeles River Estuary	7.3	NA	7.3	NA	7.3	0.0	7.3	0.0
Los Angeles Harbor	2.8	NA	2.8	NA	2.8	0.0	0.0	6.3
Long Beach Harbor	12.3	NA	12.3	NA	12.3	0.0	0.0	23.1
Marina del Rey	23.5	NA	23.5	NA	23.5	0.0	23.5	0.0
Sunset/Huntington Harbor	4.5	NA	4.5	NA	0.0	5.7	0.0	5.7
Newport Harbor	0.0	NA	6.5	NA	0.0	2.4	0.0	2.4
Dana Point Harbor	0.0	NA	7.0	NA	0.0	3.1	0.0	3.1
Upper Newport Bay	0.0	NA	6.5	NA	0.0	2.4	0.0	2.4
Anaheim Bay	6.2	NA	6.2	NA	6.2	0.0	6.2	0.0
	56.5	NA	76.5	NA	52.0	13.6	36.9	43.0
Capital Improvement								
Los Angeles Harbor	4.0	NA	4.0	NA	4.0	0.0	0.0	8.8
Long Beach Harbor	4.5	NA	4.5	NA	4.5	0.0	0.0	8.5
Upper Newport Bay***	0.0	NA	137.7	NA	0.0	51.3	0.0	51.3
	8.5	NA	146.2	NA	8.5	51.3	0.0	68.7
Total (pounds) =	**65.0**	**NA**	**222.6**	**NA**	**60.5**	**64.9**	**36.9**	**111.7**
Total generators both sites (pounds) =	**65.0**		**222.6**		**125.4**		**148.6**	
Total generators both sites (tons) =	**0.0325**		**0.1113**		**0.0627**		**0.0743**	

Total Average Annual Combined Main Engine and Generators Fuel Consumption (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**199729.5**		**715215.3**		**364452.2**		**447953.2**	
Total main engine and generators (tons) =	**99.865**		**357.608**		**182.226**		**223.977**	

Total Average Quarterly Combined Main Engine and Generators Fuel Consumption (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**49932.4**		**178803.8**		**91113.1**		**111988.3**	
Total main engine and generators (tons) =	**24.966**		**89.402**		**45.557**		**55.994**	

Total Average Daily Combined Main Engine and Generators Fuel Consumption (based on a 365 day year) (pounds)

	Alt 1 - No Action Average Year LA-2	Alt 1 - No Action Average Year LA-3	Alt 2 Average Year LA-2	Alt 2 Average Year LA-3	Alt 3 Average Year LA-2	Alt 3 Average Year LA-3	Alt 4 Average Year LA-2	Alt 4 Average Year LA-3
Total main engine and generators (pounds) =	**547.2**		**1959.5**		**998.5**		**1227.3**	
Total main engine and generators (tons) =	**0.2736**		**0.9797**		**0.4992**		**0.6136**	

		PM emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.2633
Vessel Manuvering Load Factor =	20%	0.3211
Generator Load Factor =	100%	0.2610

Total Maximum Annual Main Engine PM Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	58369.4	NA	58369.4	NA	58369.4	0.0	58369.4	0.0
Los Angeles Harbor	5930.8	NA	5930.8	NA	5930.8	0.0	0.0	15541.7
Long Beach Harbor	25598.0	NA	25598.0	NA	25598.0	0.0	0.0	54289.1
Marina del Rey	109890.2	NA	109890.2	NA	109890.2	0.0	109890.2	0.0
Sunset/Huntington Harbor	98002.2	NA	98002.2	NA	0.0	129802.8	0.0	129802.8
Newport Harbor	0.0	NA	378514.5	NA	0.0	112803.5	0.0	112803.5
Dana Point Harbor	0.0	NA	106047.4	NA	0.0	41598.3	0.0	41598.3
Upper Newport Bay	0.0	NA	151003.1	NA	0.0	45001.4	0.0	45001.4
Anaheim Bay	123700.3	NA	123700.3	NA	123700.3	0.0	123700.3	0.0
	421491.1	NA	1057056.1	NA	323488.8	329206.0	291960.0	399036.7
Capital Improvement								
Los Angeles Harbor	146788.1	NA	146788.1	NA	146788.1	0.0	0.0	384656.0
Long Beach Harbor	174772.6	NA	174772.6	NA	174772.6	0.0	0.0	370663.8
Upper Newport Bay***	0.0	NA	1600633.0	NA	0.0	477014.6	0.0	477014.6
	321560.7	NA	1922193.7	NA	321560.7	477014.6	0.0	1232334.4
Total =	**743051.8**	**NA**	**2979249.7**	**NA**	**645049.5**	**806220.6**	**291960.0**	**1631371.1**
Total both sites =	**743051.8**		**2979249.7**		**1451270.1**		**1923331.2**	

Total Maximum Annual Generator PM Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Los Angeles River Estuary	8163.1	NA	8163.1	NA	8163.1	0.0	8163.1	0.0
Los Angeles Harbor	889.5	NA	889.5	NA	889.5	0.0	0.0	1979.2
Long Beach Harbor	3688.9	NA	3688.9	NA	3688.9	0.0	0.0	6938.8
Marina del Rey	13835.6	NA	13835.6	NA	13835.6	0.0	13835.6	0.0
Sunset/Huntington Harbor	13142.4	NA	13142.4	NA	0.0	16744.5	0.0	16744.5
Newport Harbor	0.0	NA	47992.6	NA	0.0	17894.5	0.0	17894.5
Dana Point Harbor	0.0	NA	13046.6	NA	0.0	5746.3	0.0	5746.3
Upper Newport Bay	0.0	NA	19146.0	NA	0.0	7138.8	0.0	7138.8
Anaheim Bay	17087.6	NA	17087.6	NA	17087.6	0.0	17087.6	0.0
	56807.2	NA	136992.4	NA	43664.6	47524.1	39086.4	56441.1
Los Angeles Harbor	22016.3	NA	22016.3	NA	22016.3	0.0	0.0	48960.4
Long Beach Harbor	25186.2	NA	25186.2	NA	25186.2	0.0	0.0	47375.5
Upper Newport Bay***	0.0	NA	202947.4	NA	0.0	75671.0	0.0	75671.0
	47202.4	NA	250149.8	NA	47202.4	75671.0	0.0	172006.9
Total (grams) =	**104009.7**	**NA**	**387142.2**	**NA**	**90867.3**	**123195.1**	**39086.4**	**228448.0**
Total generators both sites (grams) =	**104009.7**		**387142.2**		**214062.4**		**267534.5**	

Total Maximum Annual Main Engine PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	128.7	NA	128.7	NA	128.7	0.0	128.7	0.0
Los Angeles Harbor	13.1	NA	13.1	NA	13.1	0.0	0.0	34.3
Long Beach Harbor	56.4	NA	56.4	NA	56.4	0.0	0.0	119.7
Marina del Rey	242.3	NA	242.3	NA	242.3	0.0	242.3	0.0
Sunset/Huntington Harbor	216.1	NA	216.1	NA	0.0	286.2	0.0	286.2
Newport Harbor	0.0	NA	834.5	NA	0.0	248.7	0.0	248.7
Dana Point Harbor	0.0	NA	233.8	NA	0.0	91.7	0.0	91.7
Upper Newport Bay	0.0	NA	332.9	NA	0.0	99.2	0.0	99.2
Anaheim Bay	272.7	NA	272.7	NA	272.7	0.0	272.7	0.0
	929.2	NA	2330.4	NA	713.2	725.8	643.7	879.7
Capital Improvement								
Los Angeles Harbor	323.6	NA	323.6	NA	323.6	0.0	0.0	848.0
Long Beach Harbor	385.3	NA	385.3	NA	385.3	0.0	0.0	817.2
Upper Newport Bay***	0.0	NA	3528.8	NA	0.0	1051.6	0.0	1051.6
	708.9	NA	4237.7	NA	708.9	1051.6	0.0	2716.8
Total =	**1638.1**	**NA**	**6568.1**	**NA**	**1422.1**	**1777.4**	**643.7**	**3596.6**
Total both sites =	**1638.1**		**6568.1**		**3199.5**		**4240.2**	
Total both sites (tons) =	**0.82**		**3.28**		**1.60**		**2.12**	

Total Maximum Annual Generator PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Los Angeles River Estuary	18.0	NA	18.0	NA	18.0	0.0	18.0	0.0
Los Angeles Harbor	2.0	NA	2.0	NA	2.0	0.0	0.0	4.4
Long Beach Harbor	8.1	NA	8.1	NA	8.1	0.0	0.0	15.3
Marina del Rey	30.5	NA	30.5	NA	30.5	0.0	30.5	0.0
Sunset/Huntington Harbor	29.0	NA	29.0	NA	0.0	36.9	0.0	36.9
Newport Harbor	0.0	NA	105.8	NA	0.0	39.5	0.0	39.5
Dana Point Harbor	0.0	NA	28.8	NA	0.0	12.7	0.0	12.7
Upper Newport Bay	0.0	NA	42.2	NA	0.0	15.7	0.0	15.7
Anaheim Bay	37.7	NA	37.7	NA	37.7	0.0	37.7	0.0
	125.2	NA	302.0	NA	96.3	104.8	86.2	124.4
Los Angeles Harbor	48.5	NA	48.5	NA	48.5	0.0	0.0	107.9
Long Beach Harbor	55.5	NA	55.5	NA	55.5	0.0	0.0	104.4
Upper Newport Bay***	0.0	NA	447.4	NA	0.0	166.8	0.0	166.8
	104.1	NA	551.5	NA	104.1	166.8	0.0	379.2
Total (pounds) =	**229.3**	**NA**	**853.5**	**NA**	**200.3**	**271.6**	**86.2**	**503.6**
Total generators both sites (pounds) =	**229.3**		**853.5**		**471.9**		**589.8**	
Total generators both sites (tons) =	**0.115**		**0.427**		**0.236**		**0.295**	

Maximum Quarterly Main Engine PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	32.2	NA	32.2	NA	32.2	0.0	32.2	0.0
Los Angeles Harbor	3.3	NA	3.3	NA	3.3	0.0	0.0	8.6
Long Beach Harbor	14.1	NA	14.1	NA	14.1	0.0	0.0	29.9
Marina del Rey	60.6	NA	60.6	NA	60.6	0.0	60.6	0.0
Sunset/Huntington Harbor	54.0	NA	54.0	NA	0.0	71.5	0.0	71.5
Newport Harbor	0.0	NA	208.6	NA	0.0	62.2	0.0	62.2
Dana Point Harbor	0.0	NA	58.4	NA	0.0	22.9	0.0	22.9
Upper Newport Bay	0.0	NA	83.2	NA	0.0	24.8	0.0	24.8
Anaheim Bay	68.2	NA	68.2	NA	68.2	0.0	68.2	0.0
	232.3	NA	582.6	NA	178.3	181.4	160.9	219.8
Capital Improvement								
Los Angeles Harbor	80.9	NA	80.9	NA	80.9	0.0	0.0	212.0
Long Beach Harbor	96.3	NA	96.3	NA	96.3	0.0	0.0	204.3
Upper Newport Bay***	0.0	NA	882.2	NA	0.0	262.9	0.0	262.9
	177.2	NA	1059.4	NA	177.2	262.9	0.0	679.2
Total =	**409.5**	**NA**	**1642.0**	**NA**	**355.5**	**444.4**	**160.9**	**899.1**
Total both sites =	**409.5**		**1642.0**		**799.9**		**1060.1**	
Total both sites (tons) =	**0.20**		**0.82**		**0.40**		**0.53**	

Maximum Quarterly Generator PM Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA 2	Alt 2 Worst Case Year LA 3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Los Angeles River Estuary	4.5	NA	4.5	NA	4.5	0.0	4.5	0.0
Los Angeles Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	1.1
Long Beach Harbor	2.0	NA	2.0	NA	2.0	0.0	0.0	3.8
Marina del Rey	7.6	NA	7.6	NA	7.6	0.0	7.6	0.0
Sunset/Huntington Harbor	7.2	NA	7.2	NA	0.0	9.2	0.0	9.2
Newport Harbor	0.0	NA	26.5	NA	0.0	9.9	0.0	9.9
Dana Point Harbor	0.0	NA	7.2	NA	0.0	3.2	0.0	3.2
Upper Newport Bay	0.0	NA	10.6	NA	0.0	3.9	0.0	3.9
Anaheim Bay	9.4	NA	9.4	NA	9.4	0.0	9.4	0.0
	31.3	NA	75.5	NA	24.1	26.2	21.5	31.1
Los Angeles Harbor	12.1	NA	12.1	NA	12.1	0.0	0.0	27.0
Long Beach Harbor	13.9	NA	13.9	NA	13.9	0.0	0.0	26.1
Upper Newport Bay***	0.0	NA	111.9	NA	0.0	41.7	0.0	41.7
	26.0	NA	137.9	NA	26.0	41.7	0.0	94.8
Total (pounds) =	**57.3**	**NA**	**213.4**	**NA**	**50.1**	**67.9**	**21.6**	**126.9**
Total generators both sites (pounds) =	**57.3**		**213.4**		**118.0**		**147.5**	
Total generators both sites (tons) =	**0.03**		**0.11**		**0.06**		**0.07**	

Maximum Average Daily Main Engine PM Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.4	NA	0.4	NA	0.4	0.0	0.4	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Long Beach Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.3
Marina del Rey	0.7	NA	0.7	NA	0.7	0.0	0.7	0.0
Sunset/Huntington Harbor	0.6	NA	0.6	NA	0.0	0.8	0.0	0.8
Newport Harbor	0.0	NA	2.3	NA	0.0	0.7	0.0	0.7
Dana Point Harbor	0.0	NA	0.6	NA	0.0	0.3	0.0	0.3
Upper Newport Bay	0.0	NA	0.9	NA	0.0	0.3	0.0	0.3
Anaheim Bay	0.7	NA	0.7	NA	0.7	0.0	0.7	0.0
	2.5	NA	6.4	NA	2.0	2.0	1.8	2.4
Capital Improvement								
Los Angeles Harbor	0.9	NA	0.9	NA	0.9	0.0	0.0	2.3
Long Beach Harbor	1.1	NA	1.1	NA	1.1	0.0	0.0	2.2
Upper Newport Bay***	0.0	NA	9.7	NA	0.0	2.9	0.0	2.9
	1.9	NA	11.6	NA	1.9	2.9	0.0	7.4
Total =	**4.6**	**NA**	**18.0**	**NA**	**3.9**	**4.9**	**1.8**	**9.9**
Total both sites =	**4.5**		**18.0**		**8.8**		**11.6**	
Total both sites (tons) =	**0.0022**		**0.0090**		**0.0044**		**0.0058**	

Maximum Average Daily Generator PM Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA 3	Alt 4 Worst Case Year LA 2	Alt 4 Worst Case Year LA-3
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Marina del Rey	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
Sunset/Huntington Harbor	0.1	NA	0.1	NA	0.0	0.1	0.0	0.1
Newport Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Dana Point Harbor	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.1	NA	0.1	NA	0.1	0.0	0.1	0.0
	0.3	NA	0.8	NA	0.3	0.3	0.2	0.3
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.3
Long Beach Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.3
Upper Newport Bay***	0.0	NA	1.2	NA	0.0	0.5	0.0	0.5
	0.3	NA	1.5	NA	0.3	0.5	0.0	1.0
Total (pounds) =	**0.6**	**NA**	**2.3**	**NA**	**0.5**	**0.7**	**0.2**	**1.4**
Total generators both sites (pounds) =	**0.6**		**2.3**		**1.3**		**1.6**	
Total generators both sites (tons) =	**0.0003**		**0.0012**		**0.0006**		**0.0008**	

Total Maximum Annual Combined Main Engine and Generators PM Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**1867.5**		**7421.6**		**3671.4**		**4830.0**	
Total main engine and generators (tons) =	**0.934**		**3.711**		**1.836**		**2.415**	

Total Maximum Quarterly Combined Main Engine and Generators PM Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA 3
Total main engine and generators (pounds) =	**466.9**		**1855.4**		**917.9**		**1207.5**	
Total main engine and generators (tons) =	**0.233**		**0.928**		**0.459**		**0.604**	

Total Maximum Average Daily Combined Main Engine and Generators PM Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**5.1**		**20.3**		**10.1**		**13.2**	
Total main engine and generators (tons) =	**0.0026**		**0.0102**		**0.0050**		**0.0066**	

		NO_x emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	10.6750
Vessel Manuvering Load Factor =	20%	11.8527
Generator Load Factor =	100%	10.5751

Total Maximum Annual Main Engine NOx Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2334394.9	NA	2334394.9	NA	2334394.9	0.0	2334394.9	0.0
Los Angeles Harbor	236396.7	NA	236396.7	NA	236396.7	0.0	0.0	624156.9
Long Beach Harbor	1022306.2	NA	1022306.2	NA	1022306.2	0.0	0.0	2179984.7
Marina del Rey	4415230.7	NA	4415230.7	NA	4415230.7	0.0	4415230.7	0.0
Sunset/Huntington Harbor	3926925.7	NA	3926925.7	NA	0.0	5209956.0	0.0	5209956.0
Newport Harbor	0.0	NA	15203709.3	NA	0.0	4483278.4	0.0	4483278.4
Dana Point Harbor	0.0	NA	4264882.8	NA	0.0	1664608.0	0.0	1664608.0
Upper Newport Bay	0.0	NA	6065309.5	NA	0.0	1788541.9	0.0	1788541.9
Anaheim Bay	4950018.6	NA	4950018.6	NA	4950018.6	0.0	4950018.6	0.0
	16885272.8	NA	42419174.4	NA	12958347.1	13146384.3	11699644.2	15950425.9
Capital Improvement								
Los Angeles Harbor	5850817.3	NA	5850817.3	NA	5850817.3	0.0	0.0	15447883.9
Long Beach Harbor	6979883.9	NA	6979883.9	NA	6979883.9	0.0	0.0	14883350.5
Upper Newport Bay***	0.0	NA	64292281.2	NA	0.0	18958544.2	0.0	18958544.2
	12830701.2	NA	77122982.4	NA	12830701.2	18958544.2	0.0	49288778.6
Total =	**29715974.0**	**NA**	**119542156.8**	**NA**	**25789048.3**	**32104928.5**	**11699644.2**	**65240204.5**
Total both sites =	**29715974.0**		**119542156.8**		**57893976.8**		**76939848.7**	

Total Maximum Annual Generator NOx Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	330749.8	NA	330749.8	NA	330749.8	0.0	330749.8	0.0
Los Angeles Harbor	36042.3	NA	36042.3	NA	36042.3	0.0	0.0	80151.9
Long Beach Harbor	149464.8	NA	149464.8	NA	149464.8	0.0	0.0	281145.1
Marina del Rey	560592.0	NA	560592.0	NA	560592.0	0.0	560592.0	0.0
Sunset/Huntington Harbor	532497.9	NA	532497.9	NA	0.0	678448.9	0.0	678448.9
Newport Harbor	0.0	NA	1944545.8	NA	0.0	725043.6	0.0	725043.6
Dana Point Harbor	0.0	NA	528618.8	NA	0.0	232824.7	0.0	232824.7
Upper Newport Bay	0.0	NA	775749.6	NA	0.0	289246.1	0.0	289246.1
Anaheim Bay	692347.0	NA	692347.0	NA	692347.0	0.0	692347.0	0.0
	2301693.8	NA	5550607.9	NA	1769195.9	1925563.3	1583688.8	2286860.3
Capital Improvement								
Los Angeles Harbor	892046.7	NA	892046.7	NA	892046.7	0.0	0.0	1983760.6
Long Beach Harbor	1020483.6	NA	1020483.6	NA	1020483.6	0.0	0.0	1919542.1
Upper Newport Bay***	0.0	NA	8222946.1	NA	0.0	3066008.8	0.0	3066008.8
	1912530.2	NA	10135476.4	NA	1912530.2	3066008.8	0.0	6969311.4
Total (grams) =	**4214224.0**	**NA**	**15686084.3**	**NA**	**3681726.1**	**4991572.0**	**1583688.8**	**9256171.7**
Total generators both sites (grams) =	**4214224.0**		**15686084.3**		**8673298.2**		**10839860.5**	

Total Maximum Annual Main Engine NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	5146.5	NA	5146.5	NA	5146.5	0.0	5146.5	0.0
Los Angeles Harbor	521.2	NA	521.2	NA	521.2	0.0	0.0	1376.0
Long Beach Harbor	2253.8	NA	2253.8	NA	2253.8	0.0	0.0	4805.8
Marina del Rey	9733.9	NA	9733.9	NA	9733.9	0.0	9733.9	0.0
Sunset/Huntington Harbor	8657.4	NA	8657.4	NA	0.0	11486.0	0.0	11486.0
Newport Harbor	0.0	NA	33518.4	NA	0.0	9883.9	0.0	9883.9
Dana Point Harbor	0.0	NA	9402.5	NA	0.0	3669.8	0.0	3669.8
Upper Newport Bay	0.0	NA	13371.7	NA	0.0	3943.1	0.0	3943.1
Anaheim Bay	10912.9	NA	10912.9	NA	10912.9	0.0	10912.9	0.0
	37225.7	NA	93518.3	NA	28568.3	28982.8	25793.3	35164.7
Capital Improvement								
Los Angeles Harbor	12898.8	NA	12898.8	NA	12898.8	0.0	0.0	34056.8
Long Beach Harbor	15388.0	NA	15388.0	NA	15388.0	0.0	0.0	32812.2
Upper Newport Bay***	0.0	NA	141740.2	NA	0.0	41796.4	0.0	41796.4
	28286.9	NA	170027.1	NA	28286.9	41796.4	0.0	108665.4
Total =	**65512.5**	**NA**	**263545.3**	**NA**	**56855.1**	**70779.3**	**25793.3**	**143830.0**
Total both sites =	**65512.5**		**263545.3**		**127634.4**		**169623.3**	
Total both sites (tons) =	**32.76**		**131.77**		**63.82**		**84.81**	

Total Maximum Annual Generator NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	729.2	NA	729.2	NA	729.2	0.0	729.2	0.0
Los Angeles Harbor	79.5	NA	79.5	NA	79.5	0.0	0.0	176.7
Long Beach Harbor	329.5	NA	329.5	NA	329.5	0.0	0.0	619.8
Marina del Rey	1235.9	NA	1235.9	NA	1235.9	0.0	1235.9	0.0
Sunset/Huntington Harbor	1174.0	NA	1174.0	NA	0.0	1495.7	0.0	1495.7
Newport Harbor	0.0	NA	4287.0	NA	0.0	1598.4	0.0	1598.4
Dana Point Harbor	0.0	NA	1165.4	NA	0.0	513.3	0.0	513.3
Upper Newport Bay	0.0	NA	1710.2	NA	0.0	637.7	0.0	637.7
Anaheim Bay	1526.4	NA	1526.4	NA	1526.4	0.0	1526.4	0.0
	5074.4	NA	12237.0	NA	3900.4	4245.1	3491.4	5041.7
Capital Improvement								
Los Angeles Harbor	1966.6	NA	1966.6	NA	1966.6	0.0	0.0	4373.4
Long Beach Harbor	2249.8	NA	2249.8	NA	2249.8	0.0	0.0	4231.9
Upper Newport Bay***	0.0	NA	18128.5	NA	0.0	6759.4	0.0	6759.4
	4216.4	NA	22344.9	NA	4216.4	6759.4	0.0	15364.7
Total (pounds) =	**9290.6**	**NA**	**34581.9**	**NA**	**8116.8**	**11004.5**	**3491.4**	**20406.4**
Total generators both sites (pounds) =	**9290.6**		**34581.9**		**19121.3**		**23897.8**	
Total generators both sites (tons) =	**4.645**		**17.291**		**9.561**		**11.949**	

Maximum Quarterly Main Engine NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1286.6	NA	1286.6	NA	1286.6	0.0	1286.6	0.0
Los Angeles Harbor	130.3	NA	130.3	NA	130.3	0.0	0.0	344.0
Long Beach Harbor	563.4	NA	563.4	NA	563.4	0.0	0.0	1201.5
Marina del Rey	2433.5	NA	2433.5	NA	2433.5	0.0	2433.5	0.0
Sunset/Huntington Harbor	2164.3	NA	2164.3	NA	0.0	2871.5	0.0	2871.5
Newport Harbor	0.0	NA	8379.6	NA	0.0	2471.0	0.0	2471.0
Dana Point Harbor	0.0	NA	2350.6	NA	0.0	917.5	0.0	917.5
Upper Newport Bay	0.0	NA	3342.9	NA	0.0	985.8	0.0	985.8
Anaheim Bay	2728.2	NA	2728.2	NA	2728.2	0.0	2728.2	0.0
	9306.4	NA	23379.6	NA	7142.1	7245.7	6448.3	8791.2
Capital Improvement								
Los Angeles Harbor	3224.7	NA	3224.7	NA	3224.7	0.0	0.0	8514.2
Long Beach Harbor	3847.0	NA	3847.0	NA	3847.0	0.0	0.0	8203.0
Upper Newport Bay***	0.0	NA	35435.1	NA	0.0	10449.1	0.0	10449.1
	7071.7	NA	42506.8	NA	7071.7	10449.1	0.0	27166.3
Total =	**16378.1**	**NA**	**65886.3**	**NA**	**14213.8**	**17694.8**	**6448.3**	**35957.5**
Total both sites =	**16378.1**		**65886.3**		**31908.6**		**42405.8**	
Total both sites (tons) =	**8.19**		**32.94**		**15.95**		**21.20**	

Maximum Quarterly Generator NOx Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	182.3	NA	182.3	NA	182.3	0.0	182.3	0.0
Los Angeles Harbor	19.9	NA	19.9	NA	19.9	0.0	0.0	44.2
Long Beach Harbor	82.4	NA	82.4	NA	82.4	0.0	0.0	155.0
Marina del Rey	309.0	NA	309.0	NA	309.0	0.0	309.0	0.0
Sunset/Huntington Harbor	293.5	NA	293.5	NA	0.0	373.9	0.0	373.9
Newport Harbor	0.0	NA	1071.7	NA	0.0	399.6	0.0	399.6
Dana Point Harbor	0.0	NA	291.4	NA	0.0	128.3	0.0	128.3
Upper Newport Bay	0.0	NA	427.6	NA	0.0	159.4	0.0	159.4
Anaheim Bay	381.6	NA	381.6	NA	381.6	0.0	381.6	0.0
	1268.6	NA	3059.2	NA	975.1	1061.3	872.9	1260.4
Capital Improvement								
Los Angeles Harbor	491.7	NA	491.7	NA	491.7	0.0	0.0	1093.4
Long Beach Harbor	562.4	NA	562.4	NA	562.4	0.0	0.0	1058.0
Upper Newport Bay***	0.0	NA	4532.1	NA	0.0	1689.8	0.0	1689.8
	1054.1	NA	5586.2	NA	1054.1	1689.8	0.0	3841.2
Total (pounds) =	**2322.7**	**NA**	**8645.5**	**NA**	**2029.2**	**2751.1**	**872.9**	**5101.6**
Total generators both sites (pounds) =	**2322.7**		**8645.5**		**4780.3**		**5974.5**	
Total generators both sites (tons) =	**1.16**		**4.32**		**2.39**		**2.99**	

Maximum Average Daily Main Engine NOx Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	14.1	NA	14.1	NA	14.1	0.0	14.1	0.0
Los Angeles Harbor	1.4	NA	1.4	NA	1.4	0.0	0.0	3.8
Long Beach Harbor	6.2	NA	6.2	NA	6.2	0.0	0.0	13.2
Marina del Rey	26.7	NA	26.7	NA	26.7	0.0	26.7	0.0
Sunset/Huntington Harbor	23.7	NA	23.7	NA	0.0	31.5	0.0	31.5
Newport Harbor	0.0	NA	91.8	NA	0.0	27.1	0.0	27.1
Dana Point Harbor	0.0	NA	25.8	NA	0.0	10.1	0.0	10.1
Upper Newport Bay	0.0	NA	36.6	NA	0.0	10.8	0.0	10.8
Anaheim Bay	29.9	NA	29.9	NA	29.9	0.0	29.9	0.0
	102.0	NA	256.2	NA	78.3	79.4	70.7	96.3
Capital Improvement								
Los Angeles Harbor	35.3	NA	35.3	NA	35.3	0.0	0.0	93.3
Long Beach Harbor	42.2	NA	42.2	NA	42.2	0.0	0.0	89.9
Upper Newport Bay***	0.0	NA	388.3	NA	0.0	114.5	0.0	114.5
	77.5	NA	465.8	NA	77.5	114.6	0.0	297.7
Total =	**179.5**	**NA**	**722.0**	**NA**	**155.8**	**193.9**	**70.7**	**394.1**
Total both sites =	**179.5**		**722.0**		**349.7**		**464.7**	
Total both sites (tons) =	**0.0897**		**0.3610**		**0.1748**		**0.2324**	

Maximum Average Daily Generator NOx Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2.0	NA	2.0	NA	2.0	0.0	2.0	0.0
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.5
Long Beach Harbor	0.9	NA	0.9	NA	0.9	0.0	0.0	1.7
Marina del Rey	3.4	NA	3.4	NA	3.4	0.0	3.4	0.0
Sunset/Huntington Harbor	3.2	NA	3.2	NA	0.0	4.1	0.0	4.1
Newport Harbor	0.0	NA	11.7	NA	0.0	4.4	0.0	4.4
Dana Point Harbor	0.0	NA	3.2	NA	0.0	1.4	0.0	1.4
Upper Newport Bay	0.0	NA	4.7	NA	0.0	1.7	0.0	1.7
Anaheim Bay	4.2	NA	4.2	NA	4.2	0.0	4.2	0.0
	13.9	NA	33.5	NA	10.7	11.6	9.6	13.8
Capital Improvement								
Los Angeles Harbor	5.4	NA	5.4	NA	5.4	0.0	0.0	12.0
Long Beach Harbor	6.2	NA	6.2	NA	6.2	0.0	0.0	11.6
Upper Newport Bay***	0.0	NA	49.7	NA	0.0	18.5	0.0	18.5
	11.6	NA	61.2	NA	11.6	18.5	0.0	42.1
Total (pounds) =	**25.5**	**NA**	**94.7**	**NA**	**22.2**	**30.1**	**9.6**	**55.9**
Total generators both sites (pounds) =	**25.5**		**94.7**		**52.4**		**65.5**	
Total generators both sites (tons) =	**0.0127**		**0.0474**		**0.0262**		**0.0327**	

Total Maximum Annual Combined Main Engine and Generators NOx Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA 2	Alt 2 Worst Case Year LA 3	Alt 3 Worst Case Year LA 2	Alt 3 Worst Case Year LA 3	Alt 4 Worst Case Year LA 2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**74803.3**		**298127.2**		**146755.7**		**193521.1**	
Total main engine and generators (tons) =	**37.402**		**149.064**		**73.378**		**96.761**	

Total Maximum Quarterly Combined Main Engine and Generators NOx Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**18700.8**		**74531.8**		**36688.9**		**48380.3**	
Total main engine and generators (tons) =	**9.350**		**37.266**		**18.344**		**24.190**	

Total Maximum Average Daily Combined Main Engine and Generators NOx Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**204.9**		**816.6**		**402.1**		**530.2**	
Total main engine and generators (tons) =	**0.1025**		**0.4084**		**0.2010**		**0.2651**	

		NO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	15.7883
Vessel Manuvering Load Factor =	20%	17.6309
Generator Load Factor =	100%	15.7134

Total Maximum Annual Main Engine NO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3469220.3	NA	3469220.3	NA	3469220.3	0.0	3469220.3	0.0
Los Angeles Harbor	351332.2	NA	351332.2	NA	351332.2	0.0	0.0	927529.7
Long Beach Harbor	1519310.6	NA	1519310.6	NA	1519310.6	0.0	0.0	3230429.6
Marina del Rey	6561224.1	NA	6561224.1	NA	6561224.1	0.0	6561224.1	0.0
Sunset/Huntington Harbor	5835787.5	NA	5835787.5	NA	0.0	7742323.2	0.0	7742323.2
Newport Harbor	0.0	NA	22593456.7	NA	0.0	6663291.1	0.0	6663291.1
Dana Point Harbor	0.0	NA	6337722.4	NA	0.0	2473809.9	0.0	2473809.9
Upper Newport Bay	0.0	NA	9013347.1	NA	0.0	2658227.8	0.0	2658227.8
Anaheim Bay	7356329.5	NA	7356329.5	NA	7356329.5	0.0	7356329.5	0.0
	25093204.3	NA	63037730.6	NA	19257416.8	19537652.0	17386774.0	23704611.4
Capital Improvement								
Los Angeles Harbor	8695472.9	NA	8695472.9	NA	8695472.9	0.0	0.0	22956360.6
Long Beach Harbor	10373224.4	NA	10373224.4	NA	10373224.4	0.0	0.0	22117484.9
Upper Newport Bay***	0.0	NA	95541479.3	NA	0.0	28177214.8	0.0	28177214.8
	19068697.3	NA	114610176.7	NA	19068697.3	28177214.8	0.0	73251060.3
Total =	**44161901.7**	**NA**	**177647907.3**	**NA**	**38326114.2**	**47714866.8**	**17386774.0**	**96955671.7**
Total both sites =	**44161901.7**		**177647907.3**		**86040981.1**		**114342445.6**	

Total Maximum Annual Generator NO2 Emissions (grams)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	491455.2	NA	491455.2	NA	491455.2	0.0	491455.2	0.0
	53554.6	NA	53554.6	NA	53554.6	0.0	0.0	119096.3
	222087.0	NA	222087.0	NA	222087.0	0.0	0.0	417748.4
	832973.5	NA	832973.5	NA	832973.5	0.0	832973.5	0.0
	791229.0	NA	791229.0	NA	0.0	1008095.0	0.0	1008095.0
	0.0	NA	2889005.4	NA	0.0	1077329.2	0.0	1077329.2
	0.0	NA	785465.1	NA	0.0	345949.9	0.0	345949.9
	0.0	NA	1152672.4	NA	0.0	429785.6	0.0	429785.6
	1028745.9	NA	1028745.9	NA	1028745.9	0.0	1028745.9	0.0
	3420045.2	NA	8247548.0	NA	2628816.2	2861159.7	2353174.6	3398004.4
	1325476.0	NA	1325478.0	NA	1325476.0	0.0	0.0	2947634.0
	1516318.1	NA	1516318.1	NA	1516318.1	0.0	0.0	2852212.9
	0.0	NA	12218327.1	NA	0.0	4555727.0	0.0	4555727.0
	2841794.1	NA	15060121.2	NA	2841794.1	4555727.0	0.0	10355573.9
Total (grams) =	**6261839.3**	**NA**	**23307669.2**	**NA**	**5470610.3**	**7416886.7**	**2353174.6**	**13753578.3**
Total generators both sites (grams) =	**6261839.3**		**23307669.2**		**12887497.0**		**16106752.9**	

Total Maximum Annual Main Engine NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	7648.3	NA	7648.3	NA	7648.3	0.0	7648.3	0.0
Los Angeles Harbor	774.6	NA	774.6	NA	774.6	0.0	0.0	2044.9
Long Beach Harbor	3349.5	NA	3349.5	NA	3349.5	0.0	0.0	7141.7
Marina del Rey	14465.0	NA	14465.0	NA	14465.0	0.0	14465.0	0.0
Sunset/Huntington Harbor	12865.7	NA	12865.7	NA	0.0	17068.9	0.0	17068.9
Newport Harbor	0.0	NA	49810.0	NA	0.0	14690.0	0.0	14690.0
Dana Point Harbor	0.0	NA	13972.3	NA	0.0	5453.8	0.0	5453.8
Upper Newport Bay	0.0	NA	19871.0	NA	0.0	5860.4	0.0	5860.4
Anaheim Bay	16217.9	NA	16217.9	NA	16217.9	0.0	16217.9	0.0
	55321.0	NA	138974.4	NA	42455.3	43073.1	38331.3	52259.7
Capital Improvement								
Los Angeles Harbor	19170.2	NA	19170.2	NA	19170.2	0.0	0.0	50610.1
Long Beach Harbor	22869.0	NA	22869.0	NA	22869.0	0.0	0.0	48760.7
Upper Newport Bay***	0.0	NA	210632.9	NA	0.0	62120.1	0.0	62120.1
	42039.3	NA	252672.2	NA	42039.3	62120.1	0.0	161490.9
Total =	**97360.3**	**NA**	**391646.6**	**NA**	**84494.6**	**105193.3**	**38331.3**	**213750.7**
Total both sites =	**97360.3**		**391646.6**		**189687.9**		**252081.9**	
Total both sites (tons) =	**48.68**		**195.82**		**94.84**		**126.04**	

Total Maximum Annual Generator NO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	1083.5	NA	1083.5	NA	1083.5	0.0	1083.5	0.0
	118.1	NA	118.1	NA	118.1	0.0	0.0	262.6
	489.6	NA	489.6	NA	489.6	0.0	0.0	921.0
	1836.4	NA	1836.4	NA	1836.4	0.0	1836.4	0.0
	1744.4	NA	1744.4	NA	0.0	2222.5	0.0	2222.5
	0.0	NA	6370.0	NA	0.0	2375.1	0.0	2375.1
	0.0	NA	1731.7	NA	0.0	762.7	0.0	762.7
	0.0	NA	2541.2	NA	0.0	947.5	0.0	947.5
	2268.0	NA	2268.0	NA	2268.0	0.0	2268.0	0.0
	7539.9	NA	18182.7	NA	5795.5	6307.8	5187.9	7491.3
	2922.2	NA	2922.2	NA	2922.2	0.0	0.0	6498.4
	3342.9	NA	3342.9	NA	3342.9	0.0	0.0	6288.1
	0.0	NA	26936.8	NA	0.0	10043.7	0.0	10043.7
	6265.1	NA	33201.9	NA	6265.1	10043.7	0.0	22830.1
Total (pounds) =	**13805.0**	**NA**	**51384.6**	**NA**	**12060.6**	**16351.4**	**5187.9**	**30321.4**
Total generators both sites (pounds) =	**13805.0**		**51384.6**		**28412.1**		**35509.3**	
Total generators both sites (tons) =	**6.902**		**25.692**		**14.206**		**17.755**	

Maximum Quarterly Main Engine NO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1912.1	NA	1912.1	NA	1912.1	0.0	1912.1	0.0
Los Angeles Harbor	193.6	NA	193.6	NA	193.6	0.0	0.0	511.2
Long Beach Harbor	837.4	NA	837.4	NA	837.4	0.0	0.0	1785.4
Marina del Rey	3616.3	NA	3616.3	NA	3616.3	0.0	3616.3	0.0
Sunset/Huntington Harbor	3216.4	NA	3216.4	NA	0.0	4267.2	0.0	4267.2
Newport Harbor	0.0	NA	12452.5	NA	0.0	3672.5	0.0	3672.5
Dana Point Harbor	0.0	NA	3493.1	NA	0.0	1363.5	0.0	1363.5
Upper Newport Bay	0.0	NA	4967.8	NA	0.0	1465.1	0.0	1465.1
Anaheim Bay	4054.5	NA	4054.5	NA	4054.5	0.0	4054.5	0.0
	13830.3	NA	34743.6	NA	10613.8	10768.3	9582.8	13064.9
Capital Improvement								
Los Angeles Harbor	4792.6	NA	4792.6	NA	4792.6	0.0	0.0	12652.5
Long Beach Harbor	5717.3	NA	5717.3	NA	5717.3	0.0	0.0	12190.2
Upper Newport Bay***	0.0	NA	52658.2	NA	0.0	15530.0	0.0	15530.0
	10509.8	NA	63168.0	NA	10509.8	15530.0	0.0	40372.7
Total =	**24340.1**	**NA**	**97911.6**	**NA**	**21123.7**	**26298.3**	**9582.8**	**53437.7**
Total both sites =	**24340.1**		**97911.6**		**47422.0**		**63020.5**	
Total both sites (tons) =	**12.17**		**48.96**		**23.71**		**31.51**	

Maximum Quarterly Generator NO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	270.9	NA	270.9	NA	270.9	0.0	270.9	0.0
	29.5	NA	29.5	NA	29.5	0.0	0.0	65.6
	122.4	NA	122.4	NA	122.4	0.0	0.0	230.2
	459.1	NA	459.1	NA	459.1	0.0	459.1	0.0
	436.1	NA	436.1	NA	0.0	555.6	0.0	555.6
	0.0	NA	1592.5	NA	0.0	593.8	0.0	593.8
	0.0	NA	432.9	NA	0.0	190.7	0.0	190.7
	0.0	NA	635.3	NA	0.0	236.9	0.0	236.9
	567.0	NA	567.0	NA	567.0	0.0	567.0	0.0
	1885.0	NA	4545.7	NA	1448.9	1576.9	1297.0	1872.8
	730.5	NA	730.5	NA	730.5	0.0	0.0	1624.6
	835.7	NA	835.7	NA	835.7	0.0	0.0	1572.0
	0.0	NA	6734.2	NA	0.0	2510.9	0.0	2510.9
	1566.3	NA	8300.5	NA	1566.3	2510.9	0.0	5707.5
Total (pounds) =	**3451.2**	**NA**	**12846.2**	**NA**	**3015.2**	**4087.9**	**1297.0**	**7580.4**
Total generators both sites (pounds) =	**3451.2**		**12846.2**		**7103.0**		**8877.3**	
Total generators both sites (tons) =	**1.73**		**6.42**		**3.55**		**4.44**	

Maximum Average Daily Main Engine NO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	21.0	NA	21.0	NA	21.0	0.0	21.0	0.0
Los Angeles Harbor	2.1	NA	2.1	NA	2.1	0.0	0.0	5.6
Long Beach Harbor	9.2	NA	9.2	NA	9.2	0.0	0.0	19.6
Marina del Rey	39.6	NA	39.6	NA	39.6	0.0	39.6	0.0
Sunset/Huntington Harbor	35.2	NA	35.2	NA	0.0	46.8	0.0	46.8
Newport Harbor	0.0	NA	136.5	NA	0.0	40.2	0.0	40.2
Dana Point Harbor	0.0	NA	38.3	NA	0.0	14.9	0.0	14.9
Upper Newport Bay	0.0	NA	54.4	NA	0.0	16.1	0.0	16.1
Anaheim Bay	44.4	NA	44.4	NA	44.4	0.0	44.4	0.0
	151.6	NA	380.8	NA	116.3	118.0	105.0	143.2
Capital Improvement								
Los Angeles Harbor	52.5	NA	52.5	NA	52.5	0.0	0.0	138.7
Long Beach Harbor	62.7	NA	62.7	NA	62.7	0.0	0.0	133.6
Upper Newport Bay***	0.0	NA	577.1	NA	0.0	170.2	0.0	170.2
	115.2	NA	692.3	NA	115.2	170.2	0.0	442.4
Total =	**266.7**	**NA**	**1073.0**	**NA**	**231.5**	**288.2**	**105.0**	**585.6**
Total both sites =	**266.7**		**1073.0**		**519.7**		**690.6**	
Total both sites (tons) =	**0.1334**		**0.5365**		**0.2598**		**0.3453**	

Maximum Average Daily Generator NO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
	3.0	NA	3.0	NA	3.0	0.0	3.0	0.0
	0.3	NA	0.3	NA	0.3	0.0	0.0	0.7
	1.3	NA	1.3	NA	1.3	0.0	0.0	2.5
	5.0	NA	5.0	NA	5.0	0.0	5.0	0.0
	4.8	NA	4.8	NA	0.0	6.1	0.0	6.1
	0.0	NA	17.5	NA	0.0	6.5	0.0	6.5
	0.0	NA	4.7	NA	0.0	2.1	0.0	2.1
	0.0	NA	7.0	NA	0.0	2.6	0.0	2.6
	6.2	NA	6.2	NA	6.2	0.0	6.2	0.0
	20.7	NA	49.8	NA	15.9	17.3	14.2	20.5
	8.0	NA	8.0	NA	8.0	0.0	0.0	17.8
	9.2	NA	9.2	NA	9.2	0.0	0.0	17.2
	0.0	NA	73.8	NA	0.0	27.5	0.0	27.5
	17.2	NA	91.0	NA	17.2	27.5	0.0	62.5
Total (pounds) =	**37.6**	**NA**	**140.8**	**NA**	**33.0**	**44.8**	**14.2**	**83.1**
Total generators both sites (pounds) =	**37.6**		**140.8**		**77.9**		**97.3**	
Total generators both sites (tons) =	**0.0189**		**0.0704**		**0.0389**		**0.0486**	

Total Maximum Annual Combined Main Engine and Generators NO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	111155.3		443031.2		218100.0		287591.3	
Total main engine and generators (tons) =	55.583		221.516		109.050		143.796	

Total Maximum Quarterly Combined Main Engine and Generators NO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	27791.3		110757.8		54525.0		71897.8	
Total main engine and generators (tons) =	13.896		55.379		27.262		35.949	

Total Maximum Average Daily Combined Main Engine and Generators NO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	304.6		1213.8		597.5		787.9	
Total main engine and generators (tons) =	0.1523		0.6069		0.2988		0.3940	

		SO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	7.8994
Vessel Manuvering Load Factor =	20%	9.7720
Generator Load Factor =	100%	7.7746

Total Maximum Annual Main Engine SO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1753512.6	NA	1753512.6	NA	1753512.6	0.0	1753512.6	0.0
Los Angeles Harbor	178274.1	NA	178274.1	NA	178274.1	0.0	0.0	466563.9
Long Beach Harbor	769190.9	NA	769190.9	NA	769190.9	0.0	0.0	1629820.6
Marina del Rey	3298670.9	NA	3298670.9	NA	3298670.9	0.0	3298670.9	0.0
Sunset/Huntington Harbor	2943186.7	NA	2943186.7	NA	0.0	3897086.7	0.0	3897086.7
Newport Harbor	0.0	NA	11362770.1	NA	0.0	3392406.0	0.0	3392406.0
Dana Point Harbor	0.0	NA	3182797.2	NA	0.0	1249559.9	0.0	1249559.9
Upper Newport Bay	0.0	NA	4533020.0	NA	0.0	1353353.4	0.0	1353353.4
Anaheim Bay	3715796.7	NA	3715796.7	NA	3715796.7	0.0	3715796.7	0.0
	12658631.9	NA	31737219.2	NA	9715445.2	9892406.1	8767980.2	11988790.6
Capital Improvement								
Los Angeles Harbor	4412285.1	NA	4412285.1	NA	4412285.1	0.0	0.0	11547456.8
Long Beach Harbor	5251717.0	NA	5251717.0	NA	5251717.0	0.0	0.0	11127740.8
Upper Newport Bay***	0.0	NA	48050011.9	NA	0.0	14345546.6	0.0	14345546.8
	9664002.1	NA	57714014.0	NA	9664002.1	14345546.6	0.0	37020744.1
Total =	**22322634.0**	**NA**	**89451233.2**	**NA**	**19379447.3**	**24237952.6**	**8767980.2**	**49009534.7**
Total both sites =	**22322634.0**		**89451233.2**		**43617399.9**		**57777514.9**	

Total Maximum Annual Generator SO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	243159.6	NA	243159.6	NA	243159.6	0.0	243159.5	0.0
Los Angeles Harbor	26497.5	NA	26497.5	NA	26497.5	0.0	0.0	58925.9
Long Beach Harbor	109883.0	NA	109883.0	NA	109883.0	0.0	0.0	206691.3
Marina del Rey	412134.2	NA	412134.2	NA	412134.2	0.0	412134.2	0.0
Sunset/Huntington Harbor	391480.1	NA	391480.1	NA	0.0	498779.9	0.0	498779.9
Newport Harbor	0.0	NA	1429585.0	NA	0.0	533035.2	0.0	533035.2
Dana Point Harbor	0.0	NA	388628.3	NA	0.0	171167.3	0.0	171167.3
Upper Newport Bay	0.0	NA	570313.2	NA	0.0	212647.0	0.0	212647.0
Anaheim Bay	508997.5	NA	508997.5	NA	508997.5	0.0	508997.5	0.0
	1692151.9	NA	4080678.3	NA	1300671.8	1415629.5	1164291.3	1681246.7
Capital Improvement								
Los Angeles Harbor	655812.0	NA	655812.0	NA	655812.0	0.0	0.0	1458414.8
Long Beach Harbor	750235.9	NA	750235.9	NA	750235.9	0.0	0.0	1411202.9
Upper Newport Bay***	0.0	NA	6045319.5	NA	0.0	2254058.6	0.0	2254058.6
	1406047.9	NA	7451367.4	NA	1406047.9	2254058.6	0.0	5123676.3
Total (grams) =	**3098199.8**	**NA**	**11532045.7**	**NA**	**2706719.7**	**3669688.1**	**1164291.3**	**6804923.0**
Total generators both sites (grams) =	**3098199.8**		**11532045.7**		**6376407.8**		**7969214.3**	

Total Maximum Annual Main Engine SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3865.8	NA	3865.8	NA	3865.8	0.0	3865.8	0.0
Los Angeles Harbor	393.0	NA	393.0	NA	393.0	0.0	0.0	1028.6
Long Beach Harbor	1695.8	NA	1695.8	NA	1695.8	0.0	0.0	3593.1
Marina del Rey	7272.3	NA	7272.3	NA	7272.3	0.0	7272.3	0.0
Sunset/Huntington Harbor	6488.6	NA	6488.6	NA	0.0	8591.6	0.0	8591.6
Newport Harbor	0.0	NA	25050.6	NA	0.0	7479.0	0.0	7479.0
Dana Point Harbor	0.0	NA	7016.9	NA	0.0	2754.8	0.0	2754.8
Upper Newport Bay	0.0	NA	9993.6	NA	0.0	2983.6	0.0	2983.6
Anaheim Bay	8191.9	NA	8191.9	NA	8191.9	0.0	8191.9	0.0
	27907.5	NA	69968.6	NA	21418.9	21809.0	19330.1	26430.8
Capital Improvement								
Los Angeles Harbor	9727.4	NA	9727.4	NA	9727.4	0.0	0.0	25457.8
Long Beach Harbor	11578.1	NA	11578.1	NA	11578.1	0.0	0.0	24532.5
Upper Newport Bay***	0.0	NA	105932.1	NA	0.0	31626.5	0.0	31626.5
	21305.5	NA	127237.6	NA	21305.5	31626.5	0.0	81616.8
Total =	**49213.0**	**NA**	**197206.2**	**NA**	**42724.4**	**53435.5**	**19330.1**	**108047.5**
Total both sites =	**49213.0**		**197206.2**		**96159.9**		**127377.6**	
Total both sites (tons) =	**24.61**		**98.60**		**48.08**		**63.69**	

Total Maximum Annual Generator SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	536.1	NA	536.1	NA	536.1	0.0	536.1	0.0
Los Angeles Harbor	58.4	NA	58.4	NA	58.4	0.0	0.0	129.9
Long Beach Harbor	242.3	NA	242.3	NA	242.3	0.0	0.0	455.7
Marina del Rey	908.6	NA	908.6	NA	908.6	0.0	908.6	0.0
Sunset/Huntington Harbor	863.1	NA	863.1	NA	0.0	1099.6	0.0	1099.6
Newport Harbor	0.0	NA	3151.7	NA	0.0	1175.1	0.0	1175.1
Dana Point Harbor	0.0	NA	856.8	NA	0.0	377.4	0.0	377.4
Upper Newport Bay	0.0	NA	1257.3	NA	0.0	468.8	0.0	468.8
Anaheim Bay	1122.1	NA	1122.1	NA	1122.1	0.0	1122.1	0.0
	3730.6	NA	8996.4	NA	2867.5	3120.9	2566.8	3706.5
Capital Improvement								
Los Angeles Harbor	1445.8	NA	1445.8	NA	1445.8	0.0	0.0	3215.3
Long Beach Harbor	1654.0	NA	1654.0	NA	1654.0	0.0	0.0	3111.2
Upper Newport Bay***	0.0	NA	13327.6	NA	0.0	4969.3	0.0	4969.3
	3099.8	NA	16427.5	NA	3099.8	4969.3	0.0	11295.8
Total (pounds) =	**6830.4**	**NA**	**25423.8**	**NA**	**5967.3**	**8090.3**	**2566.8**	**15002.3**
Total generators both sites (pounds) =	**6830.4**		**25423.8**		**14057.6**		**17569.1**	
Total generators both sites (tons) =	**3.415**		**12.712**		**7.029**		**8.785**	

Maximum Quarterly Main Engine SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	966.5	NA	966.5	NA	966.5	0.0	966.5	0.0
Los Angeles Harbor	98.3	NA	98.3	NA	98.3	0.0	0.0	257.1
Long Beach Harbor	423.9	NA	423.9	NA	423.9	0.0	0.0	898.3
Marina del Rey	1818.1	NA	1818.1	NA	1818.1	0.0	1818.1	0.0
Sunset/Huntington Harbor	1622.2	NA	1622.2	NA	0.0	2147.9	0.0	2147.9
Newport Harbor	0.0	NA	6262.7	NA	0.0	1869.7	0.0	1869.7
Dana Point Harbor	0.0	NA	1754.2	NA	0.0	688.7	0.0	688.7
Upper Newport Bay	0.0	NA	2498.4	NA	0.0	745.9	0.0	745.9
Anaheim Bay	2048.0	NA	2048.0	NA	2048.0	0.0	2048.0	0.0
	6976.9	NA	17492.1	NA	5354.7	5452.3	4832.5	6607.7
Capital Improvement								
Los Angeles Harbor	2431.9	NA	2431.9	NA	2431.9	0.0	0.0	6364.4
Long Beach Harbor	2894.5	NA	2894.5	NA	2894.5	0.0	0.0	6133.1
Upper Newport Bay***	0.0	NA	26483.0	NA	0.0	7906.6	0.0	7906.6
	5326.4	NA	31809.4	NA	5326.4	7906.6	0.0	20404.2
Total =	**12303.2**	**NA**	**49301.6**	**NA**	**10681.1**	**13358.9**	**4832.5**	**27011.9**
Total both sites =	**12303.2**		**49301.6**		**24040.0**		**31844.4**	
Total both sites (tons) =	**6.15**		**24.65**		**12.02**		**15.92**	

Maximum Quarterly Generator SO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	134.0	NA	134.0	NA	134.0	0.0	134.0	0.0
Los Angeles Harbor	14.6	NA	14.6	NA	14.6	0.0	0.0	32.5
Long Beach Harbor	60.6	NA	60.6	NA	60.6	0.0	0.0	113.9
Marina del Rey	227.2	NA	227.2	NA	227.2	0.0	227.2	0.0
Sunset/Huntington Harbor	215.8	NA	215.8	NA	0.0	274.9	0.0	274.9
Newport Harbor	0.0	NA	787.9	NA	0.0	293.8	0.0	293.8
Dana Point Harbor	0.0	NA	214.2	NA	0.0	94.3	0.0	94.3
Upper Newport Bay	0.0	NA	314.3	NA	0.0	117.2	0.0	117.2
Anaheim Bay	280.5	NA	280.5	NA	280.5	0.0	280.5	0.0
	932.6	NA	2249.1	NA	716.9	780.2	641.7	926.6
Capital Improvement								
Los Angeles Harbor	361.5	NA	361.5	NA	361.5	0.0	0.0	803.8
Long Beach Harbor	413.5	NA	413.5	NA	413.5	0.0	0.0	777.8
Upper Newport Bay***	0.0	NA	3331.9	NA	0.0	1242.3	0.0	1242.3
	775.0	NA	4106.9	NA	775.0	1242.3	0.0	2823.9
Total (pounds) =	**1707.6**	**NA**	**6356.0**	**NA**	**1491.9**	**2022.5**	**641.7**	**3750.5**
Total generators both sites (pounds) =	**1707.6**		**6356.0**		**3514.4**		**4392.3**	
Total generators both sites (tons) =	**0.85**		**3.18**		**1.76**		**2.20**	

Maximum Average Daily Main Engine SO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	10.6	NA	10.6	NA	10.6	0.0	10.6	0.0
Los Angeles Harbor	1.1	NA	1.1	NA	1.1	0.0	0.0	2.8
Long Beach Harbor	4.6	NA	4.6	NA	4.6	0.0	0.0	9.6
Marina del Rey	19.9	NA	19.9	NA	19.9	0.0	19.9	0.0
Sunset/Huntington Harbor	17.8	NA	17.8	NA	0.0	23.5	0.0	23.5
Newport Harbor	0.0	NA	68.6	NA	0.0	20.5	0.0	20.5
Dana Point Harbor	0.0	NA	19.2	NA	0.0	7.5	0.0	7.5
Upper Newport Bay	0.0	NA	27.4	NA	0.0	8.2	0.0	8.2
Anaheim Bay	22.4	NA	22.4	NA	22.4	0.0	22.4	0.0
	76.5	NA	191.7	NA	58.7	59.8	53.0	72.4
Capital Improvement								
Los Angeles Harbor	26.7	NA	26.7	NA	26.7	0.0	0.0	69.7
Long Beach Harbor	31.7	NA	31.7	NA	31.7	0.0	0.0	67.2
Upper Newport Bay***	0.0	NA	290.2	NA	0.0	86.6	0.0	86.6
	58.4	NA	348.6	NA	58.4	86.6	0.0	223.6
Total =	**134.8**	**NA**	**540.3**	**NA**	**117.1**	**146.4**	**53.0**	**296.0**
Total both sites =	**134.8**		**540.3**		**263.5**		**349.0**	
Total both sites (tons) =	**0.0674**		**0.2701**		**0.1317**		**0.1745**	

Maximum Average Daily Generator SO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1.5	NA	1.5	NA	1.5	0.0	1.5	0.0
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Long Beach Harbor	0.7	NA	0.7	NA	0.7	0.0	0.0	1.2
Marina del Rey	2.5	NA	2.5	NA	2.5	0.0	2.5	0.0
Sunset/Huntington Harbor	2.4	NA	2.4	NA	0.0	3.0	0.0	3.0
Newport Harbor	0.0	NA	8.6	NA	0.0	3.2	0.0	3.2
Dana Point Harbor	0.0	NA	2.3	NA	0.0	1.0	0.0	1.0
Upper Newport Bay	0.0	NA	3.4	NA	0.0	1.3	0.0	1.3
Anaheim Bay	3.1	NA	3.1	NA	3.1	0.0	3.1	0.0
	10.2	NA	24.6	NA	7.9	8.6	7.0	10.2
Capital Improvement								
Los Angeles Harbor	4.0	NA	4.0	NA	4.0	0.0	0.0	8.8
Long Beach Harbor	4.5	NA	4.5	NA	4.5	0.0	0.0	8.5
Upper Newport Bay***	0.0	NA	36.5	NA	0.0	13.6	0.0	13.6
	8.5	NA	45.0	NA	8.5	13.6	0.0	30.9
Total (pounds) =	**18.7**	**NA**	**69.7**	**NA**	**16.3**	**22.2**	**7.0**	**41.1**
Total generators both sites (pounds) =	**18.7**		**69.7**		**38.5**		**48.1**	
Total generators both sites (tons) =	**0.0094**		**0.0348**		**0.0193**		**0.0241**	

Total Maximum Annual Combined Main Engine and Generators SO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**56043.3**		**222630.0**		**110217.5**		**144946.7**	
Total main engine and generators (tons) =	**28.022**		**111.315**		**55.109**		**72.473**	

Total Maximum Quarterly Combined Main Engine and Generators SO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**14010.8**		**55657.5**		**27554.4**		**36236.7**	
Total main engine and generators (tons) =	**7.005**		**27.829**		**13.777**		**18.118**	

Total Maximum Average Daily Combined Main Engine and Generators SO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	**153.5**		**609.9**		**302.0**		**397.1**	
Total main engine and generators (tons) =	**0.0768**		**0.3050**		**0.1510**		**0.1986**	

		CO emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	1.0473
Vessel Maneuvering Load Factor =	20%	4.1890
Generator Load Factor =	100%	0.8378

Total Maximum Annual Main Engine CO Emissions (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Harbor/Facility								
Regular Maintenance								
Los Angeles River Estuary	286583.4	NA	286583.4	NA	286583.4	0.0	286583.4	0.0
Los Angeles Harbor	31229.4	NA	31229.4	NA	31229.4	0.0	0.0	69448.9
Long Beach Harbor	129506.1	NA	129506.1	NA	129506.1	0.0	0.0	243602.6
Marina del Rey	485733.8	NA	485733.8	NA	485733.8	0.0	485733.8	0.0
Sunset/Huntington Harbor	461391.2	NA	461391.2	NA	0.0	587852.8	0.0	587852.8
Newport Harbor	0.0	NA	1684882.4	NA	0.0	628225.5	0.0	628225.5
Dana Point Harbor	0.0	NA	458030.1	NA	0.0	201734.6	0.0	201734.6
Upper Newport Bay	0.0	NA	672160.5	NA	0.0	250621.9	0.0	250621.9
Anaheim Bay	599895.0	NA	599895.0	NA	599895.0	0.0	599895.0	0.0
	1994339.0	NA	4809412.1	NA	1532947.8	1668434.8	1372212.3	1981486.3
Capital Improvement								
Los Angeles Harbor	772927.9	NA	772927.9	NA	772927.9	0.0	0.0	1718860.7
Long Beach Harbor	884214.2	NA	884214.2	NA	884214.2	0.0	0.0	1663217.6
Upper Newport Bay***	0.0	NA	7124901.8	NA	0.0	2656591.8	0.0	2656591.8
	1657142.1	NA	8782043.9	NA	1657142.1	2656591.8	0.0	6038670.2
Total =	**3651481.1**	**NA**	**13591456.0**	**NA**	**3190089.9**	**4325026.6**	**1372212.3**	**8020156.4**
Total both sites =	**3651481.1**		**13591456.0**		**7515116.5**		**9392368.7**	

Total Maximum Annual Generator CO Emissions (grams)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	26203.3	NA	26203.3	NA	26203.3	0.0	26203.3	0.0
	2855.4	NA	2855.4	NA	2855.4	0.0	0.0	6349.9
	11841.2	NA	11841.2	NA	11841.2	0.0	0.0	22273.4
	44412.2	NA	44412.2	NA	44412.2	0.0	44412.2	0.0
	42186.5	NA	42186.5	NA	0.0	53749.3	0.0	53749.3
	0.0	NA	154054.4	NA	0.0	57440.7	0.0	57440.7
	0.0	NA	41879.2	NA	0.0	18445.3	0.0	18445.3
	0.0	NA	61457.9	NA	0.0	22915.2	0.0	22915.2
	54850.4	NA	54850.4	NA	54850.4	0.0	54850.4	0.0
	182349.0	NA	439740.5	NA	140162.5	152550.5	125465.9	181173.8
	70671.4	NA	70671.4	NA	70671.4	0.0	0.0	157161.1
	80846.6	NA	80846.6	NA	80846.6	0.0	0.0	152073.5
	0.0	NA	651453.3	NA	0.0	242901.0	0.0	242901.0
	151518.0	NA	802971.3	NA	151518.0	242901.0	0.0	552135.6
Total (grams) =	**333867.0**	**NA**	**1242711.6**	**NA**	**291680.5**	**395451.5**	**125465.9**	**733309.4**
Total generators both sites (grams) =	**333867.0**		**1242711.6**		**687132.0**		**858775.3**	

Total Maximum Annual Main Engine CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Harbor/Facility								
Regular Maintenance								
Los Angeles River Estuary	631.8	NA	631.8	NA	631.8	0.0	631.8	0.0
Los Angeles Harbor	68.8	NA	68.8	NA	68.8	0.0	0.0	153.1
Long Beach Harbor	285.5	NA	285.5	NA	285.5	0.0	0.0	537.1
Marina del Rey	1070.9	NA	1070.9	NA	1070.9	0.0	1070.9	0.0
Sunset/Huntington Harbor	1017.2	NA	1017.2	NA	0.0	1296.0	0.0	1296.0
Newport Harbor	0.0	NA	3714.5	NA	0.0	1385.0	0.0	1385.0
Dana Point Harbor	0.0	NA	1009.8	NA	0.0	444.7	0.0	444.7
Upper Newport Bay	0.0	NA	1481.8	NA	0.0	552.5	0.0	552.5
Anaheim Bay	1322.5	NA	1322.5	NA	1322.5	0.0	1322.5	0.0
	4396.8	NA	10602.9	NA	3379.6	3678.3	3025.2	4368.4
Capital Improvement								
Los Angeles Harbor	1704.0	NA	1704.0	NA	1704.0	0.0	0.0	3789.4
Long Beach Harbor	1949.4	NA	1949.4	NA	1949.4	0.0	0.0	3666.9
Upper Newport Bay***	0.0	NA	15707.7	NA	0.0	5856.8	0.0	5856.8
	3653.4	NA	19361.1	NA	3653.4	5856.8	0.0	13313.0
Total =	**8050.1**	**NA**	**29964.0**	**NA**	**7032.9**	**9535.1**	**3025.2**	**17681.4**
Total both sites =	**8050.1**		**29964.0**		**16568.0**		**20706.6**	
Total both sites (tons) =	**4.03**		**14.98**		**8.28**		**10.35**	

Total Maximum Annual Generator CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	57.8	NA	57.8	NA	57.8	0.0	57.8	0.0
	6.3	NA	6.3	NA	6.3	0.0	0.0	14.0
	26.1	NA	26.1	NA	26.1	0.0	0.0	49.1
	97.9	NA	97.9	NA	97.9	0.0	97.9	0.0
	93.0	NA	93.0	NA	0.0	118.5	0.0	118.5
	0.0	NA	339.6	NA	0.0	126.6	0.0	126.6
	0.0	NA	92.3	NA	0.0	40.7	0.0	40.7
	0.0	NA	135.5	NA	0.0	50.5	0.0	50.5
	120.9	NA	120.9	NA	120.9	0.0	120.9	0.0
	402.0	NA	969.5	NA	309.0	336.3	276.6	399.4
	155.8	NA	155.8	NA	155.8	0.0	0.0	346.5
	178.2	NA	178.2	NA	178.2	0.0	0.0	335.3
	0.0	NA	1436.2	NA	0.0	535.5	0.0	535.5
	334.0	NA	1770.2	NA	334.0	535.5	0.0	1217.3
Total (pounds) =	**736.1**	**NA**	**2739.7**	**NA**	**643.0**	**871.8**	**276.6**	**1616.7**
Total generators both sites (pounds) =	**736.1**		**2739.7**		**1514.9**		**1893.3**	
Total generators both sites (tons) =	**0.368**		**1.370**		**0.757**		**0.947**	

Maximum Quarterly Main Engine CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Harbor/Facility								
Regular Maintenance								
Los Angeles River Estuary	158.0	NA	158.0	NA	158.0	0.0	158.0	0.0
Los Angeles Harbor	17.2	NA	17.2	NA	17.2	0.0	0.0	38.3
Long Beach Harbor	71.4	NA	71.4	NA	71.4	0.0	0.0	134.3
Marina del Rey	267.7	NA	267.7	NA	267.7	0.0	267.7	0.0
Sunset/Huntington Harbor	254.3	NA	254.3	NA	0.0	324.0	0.0	324.0
Newport Harbor	0.0	NA	928.6	NA	0.0	346.3	0.0	346.3
Dana Point Harbor	0.0	NA	252.4	NA	0.0	111.2	0.0	111.2
Upper Newport Bay	0.0	NA	370.5	NA	0.0	138.1	0.0	138.1
Anaheim Bay	330.6	NA	330.6	NA	330.6	0.0	330.6	0.0
	1099.2	NA	2650.7	NA	844.9	919.6	756.3	1092.1
Capital Improvement								
Los Angeles Harbor	426.0	NA	426.0	NA	426.0	0.0	0.0	947.4
Long Beach Harbor	487.3	NA	487.3	NA	487.3	0.0	0.0	916.7
Upper Newport Bay***	0.0	NA	3926.9	NA	0.0	1464.2	0.0	1464.2
	913.3	NA	4840.3	NA	913.3	1464.2	0.0	3328.2
Total =	**2012.5**	**NA**	**7491.0**	**NA**	**1758.2**	**2383.8**	**756.3**	**4420.4**
Total both sites =	**2012.5**		**7491.0**		**4142.0**		**5176.7**	
Total both sites (tons) =	**1.01**		**3.75**		**2.07**		**2.59**	

Maximum Quarterly Generator CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA 3	Worst Case Year LA 2	Worst Case Year LA 3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	14.4	NA	14.4	NA	14.4	0.0	14.4	0.0
	1.6	NA	1.6	NA	1.6	0.0	0.0	3.5
	6.5	NA	6.5	NA	6.5	0.0	0.0	12.3
	24.5	NA	24.5	NA	24.5	0.0	24.5	0.0
	23.3	NA	23.3	NA	0.0	29.6	0.0	29.6
	0.0	NA	84.9	NA	0.0	31.7	0.0	31.7
	0.0	NA	23.1	NA	0.0	10.2	0.0	10.2
	0.0	NA	33.9	NA	0.0	12.6	0.0	12.6
	30.2	NA	30.2	NA	30.2	0.0	30.2	0.0
	100.5	NA	242.4	NA	77.3	84.1	69.2	99.9
	39.0	NA	39.0	NA	39.0	0.0	0.0	86.6
	44.6	NA	44.6	NA	44.6	0.0	0.0	83.8
	0.0	NA	359.1	NA	0.0	133.9	0.0	133.9
	83.5	NA	442.6	NA	83.5	133.9	0.0	304.3
Total (pounds) =	**184.0**	**NA**	**684.9**	**NA**	**160.8**	**218.0**	**69.2**	**404.2**
Total generators both sites (pounds) =	**184.0**		**684.9**		**378.7**		**473.3**	
Total generators both sites (tons) =	**0.09**		**0.34**		**0.19**		**0.24**	

Maximum Average Daily CO Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Harbor/Facility								
Regular Maintenance								
Los Angeles River Estuary	1.7	NA	1.7	NA	1.7	0.0	1.7	0.0
Los Angeles Harbor	0.2	NA	0.2	NA	0.2	0.0	0.0	0.4
Long Beach Harbor	0.8	NA	0.8	NA	0.8	0.0	0.0	1.5
Marina del Rey	2.9	NA	2.9	NA	2.9	0.0	2.8	0.0
Sunset/Huntington Harbor	2.8	NA	2.8	NA	0.0	3.6	0.0	3.6
Newport Harbor	0.0	NA	10.2	NA	0.0	3.8	0.0	3.8
Dana Point Harbor	0.0	NA	2.8	NA	0.0	1.2	0.0	1.2
Upper Newport Bay	0.0	NA	4.1	NA	0.0	1.5	0.0	1.5
Anaheim Bay	3.6	NA	3.6	NA	3.6	0.0	3.6	0.0
	12.0	NA	29.0	NA	9.3	10.1	8.3	12.0
Capital Improvement								
Los Angeles Harbor	4.7	NA	4.7	NA	4.7	0.0	0.0	10.4
Long Beach Harbor	5.3	NA	5.3	NA	5.3	0.0	0.0	10.0
Upper Newport Bay***	0.0	NA	43.0	NA	0.0	16.0	0.0	16.0
	10.0	NA	53.0	NA	10.0	16.0	0.0	36.5
Total =	**22.1**	**NA**	**82.1**	**NA**	**19.3**	**26.1**	**8.3**	**48.4**
Total both sites =	**22.1**		**82.1**		**45.4**		**56.7**	
Total both sites (tons) =	**0.0110**		**0.0410**		**0.0227**		**0.0284**	

Maximum Average Daily Generator CO Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.1	NA	0.1	NA	0.1	0.0	0.0	0.1
	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
	0.3	NA	0.3	NA	0.0	0.3	0.0	0.3
	0.0	NA	0.9	NA	0.0	0.3	0.0	0.3
	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
	0.0	NA	0.4	NA	0.0	0.1	0.0	0.1
	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
	1.1	NA	2.7	NA	0.8	0.9	0.8	1.1
	0.4	NA	0.4	NA	0.4	0.0	0.0	0.9
	0.5	NA	0.5	NA	0.5	0.0	0.0	0.9
	0.0	NA	3.9	NA	0.0	1.5	0.0	1.5
	0.9	NA	4.8	NA	0.9	1.5	0.0	3.3
Total (pounds) =	**2.0**	**NA**	**7.5**	**NA**	**1.8**	**2.4**	**0.8**	**4.4**
Total generators both sites (pounds) =	**2.0**		**7.5**		**4.2**		**5.2**	
Total generators both sites (tons) =	**0.0010**		**0.0038**		**0.0021**		**0.0026**	

Total Maximum Annual Combined Main Engine and Generators CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**8786.2**		**32703.7**		**18082.9**		**22599.9**	
Total main engine and generators (tons) =	**4.393**		**16.352**		**9.041**		**11.300**	

Total Maximum Quarterly Combined Main Engine and Generators CO Emissions (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**2196.5**		**8175.9**		**4520.7**		**5650.0**	
Total main engine and generators (tons) =	**1.098**		**4.088**		**2.260**		**2.825**	

Total Maximum Average Daily Combined Main Engine and Generators CO Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action		Alt 2		Alt 3		Alt 4	
	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3	Worst Case Year LA-2	Worst Case Year LA-3
Total main engine and generators (pounds) =	**24.1**		**89.6**		**49.6**		**61.9**	
Total main engine and generators (tons) =	**0.0120**		**0.0448**		**0.0248**		**0.0310**	

		HC emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	0.0932
Vessel Maneuvering Load Factor =	20%	0.7457
Generator Load Factor =	100%	0.0667

Total Maximum Annual Main Engine HC Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	32482.3	NA	32482.3	NA	32482.3	0.0	32482.3	0.0
Los Angeles Harbor	3758.5	NA	3758.5	NA	3758.5	0.0	0.0	7160.4
Long Beach Harbor	15075.2	NA	15075.2	NA	15075.2	0.0	0.0	25201.0
Marina del Rey	49474.7	NA	49474.7	NA	49474.7	0.0	49474.7	0.0
Sunset/Huntington Harbor	50244.1	NA	50244.1	NA	0.0	61500.5	0.0	61500.5
Newport Harbor	0.0	NA	172971.8	NA	0.0	78918.4	0.0	78918.4
Dana Point Harbor	0.0	NA	45418.3	NA	0.0	22605.4	0.0	22605.4
Upper Newport Bay	0.0	NA	69004.7	NA	0.0	31483.4	0.0	31483.4
Anaheim Bay	67221.3	NA	67221.3	NA	67221.3	0.0	67221.3	0.0
	218255.9	NA	505650.8	NA	168011.9	194507.7	149178.2	226869.1
Capital Improvement								
Los Angeles Harbor	93021.9	NA	93021.9	NA	93021.9	0.0	0.0	177219.7
Long Beach Harbor	102927.5	NA	102927.5	NA	102927.5	0.0	0.0	172266.9
Upper Newport Bay***	0.0	NA	731450.1	NA	0.0	333724.3	0.0	333724.3
	195949.3	NA	927399.4	NA	195949.3	333724.3	0.0	683210.8
Total =	414205.3	NA	1433050.3	NA	363961.2	528232.0	149178.2	910109.9
Total both sites =	414205.3		1433050.3		892193.2		1059288.1	

Total Maximum Annual Generator HC Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2086.1	NA	2086.1	NA	2086.1	0.0	2086.1	0.0
Los Angeles Harbor	227.3	NA	227.3	NA	227.3	0.0	0.0	505.5
Long Beach Harbor	942.7	NA	942.7	NA	942.7	0.0	0.0	1773.3
Marina del Rey	3535.8	NA	3535.8	NA	3535.8	0.0	3535.8	0.0
Sunset/Huntington Harbor	3358.6	NA	3358.6	NA	0.0	4279.2	0.0	4279.2
Newport Harbor	0.0	NA	12264.8	NA	0.0	4573.0	0.0	4573.0
Dana Point Harbor	0.0	NA	3334.1	NA	0.0	1468.5	0.0	1468.5
Upper Newport Bay	0.0	NA	4882.9	NA	0.0	1824.4	0.0	1824.4
Anaheim Bay	4366.8	NA	4366.8	NA	4366.8	0.0	4366.8	0.0
	14517.4	NA	35009.2	NA	11158.8	12145.0	9988.8	14423.8
Capital Improvement								
Los Angeles Harbor	5626.4	NA	5626.4	NA	5626.4	0.0	0.0	12512.1
Long Beach Harbor	6436.5	NA	6436.5	NA	6436.5	0.0	0.0	12107.1
Upper Newport Bay***	0.0	NA	51864.3	NA	0.0	19336.1	0.0	19336.1
	12062.8	NA	63927.2	NA	12062.8	19336.1	0.0	43957.3
Total (grams) =	26580.2	NA	98936.4	NA	23221.6	31483.2	9988.8	58381.2
Total generators both sites (grams) =	26580.2		98936.4		54704.8		68369.9	

Total Maximum Annual Main Engine HC Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	71.6	NA	71.6	NA	71.6	0.0	71.6	0.0
Los Angeles Harbor	8.3	NA	8.3	NA	8.3	0.0	0.0	15.6
Long Beach Harbor	33.2	NA	33.2	NA	33.2	0.0	0.0	55.5
Marina del Rey	109.1	NA	109.1	NA	109.1	0.0	109.1	0.0
Sunset/Huntington Harbor	110.8	NA	110.8	NA	0.0	135.6	0.0	135.6
Newport Harbor	0.0	NA	381.3	NA	0.0	174.0	0.0	174.0
Dana Point Harbor	0.0	NA	100.1	NA	0.0	49.8	0.0	49.8
Upper Newport Bay	0.0	NA	152.1	NA	0.0	69.4	0.0	69.4
Anaheim Bay	148.2	NA	148.2	NA	148.2	0.0	148.2	0.0
	481.2	NA	1114.6	NA	370.4	428.8	328.9	500.2
Capital Improvement								
Los Angeles Harbor	205.1	NA	205.1	NA	205.1	0.0	0.0	390.7
Long Beach Harbor	226.9	NA	226.9	NA	226.9	0.0	0.0	379.8
Upper Newport Bay***	0.0	NA	1612.6	NA	0.0	735.7	0.0	735.7
	432.0	NA	2044.6	NA	432.0	735.7	0.0	1506.2
Total =	913.2	NA	3159.3	NA	802.4	1164.6	328.9	2006.4
Total both sites =	913.2		3159.3		1966.9		2335.3	
Total both sites (tons) =	0.46		1.58		0.98		1.17	

Total Maximum Annual Generator HC Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	4.6	NA	4.6	NA	4.6	0.0	4.6	0.0
Los Angeles Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	1.1
Long Beach Harbor	2.1	NA	2.1	NA	2.1	0.0	0.0	3.9
Marina del Rey	7.8	NA	7.8	NA	7.8	0.0	7.8	0.0
Sunset/Huntington Harbor	7.4	NA	7.4	NA	0.0	9.4	0.0	9.4
Newport Harbor	0.0	NA	27.0	NA	0.0	10.1	0.0	10.1
Dana Point Harbor	0.0	NA	7.4	NA	0.0	3.2	0.0	3.2
Upper Newport Bay	0.0	NA	10.8	NA	0.0	4.0	0.0	4.0
Anaheim Bay	9.6	NA	9.6	NA	9.6	0.0	9.6	0.0
	32.0	NA	77.2	NA	24.6	26.8	22.0	31.8
Capital Improvement								
Los Angeles Harbor	12.4	NA	12.4	NA	12.4	0.0	0.0	27.6
Long Beach Harbor	14.2	NA	14.2	NA	14.2	0.0	0.0	26.7
Upper Newport Bay***	0.0	NA	114.3	NA	0.0	42.6	0.0	42.6
	26.6	NA	140.9	NA	26.6	42.6	0.0	96.9
Total (pounds) =	58.6	NA	218.1	NA	51.2	69.4	22.0	128.7
Total generators both sites (pounds) =	58.6		218.1		120.6		150.7	
Total generators both sites (tons) =	0.029		0.109		0.060		0.075	

Maximum Quarterly Main Engine HC Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	17.9	NA	17.9	NA	17.9	0.0	17.9	0.0
Los Angeles Harbor	2.1	NA	2.1	NA	2.1	0.0	0.0	3.9
Long Beach Harbor	8.3	NA	8.3	NA	8.3	0.0	0.0	13.9
Marina del Rey	27.3	NA	27.3	NA	27.3	0.0	27.3	0.0
Sunset/Huntington Harbor	27.7	NA	27.7	NA	0.0	33.9	0.0	33.9
Newport Harbor	0.0	NA	95.3	NA	0.0	43.5	0.0	43.5
Dana Point Harbor	0.0	NA	25.0	NA	0.0	12.5	0.0	12.5
Upper Newport Bay	0.0	NA	38.0	NA	0.0	17.4	0.0	17.4
Anaheim Bay	37.0	NA	37.0	NA	37.0	0.0	37.0	0.0
	120.3	NA	278.7	NA	92.6	107.2	82.2	125.1
Capital Improvement								
Los Angeles Harbor	51.3	NA	51.3	NA	51.3	0.0	0.0	97.7
Long Beach Harbor	56.7	NA	56.7	NA	56.7	0.0	0.0	94.9
Upper Newport Bay***	0.0	NA	403.1	NA	0.0	183.9	0.0	183.9
	108.0	NA	511.1	NA	108.0	183.9	0.0	376.5
Total =	228.3	NA	789.8	NA	200.6	291.1	82.2	501.6
Total both sites =	228.3		789.8		491.7		583.8	
Total both sites (tons) =	0.11		0.39		0.25		0.29	

Maximum Quarterly Generator HC Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	1.1	NA	1.1	NA	1.1	0.0	1.1	0.0
Los Angeles Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.3
Long Beach Harbor	0.5	NA	0.5	NA	0.5	0.0	0.0	1.0
Marina del Rey	1.9	NA	1.9	NA	1.9	0.0	1.9	0.0
Sunset/Huntington Harbor	1.9	NA	1.9	NA	0.0	2.4	0.0	2.4
Newport Harbor	0.0	NA	6.8	NA	0.0	2.5	0.0	2.5
Dana Point Harbor	0.0	NA	1.8	NA	0.0	0.8	0.0	0.8
Upper Newport Bay	0.0	NA	2.7	NA	0.0	1.0	0.0	1.0
Anaheim Bay	2.4	NA	2.4	NA	2.4	0.0	2.4	0.0
	8.0	NA	19.3	NA	6.2	6.7	5.5	7.9
Capital Improvement								
Los Angeles Harbor	3.1	NA	3.1	NA	3.1	0.0	0.0	6.9
Long Beach Harbor	3.5	NA	3.5	NA	3.5	0.0	0.0	6.7
Upper Newport Bay***	0.0	NA	28.6	NA	0.0	10.7	0.0	10.7
	6.6	NA	35.2	NA	6.6	10.7	0.0	24.2
Total (pounds) =	14.6	NA	54.5	NA	12.8	17.4	5.5	32.2
Total generators both sites (pounds) =	14.6		54.5		30.2		37.7	
Total generators both sites (tons) =	0.01		0.03		0.02		0.02	

Maximum Average Daily Main Engine HC Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.2	NA	0.2	NA	0.2	0.0	0.2	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.1	NA	0.1	NA	0.1	0.0	0.0	0.2
Marina del Rey	0.3	NA	0.3	NA	0.3	0.0	0.3	0.0
Sunset/Huntington Harbor	0.3	NA	0.3	NA	0.0	0.4	0.0	0.4
Newport Harbor	0.0	NA	1.0	NA	0.0	0.5	0.0	0.5
Dana Point Harbor	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
Upper Newport Bay	0.0	NA	0.4	NA	0.0	0.2	0.0	0.2
Anaheim Bay	0.4	NA	0.4	NA	0.4	0.0	0.4	0.0
	1.3	NA	3.1	NA	1.0	1.2	0.9	1.4
Capital Improvement								
Los Angeles Harbor	0.6	NA	0.6	NA	0.6	0.0	0.0	1.1
Long Beach Harbor	0.6	NA	0.6	NA	0.6	0.0	0.0	1.0
Upper Newport Bay***	0.0	NA	4.4	NA	0.0	2.0	0.0	2.0
	1.2	NA	5.6	NA	1.2	2.0	0.0	4.1
Total =	2.5	NA	8.7	NA	2.2	3.2	0.9	5.5
Total both sites =	2.5		8.7		5.4		6.4	
Total both sites (tons) =	0.0013		0.0043		0.0027		0.0032	

Maximum Average Daily Generator HC Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Marina del Rey	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Sunset/Huntington Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Newport Harbor	0.0	NA	0.1	NA	0.0	0.0	0.0	0.0
Dana Point Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Upper Newport Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
Anaheim Bay	0.0	NA	0.0	NA	0.0	0.0	0.0	0.0
	0.1	NA	0.2	NA	0.1	0.1	0.1	0.1
Capital Improvement								
Los Angeles Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Long Beach Harbor	0.0	NA	0.0	NA	0.0	0.0	0.0	0.1
Upper Newport Bay***	0.0	NA	0.3	NA	0.0	0.1	0.0	0.1
	0.1	NA	0.4	NA	0.1	0.1	0.0	0.3
Total (pounds) =	0.2	NA	0.6	NA	0.1	0.2	0.1	0.4
Total generators both sites (pounds) =	0.2		0.6		0.3		0.4	
Total generators both sites (tons) =	0.0001		0.0003		0.0002		0.0002	

Total Maximum Annual Combined Main Engine and Generators HC Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	971.8		3377.5		2087.6		2486.1	
Total main engine and generators (tons) =	0.486		1.689		1.044		1.243	

Total Maximum Quarterly Combined Main Engine and Generators HC Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	242.9		844.4		521.9		621.5	
Total main engine and generators (tons) =	0.121		0.422		0.261		0.311	

Total Maximum Average Daily Combined Main Engine and Generators HC Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	2.7		9.3		5.7		6.8	
Total main engine and generators (tons) =	0.0013		0.0046		0.0028		0.0034	

		CO_2 emission factor (g/kW-hr)
Vessel Cruise Load Factor =	80%	703.7250
Vessel Maneuvering Load Factor =	20%	869.1000
Generator Load Factor =	100%	692.7000

Total Maximum Annual Main Engine CO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	156186027.1	NA	156186027.1	NA	156186027.1	0.0	156186027.1	0.0
Los Angeles Harbor	15877899.3	NA	15877899.3	NA	15877899.3	0.0	0.0	41560422.5
Long Beach Harbor	68510225.6	NA	68510225.6	NA	68510225.6	0.0	0.0	145180111.2
Marina del Rey	293840532.1	NA	293840532.1	NA	293840532.1	0.0	293840532.1	0.0
Sunset/Huntington Harbor	262160555.2	NA	262160555.2	NA	0.0	347139492.4	0.0	347139492.4
Newport Harbor	0.0	NA	1012172240.4	NA	0.0	302126009.5	0.0	302126009.5
Dana Point Harbor	0.0	NA	283523996.6	NA	0.0	111300017.2	0.0	111300017.2
Upper Newport Bay	0.0	NA	403782117.2	NA	0.0	120528993.1	0.0	120528993.1
Anaheim Bay	330971103.7	NA	330971103.7	NA	330971103.7	0.0	330971103.7	0.0
	1127546343.0	NA	2827034697.2	NA	865385787.8	881094512.2	780997662.9	1067835045.8
Capital Improvement								
Los Angeles Harbor	392978006.6	NA	392978006.6	NA	392978006.6	0.0	0.0	1028620457.0
Long Beach Harbor	467759471.4	NA	467759471.4	NA	467759471.4	0.0	0.0	991229724.6
Upper Newport Bay***	0.0	NA	4280196442.3	NA	0.0	1277607327.2	0.0	1277607327.2
	860737478.0	NA	5140933920.3	NA	860737478.0	1277607327.2	0.0	3297457508.9
Total =	1988283821.0	NA	7967968617.5	NA	1726123265.8	2158701839.4	780997662.9	4365292554.7
Total both sites =	1988283821.0		7967968617.5		3884825105.2		5146290217.7	

Total Maximum Annual Generator CO2 Emissions (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	21665083.0	NA	21665083.0	NA	21665083.0	0.0	21665083.0	0.0
Los Angeles Harbor	2360875.4	NA	2360875.4	NA	2360875.4	0.0	0.0	5250166.6
Long Beach Harbor	9790379.7	NA	9790379.7	NA	9790379.7	0.0	0.0	18415824.0
Marina del Rey	36720416.1	NA	36720416.1	NA	36720416.1	0.0	36720416.1	0.0
Sunset/Huntington Harbor	34880169.1	NA	34880169.1	NA	0.0	44440390.5	0.0	44440390.5
Newport Harbor	0.0	NA	127373437.7	NA	0.0	47492476.5	0.0	47492476.5
Dana Point Harbor	0.0	NA	34626078.3	NA	0.0	15250696.2	0.0	15250696.2
Upper Newport Bay	0.0	NA	50813671.4	NA	0.0	18946466.7	0.0	18946466.7
Anaheim Bay	45350754.6	NA	45350754.6	NA	45350754.6	0.0	45350754.6	0.0
	150767677.9	NA	363581065.4	NA	115887508.8	126130029.8	103736253.6	149796040.6
Capital Improvement								
Los Angeles Harbor	58431666.9	NA	58431666.9	NA	58431666.9	0.0	0.0	129942123.2
Long Beach Harbor	66844661.7	NA	66844661.7	NA	66844661.7	0.0	0.0	125735625.7
Upper Newport Bay***	0.0	NA	538627037.3	NA	0.0	200832546.7	0.0	200832546.7
	125276328.6	NA	663903365.9	NA	125276328.6	200832546.7	0.0	456510295.6
Total (grams) =	276044006.4	NA	1027484431.2	NA	241163837.4	326962576.5	103736253.6	606306336.2
Total generators both sites (grams) =	276044006.4		1027484431.2		568126413.9		710042589.8	

Total Maximum Annual Main Engine CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	344331.2	NA	344331.2	NA	344331.2	0.0	344331.2	0.0
Los Angeles Harbor	35004.8	NA	35004.8	NA	35004.8	0.0	0.0	91625.0
Long Beach Harbor	151039.2	NA	151039.2	NA	151039.2	0.0	0.0	320067.4
Marina del Rey	647807.5	NA	647807.5	NA	647807.5	0.0	647807.5	0.0
Sunset/Huntington Harbor	577965.1	NA	577965.1	NA	0.0	765311.6	0.0	765311.6
Newport Harbor	0.0	NA	2231457.8	NA	0.0	666073.8	0.0	666073.8
Dana Point Harbor	0.0	NA	625063.4	NA	0.0	245374.5	0.0	245374.5
Upper Newport Bay	0.0	NA	890209.2	NA	0.0	265720.9	0.0	265720.9
Anaheim Bay	729666.4	NA	729666.4	NA	729666.4	0.0	729666.4	0.0
	2485814.2	NA	6232544.6	NA	1907848.1	1942480.9	1721805.1	2354173.3
Capital Improvement								
Los Angeles Harbor	866368.2	NA	866368.2	NA	866368.2	0.0	0.0	2267719.9
Long Beach Harbor	1031233.1	NA	1031233.1	NA	1031233.1	0.0	0.0	2185287.5
Upper Newport Bay***	0.0	NA	9436217.9	NA	0.0	2816642.0	0.0	2816642.0
	1897601.3	NA	11333819.2	NA	1897601.3	2816642.0	0.0	7269649.4
Total =	4383415.5	NA	17566363.9	NA	3805450.4	4759122.9	1721805.1	9623822.7
Total both sites =	4383415.5		17566363.9		8564573.3		11345627.8	
Total both sites (tons) =	2191.71		8783.18		4282.29		5672.81	

Total Maximum Annual Generator CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	47763.3	NA	47763.3	NA	47763.3	0.0	47763.3	0.0
Los Angeles Harbor	5204.8	NA	5204.8	NA	5204.8	0.0	0.0	11574.7
Long Beach Harbor	21584.1	NA	21584.1	NA	21584.1	0.0	0.0	40599.9
Marina del Rey	80954.7	NA	80954.7	NA	80954.7	0.0	80954.7	0.0
Sunset/Huntington Harbor	76897.6	NA	76897.6	NA	0.0	97974.3	0.0	97974.3
Newport Harbor	0.0	NA	280810.4	NA	0.0	104703.0	0.0	104703.0
Dana Point Harbor	0.0	NA	76337.4	NA	0.0	33622.0	0.0	33622.0
Upper Newport Bay	0.0	NA	112025.4	NA	0.0	41769.8	0.0	41769.8
Anaheim Bay	99981.3	NA	99981.3	NA	99981.3	0.0	99981.3	0.0
	332385.8	NA	801559.0	NA	255468.2	278069.1	228699.3	330243.7
Capital Improvement								
Los Angeles Harbor	128819.8	NA	128819.8	NA	128819.8	0.0	0.0	286473.3
Long Beach Harbor	147367.3	NA	147367.3	NA	147367.3	0.0	0.0	277199.6
Upper Newport Bay***	0.0	NA	1187469.4	NA	0.0	442760.0	0.0	442760.0
	276187.0	NA	1463656.4	NA	276187.0	442760.0	0.0	1006432.9
Total (pounds) =	608572.9	NA	2265215.4	NA	531675.3	720829.1	228699.3	1336676.7
Total generators both sites (pounds) =	608572.9		2265215.4		1252504.3		1565376.0	
Total generators both sites (tons) =	304.286		1132.608		626.252		782.688	

Maximum Quarterly Main Engine CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	86082.8	NA	86082.8	NA	86082.8	0.0	86082.8	0.0
Los Angeles Harbor	8751.2	NA	8751.2	NA	8751.2	0.0	0.0	22906.3
Long Beach Harbor	37759.8	NA	37759.8	NA	37759.8	0.0	0.0	80016.8
Marina del Rey	161951.9	NA	161951.9	NA	161951.9	0.0	161951.9	0.0
Sunset/Huntington Harbor	144491.3	NA	144491.3	NA	0.0	191327.9	0.0	191327.9
Newport Harbor	0.0	NA	557864.5	NA	0.0	166518.5	0.0	166518.5
Dana Point Harbor	0.0	NA	156265.9	NA	0.0	61343.6	0.0	61343.6
Upper Newport Bay	0.0	NA	222552.3	NA	0.0	66430.2	0.0	66430.2
Anaheim Bay	182416.6	NA	182416.6	NA	182416.6	0.0	182416.6	0.0
	621453.5	NA	1558136.2	NA	476962.3	485620.2	430451.3	588543.3
Capital Improvement								
Los Angeles Harbor	216592.1	NA	216592.1	NA	216592.1	0.0	0.0	566930.0
Long Beach Harbor	257808.3	NA	257808.3	NA	257808.3	0.0	0.0	546321.9
Upper Newport Bay***	0.0	NA	2359054.5	NA	0.0	704160.5	0.0	704160.5
	474400.3	NA	2833454.8	NA	474400.3	704160.5	0.0	1817412.4
Total =	1095853.9	NA	4391591.0	NA	951362.6	1189780.7	430451.3	2405955.7
Total both sites =	1095853.9		4391591.0		2141143.3		2836407.0	
Total both sites (tons) =	547.93		2195.80		1070.57		1418.20	

Maximum Quarterly Generator CO2 Emissions (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	11940.8	NA	11940.8	NA	11940.8	0.0	11940.8	0.0
Los Angeles Harbor	1301.2	NA	1301.2	NA	1301.2	0.0	0.0	2893.7
Long Beach Harbor	5396.0	NA	5396.0	NA	5396.0	0.0	0.0	10150.0
Marina del Rey	20238.7	NA	20238.7	NA	20238.7	0.0	20238.7	0.0
Sunset/Huntington Harbor	19224.4	NA	19224.4	NA	0.0	24493.6	0.0	24493.6
Newport Harbor	0.0	NA	70202.6	NA	0.0	26175.7	0.0	26175.7
Dana Point Harbor	0.0	NA	19084.4	NA	0.0	8405.5	0.0	8405.5
Upper Newport Bay	0.0	NA	28006.4	NA	0.0	10442.5	0.0	10442.5
Anaheim Bay	24995.3	NA	24995.3	NA	24995.3	0.0	24995.3	0.0
	83096.5	NA	200389.8	NA	63872.1	69517.3	57174.8	82560.9
Capital Improvement								
Los Angeles Harbor	32204.9	NA	32204.9	NA	32204.9	0.0	0.0	71618.3
Long Beach Harbor	36841.8	NA	36841.8	NA	36841.8	0.0	0.0	69299.9
Upper Newport Bay***	0.0	NA	296867.3	NA	0.0	110690.0	0.0	110690.0
	69046.6	NA	365914.1	NA	69046.6	110690.0	0.0	251608.2
Total (pounds) =	152143.2	NA	566303.9	NA	132918.8	180207.3	57174.8	334169.2
Total generators both sites (pounds) =	152143.2		566303.9		313126.1		391344.0	
Total generators both sites (tons) =	76.07		283.15		156.56		195.67	

Maximum Average Daily Main Engine CO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	943.4	NA	943.4	NA	943.4	0.0	943.4	0.0
Los Angeles Harbor	95.9	NA	95.9	NA	95.9	0.0	0.0	251.0
Long Beach Harbor	413.8	NA	413.8	NA	413.8	0.0	0.0	876.9
Marina del Rey	1774.8	NA	1774.8	NA	1774.8	0.0	1774.8	0.0
Sunset/Huntington Harbor	1583.5	NA	1583.5	NA	0.0	2096.7	0.0	2096.7
Newport Harbor	0.0	NA	6113.6	NA	0.0	1824.9	0.0	1824.9
Dana Point Harbor	0.0	NA	1712.5	NA	0.0	672.3	0.0	672.3
Upper Newport Bay	0.0	NA	2438.9	NA	0.0	728.0	0.0	728.0
Anaheim Bay	1999.1	NA	1999.1	NA	1999.1	0.0	1999.1	0.0
	6810.4	NA	17075.5	NA	5227.0	5321.9	4717.3	6449.8
Capital Improvement								
Los Angeles Harbor	2373.6	NA	2373.6	NA	2373.6	0.0	0.0	6212.9
Long Beach Harbor	2825.3	NA	2825.3	NA	2825.3	0.0	0.0	5987.1
Upper Newport Bay***	0.0	NA	25852.7	NA	0.0	7716.8	0.0	7716.8
	5198.9	NA	31051.6	NA	5198.9	7716.8	0.0	19916.8
Total =	12009.4	NA	48127.0	NA	10425.9	13038.7	4717.3	26366.6
Total both sites =	12009.4		48127.0		23464.6		31083.9	
Total both sites (tons) =	6.0047		24.0635		11.7323		15.5420	

Maximum Average Daily Generator CO2 Emissions (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	130.9	NA	130.9	NA	130.9	0.0	130.9	0.0
Los Angeles Harbor	14.3	NA	14.3	NA	14.3	0.0	0.0	31.7
Long Beach Harbor	59.1	NA	59.1	NA	59.1	0.0	0.0	111.2
Marina del Rey	221.8	NA	221.8	NA	221.8	0.0	221.8	0.0
Sunset/Huntington Harbor	210.7	NA	210.7	NA	0.0	268.4	0.0	268.4
Newport Harbor	0.0	NA	769.3	NA	0.0	286.9	0.0	286.9
Dana Point Harbor	0.0	NA	209.1	NA	0.0	92.1	0.0	92.1
Upper Newport Bay	0.0	NA	306.9	NA	0.0	114.4	0.0	114.4
Anaheim Bay	273.9	NA	273.9	NA	273.9	0.0	273.9	0.0
	910.6	NA	2196.1	NA	700.0	761.8	626.6	904.8
Capital Improvement								
Los Angeles Harbor	352.9	NA	352.9	NA	352.9	0.0	0.0	784.9
Long Beach Harbor	403.7	NA	403.7	NA	403.7	0.0	0.0	759.5
Upper Newport Bay***	0.0	NA	3253.3	NA	0.0	1213.0	0.0	1213.0
	756.7	NA	4010.0	NA	756.7	1213.0	0.0	2757.4
Total (pounds) =	1667.3	NA	6206.1	NA	1456.6	1974.8	626.6	3662.1
Total generators both sites (pounds) =	1667.3		6206.1		3431.5		4288.7	
Total generators both sites (tons) =	0.8337		3.1030		1.7158		2.1444	

Total Maximum Annual Combined Main Engine and Generators CO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	4991988.4		19831579.3		9817077.7		12911003.8	
Total main engine and generators (tons) =	2495.994		9915.790		4908.539		6455.502	

Total Maximum Quarterly Combined Main Engine and Generators CO2 Emissions (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	1247997.1		4957894.8		2454269.4		3227750.9	
Total main engine and generators (tons) =	623.999		2478.947		1227.135		1613.875	

Total Maximum Average Daily Combined Main Engine and Generators CO2 Emissions (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	13676.7		54333.1		26896.1		35372.6	
Total main engine and generators (tons) =	6.8383		27.1665		13.4481		17.6863	

		Fuel consumption factor (g/kW-hr)
Vessel Cruise Load Factor	80%	223.3670
Vessel Manuevering Load Factor =	20%	276.3170
Generator Load Factor =	100%	219.8370

Total Maximum Annual Main Engine Fuel Consumption (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	49583066.7	NA	49583066.7	NA	49583066.7	0.0	49583066.7	0.0
Los Angeles Harbor	5040955.4	NA	5040955.4	NA	5040955.4	0.0	0.0	13192759.3
Long Beach Harbor	21749968.0	NA	21749968.0	NA	21749968.0	0.0	0.0	46085500.1
Marina del Rey	93274619.7	NA	93274619.7	NA	93274619.7	0.0	93274619.7	0.0
Sunset/Huntington Harbor	83222797.5	NA	83222797.5	NA	0.0	110195678.0	0.0	110195678.0
Newport Harbor	0.0	NA	321298512.9	NA	0.0	95925112.1	0.0	95925112.1
Dana Point Harbor	0.0	NA	89998125.4	NA	0.0	35333087.7	0.0	35333087.7
Upper Newport Bay	0.0	NA	128177598.2	NA	0.0	38267996.9	0.0	38267996.9
Anaheim Bay	105069445.1	NA	105069445.1	NA	105069445.1	0.0	105069445.1	0.0
	357940852.4	NA	897415088.9	NA	274718054.8	279721874.6	247927131.5	339000134.0
Capital Improvement								
Los Angeles Harbor	124763646.5	NA	124763646.5	NA	124763646.5	0.0	0.0	326520792.0
Long Beach Harbor	148499781.2	NA	148499781.2	NA	148499781.2	0.0	0.0	314652774.6
Upper Newport Bay***	0.0	NA	1358682541.3	NA	0.0	405640766.6	0.0	405640766.6
	273263427.7	NA	1631945969.0	NA	273263427.7	405640766.6	0.0	1046814283.2
Total =	631204280.1	NA	2529361057.8	NA	547981482.5	685362641.3	247927131.5	1385814417.1
Total both sites =	631204280.1		2529361057.8		1233344123.8		1633741548.6	

Total Maximum Annual Generator Fuel Consumption (grams)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	6875684.8	NA	6875684.8	NA	6875684.8	0.0	6875684.8	0.0
Los Angeles Harbor	749253.3	NA	749253.3	NA	749253.3	0.0	0.0	1666212.4
Long Beach Harbor	3107099.3	NA	3107099.3	NA	3107099.3	0.0	0.0	5844491.8
Marina del Rey	11653682.9	NA	11653682.9	NA	11653682.9	0.0	11653682.9	0.0
Sunset/Huntington Harbor	11069657.5	NA	11069657.5	NA	0.0	14103713.2	0.0	14103713.2
Newport Harbor	0.0	NA	40423651.9	NA	0.0	15072330.8	0.0	15072330.8
Dana Point Harbor	0.0	NA	10989016.6	NA	0.0	4839999.0	0.0	4839999.0
Upper Newport Bay	0.0	NA	16126417.0	NA	0.0	6012897.9	0.0	6012897.9
Anaheim Bay	14392628.6	NA	14392628.6	NA	14392628.6	0.0	14392628.6	0.0
	47848006.3	NA	115386993.9	NA	36778348.9	40028940.9	32921996.2	47539645.1
Capital Improvement								
Los Angeles Harbor	18544019.6	NA	18544019.6	NA	18544019.6	0.0	0.0	41238756.4
Long Beach Harbor	21213988.6	NA	21213988.6	NA	21213988.6	0.0	0.0	39903771.8
Upper Newport Bay***	0.0	NA	170940020.2	NA	0.0	63736718.0	0.0	63736718.0
	39758008.2	NA	210698028.4	NA	39758008.2	63736718.0	0.0	144879246.2
Total (grams) =	87606014.5	NA	326085022.2	NA	76536357.0	103765658.9	32921996.2	192418891.3
Total generators both sites (grams) =	87606014.5		326085022.2		180302016.0		225340887.5	

Total Maximum Annual Main Engine Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	109312.0	NA	109312.0	NA	109312.0	0.0	109312.0	0.0
Los Angeles Harbor	11113.4	NA	11113.4	NA	11113.4	0.0	0.0	29085.1
Long Beach Harbor	47950.5	NA	47950.5	NA	47950.5	0.0	0.0	101601.1
Marina del Rey	205635.3	NA	205635.3	NA	205635.3	0.0	205635.3	0.0
Sunset/Huntington Harbor	183474.9	NA	183474.9	NA	0.0	242939.9	0.0	242939.9
Newport Harbor	0.0	NA	708342.0	NA	0.0	211478.7	0.0	211478.7
Dana Point Harbor	0.0	NA	198411.9	NA	0.0	77896.1	0.0	77896.1
Upper Newport Bay	0.0	NA	282583.2	NA	0.0	84366.5	0.0	84366.5
Anaheim Bay	231638.5	NA	231638.5	NA	231638.5	0.0	231638.5	0.0
	789124.5	NA	1978461.6	NA	605649.6	616681.2	546585.8	747367.4
Capital Improvement								
Los Angeles Harbor	275056.8	NA	275056.8	NA	275056.8	0.0	0.0	719855.1
Long Beach Harbor	327386.0	NA	327386.0	NA	327386.0	0.0	0.0	693690.5
Upper Newport Bay***	0.0	NA	2995382.3	NA	0.0	894284.8	0.0	894284.8
	602442.7	NA	3597825.0	NA	602442.7	894284.8	0.0	2307830.4
Total =	1391567.2	NA	5576286.6	NA	1208092.4	1510966.0	546585.8	3055197.8
Total both sites =	1391567.2		5576286.6		2719058.4		3601783.5	
Total both sites (tons) =	695.78		2788.14		1359.53		1800.89	

Total Maximum Annual Generator Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	15158.3	NA	15158.3	NA	15158.3	0.0	15158.3	0.0
Los Angeles Harbor	1651.8	NA	1651.8	NA	1651.8	0.0	0.0	3673.4
Long Beach Harbor	6850.0	NA	6850.0	NA	6850.0	0.0	0.0	12884.9
Marina del Rey	25692.0	NA	25692.0	NA	25692.0	0.0	25692.0	0.0
Sunset/Huntington Harbor	24404.4	NA	24404.4	NA	0.0	31093.4	0.0	31093.4
Newport Harbor	0.0	NA	89116.7	NA	0.0	33228.8	0.0	33228.8
Dana Point Harbor	0.0	NA	24226.6	NA	0.0	10670.4	0.0	10670.4
Upper Newport Bay	0.0	NA	35552.7	NA	0.0	13256.2	0.0	13256.2
Anaheim Bay	31730.3	NA	31730.3	NA	31730.3	0.0	31730.3	0.0
	105486.8	NA	254384.8	NA	81082.4	88248.7	72580.6	104807.0
Capital Improvement								
Los Angeles Harbor	40882.6	NA	40882.6	NA	40882.6	0.0	0.0	90915.9
Long Beach Harbor	46768.8	NA	46768.8	NA	46768.8	0.0	0.0	87972.8
Upper Newport Bay***	0.0	NA	376858.2	NA	0.0	140515.4	0.0	140515.4
	87651.4	NA	464509.6	NA	87651.4	140515.4	0.0	319404.1
Total (pounds) =	193138.2	NA	718894.4	NA	168733.8	228764.1	72580.6	424211.0
Total generators both sites (pounds) =	193138.2		718894.4		397497.9		496791.6	
Total generators both sites (tons) =	96.569		359.447		198.749		248.396	

Maximum Quarterly Main Engine Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	27328.0	NA	27328.0	NA	27328.0	0.0	27328.0	0.0
Los Angeles Harbor	2778.4	NA	2778.4	NA	2778.4	0.0	0.0	7271.3
Long Beach Harbor	11987.6	NA	11987.6	NA	11987.6	0.0	0.0	25400.3
Marina del Rey	51408.8	NA	51408.8	NA	51408.8	0.0	51408.8	0.0
Sunset/Huntington Harbor	45868.7	NA	45868.7	NA	0.0	60735.0	0.0	60735.0
Newport Harbor	0.0	NA	177085.5	NA	0.0	52869.7	0.0	52869.7
Dana Point Harbor	0.0	NA	49603.0	NA	0.0	19474.0	0.0	19474.0
Upper Newport Bay	0.0	NA	70645.8	NA	0.0	21091.6	0.0	21091.6
Anaheim Bay	57909.6	NA	57909.6	NA	57909.6	0.0	57909.6	0.0
	197281.1	NA	494615.4	NA	151412.4	154170.3	136646.4	186841.8
Capital Improvement								
Los Angeles Harbor	68764.2	NA	68764.2	NA	68764.2	0.0	0.0	179963.8
Long Beach Harbor	81846.5	NA	81846.5	NA	81846.5	0.0	0.0	173422.6
Upper Newport Bay***	0.0	NA	748845.6	NA	0.0	223571.2	0.0	223571.2
	150610.7	NA	899456.3	NA	150610.7	223571.2	0.0	576957.6
Total =	347891.8	NA	1394071.7	NA	302023.1	377741.5	136646.4	763799.5
Total both sites =	347891.8		1394071.7		679764.5		900445.9	
Total both sites (tons) =	173.95		697.04		339.88		450.22	

Maximum Quarterly Generator Fuel Consumption (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	3789.6	NA	3789.6	NA	3789.6	0.0	3789.6	0.0
Los Angeles Harbor	413.0	NA	413.0	NA	413.0	0.0	0.0	816.3
Long Beach Harbor	1712.5	NA	1712.5	NA	1712.5	0.0	0.0	3221.2
Marina del Rey	6423.0	NA	6423.0	NA	6423.0	0.0	6423.0	0.0
Sunset/Huntington Harbor	6101.1	NA	6101.1	NA	0.0	7773.3	0.0	7773.3
Newport Harbor	0.0	NA	22279.7	NA	0.0	6307.2	0.0	6307.2
Dana Point Harbor	0.0	NA	6056.7	NA	0.0	2667.6	0.0	2667.6
Upper Newport Bay	0.0	NA	6868.2	NA	0.0	3314.0	0.0	3314.0
Anaheim Bay	7932.6	NA	7932.6	NA	7932.6	0.0	7932.6	0.0
	26371.7	NA	63596.2	NA	20270.6	22062.2	18145.1	26201.7
Capital Improvement								
Los Angeles Harbor	10220.6	NA	10220.6	NA	10220.6	0.0	0.0	22729.0
Long Beach Harbor	11692.2	NA	11692.2	NA	11692.2	0.0	0.0	21993.2
Upper Newport Bay***	0.0	NA	94214.6	NA	0.0	35128.9	0.0	35128.9
	21912.9	NA	116127.4	NA	21912.9	35128.9	0.0	79851.0
Total (pounds) =	48284.6	NA	179723.6	NA	42183.4	57191.0	18145.1	106052.8
Total generators both sites (pounds) =	48284.6		179723.6		99374.5		124197.9	
Total generators both sites (tons) =	24.14		89.86		49.69		62.10	

Maximum Average Daily Main Engine Fuel Consumption (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	299.5	NA	299.5	NA	299.5	0.0	299.5	0.0
Los Angeles Harbor	30.4	NA	30.4	NA	30.4	0.0	0.0	79.7
Long Beach Harbor	131.4	NA	131.4	NA	131.4	0.0	0.0	278.4
Marina del Rey	563.4	NA	563.4	NA	563.4	0.0	563.4	0.0
Sunset/Huntington Harbor	502.7	NA	502.7	NA	0.0	665.6	0.0	665.6
Newport Harbor	0.0	NA	1940.7	NA	0.0	579.4	0.0	579.4
Dana Point Harbor	0.0	NA	543.6	NA	0.0	213.4	0.0	213.4
Upper Newport Bay	0.0	NA	774.2	NA	0.0	231.1	0.0	231.1
Anaheim Bay	634.6	NA	634.6	NA	634.6	0.0	634.6	0.0
	2162.0	NA	5420.4	NA	1659.3	1689.5	1497.5	2047.6
Capital Improvement								
Los Angeles Harbor	753.6	NA	753.6	NA	753.6	0.0	0.0	1972.2
Long Beach Harbor	896.9	NA	896.9	NA	896.9	0.0	0.0	1900.5
Upper Newport Bay***	0.0	NA	8206.5	NA	0.0	2450.1	0.0	2450.1
	1650.5	NA	9857.1	NA	1650.5	2450.1	0.0	6322.8
Total =	3812.5	NA	15277.5	NA	3309.8	4139.6	1497.5	8370.4
Total both sites =	3812.5		15277.5		7449.5		9867.9	
Total both sites (tons) =	1.9063		7.6387		3.7247		4.9340	

Maximum Average Daily Generator Fuel Consumption (based on a 365 day year) (pounds)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	41.5	NA	41.5	NA	41.5	0.0	41.5	0.0
Los Angeles Harbor	4.5	NA	4.5	NA	4.5	0.0	0.0	10.1
Long Beach Harbor	18.8	NA	18.8	NA	18.8	0.0	0.0	35.3
Marina del Rey	70.4	NA	70.4	NA	70.4	0.0	70.4	0.0
Sunset/Huntington Harbor	66.9	NA	66.9	NA	0.0	85.2	0.0	85.2
Newport Harbor	0.0	NA	244.2	NA	0.0	91.0	0.0	91.0
Dana Point Harbor	0.0	NA	66.4	NA	0.0	29.2	0.0	29.2
Upper Newport Bay	0.0	NA	97.4	NA	0.0	36.3	0.0	36.3
Anaheim Bay	86.9	NA	86.9	NA	86.9	0.0	86.9	0.0
	289.0	NA	696.9	NA	222.1	241.8	198.9	287.1
Capital Improvement								
Los Angeles Harbor	112.0	NA	112.0	NA	112.0	0.0	0.0	249.1
Long Beach Harbor	128.1	NA	128.1	NA	128.1	0.0	0.0	241.0
Upper Newport Bay***	0.0	NA	1032.5	NA	0.0	385.0	0.0	385.0
	240.1	NA	1272.6	NA	240.1	385.0	0.0	875.1
Total (pounds) =	529.1	NA	1969.6	NA	462.3	626.8	198.9	1162.2
Total generators both sites (pounds) =	529.1		1969.6		1089.0		1361.1	
Total generators both sites (tons) =	0.2646		0.9848		0.5445		0.6806	

Total Maximum Annual Combined Main Engine and Generators Fuel Consumption (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	1584705.4		6295181.0		3116556.3		4098575.2	
Total main engine and generators (tons) =	792.353		3147.591		1558.278		2049.288	

Total Maximum Quarterly Combined Main Engine and Generators Fuel Consumption (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	396176.4		1573795.3		779139.1		1024643.8	
Total main engine and generators (tons) =	198.088		786.898		389.570		512.322	

Total Maximum Average Daily Combined Main Engine and Generators Fuel Consumption (based on a 365 day year) (pounds)

	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Total main engine and generators (pounds) =	4341.7		17247.1		8538.5		11229.0	
Total main engine and generators (tons) =	2.1708		8.6235		4.2693		5.6145	

Worst-Case Year Maximum Daily Emissions
Assumes 10-hour Day, 313 Work-day Year
(pounds per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	47	79	69	63
NO_x	1889	3172	2753	2530
NO_2	2807	4714	4091	3760
SO_2	1415	2373	2066	1895
CO	223	360	334	296
HC	25	38	38	33
CO_2	126067	211340	183997	168798
Fuel Consumption	40020	67088	58411	53585

Worst-Case Year Average Daily Emissions
Assumes 10-hour Day, 313 Work-day Year
(pounds per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	5	20	10	13
NO_x	205	817	402	530
NO_2	305	1214	598	788
SO_2	154	610	302	397
CO	24	90	50	62
HC	3	9	6	7
CO_2	13677	54333	26896	35373
Fuel Consumption	4342	17247	8539	11229

Worst-Case Year Average Quarterly Emissions
(pounds per quarter)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	467	1855	918	1208
NO_x	18701	74532	36689	48380
NO_2	27791	110758	54525	71898
SO_2	14011	55658	27554	36237
CO	2197	8176	4521	5650
HC	243	844	522	622
CO_2	1247997	4957895	2454269	3227751
Fuel Consumption	396176	1573795	779139	1024644

Worst-Case Year Average Quarterly Emissions
(tons per quarter)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	0.2	0.9	0.5	0.6
NO_x	9.4	37	18	24
NO_2	14	55	27	36
SO_2	7.0	28	14	18
CO	1.1	4.1	2.3	2.8
HC	0.1	0.4	0.3	0.3
CO_2	624	2479	1227	1614
Fuel Consumption	198	787	390	512

Worst-Case Year Average Yearly Emissions
(tons per year)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	1	4	2	2
NO_x	**37**	**149**	**73**	**97**
NO_2	56	**222**	**109**	**144**
SO_2	28	111	55	72
CO	4	16	9	11
HC	0	2	1	1
CO_2	2496	9916	4909	6456
Fuel Consumption	792	3148	1558	2049

Average Daily Emissions
10-Year Project Assessment Period
(pounds per day)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	0.6	2.3	1.2	1.4
NO_x	26	93	47	58
NO_2	38	138	70	86
SO_2	19	69	35	43
CO	3	10	6	7
HC	0.3	1.0	0.6	0.7
CO_2	1724	6173	3145	3866
Fuel Consumption	547	1959	998	1227

Average Quarterly Emissions
10-Year Project Assessment Period
(pounds per quarter)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	59	211	107	132
NO_x	2360	8470	4294	5288
NO_2	3507	12587	6381	7859
SO_2	1766	6323	3222	3960
CO	270	924	521	617
HC	29.1	94.9	59.3	67.8
CO_2	157296	563284	287008	352777
Fuel Consumption	49932	178804	91113	111988

Average Quarterly Emissions
10-Year Project Assessment Period
(tons per quarter)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	0.03	0.11	0.05	0.07
NO_x	1.2	4.2	2.1	2.6
NO_2	1.8	6.3	3.2	3.9
SO_2	0.9	3.2	1.6	2.0
CO	0.13	0.46	0.26	0.31
HC	0.01	0.05	0.03	0.03
CO_2	79	282	144	176
Fuel Consumption	25	89	46	56

Average Yearly Emissions
10-Year Project Assessment Period
(tons per year)

Pollutant	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
PM	0.1	0.4	0.2	0.3
NO_x	5	**17**	9	11
NO_2	7	25	13	16
SO_2	4	13	6	8
CO	0.5	1.8	1.0	1.2
HC	0.06	0.19	0.12	0.14
CO_2	315	1127	574	706
Fuel Consumption	100	358	182	224

Worst-Case Year
Total Number of Barge Round Trips

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	57	NA	57	NA	57	0	57	0
Los Angeles Harbor	8	NA	8	NA	8	0	0	8
Long Beach Harbor	29	NA	29	NA	29	0	0	29
Marina del Rey	51	NA	51	NA	51	0	51	0
Sunset/Huntington Harbor	75	NA	75	NA	0	75	0	75
Newport Harbor	0	NA	188	NA	0	188	0	188
Dana Point Harbor	0	NA	38	NA	0	38	0	38
Upper Newport Bay	0	NA	75	NA	0	75	0	75
Anaheim Bay	113	NA	113	NA	113	0	113	0
	333	NA	634	NA	258	376	221	413
Capital Improvement								
Los Angeles Harbor	198	NA	198	NA	198	0	0	198
Long Beach Harbor	198	NA	198	NA	198	0	0	198
Upper Newport Bay***	0	NA	795	NA	0	795	0	795
	396	NA	1191	NA	396	795	0	1191
Total =	**729**	**NA**	**1825**	**NA**	**654**	**1171**	**221**	**1604**

Average Year
Total Number of Barge Round Trips

Harbor/Facility	Alt 1 - No Action Annual Average LA-2	Alt 1 - No Action Annual Average LA-3	Alt 2 Annual Average LA-2	Alt 2 Annual Average LA-3	Alt 3 Annual Average LA-2	Alt 3 Annual Average LA-3	Alt 4 Annual Average LA-2	Alt 4 Annual Average LA-3
Regular Maintenance								
Los Angeles River Estuary	10	NA	10	NA	10	0	10	0
Los Angeles Harbor	5	NA	5	NA	5	0	0	5
Long Beach Harbor	19	NA	19	NA	19	0	0	19
Marina del Rey	17	NA	17	NA	17	0	17	0
Sunset/Huntington Harbor	5	NA	5	NA	0	5	0	5
Newport Harbor	0	NA	5	NA	0	5	0	5
Dana Point Harbor	0	NA	4	NA	0	4	0	4
Upper Newport Bay	0	NA	5	NA	0	5	0	5
Anaheim Bay	8	NA	8	NA	8	0	8	0
	64	NA	78	NA	59	19	35	43
Capital Improvement								
Los Angeles Harbor	7	NA	7	NA	7	0	0	7
Long Beach Harbor	7	NA	7	NA	7	0	0	7
Upper Newport Bay***	0	NA	106	NA	0	106	0	106
	14	NA	120	NA	14	106	0	120
Total =	**78**	**NA**	**198**	**NA**	**73**	**125**	**35**	**163**

Worst-Case Day
Worst-Case Number of Barge Round Trips Per Day (10-hour Day)

Harbor/Facility	Alt 1 - No Action Worst Case Year LA-2	Alt 1 - No Action Worst Case Year LA-3	Alt 2 Worst Case Year LA-2	Alt 2 Worst Case Year LA-3	Alt 3 Worst Case Year LA-2	Alt 3 Worst Case Year LA-3	Alt 4 Worst Case Year LA-2	Alt 4 Worst Case Year LA-3
Regular Maintenance								
Los Angeles River Estuary	2	NA	2	NA	2	0	2	0
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Marina del Rey	1	NA	1	NA	1	0	1	0
Sunset/Huntington Harbor	2	NA	2	NA	0	1	0	1
Newport Harbor	0	NA	1	NA	0	4	0	4
Dana Point Harbor	0	NA	1	NA	0	2	0	2
Upper Newport Bay	0	NA	1	NA	0	4	0	4
Anaheim Bay	2	NA	2	NA	2	0	2	0
	13	NA	16	NA	11	11	5	13
Capital Improvement								
Los Angeles Harbor	3	NA	3	NA	3	0	0	1
Long Beach Harbor	3	NA	3	NA	3	0	0	1
Upper Newport Bay***	0	NA	3	NA	0	4	0	4
	6	NA	9	NA	6	4	0	6
Total =	**19**	**NA**	**25**	**NA**	**17**	**15**	**5**	**19**

Harbor/Facility	One-Way Trip Distance (Miles) LA-2	One-Way Trip Distance (Miles) LA-3	Round-Trip Distance (Miles) LA-2	Round-Trip Distance (Miles) LA-3
Regular Maintenance				
Los Angeles River Estuary	13	23	**46**	**0**
Los Angeles Harbor	8	24	**48**	**0**
Long Beach Harbor	11	24	**48**	**0**
Marina del Rey	30	53	**106**	**0**
Sunset/Huntington Harbor	16	21	**42**	**0**
Newport Harbor	27	7	**14**	**0**
Dana Point Harbor	38	16	**32**	**0**
Upper Newport Bay	27	7	**14**	**0**
Anaheim Bay	15	19	**38**	**0**
Capital Improvement				
Los Angeles Harbor	8	24	**48**	**0**
Long Beach Harbor	11	24	**48**	**0**
Upper Newport Bay***	27	7	**14**	**0**

Harbor/Facility	Disposal Economically Feasible LA-2	Disposal Economically Feasible LA-3	County of Origin	Volume per cycle (cy)	Maintenance Dredging Time Period for each cycle (years)	Volume per 10 years (cy)	Average Annual Volume (cy)		Alt 1 - No Action Worst Case Year LA-2 (cubic yards)	Alt 1 - No Action Worst Case Year LA-3 (cubic yards)	Alt 2 Worst Case Year LA-2 (cubic yards)	Alt 2 Worst Case Year LA-3 (cubic yards)	Alt 3 Worst Case Year LA-2 (cubic yards)	Alt 3 Worst Case Year LA-3 (cubic yards)	Alt 4 Worst Case Year LA-2 (cubic yards)	Alt 4 Worst Case Year LA-3 (cubic yards)
Regular Maintenance																
Los Angeles River Estuary	Yes	No	LA	75,000	4 - 5*	187,500	18,750		75,000	NA	75,000	NA	75,000	-	75,000	-
Los Angeles Harbor	Yes	Yes	LA	10,000	1	100,000	10,000		10,000	NA	10,000	NA	10,000	-	-	10,000
Long Beach Harbor	Yes	Yes	LA	38,000	1	380,000	38,000		38,000	NA	38,000	NA	38,000	-	-	38,000
Marina del Rey	Yes	No	LA	67,000	2	335,000	33,500		67,000	NA	67,000	NA	67,000	-	67,000	-
Sunset/Huntington Harbor	Yes	Yes	Orange	100,000	10	100,000	10,000		100,000	NA	100,000	NA	-	100,000	-	100,000
Newport Harbor	No	Yes	Orange	250,000	25	100,000	10,000		-	NA	250,000	NA	-	250,000	-	250,000
Dana Point Harbor	No	Yes	Orange	50,000	8	62,500	6,250		-	NA	50,000	NA	-	50,000	-	50,000
Upper Newport Bay	No	Yes	Orange	100,000	10	100,000	10,000		-	NA	100,000	NA	-	100,000	-	100,000
Anaheim Bay	Yes	No	Orange	150,000	10	150,000	15,000		150,000	NA	150,000	NA	150,000	-	150,000	-
						1,515,000	151,500		440,000	NA	840,000	NA	340,000	500,000	292,000	548,000
Capital Improvement																
Los Angeles Harbor	Yes	Yes	LA	263,000	20 - 25**	131,500	13,150		263,000	NA	263,000	NA	263,000	-	-	263,000
Long Beach Harbor	Yes	Yes	LA	263,000	20 - 25**	131,500	13,150		263,000	NA	263,000	NA	263,000	-	-	263,000
Upper Newport Bay***	No	Yes	Orange	2,120,000	2***	2,120,000	212,000		-	NA	1,060,000	NA	-	1,060,000	-	1,060,000
						2,383,000	238,300		526,000	NA	1,586,000	NA	526,000	1,060,000	-	1,586,000
								Total	966,000	NA	2,426,000	NA	866,000	1,560,000	292,000	2,134,000
							Increase by:	50%	**1,449,000**	NA	**3,639,000**	NA	**1,299,000**	**2,340,000**	**438,000**	**3,201,000**
							Ratio Total 10 year volume/peak year		1.0	NA	1.1	NA	1.1	1.1	1.5	1.0

*for worst case annual average assume 4 year cycle
**for worst case annual average assume 20 year cycle
***Upper Newport Bay capital improvement project occurs over 2 years
Worst case year = 1060000 cy for capital improvement

Assume Period of Assessment = 10 years

65,000

		Alt 1 - No Action Annual Average LA-2 (cubic yards)	Alt 1 - No Action Annual Average LA-3 (cubic yards)	Alt 2 Annual Average LA-2 (cubic yards)	Alt 2 Annual Average LA-3 (cubic yards)	Alt 3 Annual Average LA-2 (cubic yards)	Alt 3 Annual Average LA-3 (cubic yards)	Alt 4 Annual Average LA-2 (cubic yards)	Alt 4 Annual Average LA-3 (cubic yards)
		18,750	NA	18,750	NA	18,750	-	18,750	-
		10,000	NA	10,000	NA	10,000	-	-	10,000
		38,000	NA	38,000	NA	38,000	-	-	38,000
		33,500	NA	33,500	NA	33,500	-	33,500	-
		10,000	NA	10,000	NA	-	10,000	-	10,000
		-	NA	10,000	NA	-	10,000	-	10,000
		-	NA	6,250	NA	-	6,250	-	6,250
		-	NA	10,000	NA	-	10,000	-	10,000
		15,000	NA	15,000	NA	15,000	-	15,000	-
		126,250	NA	151,500	NA	115,250	36,250	67,250	84,250
		13,150	NA	13,150	NA	13,150	-	-	13,150
		13,150	NA	13,150	NA	13,150	-	-	13,150
		-	NA	212,000	NA	-	212,000	-	212,000
		26,300	NA	238,300	NA	26,300	212,000	-	238,300
		151,550		389,800	NA	141,550	248,250	67,250	322,550
Increase by:	0%	**151,550**	NA	**389,800**	NA	**141,550**	**248,250**	**67,250**	**322,550**

		Alt 1 - No Action 10 Year Total LA-2 (cubic yards)	Alt 1 - No Action 10 Year Total LA-3 (cubic yards)	Alt 2 10 Year Total LA-2 (cubic yards)	Alt 2 10 Year Total LA-3 (cubic yards)	Alt 3 10 Year Total LA-2 (cubic yards)	Alt 3 10 Year Total LA-3 (cubic yards)	Alt 4 10 Year Total LA-2 (cubic yards)	Alt 4 10 Year Total LA-3 (cubic yards)
		187,500	NA	187,500	NA	187,500	-	187,500	-
		100,000	NA	100,000	NA	100,000	-	-	100,000
		380,000	NA	380,000	NA	380,000	-	-	380,000
		335,000	NA	335,000	NA	335,000	-	335,000	-
		100,000	NA	100,000	NA	-	100,000	-	100,000
		-	NA	100,000	NA	-	100,000	-	100,000
		-	NA	62,500	NA	-	62,500	-	62,500
		-	NA	100,000	NA	-	100,000	-	100,000
		150,000	NA	150,000	NA	150,000	-	150,000	-
		1,252,500	NA	1,515,000	NA	1,152,500	362,500	672,500	842,500
		131,500	NA	131,500	NA	131,500	-	-	131,500
		131,500	NA	131,500	NA	131,500	-	-	131,500
		-	NA	2,120,000	NA	-	2,120,000	-	2,120,000
		263,000	NA	2,383,000	NA	263,000	2,120,000	-	2,383,000
Total		1,515,500		3,898,000	NA	1,415,500	2,482,500	672,500	3,225,500
Increase by:	0%	**1,515,500**	NA	**3,898,000**	NA	**1,415,500**	**2,482,500**	**672,500**	**3,225,500**

	Alt 1 - No Action Worst Case Year LA-2 (cubic yards)	Alt 1 - No Action Worst Case Year LA-3 (cubic yards)	Alt 2 Worst Case Year LA-2 (cubic yards)	Alt 2 Worst Case Year LA-3 (cubic yards)	Alt 3 Worst Case Year LA-2 (cubic yards)	Alt 3 Worst Case Year LA-3 (cubic yards)	Alt 4 Worst Case Year LA-2 (cubic yards)	Alt 4 Worst Case Year LA-3 (cubic yards)
LA River Estuary	75,000	NA	75,000	NA	75,000	NA	75,000	NA
LA/Long Beach Harbors	574,000	NA	574,000	NA	574,000	NA	NA	574,000
Marina del Rey	67,000	NA	67,000	NA	67,000	NA	67,000	NA
Basin II/III	250,000	NA	1,710,000	NA	150,000	1,560,000	150,000	1,560,000
	966,000	-	2,426,000	-	866,000	1,560,000	292,000	2,134,000
Increase by: 50%								
LA River Estuary	112500	NA	112500	NA	112500	NA	112500	NA
LA/Long Beach Harbors	861000	NA	861000	NA	861000	NA	NA	861000
Marina del Rey	100500	NA	100500	NA	100500	NA	100500	NA
Basin II/III	375000	NA	2565000	NA	225000	2340000	225000	2340000
	1,449,000	-	**3,639,000**	-	**1,299,000**	**2,340,000**	**436,000**	**3,201,000**
Total LA Co.	1,074,000	NA	1,074,000	NA	1,074,000	NA	213,000	861,000
Total Orange Co.	375,000	NA	2,565,000	NA	225,000	2,340,000	225,000	2,340,000
% LA River Estuary	10%	NA	10%	NA	10%	NA	53%	NA
% LA/Long Beach Harbors	80%	NA	80%	NA	80%	NA	NA	100%
% Marina del Rey	9%	NA	9%	NA	9%	NA	47%	NA

	Alt 1 - No Action Annual Average LA-2 (cubic yards)	Alt 1 - No Action Annual Average LA-3 (cubic yards)	Alt 2 Annual Average LA-2 (cubic yards)	Alt 2 Annual Average LA-3 (cubic yards)	Alt 3 Annual Average LA-2 (cubic yards)	Alt 3 Annual Average LA-3 (cubic yards)	Alt 4 Annual Average LA-2 (cubic yards)	Alt 4 Annual Average LA-3 (cubic yards)
LA River Estuary	18,750	NA	18,750	NA	18,750	NA	18,750	NA
LA/Long Beach Harbors	74,300	NA	74,300	NA	74,300	NA	NA	74,300
Marina del Rey	33,500	NA	33,500	NA	33,500	NA	33,500	NA
Basin II/III	25,000	NA	263,250	NA	15,000	248,250	15,000	248,250
	151,550	-	389,800	-	141,550	248,250	67,250	322,550
Increase by: 0%								
LA River Estuary	18750	NA	18750	NA	18750	NA	18750	NA
LA/Long Beach Harbors	74300	NA	74300	NA	74300	NA	NA	74300
Marina del Rey	33500	NA	33500	NA	33500	NA	33500	NA
Basin II/III	25000	NA	263250	NA	15000	248250	15000	248250
	151,550	-	**389,800**	-	**141,550**	**248,250**	**67,250**	**322,550**
Total LA Co.	126,550	NA	126,550	NA	126,550	NA	52,250	74,300
Total Orange Co.	25,000	NA	263,250	NA	15,000	248,250	15,000	248,250
% LA River Estuary	15%	NA	15%	NA	15%	NA	36%	NA
% LA/Long Beach Harbors	59%	NA	59%	NA	59%	NA	NA	100%
% Marina del Rey	26%	NA	26%	NA	26%	NA	64%	NA

	Alt 1 - No Action 10 Year Total LA-2 (cubic yards)	Alt 1 - No Action 10 Year Total LA-3 (cubic yards)	Alt 2 10 Year Total LA-2 (cubic yards)	Alt 2 10 Year Total LA-3 (cubic yards)	Alt 3 10 Year Total LA-2 (cubic yards)	Alt 3 10 Year Total LA-3 (cubic yards)	Alt 4 10 Year Total LA-2 (cubic yards)	Alt 4 10 Year Total LA-3 (cubic yards)
LA River Estuary	187,500	NA	187,500	NA	187,500	NA	187,500	NA
LA/Long Beach Harbors	743,000	NA	743,000	NA	743,000	NA	NA	743,000
Marina del Rey	335,000	NA	335,000	NA	335,000	NA	335,000	NA
Basin II/III	250,000	NA	2,632,500	NA	150,000	2,482,500	150,000	2,482,500
	1,515,500	-	3,898,000	-	1,415,500	2,482,500	672,500	3,225,500
Increase by: 0%								
LA River Estuary	187500	NA	187500	NA	187500	NA	187500	NA
LA/Long Beach Harbors	743000	NA	743000	NA	743000	NA	NA	743000
Marina del Rey	335000	NA	335000	NA	335000	NA	335000	NA
Basin II/III	250000	NA	2632500	NA	150000	2482500	150000	2482500
	1,515,500	-	**3,898,000**	-	**1,415,500**	**2,482,500**	**672,500**	**3,225,500**
Total LA Co.	1,265,500	NA	1,265,500	NA	1,265,500	NA	522,500	743,000
Total Orange Co.	250,000	NA	2,632,500	NA	150,000	2,482,500	150,000	2,482,500
% LA River Estuary	15%	NA	15%	NA	15%	NA	36%	NA
% LA/Long Beach Harbors	59%	NA	59%	NA	59%	NA	NA	100%
% Marina del Rey	26%	NA	26%	NA	26%	NA	64%	NA