FINAL

Engineering Evaluation/ Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7 Station Landfill, Naval Weapons Station, Seal Beach, Orange County, California

Prepared by

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Southwest Division

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Executive Summary

This Engineering Evaluation/Cost Analysis (EE/CA) was performed in accordance with current U.S. Environmental Protection Agency (EPA) and Department of Navy (Navy) guidance documents for a non-time critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Chapter 6.8 of the California Health and Safety Code. This EE/CA summarizes the site characteristics, identifies removal action objectives, describes removal action alternatives, analyzes these alternatives, and describes the recommended removal action alternative for buried refuse, waste debris, and contaminated soil at Installation Restoration (IR) Site 7, the former Station Landfill, of the Naval Weapons Station (NAVWPNSTA) Seal Beach (Operable Unit [OU]) 2.

Site Background

The Site 7 Station Landfill (Site 7) is located at NAVWPNSTA Seal Beach, in Seal Beach, California. It is an approximately 33-acre site located near the southern boundary of the Station and at the east boundary of the Seal Beach National Wildlife Refuge (NWR). Landfill activities were reportedly conducted at the site from approximately 1955 to 1973. There is an existing soil cover consisting of a nonuniform, nonengineered soil cover of variable thickness overlying Site 7 that ranges from 0 to 4 feet with refuse exposed at the ground surface in some areas. The present ground surface of Site 7 is relatively flat. The landscape is dominated by native vegetation.

A large variety of wastes generated by NAVWPNSTA Seal Beach during the period of active landfilling may have been buried in trenches at Site 7. Almost any type of waste generated on Station may have been disposed of at Site 7 Station Landfill. The major types of waste reportedly disposed of in the landfill include small, mostly empty, containers that once contained paints, petroleum products, and various solvents; used rags; batteries; asbestos; and inert construction debris. However, as noted below, exploratory drilling and trenching of the landfill identified primarily inert materials.

Previous Investigations

NAVWPNSTA Seal Beach and the Navy have been actively engaged in the IR Program since 1980. Since 1985, Site 7 has been the subject of nine environmental investigations, including:

- Initial Assessment Study (NEESA, 1985)
- Resource Conservation Recovery Act Facility Assessment (A.T. Kearney, 1989)
- Plan of Action/Site Inspection (SWDIV, 1990)
- Remedial Investigation (SWDIV, 1995b)
- Landfill Closure Plan (SWDIV, 1996)
- Ecological Risk Assessment Phase II Validation Study (SWDIV, 1999a)
- Supplemental Groundwater Monitoring Study (SWDIV, 1999b)

- Supplemental Characterization Report Installation Restoration Site 7 (SWDIV, 1999c)
- Screening Aquatic Ecological Risk Assessment (SWDIV, 2000)

Investigations and studies to date have indicated that the risk to human health and ecological receptors are marginal (SWDIV, 1995b, 1999a, and 2000). The most significant possible risk are to aquatic ecological receptors in Perimeter Pond.

Information to identify known areas of debris associated with past landfill operations were obtained during the previous investigations. Locations of these areas were identified and have been designated as Areas 1 to 6 (See Figure 2-9). A brief summary of the areas are as follows:

Area 1: This area lies in the northeast portion of the site. It covers approximately 8 acres. Most of the waste disposal and landfilling activities took place in Area 1 in a series of unlined trenches lying in an east-west orientation. Reportedly, the trenches were excavated to a depth of 10 feet bgs and filled with debris (NEESA, 1985). However, exploration during a supplemental characterization indicated the bottoms of the debris burial depths varying between 5.5 and 9 feet bgs with an average bottom depth of 6.4 feet bgs (SWDIV, 1999c). Types of debris observed during exploratory drilling included diapers, clothing, wire, and rubber.

Area 2: This area lies along the southern boundary of the site adjacent to Perimeter Road. It is probably a single, contiguous trench approximately 600 feet long by 40 feet wide (about 0.6 acres). The bottom depths of debris range from 6 to 10 feet bgs (SWDIV, 1999c) with an average bottom depth of 7.5 feet bgs. During exploratory drilling, building materials such as wood, metal, and concrete were observed.

Area 3: This area lies in the northwest portion of Site 7. It is an irregularly shaped area that is approximately 1 acre. Site visits to Area 3 reveal surficial scattered rusted metal debris. This surficial metal debris accounts for the geophysical anomalies detected in this area during the presampling activities of the RI (SWDIV, 1995b).

Area 4: This area lies in the northwest portion of Site 7 southeast of Area 3. It is similar to Area 3 in that it is also an irregularly shaped area littered with surficial rusted metal debris that is approximately 1 acre.

Area 5: This area forms the eastern shoreline of Perimeter Pond and lies between Perimeter Pond and East Pond (see Figure 2-9). Two north-south-oriented trenches lie in this area, with a portion of the western trench exposed to Perimeter Pond. Exposed debris observed includes materials such as concrete, metal banding, and lumber. Area 5 covers about 0.7 acres and has an average bottom debris depth of 7 feet (SWDIV, 1999c).

Area 6: This area lies to the southeast of Area 5. This area is similar to Areas 3 and 4 in that the debris found in this area appears to be surficial only. It lies along an unpaved access road between Perimeter Road and the eastern shore of Perimeter Pond. The debris, mostly pieces of lumber, appear to be recent debris that had fallen off of vehicles during the removal of portions of the exposed trench at Area 5. This area is irregular in shape and occupies about 0.1 acres.

Site Characteristics

Site 7 is underlain by predominantly clay and fine-grained silty clay soil to about 25 to 30 feet bgs. The clay and silty clay are underlain by lenses of silty sand. A 2- to 5-foot-thick bed of fine-grained silt, interbedded in the upper clay interval between 10 to 15 bgs appears across most of the site (SWDIV, 1995b).

Chemical analyses of soil samples detected remnants of past waste disposal operations, including low levels of VOCs, SVOCs, PCBs, pesticides, and cyanide with no consistent pattern. Metals were detected but generally within background levels. Also, results of migration gas sampling indicate there is no significant migration of landfill gas.

Shallow groundwater shows low levels and infrequent detections of COPCs, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, metals, asbestos, and cyanide. Ten quarters of shallow groundwater sampling do not indicate a plume of significant contamination. At Site 7, shallow groundwater was encountered between 3 and 5 feet bgs.

Removal Action Objectives

Based on CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan, the Applicable or Relevant and Appropriate Requirements evaluation, and the human health and ecological risk assessments, the Removal Action Objectives (RAOs) for Site 7 are as follows:

- Reduce the potential for exposure of ecological receptors to landfill waste and potentially contaminated soil by increasing separation and/or eliminating exposure pathways (e.g., water seeps) of wastes to human and ecological receptors
- Restore habitat that is compatible with the Seal Beach National Wildlife Refuge habitat
- Minimize impact to wetlands and improve conditions of remaining wetlands, to the extent practicable
- Control surface water runoff and reduce the potential for erosion of the landfill surface
- Comply with chemical-specific ARARs where exceedances have occurred due to waste releases

Removal Action Alternatives and Comparative Analysis

Four alternatives have been developed for the removal action at Site 7 based on the RAOs. The four alternatives were evaluated based on the following evaluation criteria: (1) effectiveness, (2) implementability, and (3) cost. A brief description of the alternatives evaluated in this EE/CA are as listed below:

- Alternative 1: No Action
- Alternative 2: Capping and Long-term Maintenance/Monitoring
  Primary alternative involves capping Area 1 with a Title 27 compliant cap, surficial

debris removal, and excavation and offsite disposal of waste, and performing long-term monitoring/maintenance.

- Alternative 3: Limited Repair of Existing Soil Cover and Groundwater Monitoring
  Primary alternative involves performing limited soil cover repairs of Area 1, surficial debris removal, excavation and offsite disposal of waste, and groundwater monitoring.
- Alternative 4: Excavation and Offsite Disposal
  Primary alternative involves excavation and offsite disposal of wastes for areas 1, 2, and 5, and surficial debris removal.

The removal action activities for Areas 3, 4, 5, and 6 are common for Alternatives 2, 3, and 4. They include removal of surface debris, followed by a geophysical survey to confirm removal effectiveness in Areas 3, 4, and 6; and excavation and offsite disposal, followed by backfill with imported soil at Area 5.

The four alternatives analyzed were compared against each other in order to evaluate the relative performance of each alternative in relation to each criterion for effectiveness, implementability, and cost.

The effectiveness of each alternative was evaluated based on the overall protection of human health and the environment; long-term effectiveness and permanence; compliance with ARARs; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness.

Recommended Removal Action Alternative

Based on this analysis, the Navy recommends Alternative 3, Existing Soil Cover Repair and Groundwater Monitoring. The alternative best meets the NCP criteria that includes the following:

- Adequately protects public health and safety and the environment.
- Complies with ARARs.
- Meets the RAOs.
- Provides moderate long-term effectiveness.
- Provides high short-term effectiveness because of low impacts on the community, workers, and the environment when compared with Alternatives 2 and 4.
- Provides adequate reliability and control with a few minor repairs to the existing cover.
- Provides high technical feasibility and low administrative requirements when compared with Alternatives 2 and 4.
- Provides high reasonableness of costs: This alternative offers the highest benefit in terms of achieving RAOs for the estimated cost.

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Acronyms

ACOE	Army Corps of Engineers
Ag+	silver ion
AM	Action Memorandum
AOCs	areas of concern
APR	annual percentage rate
ARARs	applicable or relevant and appropriate requirements
AWQC	Ambient Water Quality Criteria
BCFs	bioconcentration factors
bgs	below ground surface
CA-HSC	California Health and Safety Code
CCR	California Code of Regulations
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CIWMB	California Integrated Waste Management Board
COC	chemical of concern
COPC	chemicals of potential concern
CPT	cone penetrometer testing
Cu	copper
cy	cubic yards
DDT	dichlorodiphenyl-trichloroethane
DERP	Defense Environmental Restoration Program
DON	Department of the Navy
DTSC	Department of Toxic Substances Control

EEC	extreme effect concentration
EE/CA	Engineering Evaluation/Cost Analysis
EO	Executive Order
EPA	Environmental Protection Agency
EPRGs	ecological preliminary remediation goals
ERA	Ecological Risk Assessment
ER-L	Effective Range – Low
ER-M	Effects Range – Median
FDEP	Florida Department of Environmental Protection
FFSRA	Federal Facility Site Remediation Agreement
HHRA	human health risk assessment
HMW	high molecular weight
IAS	Initial Assessment Study
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
LEA	Local Enforcement Agency
LMW	low molecular weight
MEC	midrange effect concentration
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
mg/L	milligrams per liter
µg/L	micrograms per liter
NACIP	Navy Assessment and Control of Installation Pollutants
NAVSEASYSCOM	Naval Sea Systems Command
NAVWPNSTA	Naval Weapons Station
NAWQ	National Ambient Water Quality
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center
Ni	nickel

NISC	Newport-Inglewood structural zone
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no adverse effects levels
NOEC	no observed effect concentration
NWR	National Wildlife Refuge
OCFCC	Orange County Flood Control Channel
O&M	operation and maintenance
PAHs	polycyclic aromatic hydrocarbons
Pb	lead
PCBs	polychlorinated biphenyls
PEL	probable effects level
POA	Plan of Action
POLB	Port of Long Beach
ppb	parts per billion
ppm	parts per million
PRGs	Preliminary Remediation Goals
QA/QC	quality assurance/quality control
RAB	restoration advisory board
RAC	Remedial Action Contractor
RAOs	removal action objectives
RAP	Remedial Action Plan
RAW	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RFA	RCRA Facility Assessment
RFW	Roy F. Weston, Inc
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act

SCAQMD	South Coast Air Quality Management District
SI	Site Inspection
SQGs	sediment quality guidelines
SVOCs	semivolatile organic compounds
SWDIV	Southwest Division, Naval Facilities Engineering Command
SWMU	solid waste management unit
TBC	to be considered
TCGs	target cleanup goals
TDS	total dissolved solids
TEC	threshold effect concentration
TEL	Threshold Effects Level
UCLs	upper confidence levels
UET	upper effects threshold
ULBV	Upper Limit Background Values
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
VOCs	volatile organic compounds

1. Introduction

This Engineering Evaluation/Cost Analysis (EE/CA) identifies and evaluates proposed removal action alternatives to mitigate or prevent damage to public health or welfare or the environment from buried refuse, waste debris, and contaminated soil at Installation Restoration (IR) Site 7, the former Station Landfill, of the Naval Weapons Station (NAVWPNSTA) Seal Beach.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) define removal actions to include *"the cleanup or removal of released hazardous substances from the environment, such actions as may necessarily be taken in the event of the threat of release of hazardous substance into the environment, such action as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removal material, or the taking of such other actions as may be necessary to prevent, minimize or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release."* The United States (U.S.) Environmental Protection Agency (EPA) has classified removal actions into three types based on the circumstance surrounding the release or threat of release: "emergency," "time critical," and "non-time critical." The mitigation of waste debris and contaminated soil at Site 7 has been determined to be a non-time critical removal, since onsite action would be taken more than 6 months after commencement of the planning period.

Additionally, the California Health and Safety Code (CA-HSC) specifies the preparation of necessary documentation that depends upon the costs of the removal action. The CA-HSC requires development of either: a Remedial Action Plan (RAP) for removal actions that cost $1 million or greater or a Removal Action Work Plan (RAW) for removal actions that cost less than $1 million. Further, the CA-HSC authorizes the Department of Toxic Substances Control (DTSC) to waive the RAP requirements, in favor of a RAW or a RAP-equivalent document, for removal actions when an imminent and/or substantial endangerment determination exists. DTSC may also waive the RAP requirements if a RAP-equivalent document that meets the requirements of a CA-HSC §25356.1(h)(3) is prepared.

Site 7 is an approximately 33-acre site located near the southern boundary of the base and at the eastern boundary of the Seal Beach National Wildlife Refuge (NWR). A portion of Site 7 is located within the NWR. Landfill activities were reportedly conducted at the site from approximately 1955 to 1973. This EE/CA addresses the implementability, effectiveness, and cost of mitigating potential impacts emanating from Site 7 and addresses applicable regulatory requirements. The Department of the Navy (DON), with state regulatory oversight, is the lead agency for the mitigation of environmental impacts from Site 7. As the lead agency, DON has final approval authority of the recommended alternative selected and overall public participation activities with state concurrence. DON is working in cooperation with DTSC, California Regional Water Quality Control Board (RWQCB) Santa Ana Region, California Integrated Waste Management Board, and U.S. Fish and Wildlife

Service (USFWS) in the implementation of this removal action. Applicable or Relevant and Appropriate Requirements were identified by the agencies and are included in Appendix A.

This EE/CA will be used as the basis for a future CERCLA removal action and is issued in accordance with the Community Relations Plan prepared for NAVWPNSTA Seal Beach to facilitate public involvement in the decisionmaking process. The public is encouraged to review and comment on the proposed removal activities described in this EE/CA. There will be a formal 30-day comment period at the time this EE/CA is made to the public. DON will provide written responses to significant public comments provided during this period.

An action memorandum on the selected removal alternative will be prepared based on this EE/CA, incorporating regulatory and public comments. The action memorandum would provide a written record of the decision to select an appropriate removal action. As the primary decision document, the action memorandum substantiates the need for a removal action, identifies the proposed action, and explains the rationale for the removal action selection. A remedial action plan (RAP) or remedial action work plan (RAW) will be incorporated into the Action Memorandum.

NAVWPNSTA Seal Beach formed a restoration advisory board (RAB) as part of the community outreach effort associated with the Department of Defense IR Program. The RAB meets regularly to review IR documents and discuss restoration issues. The RAB is made up of members of the community representing diverse interests, and meetings are open to the public. The RAB membership selects a community co-chair that serves for a designated period.

To gain a more thorough understanding of the activities associated with this removal action, the public is encouraged to review the documents for this and other NAVWPNSTA Seal Beach IR activities contained in the information repositories. These repositories are located at:

Naval Weapons Station Seal Beach
800 Seal Beach Boulevard, Building 110
Seal Beach, CA 90740-5000
c/o Pei-Fen Tamashiro/Code N45S
562/626-7897

Seal Beach Public Library, Mary Wilson Branch
707 Electric Avenue
Seal Beach, CA 90740
562/431-3584

Project documents are also available to the public through the Administrative Record. The Administrative Record (located at 1220 Pacific Coast Highway, San Diego, CA) is currently housed by the Southwest Division, Naval Facilities Engineering Command (SWDIV) and maintained by Diane Silva (SWDIV Administrative Record Coordinator, 619/532-3676).

2. Site Characterization

This section includes descriptions of the facility and background, previous investigations, nature and extent of contamination, analytical data, and risk-screening evaluation. The information for this site characterization was taken from various sources, including the Initial Assessment Study (IAS) Report (NEESA, 1985), Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) Report (A.T. Kearney, 1989), Plan of Action/Site Inspection (SWDIV, 1990), Remedial Investigation (SWDIV, 1995b), Site 7 Landfill Closure Plan (SWDIV, 1996), Ecological Risk Assessment (ERA) Phase II Validation Study (SWDIV, 1999a), Groundwater Monitoring Study (SWDIV, 1999b), Supplemental Characterization Report Installation Restoration Site 7 (SWDIV, 1999c), and Screening Aquatic ERA (SWDIV, 2000).

2.1 Facility Description and Background

NAVWPNSTA Seal Beach is part of the Commander Navy Region Southwest, and its major claimant is the Commander-in-Chief Pacific Fleet. NAVWPNSTA Seal Beach's main function is to provide fleet combatants with ready-for-use ordnance. Because of NAVWPNSTA Seal Beach's geographic location, it serves as a supply point for two-thirds of the operating Navy and Marine Corps forces in the Pacific.

NAVWPNSTA Seal Beach (Figure 2-1), located about 30 miles south of the Los Angeles urban center, consists of about 5,000 acres of land located on the Pacific Coast within the City of Seal Beach in Orange County, California.

The naval facility at Seal Beach was originally commissioned in 1944 at the height of World War II as the "Naval Ammunition and Net Depot." In 1962, the Naval Ammunition and Net Depot was christened as the "Naval Weapons Station." In October 1997, this naval facility was renamed "Weapons Support Facility" as part of a Naval reorganization. In October 1998, the base reverted back to "Naval Weapons Station." NAVWPNSTA Seal Beach supplies ships home-ported at San Diego Naval Station. In addition to readying combat and training ships with missiles, torpedoes, and conventional ammunition required for deployment, NAVWPNSTA Seal Beach's mission has expanded to include analyzing the performance of those weapons and using that data to extend their life expectancy and reliability.

The Port of Long Beach (POLB) completed its creation of 116 acres of wetland habitat within the NWR in 1990 as mitigation for construction of the 147-acre Pier J Landfill in a protected deep-water area of Long Beach Harbor. The construction consisted of creating four tidally influenced basins (i.e., POLB Mitigation Ponds), two of which have islands to provide additional habitat for birds (Recon, 1997). POLB Mitigation Pond 4, also referred to as "Perimeter Pond," lies along the western boundary of Site 7.

2.1.1 Site Location

Site 7 Station Landfill, a former waste disposal site, is situated at the southern boundary of NAVWPNSTA Seal Beach, adjacent to Perimeter Road and the Orange County (Bolsa Chica) Flood Control Channel (Figures 2-2). The site is within Sections 17 and 18 of Township 5 South, Range 11 West, of the San Bernardino Meridian. The longitude and latitude of Site 7 are 118°03′ west and 33°44′ north, respectively.

Site 7 Station Landfill is an approximately 33-acre site located near the southern boundary of the Station and at the eastern boundary of the Seal Beach NWR. A portion of Site 7 is located within the NWR (Figure 2-3). The NWR was established to preserve one of the largest remaining salt marshes in Southern California. It provides essential habitat for the California least tern and light-footed clapper rail and maintains quality habitat for the California brown pelican, peregrine falcon, and Belding's savannah sparrow.

Site 7 is bounded on the north by a railroad spur and oval laydown area, and on the south by a drainage ditch and Perimeter Road. The eastern boundary is not delineated but appeared in aerial photographs (by previous investigations) to extend to the southern projection of the marshalling yard. The western boundary cuts north-south along the eastern shoreline of Perimeter Road at the southeast corner of the NWR. Perimeter Road forms the southern boundary of Site 7.

2.1.2 Type of Facility and Operational Status

The landfill reportedly began operations some time between October 1955 and December 1957 and operated until about 1973, when a contract was awarded for off-Station disposal of wastes. According to interviews of long-time Station employees and a review of historical aerial photographs conducted by the 1985 IAS, it is reported that the landfill was developed in three stages. A different trench was used in each of these three stages. Each trench was reported to be about 80 feet wide by 300 feet long and was excavated to about the water table. The total volume of the three trenches is reportedly about 27,000 cubic yards. However, results of the aerial photograph review and geophysical survey conducted for the Remedial Investigation (RI) indicate landfilling was not limited to three trenches (SWDIV, 1993b; 1993c).

Almost any waste produced on-Station may have been disposed at the landfill. Full, partially full, and empty drums and cans may have been disposed at Site 7. The largest volume of waste was reportedly empty paint and solvent containers, mostly 1- and 5-gallon cans. Other reported wastes include lumber, metal banding, construction debris, asbestos insulation, rags, paint, mineral spirits, alcohol, solvents, paint thinner, transformer oil filters, and petroleum products (NEESA, 1985). During the 1960s, non-Station personnel were allowed to enter NAVWPNSTA Seal Beach and dispose of wastes at the landfill. The road-oiling contractor's truck was reportedly observed at the landfill during this time; whether the tank truck discharged to the landfill is unknown (NEESA, 1985).

Subsequent field investigations of Site 7 conducted under the Navy's IR Program confirmed the presence of multiple trenches, although mostly shorter and narrower than those previously reported (SWDIV, 1995b). Investigations to date have demonstrated that much

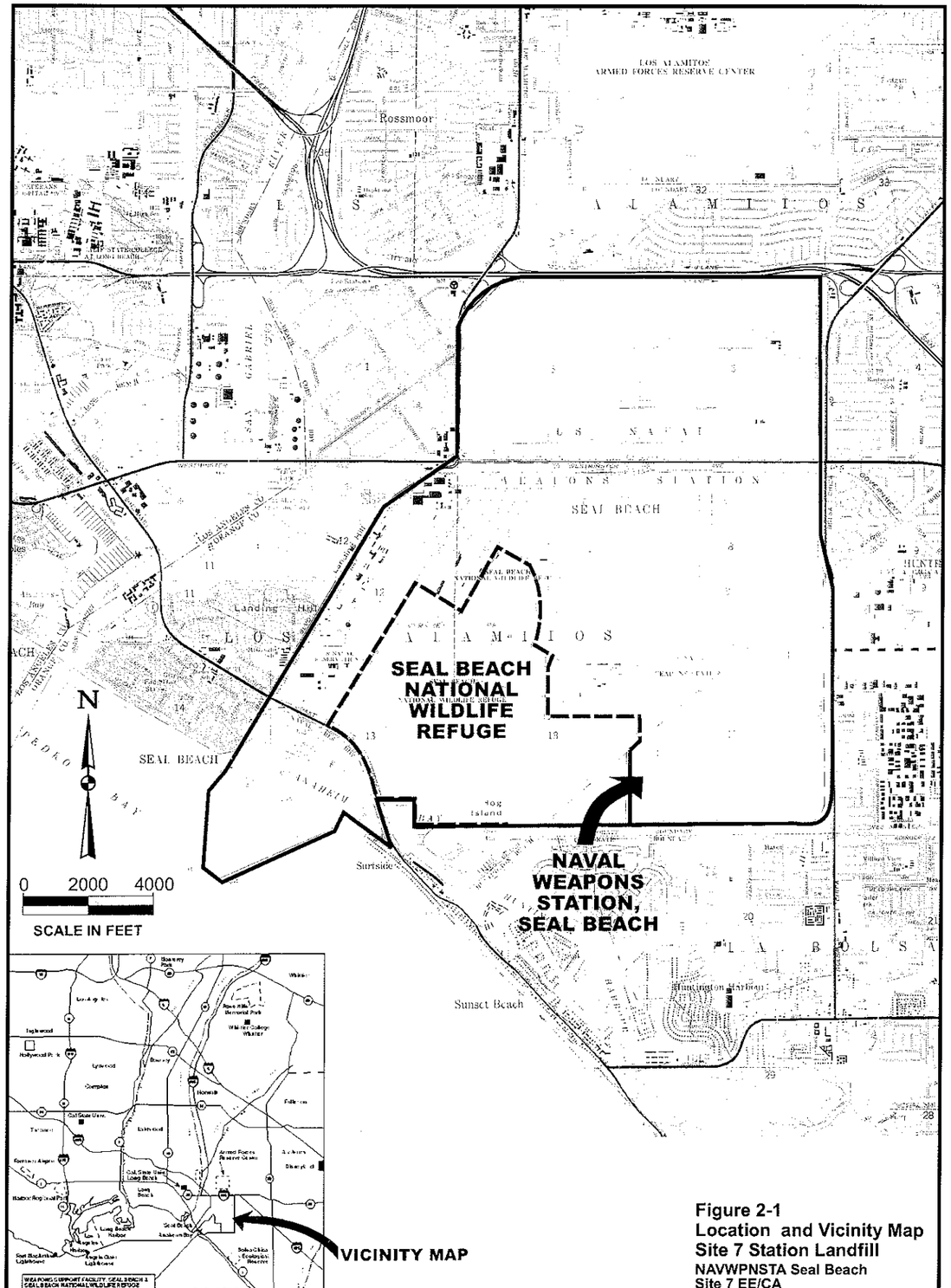

Figure 2-1
Location and Vicinity Map
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

SCO141948 02 40 Loc&VicMap FH10 05/02

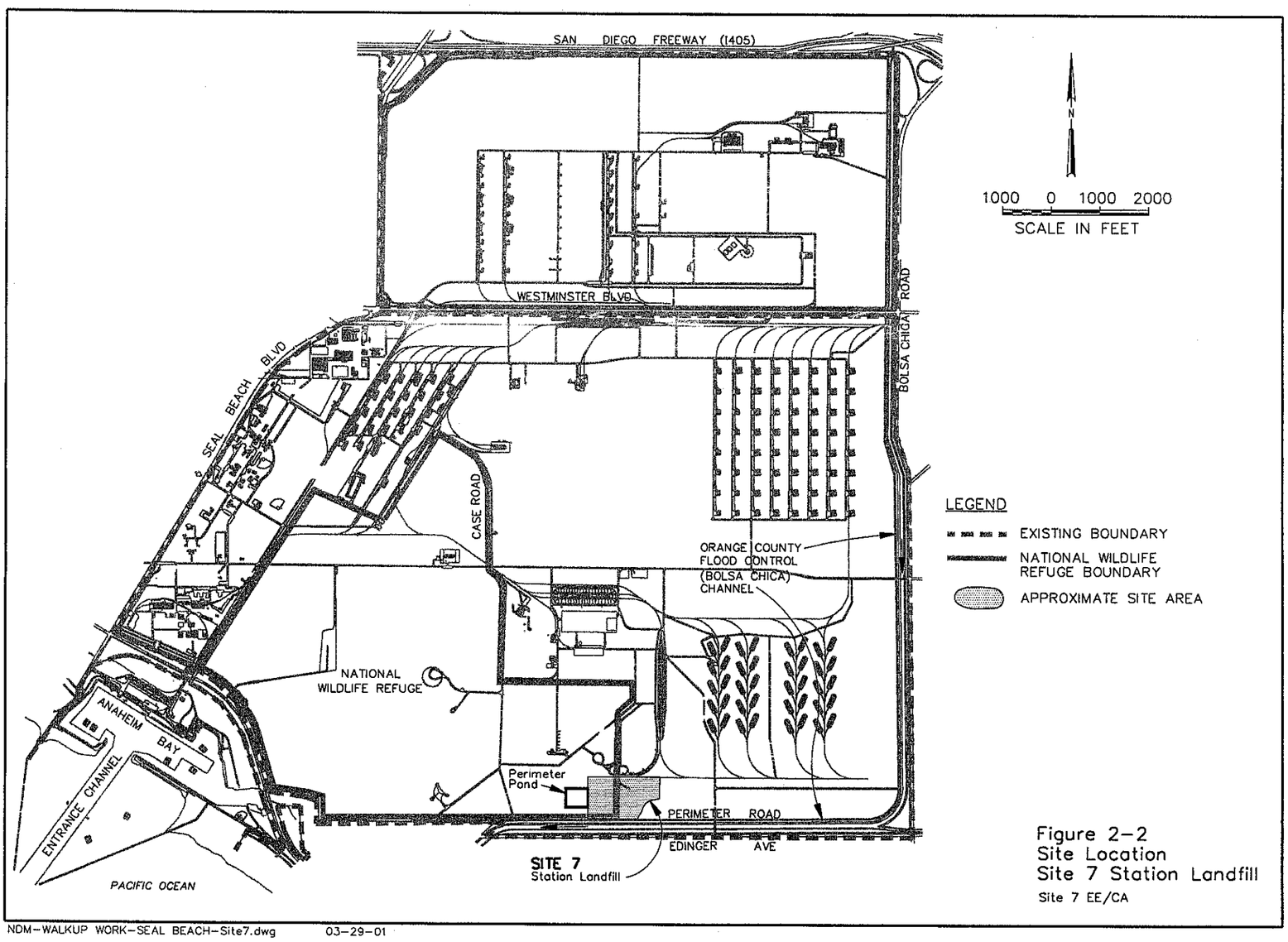

Figure 2-2
Site Location
Site 7 Station Landfill
Site 7 EE/CA

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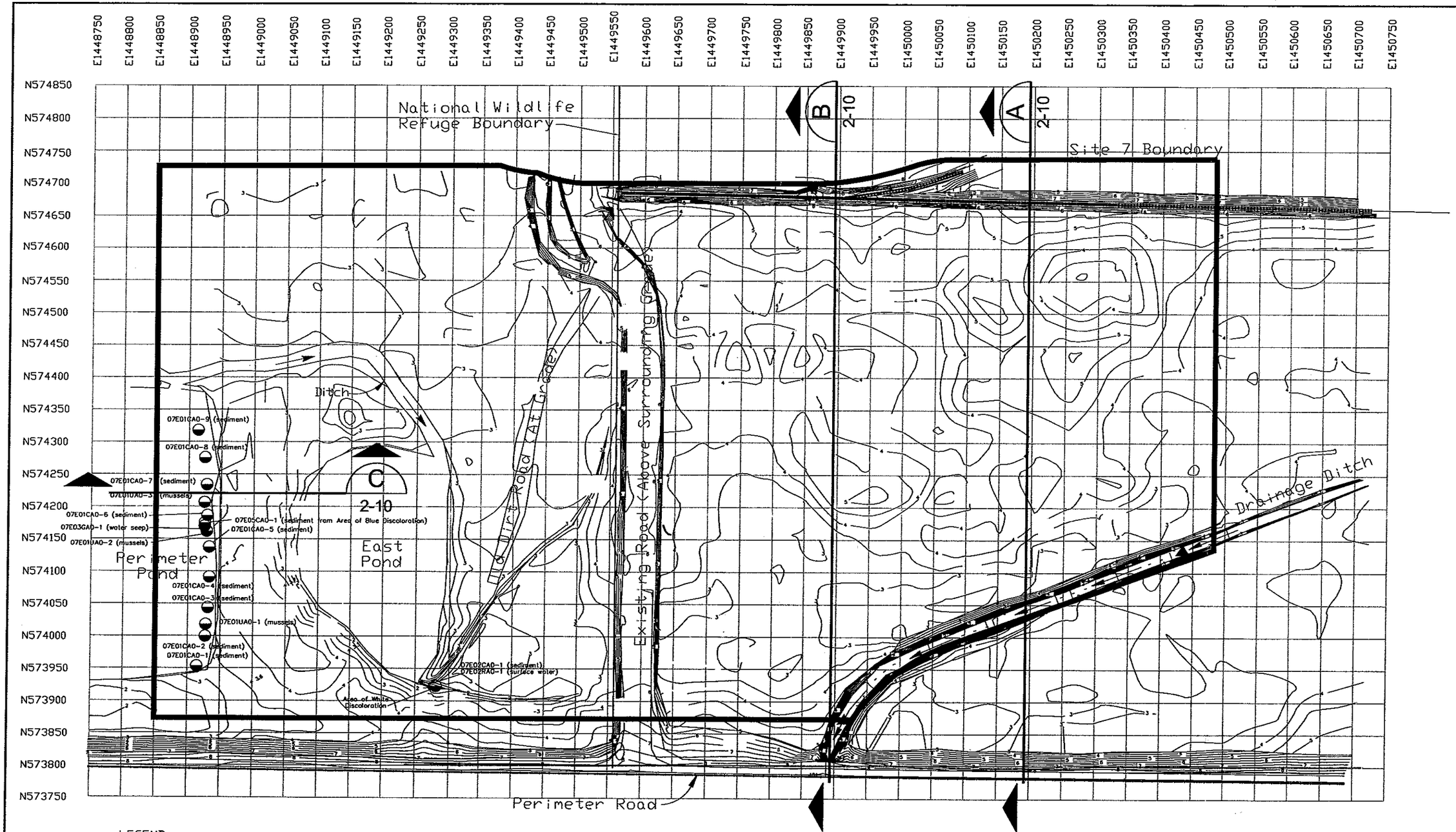


Figure 2-3
Aquatic Ecological Risk Assessment
Sample Locations at Site 7
Site 7 Station Landfill
NAVWPNSTA Seal Beach

NDM-WalkUp Work-Seal Beach-Fig2-3.dwg 21-MAy-2002

of the material in these trenches appears to be predominantly domestic refuse, construction debris, and earthen fill material (SWDIV, 1996). In addition, results of the previous investigations concluded that the current risks associated with the degree and types of chemical contamination that may be attributable to Site 7 did not warrant remediation. Descriptions of the previous investigations are summarized in Section 2.2.

Currently, no disposal activity occurs at the site. The current and future uses of the land occupied by the refuge are the same. National wildlife refuges are established by Congress and are considered permanent entities.

2.1.3 Topography/Structures

NAVWPNSTA Seal Beach is bordered to the southwest by Anaheim Bay and to the north, east, and west by highly developed urban communities. Most of NAVWPNSTA Seal Beach lies on relatively flat alluvial deposits that slope evenly from approximately 20 feet above sea level in the northeast part of the facility to sea level in the tidal salt marsh of the NWR in the southwest. The most pronounced topographic feature on NAVWPNSTA Seal Beach is Landing Hill on the western portion of the facility. Landing Hill is uplifted along the Newport-Inglewood Fault Zone that covers an area extending west of NAVWNSTA Seal Beach across Seal Beach Boulevard. Landing Hill reaches a maximum elevation of about 50 feet above sea level on NAVWPNSTA Seal Beach (SWDIV, 1995b). Most of the administrative and public works buildings of NAVWPNSTA Seal Beach are on Landing Hill (Figure 2-1).

Site 7 consist of an almost rectangular-shaped area with almost half of Site 7 located in the eastern portion of the NWR (immediately north of the Orange County [Bolsa Chica] Flood Control Channel (OCFCC)) in the southern part of NAVWPNSTA Seal Beach. A drainage ditch on the southeast corner of Site 7 served as an unlined flood control channel prior to the excavation of the OCFCC (Figure 2-3). Seawater floods the ditch during high tides, and freshwater flows into the ditch from the flood control channel during periods of high drainage.

An elevated, unpaved access road runs north-south through the middle of Site 7 and acts as a tidal barrier. The area west of the road becomes flooded during high tides and supports tidal salt marsh vegetation. Driftwood and other transported materials (natural and synthetic) are deposited along the western edge of the dirt road as the road forms the furthest extent of the tidal bore. The area east of the dirt road is not ordinarily submerged by tidal waters; therefore, it does not support tidal salt marsh vegetation. The soil is soft, fine-grained, and dry at the surface. The total surface area of the site is approximately 33 acres.

The site is relatively flat with elevations ranging from 2 to 8 feet above mean sea level (Figure 2-3). The greatest topographic relief is associated with the railroad spur and the unpaved access road through the site. The ground surface gently slopes to the south with numerous closed depressions (SWDIV, 1996). A nonuniform, nonengineered soil cover exists over the landfill. The landscape is dominated by native vegetation. No buildings or aboveground or below ground structures are located on the site.

2.1.4 Geology/Soil Information

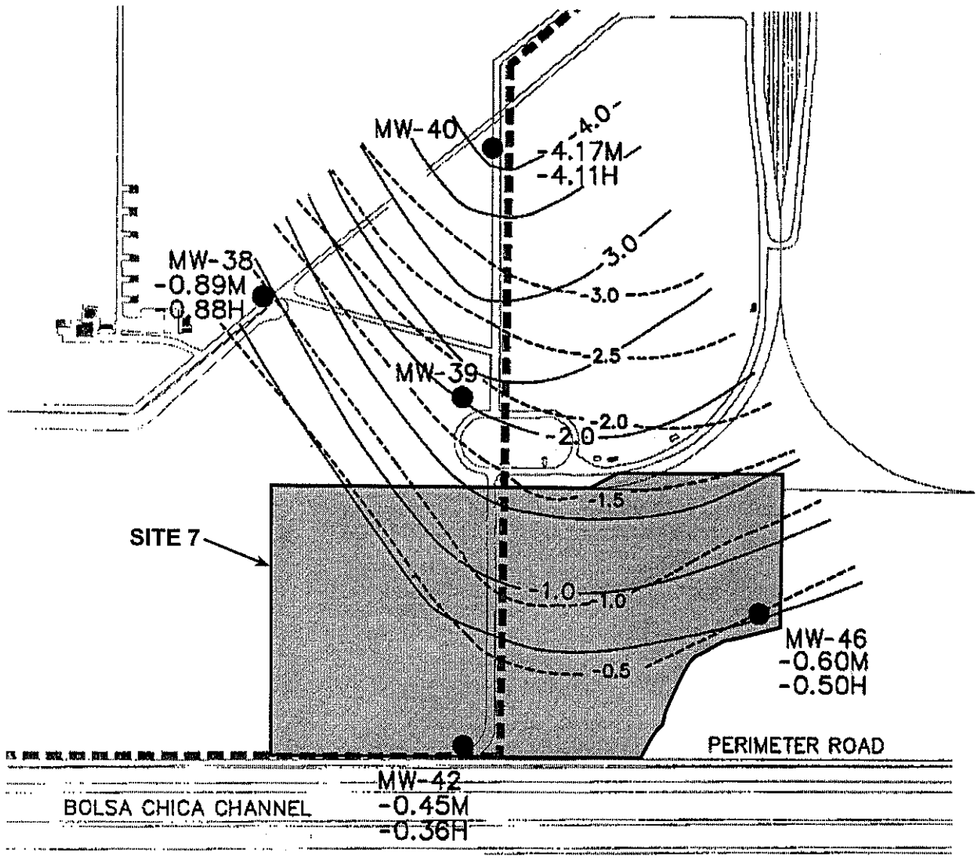
A brief description of the geology of NAVWPNSTA Seal Beach and Site 7, including soil, groundwater, and surface water, is provided below.

NAVWPNSTA Seal Beach is located adjacent to the Pacific Ocean at the seaward edge of the Orange County Coastal Plain at the northwest corner of Orange County, California. The northwest-trending Newport-Inglewood structural zone (NISZ) underlies the southwestern portion of NAVWPNSTA Seal Beach. The NISZ consists of a complex set of faults and folds that extend from Newport Beach, approximately 10 miles southeast of NAVWPNSTA Seal Beach, to Beverly Hills at the base of the Santa Monica Mountains, approximately 30 miles northwest of the station. In the vicinity of the Station, alluvial and coastal deposits of Recent age, upper Pleistocene deposits of the Lakewood Formation, and lower Pleistocene deposits of the Pico Formation are the formations of interest. In the vicinity of Landing Hill, terrace cover deposits of the upper Pleistocene are exposed at the surface. Descriptions of the upper Pliocene to Recent stratigraphic formations underlying the Station follow from youngest to oldest. Uplift along the NISZ has produced a line of low coastal hills and mesas near the southern end, including Landing Hill in the west edge of NAVWPNSTA Seal Beach. Adjacent to Landing Hill on the east is Sunset Gap, a wetlands comprising coastal salt marsh and tidal mud flats.

The structural basin along the Coastal Plain of Orange County contains primarily sedimentary rocks that have reached a thickness in excess of 30,000 feet since the Middle Miocene time. In a practical sense, only about the upper 4,000 feet of the sediments are of importance as a freshwater bearing reservoir. A considerable portion of the sedimentary section that was deposited has been removed by erosion, resulting in numerous unconformities and stratigraphic discontinuities (SWDIV, 1996).

The depth to groundwater at Site 7 was observed to range between 1 and 9 feet below ground surface (bgs) during the November 1988 site inspection field activities, between 3 and 5 feet bgs during December 1993 RI field activities, and between 2 and 4 feet and 5 to 9 feet bgs for the February 1998 and July 1998 water-level monitoring events, respectively. According to a tidal influence evaluation conducted in August/September 1993, the groundwater levels are noticeably influenced by tidal fluctuations. The mean groundwater gradient across Site 7, calculated based on 1993 water level data, was approximately 0.002 feet/feet to the northeast (Figure 2-4). The average gradient for the February/March 1998 monitoring event was 0.001 feet/feet, while the average gradient across the site for the July 1998 monitoring event was 0.0025 feet/feet. The groundwater flow direction was to the southwest (approximate gradient of 0.001 feet/feet) during February/March 1998, towards the NWR, and to the southeast (approximate gradient of 0.004 feet/feet) and east (approximate gradient of 0.001 feet/feet) during July 1998, away from the NWR (Figure 2-5). The underlying shallow groundwater is saline to hypersaline (total dissolved solids [TDS] ranging between 24,000 and 57,000 milligrams per liter [mg/L]).

Review of boring logs and cone penetrometer test data provided lithologic information for Site 7. The subsurface lithology is predominantly clay and fine-grained silty clay to approximately 25 to 30 feet bgs, underlain by lenses of silty sand. A 2- to 5-foot bed of fine-grained silt, interbedded in the upper clay interval between 10 to 15 feet bgs, appears across



LEGEND

- MONITORING WELL
- ROAD
- NATIONAL WILDLIFE REFUGE BOUNDARY
- BUILDING
- APPROXIMATE SITE 7 AREA
- SITE BOUNDARY
- --4.11H-- HIGH TIDE GROUNDWATER LEVEL CONTOUR FEET MSL 17 SEPTEMBER 1993, 1400
- —-4.17M— DAILY MEAN GROUNDWATER LEVEL CONTOUR FEET MSL 17 SEPTEMBER 1993

CONTOUR INTERVAL = 0.5 FEET

N

0 250 500

SCALE IN FEET

Figure 2-4
Groundwater Elevations and Groundwater Gradients
(September 1993)
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

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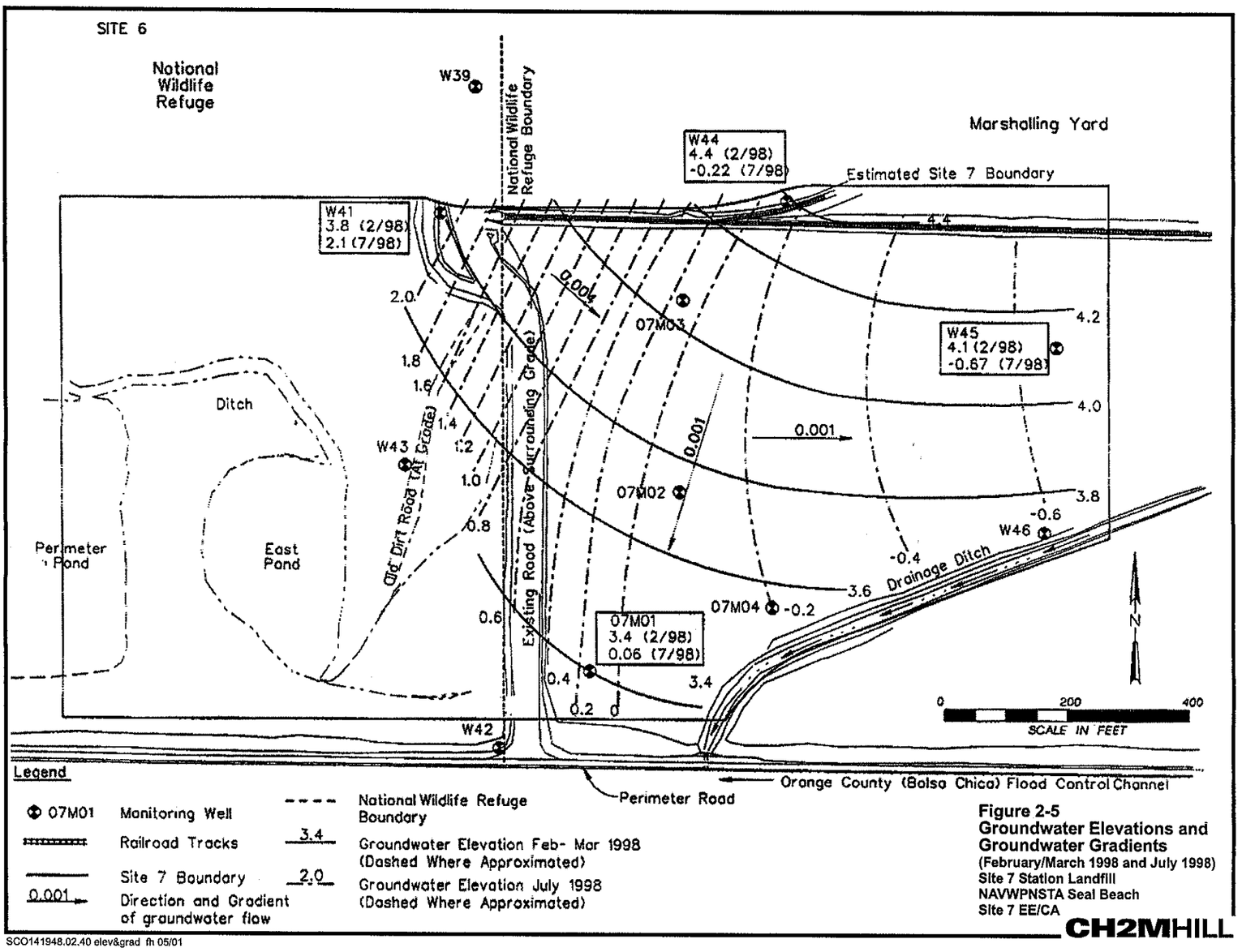

Figure 2-5
Groundwater Elevations and Groundwater Gradients
(February/March 1998 and July 1998)
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

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most of the site (SWDIV, 1995b). The locations of lithologic information obtained from CPTs and lithologic logs generated from soil borings are shown in Figure 2-6. Northwest-southeast and northeast-southwest cross sections through the site are presented in Figures 2-7 and 2-8, respectively.

2.1.5 Surrounding Land Use and Populations

NAVWPNSTA Seal Beach, located in Orange County, is bordered by the city of Seal Beach on the north, west, and southwest; the city of Westminster on the northeast; the city of Huntington Beach on the southeast and south; and county land on the south between Edinger and Warner Avenues.

The predominant land use in the surrounding areas is medium-density residential, with scattered parcels of high-density residential, commercial, industrial, and recreational development (SWDIV, 1995b). Future land uses for the adjacent cities include commercial/industrial, limited residential, and open space. The Station is surrounded by residential land uses on the south, southwest, northwest, north, and northeast. Major commercial/industrial uses border the Station on the west (including the Boeing Company, formerly the Rockwell International facility) and east (including Boeing Aerospace, formerly McDonnell-Douglas Aerospace). The Sunset Aquatic Park borders Site 7 to the south and is a commercial development consisting of 260 boat slips, park facilities, a marine repair yard, a boat launch, harbor patrol office, and public picnic areas.

Explosive quantity distance arcs that restrict development to specific permitted uses cover approximately 75 percent of NAVWPNSTA Seal Beach. Two agricultural outleases, totaling approximately 2,200 acres, are used for farming (irrigated and dry) and maintenance. Approximately 76 acres of land are currently being leased for oil production (including Oil Island). In addition to the outlease land, the NWR, a major biological resource, encompasses approximately 911 acres of NAVWPNSTA Seal Beach. The areas covered by the explosive quantity distance arcs overlap the agricultural outlease areas and portions of the NWR (Recon, 1997).

Other land uses on NAVWPNSTA Seal Beach include residential; ordnance transfer operations; weapons production, evaluation, and quality assurance; storage (inert and explosive); and administration/community support.

Water is supplied to NAVWPNSTA Seal Beach by the city of Seal Beach by a gravity-fed distribution system. Groundwater under NAVWPNSTA Seal Beach is not currently used for drinking purposes on-station. Nonpotable water used for agricultural purposes is supplied by on-station agricultural wells with screened intervals between 140 and 600 feet bgs. Because of the distance of these wells from the site (with the nearest well about 4,300 feet north of Site 7) and their screen intervals, Site 7 is not expected to impact the water quality in these wells.

No regular Station activities take place at Site 7. There are no buildings or structures present. Infrequent mowing occurs as needed to control vegetation growth on the eastern portion of Site 7.

2.1.6 Sensitive Ecosystems

Approximately 911 acres of NAVWPNSTA Seal Beach, including almost all of the saltwater marsh, is included in the NWR. The ecological habitats at the station include open water, tidal channels, mud flats, and salt marshes of Anaheim Bay. The main purpose of the NWR is to preserve and enhance the area's living resources. Scientific investigations have been and are being conducted on the NWR. Limited recreational activities are authorized for military and civilian personnel (retired military).

The salt marsh ecosystem supports a large diversity of organisms. The mixture of mud, sand, and silt in the tidal mud flats supports a variety of benthic species, including annelids, mollusks, crustaceans, and echinoderms. These tidal flats trap water that helps sustain large populations of California horn shell *(Cerithides californica)* and the striped shore crab (*Pachgrapsus crassipes*). Mussels, clams, and oysters also feed off the plankton carried through the marsh by the tide (NEESA, 1985). Many of these invertebrates are food sources for the birds that inhabit the area.

Several species of phytoplankton and zooplankton organisms can be found in the salt marsh. The tidal salt marsh also contains a diverse population of fish. Many species of fish use the shallow protected waters of the bays in the salt marsh for spawning and nursery grounds. Birds using the tidal salt marsh and adjacent areas include numerous species of shorebirds and waterfowls, and several predators of those groups. In addition, the salt marsh is host to small mammals, reptiles, and amphibians. A variety of plant species also grow in and around the tidal salt marsh (SWDIV, 1995b).

Seven species of birds known to be resident or migrants at NAVWPNSTA Seal Beach are listed by either federal or state agencies, or both, as threatened or endangered. They include the California brown pelican (*Pelicanus occidentalis californicus*), Swainson's hawk (*Buteo swainsoni*), Peregrine falcon (*Falco peregrinus anatum*), Aleutian Canada goose (*Branta canadensis leucopareia*), Western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) (Recon, 1997). Because of the rapidly disappearing habitat on the coast of Southern California, two species of federally listed endangered birds, the California least tern and the light-footed clapper rail, rely on the Seal Beach NWR tidal salt marsh habitat for their nesting grounds.

The vegetative community at Site 7 has been characterized as predominantly annual grassland east of the unpaved access road, and coastal salt marsh/mudflat west of the access road (in the NWR) (Recon, 1997). The grassland portions of Site 7 are a mixture of native species and invasive weedy plants, including grasses and forbes. Because of disturbances, patches of bare soil are common on Site 7 (SWDIV, 1995b). The following sensitive plant species have been observed at Site 7: Southern tarplan (*Hemizonia parryi* ssp. *Australis*), Coulter's goldfields (*Lasthenia glabrata* ssp. *Coultri*), and Seaside calandrinia (*Calandrinia maritima*) (Recon, 1997).

Mammals observed at Site 7 include the house mouse and western harvest mouse (SWDIV, 1999a), the blacktail hare, cottontail, and California vole. Birds sighted include the mourning dove, barn owl, California least tern, Forster's tern, rock dove, Cooper's hawk, red-tailed hawk, turkey vulture, Northern mockingbird, Western meadowlark, and the Belding's savannah sparrow (which nests throughout Site 7).

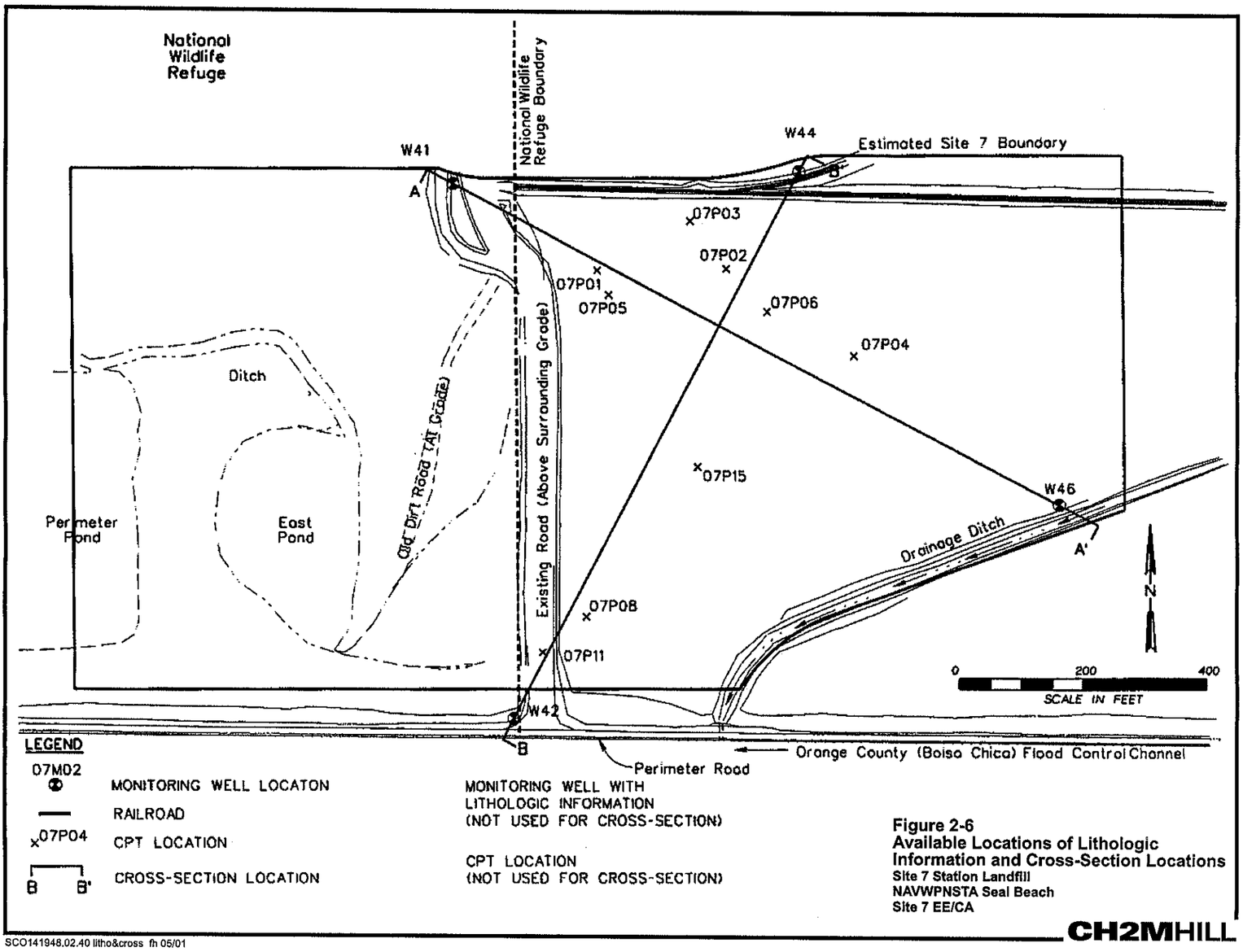

Figure 2-6
Available Locations of Lithologic Information and Cross-Section Locations
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

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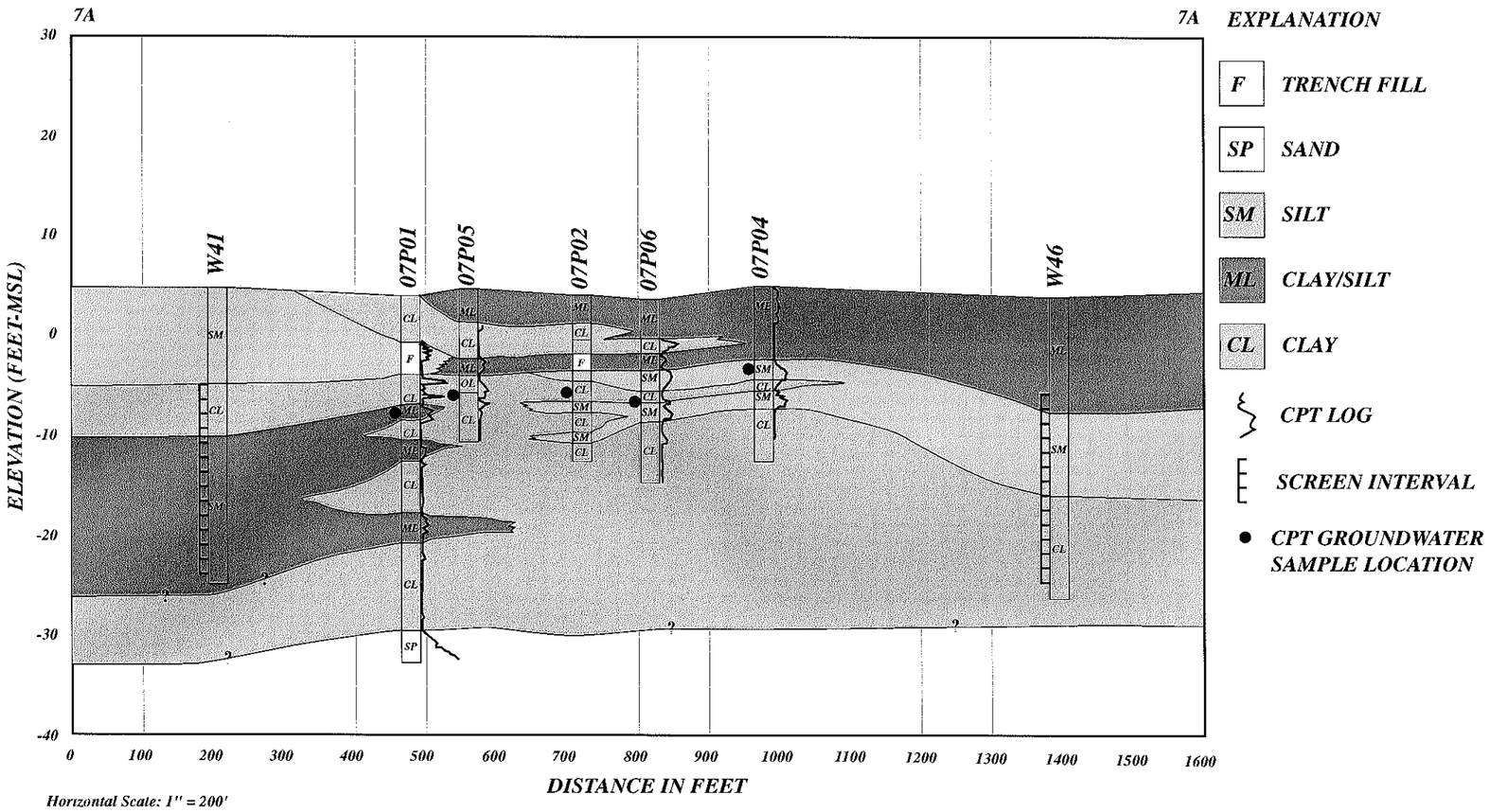

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Vertical Scale: 1" = 14'

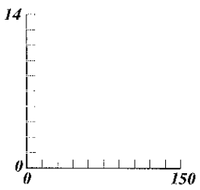

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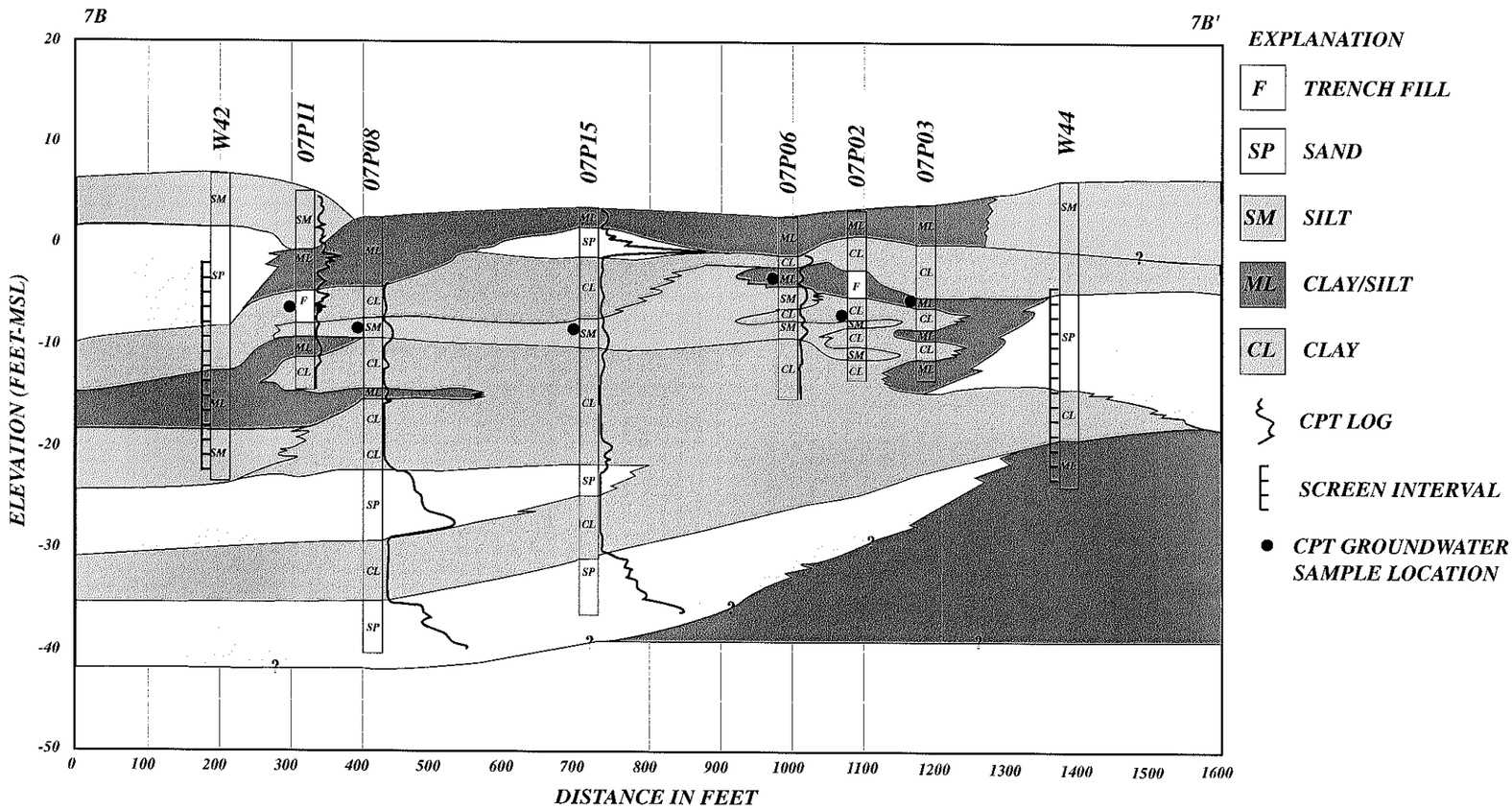
Figure 2-7
Cross-Section 7A-7A'
Site 7 Station Landfill

NAVWPNSTA Seal Beach
Site 7 EE/CA



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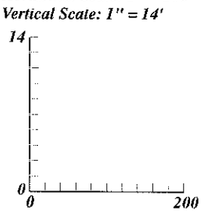

Figure 2-8
Cross-Section 7B-7B'
Site 7 Station Landfill

NAVWPNSTA Seal Beach
Site 7 EE/CA

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Marine fauna in Perimeter Pond include deepbody anchovy, topsmelt, goby, horned snail, saltmarsh snail, striped shore crab, and various mollusks and polychaetes (SWDIV, 1995b). Along the western border of the site, mussels can be found attached to hard substrate (rocks and concrete debris) along the Perimeter Pond shoreline.

2.1.7 Meteorology

California's climate is largely influenced by the Pacific high-pressure system, which is a semipermanent high-pressure system located off the Pacific Coast that tends to migrate seasonally. During the summer, the high-pressure system moves northerly and produces persistent temperature inversions and predominantly northwest airflow. Skies remain clear, and little precipitation occurs because the high-pressure system tends to block migrating extra-tropical storms. Warm, moist tropical air from off the coast of Mexico also blows into Southern California, bringing occasional thunderstorms and isolated showers that occur mainly over the mountains.

The Pacific high-pressure system begins to shift southerly during the fall, and its effects are less pronounced, especially during the winter. Extra-tropical storms can move into Southern California, increasing precipitation and cooling temperatures. During the winter, Santa Ana wind conditions are not uncommon. Santa Ana winds occur when high pressure builds in the Great Basin area of Utah and Nevada. The clockwise circulation around the high-pressure system produces north-to-northeast winds, which can persist from several hours to a few days and reach sustained speeds of up to 60 miles per hour (SWDIV, 1995b).

2.2 Previous Actions and Investigations

NAVWPNSTA Seal Beach and the Navy have been actively engaged in the IR Program since 1980. Since 1985, Site 7 has been the subject of nine environmental investigations, including:

- IAS (NEESA, 1985)
- RFA (A.T. Kearney, 1989)
- Plan of Action/Site Inspection (SWDIV, 1990)
- RI (SWDIV, 1995b)
- Landfill Closure Plan (SWDIV, 1996)
- ERA Phase II Validation Study (SWDIV, 1999a)
- Supplemental Groundwater Monitoring Study (SWDIV, 1999b)
- Supplemental Characterization Report IR Site 7 (SWDIV, 1999c)
- Screening Aquatic ERA (SWDIV, 2000)

Investigations and studies to date have indicated that the risk to human health and ecological receptors are marginal (SWDIV, 1995b, 1999a, and 2000). The most significant possible risk are to aquatic ecological receptors in Perimeter Pond.

The following briefly summarizes the results of previous environmental investigations conducted at Site 7.

2.2.1 IAS

In 1985, the Navy conducted an IAS to investigate potentially contaminated sites at NAVWPNSTA Seal Beach (NEESA, 1985). The IAS was conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) Program by the Naval Energy and Environmental Support Activity (NEESA). The IAS concluded that 9 of the 25 impacted sites identified at NAVWPNSTA Seal Beach posed a potential threat to human health or the environment and were sufficient to warrant further investigation. Site 7 was identified as one of the nine sites, and a confirmation study was recommended to sample and monitor the site to confirm or deny the presence of contamination.

2.2.2 RFA

In 1989, A.T. Kearney, Inc., performed an RFA of NAVWPNSTA Seal Beach for EPA. Based on historical information, interviews with NAVWPNSTA Seal Beach personnel, and visual inspections of the sites, the RFA identified 69 solid waste management units (SWMUs) and areas of concern (AOCs). Many of these SWMUs and AOCs were the same as IR Program sites identified by the 1985 IAS. Site 7 was designated SWMU No. 9 by the RFA and recommended for further investigation (A.T. Kearney, 1989).

2.2.3 Plan of Action/Site Inspection

In 1987, Roy F. Weston, Inc. (RFW) was contracted by NEESA to produce a Plan of Action (POA) for Verification Study of hazardous waste disposal at the nine sites recommended by the IAS. The POA included a comprehensive background facility review, in addition to the development of data objectives, sampling plan and procedures, quality assurance/quality control (QA/QC), and Site Safety Plan. The POA served as a Site Inspection (SI) Workplan.

The analytical results from this initial SI sampling and the four subsequent groundwater sampling events, background reviews, and field observations indicated that eight of the nine sites, including Site 7, showed evidence of being impacted. Sites 1, 2, 4, 6, 7, 8, 19, and 22 were assessed to contain elevated concentrations of potential contaminants and recommended for additional investigation. The final SI Report for these sites was released in October 1990 (SWDIV, 1990).

2.2.4 Remedial Investigation

As a consequence of the findings of the SI (SWDIV, 1990), RFW was again contracted by NEESA to prepare a RI Workplan for Sites 1, 2, 4, 6, 7, 8, 19, and 22. The RI Workplan was completed in July 1990 and included recommended sampling locations and analytical parameters to delineate the nature and extent of contamination. The recommendations of the RI Workplan were not implemented by the Navy because revisions were required to comply with CERCLA requirements. However, they served as a starting point for the 1993 RI/FS Workplan (SWDIV, 1993a). The RI activities were initiated in July 1993.

The Final RI Report for Sites 1, 7, 19, and 22 was completed in December 1995 (SWDIV, 1995b). The RI at Site 7 included historical aerial photographs review, geophysical survey, soil gas sampling, integrated surface sampling, and ambient air sampling (including meteorological monitoring). Other field investigation activities performed at Site 7 included groundwater monitoring well installation and sampling (for four quarters), aquifer testing, cone penetrometer testing (CPT), direct push groundwater sampling, and surface and

subsurface soil sampling. The RI at Site 7 was developed and executed based on the EPA's guidance on presumptive remedies for landfills (EPA, 1991a, 1992, and 1993). EPA's guidance states that a comprehensive characterization of landfill's contents is not necessary or appropriate. Following EPA's guidance, data were collected to characterize routes of exposure including potential pathways of migration (e.g., groundwater contamination, soil vapor, atmospheric releases, etc.). A baseline human health risk assessment (HHRA) and a preliminary ERA were conducted using the data collected from the field investigations. The results of the risk assessments indicated that the chemical risks from Site 7 to human and ecological receptors are low. Therefore, the report recommended that Site 7 did not warrant remediation. Therefore, a no-action interim record of decision (ROD) was recommended.

2.2.5 Landfill Closure Plan

The Landfill Closure Plan was prepared to develop a document to comply with State landfill closure requirements with (at the time) CCR Title 23, Chapter 15 as the primary regulatory guidance and additional guidance from specific provisions of CCR Title 14, Chapters 3 and 5 not covered by CCR Title 23, Chapter 15. As part of the preparation of the landfill closure plan, an assessment of Site 7 and the surrounding areas was conducted in early 1996 to collect additional site-specific data to support landfill closure design. No chemical analytical data were generated for site characterization purposes.

Based on the absence of a need for remediation based on the results of IR Program investigations, the Navy began the process of closing the Site 7 landfill in accordance with state landfill closure guidelines at that time. Elements of the assessment included:

- Archaeological and paleontological resources evaluation
- Documents review and field investigation of the area east of Perimeter Pond
- Wetlands delineation
- Field evaluation of existing landfill cover soil thickness
- Groundwater level measurements
- Topographic survey
- Hydrology reconnaissance
- Sampling/analyses of onsite and stockpile soils
- Geophysical survey using seismic reflection

It was the Landfill Closure Plan that first designated Site 7 into distinct areas, as shown in Figure 2-9. The Site 7 Landfill Closure Plan was withdrawn when the Navy decided not to close the landfill outside of the IR Program.

2.2.6 ERA Phase II Validation Study

Previous investigations led to the first evaluation of risks to ecological receptors as part of the Final RI Report for Sites 1, 7, 19, and 22 (SWDIV, 1995b). At the request of the State of California, additional evaluation of risks to ecological receptors at Sites 1 and 7 was done in accordance with DTSC's July 1996 "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities," which was not available at the time the RI was conducted. This ERA Phase II Validation Study was conducted to obtain site-specific data on concentrations of chemicals in the tissues of food items of terrestrial ecological receptors for the re-evaluation of ecological risks and development of ecological preliminary

remediation goals (EPRG). The developed EPRGs were all near or above site maximum concentrations, so the proposed values did not alter the RI's conclusion for no further action at Site 7. The established values were considered to be conservatively protective of the environment.

2.2.7 Supplemental Groundwater Monitoring Study

In 1998, CH2M HILL performed a Groundwater Monitoring Study at Sites 1 and 7. The supplemental groundwater monitoring study conducted at Sites 1 and 7 consisted of two 3-week continuous water-level monitoring events and two groundwater sampling events. With respect to Site 7, the objectives of the continuous groundwater-level monitoring were to confirm the direction of groundwater flow during the wet season. The objectives of the groundwater sampling events were to evaluate the source of elevated levels of gross alpha and gross beta in the groundwater at Site 7 and to assess the concentrations of metals and cyanide. Results of the groundwater monitoring indicated that the groundwater conditions at Site 7 are complex. Surface water features at or adjacent to the site (i.e., NWR tidal salt marsh, POLB mitigation ponds, OCFCC, drainage ditch, and seasonal ponding due to rainfall) affect the shallow groundwater flow conditions. Site 7 groundwater is affected not only by Anaheim Bay tidal fluctuations but also by the influence that rainfall and tidal fluctuations exert on these hydrologic features. It appears groundwater flow is generally away from the NWR during periods with no rainfall (dry season) and is generally towards the NWR during periods of significant rainfall (wet season). The exact groundwater flow direction is determined by the interaction among the hydrologic features at or adjacent to Site 7.

The groundwater quality data trends at Site 7 indicated sporadic detection of few metals that exceeded their respective Ambient Water Quality Criteria (AWQC) and background concentrations. In addition, the radionuclides were found to be naturally occurring, and cyanide was not detected in the September 1998 sampling event. Overall, natural attenuation processes (e.g., dilution due to tidal "flushing") appear to have been active over time, and no well defined plumes exist.

2.2.8 Supplemental Characterization of Perimeter Pond Trenches

The supplemental characterization of Perimeter Pond trenches was performed by Foster Wheeler in June 1998 to provide a better estimate of the locations, dimensions, and volumes of the trenches that comprise Site 7. A combination of land survey, geophysical survey, and exploratory boring and soil sampling was used to characterize the existence of buried waste, and initial estimates of the in-place waste volumes were estimated for Areas 1, 2, 5, and 6 (see Figure 2-9). The findings for Areas 3 and 4 were inconclusive with respect to the existence of a disposal trench(es).

2.2.9 Screening Aquatic ERA

To supplement the ERA Phase II Validation Study, a Screening Aquatic ERA was performed in December 1999 to address concerns of the presence of areas of discolored sediment adjacent to Perimeter Pond and discharges of water (seeps) from areas of exposed debris. The nature of the seeps along Perimeter Pond are somewhat dynamic. It is probable that voids in the refuse are filling with sea water during high tides and draining into the pond

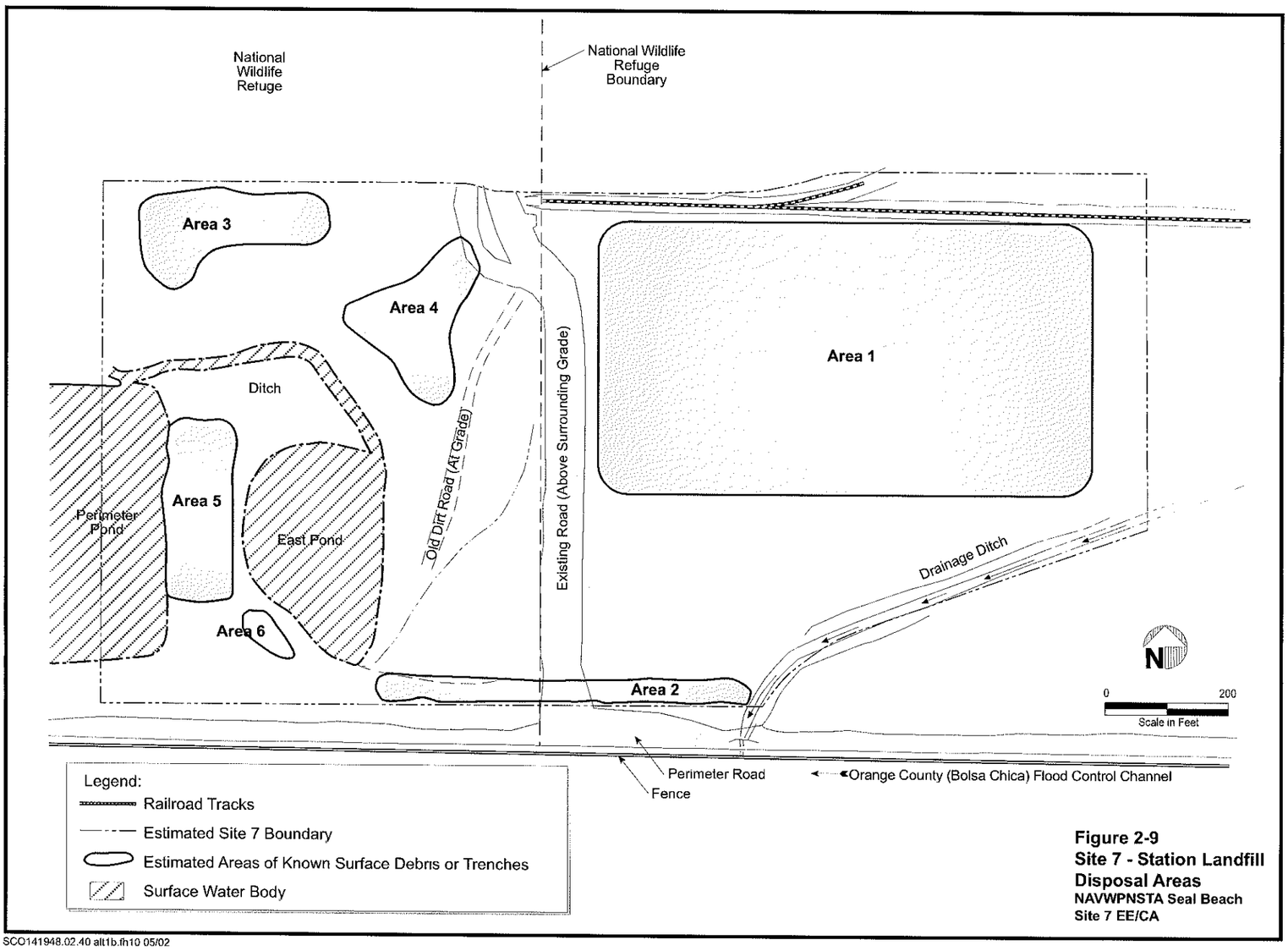

Figure 2-9
Site 7 - Station Landfill Disposal Areas
NAVWPNSTA Seal Beach
Site 7 EE/CA

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during falling and low tides. Sediment moving in and out of the seeps, the duration of flooding, and the rates of rise and fall of the tides probably affect the amounts of water moving into and out of the refuse. As part of the Screening Aquatic ERA, concentrations of chemicals in sediment, water, and mussel tissue collected from or near Perimeter Pond were compared with respective ecological screening values (sediment and water) or with statewide concentrations in mussel tissue in a screening risk analysis. Maximum values of some chemicals in some samples from all media exceeded screening risk levels but not by large amounts. Based on sediment samples collected from 10 locations along the eastern shoreline of Perimeter Pond, low risks to sessile benthic invertebrates caused by silver, dichlorodiphenyl-trichloroethane (DDT) and metabolites, and Aroclor 1254 in sediment would occur at two locations: the southeast corner of the pond and an area near the exposed debris at the approximate center of the east shoreline (see Figure 2-3). Aquatic organisms in the immediate vicinity of water seep(s) could intermittently be exposed to elevated concentrations of copper, lead, nickel, and zinc. Ecological risks from sediment and water were detected in localized (small) areas, and risks from contaminated mussels (as a surrogate for invertebrates in general) are similar to those in nearby embayments (Anaheim Bay and Huntington Harbour).

2.3 Source, Nature, and Extent of Contamination

The source, nature, and extent of contamination at Site 7 are discussed in this section. The information presented summarizes the results of the previous investigations. More detailed descriptions of the materials reported in the disposal fill are in the documents cited in Section 2.2.

The Site 7 Station Landfill is located along the southern boundary of NAVWPNSTA Seal Beach at the southeast portion of the Seal Beach NWR (Figure 2-2). A large variety of wastes generated by NAVWPNSTA Seal Beach during the period of active landfilling (approximately 1955 to 1973) may have been buried in trenches at Site 7. Almost any type of waste generated on Station may have been disposed of at Site 7 Station Landfill. The major types of waste reportedly disposed of in the landfill include small, mostly empty, containers that once contained paints, petroleum products, and various solvents; used rags; batteries; asbestos; and inert construction debris. However, as noted below, exploratory drilling and trenching of the landfill identified primarily inert materials.

Figure 2-9 shows the locations of known areas of debris associated with past landfill operations. In addition, Figure 2-10 shows cross-sections through the areas where waste was placed in trenches. For the purposes of this EE/CA, these areas are designated from 1 to 6. These areas were designated based on information obtained from past investigations (see Section 2.2).

Area 1: This area lies in the northeast portion of the site. It covers approximately 8 acres. Most of the waste disposal and landfilling activities took place in Area 1 in a series of unlined trenches lying in an east-west orientation. Reportedly, the trenches were excavated to a depth of 10 feet bgs and filled with debris (NEESA, 1985). However, exploration during a supplemental characterization indicated the bottoms of the debris burial depths varying between 5.5 and 9 feet bgs with an average bottom depth of 6.4 feet bgs (SWDIV, 1999c).

Types of debris observed during exploratory drilling included diapers, clothing, wire, and rubber.

Area 2: This area lies along the southern boundary of the site adjacent to Perimeter Road. It is probably a single, contiguous trench approximately 600 feet long by 40 feet wide (about 0.6 acres). The bottom depths of debris range from 6 to 10 feet bgs (SWDIV, 1999c) with an average bottom depth of 7.5 feet bgs. During exploratory drilling, building materials such as wood, metal, and concrete were observed.

Area 3: This area lies in the northwest portion of Site 7. It is an irregularly shaped area that is approximately 1 acre. Site visits to Area 3 reveal surficial scattered rusted metal debris. This surficial metal debris accounts for the geophysical anomalies detected in this area during the presampling activities of the RI (SWDIV, 1995b).

Area 4: This area lies in the northwest portion of Site 7 southeast of Area 3. It is similar to Area 3 in that it is also an irregularly shaped area littered with surficial rusted metal debris that is approximately 1 acre.

Area 5: This area forms the eastern shoreline of Perimeter Pond and lies between Perimeter Pond and East Pond (see Figure 2-9). Two north-south-oriented trenches lie in this area, with a portion of the western trench exposed to Perimeter Pond. Exposed debris observed includes materials such as concrete, metal banding, and lumber. Area 5 covers about 0.7 acres and has an average bottom debris depth of 7 feet (SWDIV, 1999c).

Area 6: This area lies to the southeast of Area 5. This area is similar to Areas 3 and 4 in that the debris found in this area appears to be surficial only. It lies along an unpaved access road between Perimeter Road and the eastern shore of Perimeter Pond. The debris, mostly pieces of lumber, appear to be debris that had fallen off of vehicles during the removal of portions of the exposed trench at Area 5. This area is irregular in shape and occupies about 0.1 acres.

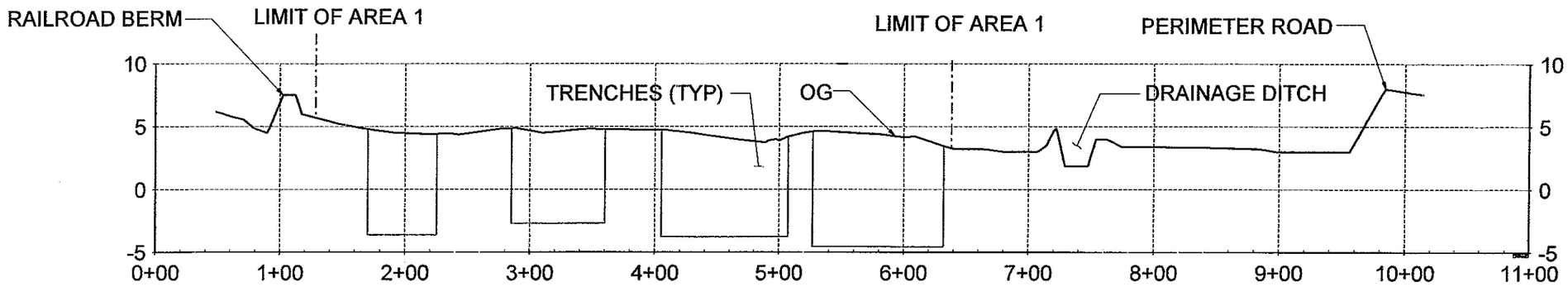
These six areas were identified through historical aerial photographs (SWDIV, 1993b), geophysical surveys (SWDIV, 1995b; SWDIV, 1999c), exploratory trenching (SWDIV, 1996; SWDIV, 1999c), surface and subsurface soil sampling (SWDIV, 1995b; SWDIV, 1999c), and groundwater sampling (SWDIV 1990; SWDIV, 1995b; SWDIV, 1999b).

The present ground surface of Site 7 is relatively flat. A nonuniform, nonengineered soil cover exists over the landfill. The landscape is dominated by native vegetation.

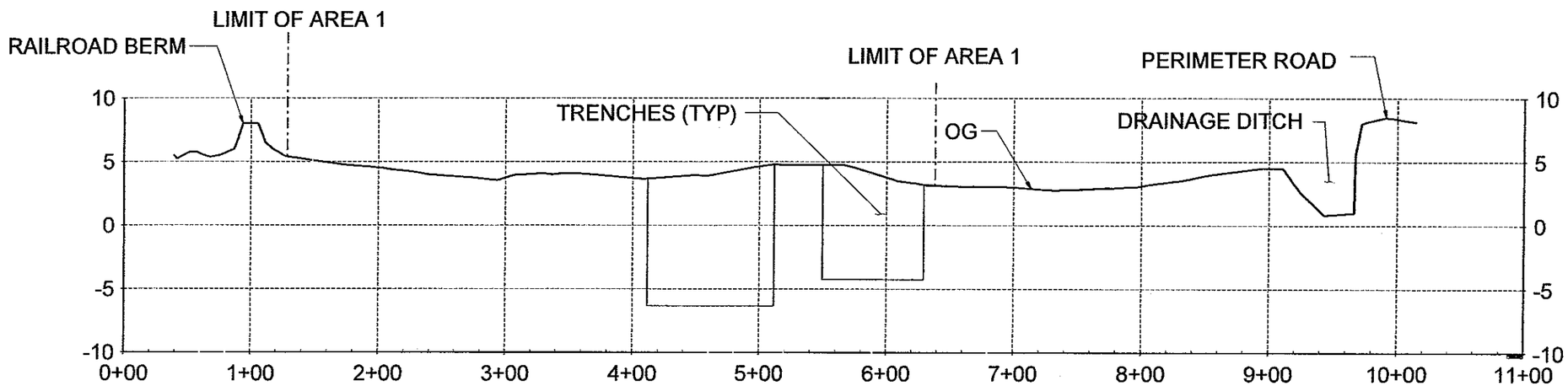
Site 7 is underlain by predominantly clay and fine-grained silty clay soil to about 25 to 30 feet bgs. The clay and silty clay are underlain by lenses of silty sand. A 2- to 5-foot-thick bed of fine-grained silt, interbedded in the upper clay interval between 10 to 15 bgs appears across most of the site (SWDIV, 1995b).

Chemical analyses of soil samples detected remnants of past waste disposal operations, including low levels of VOCs, SVOCs, PCBs, pesticides, and cyanide with no consistent pattern. Metals were detected but generally within background levels.

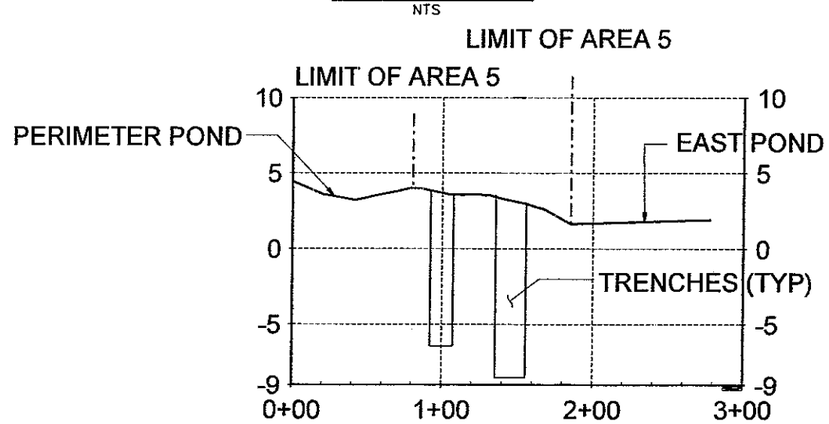
Concentrations of methane in landfill gas results from Site 7 are significantly less in comparison to typical Southern California landfills (Aero Vironment, 1993b). Also, results of migration gas sampling indicate there is no significant migration of landfill gas.



SECTION A
NTS



SECTION B
NTS



SECTION C
NTS

SCALE

HOR 1"=100'
VER 1"=20'

FIGURE 2-10
SITE 7 CROSS SECTIONS
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

CH2MHILL

NDM-WalkUp Work-Seal Beach- site7xsects.dgn

The Navy's primary contractor, CH2M HILL, retained Aero Vironment who conducted a landfill assessment for Site 7 Station Landfill in 1993. Detailed descriptions of the assessment are provided in *Ambient Air and Integrated Surface Sampling at Sites 7 and 19 for Seal Beach Naval Weapon Station* (Aero Vironment, Inc. November 1993) and *Soil Gas Sampling at Sites 7 and 19 for Seal Beach Weapon Station* (Aero Vironment, Inc. November 1993). The assessment and field procedures were performed in accordance with the State of California Air Resources Board (CARB) Testing Guidelines for Active Solid Waste Disposal Sites, as required by California Health and Safety Code Section (HSC) 41805.5, which requires all active disposal sites to conduct tests and measurements to determine the composition of landfill gases, the presence of specified air contaminants in the ambient air, and whether offsite subsurface migration of landfill gas is occurring.

Specific monitoring requirements included the following:

- Landfill gas testing
- Gas migration probe sampling
- Integrated surface sampling
- Ambient air sampling
- Weather reporting data

Landfill gas probes were installed within the boundaries of the landfill to depths ranging from 4 to 6 feet. The landfill gas probes were constructed of a ½-inch galvanized steel pipe. Several small holes were drilled in the bottom foot of the pipe to enable gas collection, and a probe point was connected to the probe to prevent soil from entering the probe as it was installed. All samples collected during assessment were analyzed for Attachment 1 compounds in accordance with HSC 41805.5 (Table 2-1). The analytical method United States Environmental Protection Agency (USEPA) TO-14 meets the requirements established by HSC 41805.5 and includes all Attachment 1 compounds (California Air Resources Board, 1986).

Landfill gas probes were also sampled on 17 September 1993. These samples were analyzed for fixed and permanent gases using American Society for Testing and Materials (ASTM) 1945.

TABLE 2-1. SPECIFIED COMPOUNDS FOR LANDFILL ASSESSMENT

Compound		Detection Limits (ppb)	
		Air	Disposal Site
Chloroethene (vinyl chloride)	CH_2CHCl	2	500
Benzene	C_6H_6	2	500
1,2-Dibromoethane (ethylene dibromide)	$BrCH_2CH_2Br$	0.5	1
1,2-Dichloroethane (ethylene dichloride)	ClCH2CH2Cl	0.2	20
Dichloromethane (ethylene chloride)	CH_2Cl_2	1	60

TABLE 2-1. SPECIFIED COMPOUNDS FOR LANDFILL ASSESSMENT

Compound		Detection Limits (ppb)	
		Air	Disposal Site
Tetrachloroethene (perchloroethylene)	$Cl_2C{:}CCl_2$	0.2	10
Tetrachloromethane (carbon tetrachloride)	CCl_4	0.2	5
1,1,1-Trichloroethane (methyl chloroform)	CH_3CCl_3	0.5	10
Trichloroethylene	$HClC{:}CCl_2$	0.6	10
Trichloromethane (chloroform)	$CHCl_3$	0.8	2

Ppb = parts per billion

Results of the monitoring are included in the *Ambient Air and Integrated Surface Sampling at Sites 7 and 19 for Seal Beach Naval Weapon Station* (Aero Vironment, Inc. November 1993) and *Soil Gas Sampling at Sites 7 and 19 for Seal Beach Weapon Station* (Aero Vironment, Inc. November 1993). A figure with the sample locations and tables summarizing the results are provided in Appendix B-7.

Shallow groundwater shows low levels and infrequent detections of COPCs, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, metals, asbestos, and cyanide. Ten quarters of shallow groundwater sampling do not indicate a plume of significant contamination. At Site 7, shallow groundwater was encountered between 3 and 5 feet bgs. The underlying shallow groundwater is saline to hypersaline (TDS ranging between 24,000 and 57,000 mg/L) and cannot reasonably be regarded as a potential drinking water source. A connection between the shallow groundwater and the lower aquifer system (deeper main drinking water source) appears to be unlikely as presented in the site discussion above.

The lack of a verifiable groundwater plume and of significant gas emissions at this former landfill site suggests that natural attenuation processes have been actively taking place over the last 25 to 50 years since the conclusion of landfilling operations. For example, the wastes were buried in clays and silty clays, which would tend to immobilize the metals, polycyclic aromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs). Most VOCs are expected to have volatilized to the atmosphere or dissolved into rainwater and infiltrated to groundwater. Over the course of 25 to 50 years, the effects of advective transport and dispersion on soluble compounds would significantly reduce their concentrations in soil and groundwater. Historic, seasonal, and tidal fluctuations of groundwater levels at Site 7 can enhance passive aerobic biodegradation as the subsurface soil matrix is alternately saturated and unsaturated. In particular, the lack of gas emissions seems to indicate that organic matter in the landfill has entered the final phases of degradation.

Of the nine major studies that have been conducted at Site 7 since 1985, the exposed debris along the eastern shoreline of Perimeter Pond (Area 5) appears to be the only area of

moderate concern. The concern at Area 5 involves the possible risks to aquatic ecological receptors due to the exposure of waste and tidal water seeps discharging from refuse buried along the east shoreline of the Perimeter Pond. The risks stemming from Area 5 are described in the Site 7 Screening Aquatic ERA (SWDIV, 2000). In aggregate, risks from sediment were minimal, but two spatially limited areas had concentrations of some chemicals exceeding sediment screening benchmarks.

2.4 Analytical Data

This section discusses the analytical results of chemicals of potential concern (COPC) detected at Site 7 and summarizes the data quality.

2.4.1 Presentation of Analytical Data

Analytical data has been collected at Site 7 as part of six investigations since 1990. These investigations resulted in the following reports:

- SI (SWDIV, 1990)
- RI (SWDIV, 1995b)
- ERA Phase II Validation Study (SWDIV, 1999a)
- Groundwater Monitoring Study (SWDIV, 1999b)
- Supplemental Characterization Report IR Site 7 (SWDIV, 1999c)
- Screening Aquatic ERA (SWDIV, 2000)

Tabulated Site 7 analytical data summaries from these reports are presented in Appendixes D-1, D-2, D-3, D-4, D-5, and D-6, respectively. As described in Section 2.2.5, although the Site 7 Landfill Closure Plan (SWDIV, 1996) involved field data collection, this data was intended to support the design of a possible landfill cover and not for site characterization or risk assessment.

The SI collected soil, groundwater, and surface water samples and analyzed them for metals, VOCs, and SVOCs. Based on the data collected (see Appendix B-1), the SI recommended that Site 7 be further studied under an RI, including comparison of the data to background concentrations (which were not available at that time) and conduction of a risk assessment.

The RI was a comprehensive evaluation of Site 7, as summarized above in Section 2.2.4. Analytical results were collected in a two-phased approach: (1) field screening of surface soil samples and groundwater samples using an on-site mobile laboratory followed by (2) soil, sediment, and groundwater sampling analyzed by an offsite commercial laboratory. Based on the data collected (see Appendix B-2), the RI recommended a no-action interim ROD because of the absence of human and ecological risks observed.

The ERA Phase II Validation Study collected colocated samples of soil, plants, invertebrates, and small mammals at three areas at Site 7 (and also Site 1) that serve as food items for ground squirrels, clapper rails, and the American kestrel. These three animals are considered to be conservative ecological receptors for evaluating terrestrial ecological risks. Based on the data collected (see Appendix B-3), the ERA Phase II Validation Study developed site-specific EPRGs. The developed EPRGs were all near or above site maximum

concentrations, so the proposed values did not alter the conclusion of the RI for no further action at the site.

The Groundwater Monitoring Study collected an additional two rounds of groundwater sampling at Site 7 (and also Site 1) in June/July 1998 and September 1998. The two groundwater sampling events in 1998 allowed for a data trend comparison against historical groundwater sampling events (i.e., four quarters of groundwater monitoring results associated with the SI and four quarters of groundwater monitoring results associated with the RI). Groundwater samples were analyzed for metals (total and dissolved), cyanide, TDS, and radiological parameters. Based on the data collected (see Appendix B-4), the Groundwater Monitoring Study confirmed the results of the earlier SI and RI groundwater sampling that, although past landfill disposal operations have impacted the groundwater quality, no well defined plumes exist, and natural attenuation processes appear to have been active. The observed radionuclides are naturally occurring and were not of levels to pose a health threat to field workers.

The Supplemental Characterization Report collected 60 soil samples from three hand auger samples and 17 borings to better estimate the locations, dimensions, and volumes of trenches at Site 7. This information would be used to provide a reasonable level of confidence to estimate the cost of a "clean closure" removal action alternative. These soil samples were analyzed for metals, VOCs, SVOCs, pesticides, and PCBs. The data collected as part of this supplemental characterization are summarized in Appendix B-5.

The Screening Aquatic ERA collected sediment, mussel, and water samples from targeted areas of interest east of Perimeter Pond along the western boundary of Site 7. These samples were analyzed for metals, pesticides, PCBs, and PAHs based on COPCs for Site 7. One additional group of chemicals, VOCs, was added at the suggestion of a regulatory agency. Based on the data collected (see Appendix B-6), low risks to sessile benthic invertebrates caused by chemicals in sediment would occur at two locations along the eastern shoreline of Perimeter Pond. Aquatic organisms in the immediate vicinity of water seeps could intermittently be exposed to elevated concentrations, of copper, silver, zinc, and some pesticides (DDT and its metabolites DDD and DDE). The elevated concentrations of these pesticides are provided in Table 7 and Table 11 of Appendix B-6. Ecological risks from sediment and water were detected in localized (small) areas, and risks from contaminated mussels (as a surrogate for invertebrates in general) are similar to those in nearby embayments (Anaheim Bay and Huntington Harbour).

2.4.2 Data Quality

A description of the QA/QC procedures and specific discussion of data quality are included in each document that contains analytical results from previous investigations. In general, the information contained in these documents was found to be of acceptable quality to adequately describe site conditions. All data collected were validated by an outside, independent validator in accordance with NEESA (now known as Naval Facilities Engineering Service Center [NFESC]) guidelines.

2.5 Risk Evaluation

This section summarizes the potential risk to human health or the environment from exposed and buried wastes at Site 7.

2.5.1 Risk Evaluation Findings

Four risk assessments have been performed using data collected from Site 7. They include a baseline HHRA and a preliminary ERA conducted as part of the RI (SWDIV, 1995b), a Phase II ERA Validation Study (SWDIV, 1999a) to assess risks to terrestrial ecological receptors, and a Screening Aquatic ERA (SWDIV, 2000) to assess risks to aquatic receptors in Perimeter Pond.

2.5.1.1 Baseline Human Health Risk Assessment

Based on the baseline HHRA, only PCBs were detected at concentrations to qualify as COPCs from a human health standpoint. PCBs were detected at a maximum concentration of 0.435 milligrams per kilogram (mg/kg) in soils. The HHRA determined that these levels correspond to an estimated excess lifetime cancer risk of 6×10^{-6}, which is within the range of concern that can be addressed through risk management decisions (SWDIV, 1995b).

2.5.1.2 Preliminary ERA

The preliminary ERA identified DDT and its metabolites (DDD and DDE) as ecological COPCs in sediments. However, the DDT and its metabolites are likely to be regional contaminants dispersed by agricultural activities in the Los Angeles area (SWDIV, 1995b). Therefore, no significant ecological risks were identified.

2.5.1.3 Phase II ERA Validation Study

The Phase II ERA Validation Study was a site-specific ERA conducted in conformance with DTSC's 1996 guidance (State of California, 1996). Based on the analytical results collected from colocated soil, plants, invertebrates, and small mammals, site-specific EPRGs were developed. The developed EPRGs were all near or above site maximum concentrations, so the proposed values did not alter the RI's preliminary ERA's conclusion for no further action at the site.

2.5.1.4 Screening Aquatic ERA

The Screening Aquatic ERA identified possible low risks to sessile benthic invertebrates caused by concentrations of several chemicals (silver, DDT and metabolites, and Aroclor 1254) in sediment that exceed the screening concentrations. Based on the 10 locations sampled along Area 5 on the eastern shoreline of Perimeter Pond, those risks would occur at 2 locations: the southeast corner of the pond and an area near the exposed debris at the approximate center of the east shoreline. Aquatic organisms in the immediate vicinity of a water seep (or other seeps, if they occur) could be intermittently exposed to elevated concentrations of copper, lead, nickel, and zinc. Risks from such exposure would be limited to a small area because the seep would be rapidly diluted upon entering the pond. Concentrations of pesticides in mussel tissue exceed no-adverse-effects levels (NOAEL) for those pesticides in birds and indicate possible risks to birds consuming large amounts of

food from the area. However, that risk may be regional as higher concentrations of the same pesticides are found in mussels from Anaheim Bay and Huntington Harbour.

Each of the above documents is available for review in its entirety in the Administrative Record File for NAVWPNSTA Seal Beach, which can be reviewed at SWDIV at 1220 Pacific Coast Highway, San Diego, California, and maintained by Diane Silva (SWDIV Administrative Record Coordinator, 619/532-3676).

According to the NCP, eight factors must be considered to determine the appropriateness of a removal action (40 *Code of Federal Regulations* [CFR] 300.415[b][2]). Of the eight NCP criteria for determining the appropriateness of a removal action, those identified as being applicable for this removal action are:

- Actual or potential exposure to nearby animals or the food chain from hazardous substances or pollutants or contaminants (40 CFR 300.415[b][2][i]); and
- Actual or potential contamination of sensitive ecosystems (40 CFR 300.415[b][2][ii]).

2.5.2 Health and Environmental Effects Associated With Chemicals of Concern and Threat to Nearby Human Populations and Environment

Potential biotic exposure to actual and potential releases of silver, DDT, DDD, and Aroclor 1254 in sediment, and copper, lead, and zinc in water were identified in the Screening Aquatic ERA (SWDIV, 2000). General effects to aquatic ecological receptors are described below.

2.5.2.1 Copper

As with most other heavy metals, copper exposure can result in several toxic effects to a wide variety of plant and animal life. Copper (Cu) may cause reduced biochemical response in microbial communities (e.g., respiration, mineralization, etc.) and growth effects for plants. In the aquatic environment, copper toxicity is a function of water pH and hardness. Toxicity to aquatic life is related primarily to the dissolved cupric ion. Copper exposure may produce growth, reproductive, and lethal effects for fish, benthic macroinvertebrates, and amphibians.

Fish and Aquatic Invertebrates (and Benthos). Copper is toxic to many fish and aquatic organisms. The gill is the primary organ for concentration of, and exposure to, copper in aquatic organisms. In general, early life stages are most susceptible to copper toxicity. Toxicity to aquatic life is related primarily to the dissolved cupric ion. The cupric ion is the most readily available and toxic inorganic species of copper in fresh water, seawater, and sediment interstitial waters. In solution, copper interacts with numerous inorganic and organic compounds resulting in altered bioavailability and toxicity (Eisler, 1998). Copper toxicity is dependent on water hardness, decreasing as hardness increases. Increased temperature has the effect of decreasing the toxicity of copper (Mance, 1990).

Exposure to copper has been shown to affect caddisfly (*Clistoronia magnifica*) life cycles (Nebeker et al., 1984). The no observed effect concentration (NOEC) of copper was 0.0083 mg/L, and exposure to 0.013 mg/L copper resulted in significant reductions in adult emergence. Exposure to 0.017 mg/L and greater resulted in 60 and 40 percent larvae

surviving to pupae and swimming pupae, respectively. Furthermore, no adults emerged following exposure to greater than 0.0035 mg/L copper.

In a review of copper hazards to fish, wildlife, and invertebrates, Eisler (1998) found that many species of freshwater plants and animals die within 96 hours at concentrations from 5.0 to 9.8 µg/L Cu. Sensitive species of freshwater mollusks, crustaceans, and fishes die at concentrations from 0.23 to 0.91 µg/L Cu. The most sensitive species of marine mollusks, crustaceans, and fishes have an LC50 (96-h) ranging from 28 to 39 µg/L Cu (Eisler, 1998). Significant sublethal effects to estuarine algae, mollusks, and arthropods can occur at 1 to 10 µg/L Cu. Toxic effect levels (48- to 96-hour LC50 or EC50) for fresh water range from 10 to 900; 700 to 10,000; and 20 to 2,000 for species of Salmonidae, Centrarchidae, and Cyprinidae, respectively (Rand and Petrocelli, 1985). The acute toxicity data indicate a considerable range of toxic effect values both within and among invertebrate taxa. Crustaceans appear to be most susceptible, with 3-day LC50s of 0.024 mg/L for *Dapnia pulex* and 0.019 to 0.022 mg/L for *Gammarus pseudolimnaeus*. Mollusks are less susceptible, with 4-day LC50s ranging from 0.037 to 2 mg/L depending on the species tested. Four-day LC50s for oligochaetes, rotifers, and chironomid larvae range from 0.1 to 1.7 mg/L (Mance, 1990).

Pipe and Coles (1995) found that the immune systems of marine mussels (*Mytilus* spp.) were compromised following exposure to copper with an increase in the rate of infection to *Vibrio tubiashi* following copper exposure. Copper has also been shown to compromise immune responses in rainbow trout (*Oncorhynchus mykiss*) (Carballo et al., 1995).

In California, the acute ambient water quality values for copper, based on the dissolved fraction, are 13 µg/L at a water hardness of 100 mg/L $CaCO_3$ in freshwater and 4.8 µg/L in saltwater (65 FR 31682). The chronic criteria are 9 µg/L and 3.1 µg/L, respectively. For screening purposes, the threshold effects level (TEL) for copper in freshwater sediments is 35.7 mg/kg, and the TEL in marine sediments is 18.7 mg/kg (Buchman, 1999).

Bioavailability and Bioaccumulation. Bioavailability of copper in soil can depend on its interactions with other metals such as zinc, iron, cadmium, and chromium (Bodek, et al., 1988). Bioavailability and toxicity of copper to aquatic organisms is dependent on the total concentration of copper and its chemical form. Both bioavailability and toxicity are significantly reduced by increases in suspended solids, water hardness, and the presence of natural organic chelators (Eisler, 1998). Copper is not known to be appreciably bioaccumulated by fish, but some algae and bivalve mollusks do bioconcentrate or bioaccumulate copper by factors of over 1,000 (EPA, 1985). Bioconcentration factors (BCFs) reported for several marine invertebrate species range from 90 for the mussel (*Mytilus edulis*) in a 14-day study to 3,300 for the clam (*Mya arenaria*) in a 35-day study (Boening, 1998). BCFs in fresh water ranged from zero in the bluegill (*Lepomis macrochirus*) to 2,000 in algae (Boening, 1998). Polychaete worms had a BCF of 2,550 in saltwater. The highest saltwater BCFs were for bivalve mollusks, ranging from 85 to 28,200 (Eisler, 1998). There is little evidence that copper will biomagnify in food chains (MOE, 1993; ATSDR 1990). Eisler (1998) reported that maximum concentrations in tissues of fishes, elasmobranchs, birds, and marine mammals from collection sites are lower when compared to more primitive organisms. It is generally assumed that copper does not significantly biomagnify in food chains (Boening, 1998).

2.5.2.2 Lead

Lead (Pb) can be extremely toxic to a wide variety of organisms. Plants exposed to high concentrations of lead in soils usually exhibit decreases in transpiration rate, weight (e.g., leaves, root, and shoot), and growth (e.g., elongation and biomass). Similarly, lead concentrations in soil can reduce the rate of decomposition by microflora, inhibit soil respiration and other biochemical processes, and reduce nitrogen and carbon mineralization efficiency. In general, invertebrates are more sensitive to lead than fish, but the severity of toxicity is species dependent. For terrestrial invertebrates, such as earthworms, significant amounts of lead exposure may cause impairment to cocoon production, reduced reproductive success (e.g., reduced hatches/cocoon or percent hatches), and decreases in overall growth. For aquatic invertebrates and fish, acute and chronic lead toxicity increases as hardness decreases and can readily cause mortality. The effects of lead on amphibians and reptiles are not very well known, due to lack of research to date. However, it is believed that elevated body burdens of lead in amphibians and reptiles may result in physiological and reproductive effects. Research with mice in the laboratory has implicated lead as a potential carcinogen and an agent for adverse reproductive effects (e.g., reduced offspring weight).

Fish and Aquatic Invertebrates. Eisler (1988) conducted a review and found that several trends are evident concerning lead toxicity in aquatic organisms: 1) dissolved waterborne Pb was more toxic than total lead (Pb); 2) organic lead compounds were more toxic than inorganic forms; 3) effects were most pronounced at elevated water temperatures and reduced pH, after long exposures; and 4) younger life stages had more pronounced effects.

Within invertebrates, crustaceans appear to be the most sensitive to lead (Mance, 1990). The LC50/EC50 for various lead compounds to Daphnia magna ranged from 450 to 1,910 parts per million (ppm) and increased with water hardness (EPA, 1980). Reproductive impairment in daphnids was significant with exposure to 10 parts per billion (ppb) lead (Eisler, 1988). Rotifers exposed to lead chloride in relatively soft water had an LC50/EC50 value of 40,800 ppb (EPA, 1980). Snails exhibit significant mortality rates when exposed to lead at 19 ppb over their lifetime (Eisler, 1988).

Chronic lead exposure to fishes can lead to spinal curvature, anemia, darkening of the tail, caudal fin degeneration, reduced swimming ability, enzyme inhibition in various organs, muscular atrophy, paralysis, reduced growth, delay in maturation, and death (Eisler, 1988). One sign of acute toxicity in fishes is increased mucous formation. The excess coagulates over the entire body, particularly the gills, and can result in death from suffocation (Aronson, 1971; NRCC, 1973). Rand and Petrocelli (1985) found that toxic effect levels (48- to 96-hour LC50 or EC50) ranged from 1,000 to 500,000; 20,000 to 400,000; and 2,000 to 500,000 ppb for species of Salmonidae, Centrarchidae, and Cyprinidae, respectively. An LC50 value of 40 mg/L lead was reported for a 96-hour static toxicity test with goldfish (*Carassius auratus*) (Bolognani, et al., 1992). LC50 values for rainbow trout (*Oncorhynchus mykiss*) exposed to lead under the static conditions were 471 and 542 mg/L (total) and 1.47 and 1.32 mg/L (dissolved), while the LC50 under flow-through conditions was only 1.17 mg/L (Goettl and Davies, 1976).

In California, the acute ambient water quality values for lead, based on the dissolved fraction, are 65 micrograms per liter (μg/L) at a water hardness of 100 mg/L $CaCO_3$ in fresh

water and 210 μg/L in saltwater (65 FR 31682). The chronic criteria are 2.5 μg/L and 8.1 μg/L, respectively. For screening purposes, the TEL for lead in freshwater sediments is 35.0 mg/kg, and the TEL in marine sediments is 30.2 mg/kg (Buchman, 1999). The probable effects levels (PELs) are 91.3 mg/kg and 112.2 mg/kg for freshwater and marine sediments, respectively. The acute and chronic National Ambient Water Quality (NAWQ) criterion for lead are 0.082 and 0.0032 mg/L at a hardness of 100 mg/L $CaCO_3$ (EPA, 1985).

Bioavailability and Bioaccumulation. Due to strong absorption of lead to soil organic matter, the bioavailability of the lead is limited. Organic compounds of lead are more bioavailable than inorganic lead. Compared to lead carbonate, lead sulfate is relatively soluble and likely to be more bioavailable.

Lead can be bioaccumulated by plants and animals. The primary route of lead exposure to plants is through root uptake; however, translocation to shoots is limited (Wallace, et al., 1977). In aquatic organisms, the highest lead concentrations are usually seen in benthic organisms and algae, whereas the lowest concentrations tend to be evident in upper trophic level predators like carnivorous fish (Eisler, 1988; as cited in ATSDR, 1993). Lead is known to bioconcentrate in aquatic biota. Invertebrates exposed to 32-ppb lead had BCFs of 1,000 to 9,000 over a 28-day period. Median BCF values in aquatic biota exposed to various concentrations of Pb^{2+} varied from about 42 in fish to 2,570 in mussels (EPA, 1985); however, available evidence does not support the occurrence of lead biomagnification through the aquatic food chain (Eisler, 1988). In vertebrates, lead tends to concentrate in bone matter instead of soft tissue, minimizing movement to higher trophic levels and uptake of lead by predators, especially raptors that regurgitate undigestible material (Stansley and Roscoe, 1996).

2.5.2.3 Nickel

Nickel (Ni) can be extremely toxic to a wide variety of organisms. Nickel toxicity reduces photosynthesis, growth, and nitrogenase activity of algae. Similarly, nickel concentrations in soil can reduce the metabolism of soil bacteria, and mycelial growth, spore germination, and sporulation of fungi (Babich and Stotzky, 1982). Excess nickel has produced adverse effects in yeasts, higher plants, protozoans, mollusks, crustaceans, insects, annelids, echinoderms, fishes, amphibians, birds, and mammals (EPA, 1975). Nickel interacts with numerous inorganic and organic compounds (Schroeder et al., 1974; Nielsen, 1980; EPA, 1980, 1985; and USPHS, 1993). These interactions are complex and may be additive or synergistic in producing adverse effects; some interactions are antagonistic (Eisler, 1998).

Fish and Aquatic Invertebrates. Eisler (1998) conducted a review and found that aquatic organisms vary widely in their tolerance to nickel. Sensitive species were killed by ionic nickel at concentrations from 11 to 113 μg/L. Mortality occurred in rainbow trout embryos at concentrations of 11 to 90 μg/L, and in largemouth bass at 113 μg/L. Embryos of channel catfish and the narrow-mouthed toad were intermediate in sensitivity, with mortality occurring at 38 μg/L and 50 μg/L, respectively (Eisler, 1998). Mortality in dapnids occurred at 13 μg/L. Less sensitive species included mysid shrimp, freshwater snails, clam embryos, and salamander embryos, which died at 150, 237, 310, and 410 μg/L, respectively (Eisler, 1998). Aquatic bacteria and yeasts are comparatively tolerant to nickel; sensitive species of freshwater eubacteria show reduced growth at 5 mg/L, and in marine eubacteria, growth inhibition begins at 10 to 20 mg/L (Babich and Stotzky, 1982).

In California, the acute ambient water quality values for nickel, based on the dissolved fraction, are 470 µg/L at a water hardness of 100 mg/L $CaCO_3$ in fresh water and 74 µg/L in saltwater (65 FR 31682). The chronic criteria are 52 µg/L and 8.2 µg/L, respectively. For screening purposes, the TEL for nickel in freshwater sediments is 18.0 mg/kg, and the TEL in marine sediments is 15.9 mg/kg (Buchman, 1999). The PELs are 35.9 mg/kg and 42.8 mg/kg for freshwater and marine sediments, respectively.

Bioavailability and Bioaccumulation. The chemical and physical forms of nickel and its salts influence bioavailability and toxicity. Insoluble, inorganic nickel is usually unavailable in water and soils, but acid rain can mobilize nickel and make it more bioavailable for uptake by plants and animals. The bioaccumulation of nickel in the environment varies greatly among groups. Reported BCFs for aquatic macrophytes range from 6 in pristine areas to 690 near a nickel smelter; BCFs for crustaceans range from 10 to 39, and 2 to 191 and 2 to 52 for mollusks and fish, respectively (Sigel and Sigel, 1988). Under laboratory conditions, BCFs for nickel are around 10 for algae, 100 for cladocerans, 61 for fathead minnows, and range from 299 to 414 for marine mussels and oysters (EPA, 1980). Nickel can bioaccumulate, but there is little evidence of significant biomagnification along food chains (NRCC, 1981; Sigel and Sigel, 1988; and WHO, 1991).

2.5.2.3 Silver

As with most other heavy metals, silver exposure can result in several toxic effects to a wide variety of plant and animal life. Free silver ions (Ag+) are strongly fungicidal, algicidal, and bactericidal. In solution, ionic silver is highly toxic to aquatic plants and animals. Silver may cause growth and germination effects in terrestrial plants. Bioavailability and toxicity of silver in sediments depend strongly on complex sediment properties (Rodgers, et al., 1995). Toxic effects in freshwater sediments are modified by pH, organic carbon, cation exchange capacity, and the amounts of silt and clay (Ratte, 1999). In the aquatic environment, silver toxicity is a function of chemical form, water pH, and hardness. Silver exposure may produce growth, reproductive, and lethal effects for fish, benthic macroinvertebrates and amphibians. In toxicity tests with fish and amphibian species for a variety of metals and metalloids, silver was the most toxic element tested, as judged by the acute LC50 values (Birge and Zuiderveen, 1995).

Fish and Aquatic Invertebrates. In solution, ionic silver is highly toxic to aquatic animals (see Eisler 1996 for a review) where water concentrations of 1.2 to 4.9 µg/L killed sensitive species, including insects, daphnids, amphipods, trout, flounders, sticklebacks, guppies, and dace. At nominal water concentrations of 0.5 to 4.5 µg/L, most species of exposed organisms exhibited high accumulation with adverse effects on growth (Eisler, 1996). Ag+ is the most toxic chemical form of silver to fishes. LeBlanc et al. (1984) found that silver ion was 300 times more toxic than silver chloride, 15,000 times more toxic than silver sulfide, and 17,500 times more toxic than silver thiosulfate complex to fathead minnows.

Several acute toxicity values (depending on the chemical compound) for various freshwater aquatic organisms are available (Ratte, 1999). These range from 0.0005 mg/L silver nitrate for *Daphnia pulex* (water flea) to >1,000 mg/L silver sulfide for several species. Early developmental stages appear to be more susceptible than adults to the effects of silver compounds. Tests with marine vertebrates have been performed exclusively with fish. Silver toxicity for marine fish is expected to be lower than for freshwater fish due to the

moderating action of increasing chloride concentration (Ratte, 1999). Anadromous rainbow trout (*Oncorhynchus mykiss*) adapter to brackish water showed markedly lower sensitivity to silver than they did in fresh water (Ferguson and Hogstrand, 1998). For most species tested, silver seems to be less toxic to juvenile and adult fish in seawater than in fresh water (see Ratte 1999 for review).

In California, the acute ambient water quality values for silver, based on the dissolved fraction, is 3.4 µg/L at a water hardness of 100 mg/L $CaCO_3$ in fresh water and 1.9 µg/L in saltwater (65 FR 31682).

Benthos. Bioavailability and toxicity of silver in sediments depend strongly on complex sediment properties (Rodgers, et al., 1995). Toxic effects in freshwater sediments are modified by pH, organic carbon, cation exchange capacity, and the amounts of silt and clay (Ratte, 1999). These factors affect the concentration of ionic silver in pore water and overlying water immediately above the sediments, which is the main exposure route for benthic epifauna and infauna. The toxicity of silver to sediment organisms differs with species, chemical compound, and test method used (Ratte, 1999). As in the water column, the relative toxicity of silver compounds depends largely on the solubility and formation of free silver ions.

Juvenile bivalves are particularly sensitive to ionic silver, with toxicity ranging from <1 to 14 µg/L in the water (see Ratte 1999 for review). Other examples of toxicity to marine invertebrates have been reported; for example, 400 µg/L killed 90 percent of tested barnacles (*Balanus balanoides*) within 48 hours, and 10 to 100 µg/L $AgNO_3$ caused abnormal or delayed development in eggs of sea urchin (*Paracentrotus* sp.) (Wilber, 1969 in Ratte, 1999). The effect threshold for development of sea urchin (*Arbaceia* sp.) was 0.5 µg/L.

In California, the acute ambient water quality values for silver, based on the dissolved fraction, are 3.4 µg/L at a water hardness of 100 mg/L $CaCO_3$ in fresh water and 1.9 µg/L in saltwater (65 FR 31682). For screening purposes, the upper effects threshold (UET) for silver in freshwater sediments is 4.5 mg/kg, and TEL in marine sediments is 0.73 mg/kg (Buchman, 1999).

Bioavailability and Bioaccumulation. Silver can bioconcentrate in aquatic biota and bioaccumulate in plants and animals (Luoma and Jenne, 1977). Lower solubility of a silver compound leads to lower bioavailability and bioaccumulation (Ewell, et al., 1993). The ability to accumulate dissolved silver from the medium ranges widely between species. Reported BCFs (mg Ag per kg FW organism/mg Ag per liter of medium) range from 210 in diatoms to 18,700 in oysters (EPA, 1980). Filter-feeding marine zooplankton have weight-related concentration factors averaging 5×10^3 (Fisher and Reinfelder, 1995). Silver is the most strongly accumulated of all trace metals by marine bivalve mollusks (Luoma, 1994). The major pathway for silver accumulation in oysters and other bivalves was from dissolved silver; there was negligible intake from silver adsorbed to suspended sediments or algal cells. Oysters eliminate adsorbed silver in the feces (Abbe and Sanders, 1990; and Sanders, et al., 1990). Several species of benthic invertebrates have exhibited elevated tissue concentrations compared to their substrate (Ratte, 1999). Bioaccumulation of silver by carnivorous organisms has not been well studied; however, observed concentrations in fish do not support a substantial accumulation of silver (Ratte, 1999). Biomagnification of silver

in aquatic food chains is unlikely at silver concentrations normally encountered in the environment (Connell, et al., 1991).

2.5.2.4 Zinc

Zinc exposure can result in several toxic effects to a wide variety of animal life. Zinc exposure may produce growth, reproductive, and lethal effects for fish, benthic macroinvertebrates, and amphibians. Zinc interacts with numerous chemicals, and the patterns of accumulation, metabolism, and toxicity from these interactions sometimes differs greatly from those produced by zinc alone (Eisler, 1993).

Fish and Aquatic Invertebrates (and Benthos). Effects of zinc on invertebrates include increased mortality and reduced growth and reproductive capability. Several toxicological endpoints for invertebrates, fish, and avian receptors are summarized in Straub and Boening (1998). In a review of zinc hazards to fish, wildlife, and invertebrates, Eisler (1993) found that arthropods were the most sensitive group of tested invertebrates to zinc. Toxicity was usually greatest to marine crustaceans (Eisler, 1981) and larvae (Eisler, 1980). Similar to other invertebrates, elevated temperatures, extended exposures, soft water, and increasing salinity increased the toxic effects (Eisler, 1993).

Munzinger and Guarducci (1988) investigated the effects of zinc on the reproductive capabilities of *Biomphalaria glabrata* (Say). The effects of 500 to 2,000 µg/L $ZnCl_2$ were tested at water hardnesses of 61 to 68.5 mg/L. Zinc contamination significantly reduced the fecundity of the mollusks. Growth rate was significantly reduced in test groups exposed to 500 and 1,500 µg/L Zn. Maturity was delayed at the lower concentration, and no mollusks achieved maturity at 1,500 µg/L. Hatch rates were reduced with zinc exposure. In a study of reproductive effects of zinc on the snail *Ancylus fluviatilis*, Willis (1988) found that there was no effect on growth, behavioral adaptations, or reproduction at a concentration of 320 µg/L zinc. However, concentrations of 100 µg/L were lethal to newly hatched organisms exposed for 30 days. Conrad (1988) examined the effects of zinc on embryonic development of the mud snail *Ilynassa obsoleta* and found the NOAEL to be 6.54 µg/L to 65.4 µg/L.

Eisler (1993) conducted a review and found that several trends are evident concerning zinc toxicity in fish: 1) freshwater fish are more sensitive than marine fish; 2) embryos and larvae are the most sensitive developmental stages; 3) effects are lethal or sublethal for most species in the range of 50 to 235 µg/L Zn; and 4) behavioral modifications occur at concentrations as low as 5.6 µg/L Zn. Several other toxicological endpoints for fish are summarized in Straub and Boening (1998).

In California, the acute ambient water quality values for zinc, based on the dissolved fraction, are 120 µg/L at a water hardness of 100 mg/L $CaCO_3$ in fresh water and 90 µg/L in saltwater (65 FR 31682). The chronic criteria are 120 µg/L and 81 µg/L, respectively. For screening purposes, the TEL for zinc in freshwater sediments is 123.1 mg/kg and the TEL in marine sediments is 124 mg/kg (Buchman, 1999).

Bioavailability and Bioaccumulation. The amount of bioavailable zinc is determined by the amount of zinc present and in what form it exists (e.g., soluble or insoluble). Zinc is more bioavailable under acidic soil conditions, particularly at pH <5 (Duquette and Hendershot,

1990). Zinc availability decreases in cool soil temperatures (Killorn, 1984; Rehm and Schmitt, 1997; Mahler, et al., 1981). In aquatic systems, low alkalinity, low hardness, and high pH promote the formation of bioavailable species of zinc (Paulauskis and Winner, 1988; Everall, et al., 1989; Schubauer-Berigan, et al., 1993). Zinc bioavailability and toxicity to aquatic organisms are highest under these conditions (Weatherly, et al., 1980). Water hardness is the principal modifier of acute zinc toxicity.

Since zinc is an essential trace element to both plants and animals, its uptake is a common occurrence, and most species accumulate more than they need for normal metabolism. Bioconcentration is organism dependent; BCFs reported in EPA (1987) ranged from 51 in Atlantic salmon (*Salmo salar*) to 1,130 for the mayfly (*Ephemerella grandis*). There is little evidence of successive biomagnification of zinc in tissues of fish and avian receptors. Elder and Collins (1991) showed that mollusks accumulated more than the fish that fed off the mollusks.

2.5.2.5 DDT, DDE, and DDD

The toxicity and accumulation of DDT in fish are correlated with age, fat content, and body length. Signs of toxicity are similar to those exhibited by insects (Ellgaard, et al., 1977). Exposure to lethal concentrations of DDT results in increasing levels of irritability or excitability followed by muscular spasms, complete loss of equilibrium, convulsions, and eventually death. Although a significant number of aquatic DDD, DDE, and DDT toxicity studies have been conducted with invertebrates, only a few studies have investigated their toxicity to plants, fish, reptiles, and amphibians. Because DDT can accumulate in fatty tissues, birds and mammals in higher trophic levels have the potential to become exposed to and bioaccumulate significant quantities of DDT and its metabolites. DDT has significant effects on the reproduction of birds through eggshell thinning and other reproductive impairment. The effects of DDT on mammals have been primarily demonstrated in laboratory studies, although bats appear to be very sensitive.

Fish and Aquatic Invertebrates (and Benthos). More than 40 acute toxicity values for various aquatic organisms were available (AQUIRE, 1999). These ranged from 0.00036 mg/L for water flea (*Daphnia pulex*) to 1.23 mg/L for the planarian, *Polycellis felina*. Early developmental stages appear to be more susceptible than adults to the effects of DDT (EPA, 1989). Some effects appear to be reversible, and some aquatic invertebrates have demonstrated resistance (Johnson and Finley, 1980).

One study reported 96-hour LC50 values for several fish species ranging from 1.5 (largemouth bass) to 56 µg/L (guppy) (Johnson and Finley, 1980). Species with similar 96-hour LC50 values included coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Oncorhynchus mykiss*), northern pike (*Esox lucicus*), black bullhead (*Ameirurus melas*), bluegill sunfish (*Lepomis macrochirus*), walleye (*Stizostedion vitreum*), fathead minnow (*Pimephales promelas*), and channel catfish (*Ictalurus punctatus*). Toxicity to chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon was greater in smaller fish than larger fish (WHO, 1989).

Black bullhead was exposed to DDT for a 96-hour period (Markling, 1966). The LC50 values ranged from 0.017 to 0.042 mg/L. Compared to other fish species, the black bullhead seems

to be relatively sensitive to DDT. Macek and McAllister (1970) observed a similar 96-hour black bullhead study and reported a LC50 value of 0.005 mg/L.

The screening ecological benchmarks for DDD, DDE, and DDT in surface waters are 0.000011, 0.0105, and 0.000001 mg/L, respectively (TNRCC, 2000). In California, the acute ambient water quality values for 4,4'-DDT are 1.1 µg/L in fresh water and 0.13 µg/L in saltwater (65 FR 31682). For screening purposes, the TEL for DDT (total) in freshwater sediments is 0.00698 mg/kg, and the TEL in marine sediments is 0.00389 mg/kg (Buchman, 1999).

Bioavailability and Bioaccumulation. Plants can bioaccumulate significant amounts of DDT, DDD, and DDE, and they have been noted in the roots of some grain, maize, and rice plants (EPA, 1989). In wildlife, bioaccumulation is a significant exposure pathway for higher trophic-level organisms that prey on fish and other aquatic organisms. Some aquatic organisms bioaccumulate DDT and its metabolites at concentrations from 1,000 to 1,000,000 times that measured in surrounding media (EPA, 1989). Concentrations of DDT and its metabolites have been measured in fat and brain cells at levels up to several hundred times that measured in blood. Because DDT can accumulate in fatty tissues, birds and mammals in higher trophic levels have the potential to become exposed to and bioaccumulate significant quantities of DDT and its metabolites.

2.5.2.6 PCBs

PCBs are structurally specific toxicants that require an interaction with, or stimulation of, specific biochemical receptors to initiate the expression of toxicity response (Hansen, 1994). In general, PCB toxicity increases with increasing chlorination and with increasing exposure. In addition, PCBs tend to be most toxic to the early life stages of most invertebrate species (Johnson and Finley, 1980).

In vertebrates (e.g., mammals, birds, fish), PCBs elicit a variety of biologic and toxic effects, including liver damage, tumors, and a wasting syndrome (Eisler, 1986). Other symptoms related to PCBs include decreased developmental and reproductive activity, endocrine and hepatotoxic effects, and carcinogenesis (Safe, 1993). Mutagenic, carcinogenic, and teratogenic properties of PCBs have been documented. In general, mutagenic activity tends to decrease with increasing chlorination (EPA, 1980). The carcinogenic effects of PCBs have been established in mice and rats with various Aroclor and Kanechlor PCBs, and these, in turn, may enhance the carcinogenicity of other chemicals (EPA, 1980).

Fish and Aquatic Invertebrates (just Benthos). Decreased growth of aquatic organisms during exposure to PCBs is well documented. Concentrations as low as 0.1 µg/L of Aroclor 1254 produced growth reductions in marine diatoms and a freshwater alga (*Scenedesmus quadricauda*) and altered the population structure of phytoplankton communities (EPA, 1980). Decreased shell growth of oysters was reported in acute testes with Aroclor 1016, 1248, and 1254 in concentrations ranging from 10.1 to 17.0 µg/L (EPA, 1980). In addition, reproductive toxicity caused by PCB exposure is reported for Baltic flounder (*Platichthys flesus*) when ovaries exceeded 0.12 mg/kg fresh weight and for cyprinid minnows (*Phoxinus phoxinus*) when gonads contained more than 24 mg/kg fresh weight (Ernst, 1984). Trout and salmon exposed to PCBs exhibit reproductive effects that include increased

prehatch mortality, posthatch deformities, low survival post hatch, and complete reproductive failure (EPA, 1980). Acute LC_{50} values for Aroclor 1242 (4 days) was 10 µg/L for scud (*Gammarus pseudolimnaeus*) (NAS, 1979), 400 µg/L for damselfly (*Ischnura verticalis*) (Johnson and Finley, 1980), and 800 µg/L for dragonfly (*Macromia* Spp.) (Johnson and Finley, 1980) (as cited in USFWS, 1986).

Various sediment quality guidelines (SQGs) have been proposed to predict the likelihood that effects from various sediment contaminants will occur to benthic organisms and their communities. Consensus-based SQGs for total PCBs in freshwater sediments have been proposed in the past (MacDonald, et al., 2000). For total PCBs, the threshold effect concentration (TEC), midrange effect concentration (MEC), and extreme effect concentration (EEC) are 0.040, 0.40, and 1.7 mg/kg, respectively (MacDonald, et al., 2000). Chronic screening values for Aroclors (PCB mixtures) have been proposed in the past as well (Smith, et al., 1996). The chronic screening values, or TEC, for Aroclor 1254 and Aroclor 1260 are 0.06 and 0.005 mg/kg, respectively (Smith, et al., 1996). For surface water, the screening ecological benchmark used for total PCBs and aroclors is 0.000014 mg/L (TNRCC, 2000). In California, the ambient water quality values (chronic) for PCBs, based on total aroclors, are 0.014 µg/L in fresh water and 0.03 µg/L in saltwater (65 FR 31682).

Bioavailability and Bioaccumulation. Increased sorption includes the tendency to strongly bind to soil, bioaccumulate in lipids (e.g., of invertebrates, fish, birds, mammals, and humans), and biomagnify up the food chain. The bioavailability of organic contaminants, such as PCBs, to the benthic community is highly dependent on the amount of organic matter in sediments (Gunnarsson, et al., 1999). As the percentage of organic content of the contaminated media increases, the bioavailability decreases. PCBs have a strong sorption affinity for organic matter. It has been suggested that the primary route of PCB exposure, and subsequent bioaccumulation, is probably through ingestion (Lamoureux and Brownawell, 1999). PCB transfer through aquatic ecosystems has been reported in the Great Lakes using a sediment-lake trout model (Jensen, 1984).

It has also been shown that rats, mice, and monkeys absorb between 75 and 90 percent of orally administered doses of PCBs (ATSDR, 1995). It depends on the animal species, but PCBs are usually metabolized (via the microsomal monooxygenase system catalyzed by cytochrome P-450) to polar metabolites that can undergo conjugation with glutathoine and glucuronic acid (ATSDR, 1995).

2.5.3 Documented Exposure Pathways

There are no documented impacts due to exposure to chemicals in soil, groundwater, or sediment at Site 7. The primary receptors that are most likely to be impacted by Site 7 under existing conditions are species inhabiting the water column and residing in or on the sediment located along the eastern shoreline of Perimeter Pond. Ecological receptors at Site 7 include crustaceans, echinoderms, molluscs, nematodes, polychaetes, and various fishes (Bradley, 2001). A list of species potentially inhabiting Perimeter Pond is listed in Appendix C.

Another possible, though less likely, exposure pathway for chemicals from Site 7 wastes to impact the environment is through groundwater. Groundwater appears to flow predominantly away from the NWR and the Pacific coast and towards the north and

northeast (SWDIV, 1995b). However, during periods of significant rainfall (wet weather conditions), the groundwater at Site 7 may flow towards the NWR. The exact groundwater flow direction is determined by the interaction among hydrologic features at or adjacent to Site 7, including the NWR tidal marsh and the OCFCC (SWDIV, 1999b).

Human exposure to buried contaminants at Site 7 may occur if there was future disturbance of the existing soil cover. Otherwise, human exposure to Site 7 (especially the areas within the Seal Beach NWR) would be limited. Because wildlife refuges are established to protect wildlife, human presence on refuges is usually limited to USFWS personnel, scientists from academic institutions, and brief visits by the general public.

2.5.4 Sensitive Populations

Of the seven species of birds that are listed as endangered by either federal or state agencies and are known to occur at NAVWPNSTA Seal Beach and the associated wetlands, the state-listed Belding's Savannah sparrow nests in the upland areas of Site 7, north of Perimeter Pond. Other species (including the California least tern and Aleutian Canada goose) have been observed and may periodically visit the site.

The western portion of Site 7 lies in the Seal Beach NWR. In general, the NWR should be considered a sensitive ecological habitat because it provides essential habitat for a variety of avian species. In particular, Perimeter Pond, which abuts Area 5 of Site 7, was constructed to provide additional habitat for endangered species and other biota.

Site 7 is not normally used for human activities; therefore, human populations would not be a likely sensitive receptor.

3. Identification of Removal Action Objectives

3.1 Statutory Framework

This removal action is taken pursuant to CERCLA and the NCP under the delegated authority of the Office of the President of the United States by Executive Order (EO) 12580. These orders provide DON with authorization to conduct and finance removal actions. This removal action is non-time critical because a 6-month planning period was available from the time a removal action was determined to be necessary to the time when removal actions would be initiated. The requirements for this EE/CA and its mandated public comment period provide opportunity for public input to the cleanup process. The entire process is also governed by the Federal Facility Site Remediation Agreement (FFSRA) for NAVWPNSTA Seal Beach. The parties to the FFSRA are DON, DTSC, and RWQCB Santa Ana Region.

Additionally, the CA-HSC specifies the preparation of necessary documentation that depends upon the costs of the removal action. The CA-HSC requires development of either: a Removal Action Plan (RAP) for removal actions that cost $1 million or greater or a Removal Action Work Plan (RAW) for removal actions that cost less than $1 million. Further, the CA-HSC authorizes DTSC to waive the RAP requirements, in favor of a RAW or a RAP-equivalent document, for removal actions when an imminent and/or substantial endangerment determination exists. DTSC may also waive the RAP requirements if a RAP-equivalent document that meets the requirements of a CA-HSC §25356.1(h)(3) is prepared. The RAP or RAW requirements would be fulfilled in the Action Memorandum (AM) prepared for this removal action.

DON, with state regulatory oversight, is the lead agency for the removal action. As such, DON has final approval authority over the recommended alternative and all public participation activities with state concurrence. SWDIV is the regional manager of DON's CERCLA program, and is, therefore, providing technical expertise to NAVWPNSTA Seal Beach to conduct activities specific to the preparation of the EE/CA and the execution of the recommended alternative.

This EE/CA complies with the requirements of CERCLA, Superfund Amendments and Reauthorization Act (SARA), NCP at 40 CFR Part 300, Defense Environmental Restoration Program (DERP) at 10 United States Code (USC) §2701, et seq., and EO 12580. This EE/CA is being pursued under 40 CFR Part 300.415(b)(2).

3.2 Determination of Removal Scope

The scope of this removal action is to reduce risks to humans and the environment associated with waste contained in the disposal fill at Site 7 to the extent practicable and reasonable. This EE/CA identifies four alternatives and recommends an alternative for effectively reducing the risks to humans and the environment.

A RAW will be prepared by the Remedial Action Contractor (RAC) to implement the final alternative selected by DON. The RAW would contain planning and design to implement the removal action selected in the AM. Upon successful completion of the removal action, a project closeout report would be prepared to document the removal action and provide the basis for the decision of no further action.

3.3 Determination of Removal Schedule

Once the draft EE/CA is completed and approved by DON, it would be available for public review and comment for 30 days. NAVWPNSTA Seal Beach would review the comments and direct the incorporation of public comments into the final EE/CA. The schedule for this removal action would be based on timely regulatory approval of the EE/CA, public acceptance of the removal action, and adequate funding and contracting availability. Table 3-1 shows the projected schedule, assuming timely approval and selection of the preferred Alternative 3.

Site 7 is only a few feet above groundwater and directly adjacent to the Perimeter Pond. Therefore, groundwater elevation due to tidal fluctuations should be considered during implementation of the removal if intrusive action is to be conducted.

One of the primary factors that may affect this removal action is the Belding's savannah sparrow nesting area located in a portion of Site 7 that is within the boundaries of the Seal Beach NWR (a portion of Area 2 and Areas 3, 4, 5, and 6). The breeding season of this species is from approximately 31 March to 15 September. The removal action should be timed to coincide with nonbreeding periods. In consultation with USFWS as the Refuge Manager, DON has agreed not to implement the removal action in the Seal Beach NWR during the nesting season, between approximately 31 March to 15 September. Aside from the previously mentioned dependence upon timely regulatory approval of the EE/CA, public acceptance of the removal action, and adequate funding and contracting availability, there are no other anticipated weather-related restrictions, administrative restrictions, nor material availability restrictions that are expected to impact the removal schedule. Additionally, it may be necessary to coordinate the removal with train schedules if the railroad is used to transport excavated material for offsite disposal.

The removal action and site restoration activities are expected to be completed in 2003. The schedule for Site 7 removal action activities is presented in Table 3-1.

TABLE 3-1. PROJECTED REMOVAL ACTION SCHEDULE FOR SITE 7
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Activity	Start Date	Completion Date
Complete Draft EE/CA	October 2000	October 2001
Solicitation of Applicable or Relevant and Appropriate Requirements (ARAR)	December 2000	April 2001
Prepare and Publish Notice of Availability	October 2001	October 2001
RAB Meeting	July 2001	July 2001

TABLE 3-1. PROJECTED REMOVAL ACTION SCHEDULE FOR SITE 7
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Activity	Start Date	Completion Date
EE/CA Public Comment Period	October 2001	December 2001
Prepare Final EE/CA and Response to Public Comments	January 2002	May 2002
Prepare Draft AM/RAP	May 2002	July 2002
Prepare Final AM/RAP, California Environmental Quality Act (CEQA) Documentation	July 2002	September 2002
Removal Action Planning and Review	September 2002	October 2002
Implement Removal Action	October 2002	February 2003

3.4 Applicable or Relevant and Appropriate Requirements

The NCP states, "Removal actions...shall to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws." [40 CFR 300.415(i)].

The evaluation of applicable or relevant and appropriate requirements (ARARs) for this EE/CA can be found in Appendix A. The following sections provide an overview of the ARARs process and a summary of those ARARs that potentially affect the development of removal action objectives (RAOs).

3.4.1 ARARs Overview

Identification of ARARs is a site-specific determination involving a two-part analysis: first, a determination of whether a given requirement is applicable; then if it is not applicable, whether it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the chemical of concern (COC), remedial action, or place involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the circumstances of the site are sufficiently similar to circumstances in which the law otherwise applies, and it is well suited to the conditions of the site.

A requirement must be substantive in order to constitute an ARAR for activities conducted onsite. Procedural or administrative requirements, such as permits and reporting requirements, are not ARARs.

In addition to ARARs, the NCP provides that where ARARs do not exist, agency advisories, criteria, or guidance are "to be considered" (TBC) useful "in helping to determine what is protective at a site or how to carry out certain actions or requirements" (55 Federal Register 8745). The NCP preamble states, however, that provisions in the TBC category "should not be required as cleanup standards because they are, by definition, generally neither promulgated nor enforceable, so they do not have the same status under CERCLA as do ARARs."

As the lead federal agency, DON has the primary responsibility for the identification of federal ARARs at Site 7. As the lead state agency, DTSC has the responsibility for identifying state ARARs (Appendix A). Requirements of ARARs and TBCs are generally divided into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific and location-specific ARARs affecting the development of RAOs are discussed in the following section. Other chemical-specific, location-specific, and action-specific ARARs are presented in Section 4 for each of the alternatives considered. A detailed discussion of all of the ARARs considered for this EE/CA can be found in Appendix A.

The initial solicitations for ARARs for NAVWPNSTA Seal Beach were conducted for the *Final Remedial Investigation Report for Operable Units 1, 2, and 3* (SWDIV, 1995b), which included identification for state ARARs for Site 7 as well as Sites 1, 19, and 22. DTSC responded on 13 July 1994 and identified state chemical-, location-, and action-specific ARARs. The state agencies that provided ARARs were DTSC, RWQCB Santa Ana Region, California Integrated Waste Management Board (CIWMB), South Coast Air Quality Management District (SCAQMD), and California Department of Fish and Game (CDFG). Additional responses for ARARs were provided by City of Seal Beach, State Lands Commission, and California Coastal Commission (CCC) in letters dated 06 September, 07 September, and 31 October 1994, respectively (SWDIV, 1995b).

A subsequent request by DON was submitted in a letter dated 24 December 1996, requested ARARs for radionuclides Sites 7, 8, and 19 for the initial preparation of the draft EE/CA reports for these sites. Responses to this request were provided by DTSC (letter dated 13 January and 14 March 1997), RWQCB Santa Ana Region (letter dated 6 January 1997), SCAQMD (letter dated 14 January 1997), City of Seal Beach (letter dated 23 January 1997), CIWMB (letter dated 28 January 1997), and CDFG (letter dated 25 February 1997).

The latest request for identification of state action-specific ARARs specifically for Site 7 was presented in a letter dated 09 November 2000 to DTSC and a subsequent request was made on 23 March 2001. DTSC responded to DON's request for identification of state action-specific ARARs at Site 7 in a letter dated 24 January 2001. Additional responses were provided on 15 March and 24 April, 2001. DON has reviewed the ARARs identified by the state, and DON's determination on those ARARs is provided in Appendix A.

Appendix D contains copies of ARARs submitted in response to the DON's solicitation.

3.4.2 ARARs Affecting RAOs

- The substantive provisions of the following requirements also have been identified as location- and chemical-specific ARARs that affect the development of RAOs for Site 7.
- National Wildlife Refuge System Administration Act of 1996, 16 U.S.C. § 668dd-668ee and 50 C.F.R. § 27.11-27.97
- Protection of Wetlands, EO 11990
- Floodplain Management, EO 11988
- Endangered Species Act of 1973

- Migratory Bird Treaty Act
- California Fish and Game Code §§ 2080, 2014, 3005, and 5650(a), (b), and (f)
- State Water Resource Control Board Resolutions 68-16, 88-63, and 89-42
- California Code of Regulations, Title 27, §§ 20210, 20220, 20230, 20390, 20395, 20400, 20410, 20950, 21090, 22207(a), 22212(a), 22222,
- California Water Code, Division 7, §§ 13241, 13243, 13263(a), 13269, and 13360
- Comprehensive Water Quality Control Plan for the Santa Ana Region Basin Plan (Cal. Water Code § 13240), Chapters 3, 4, and 5
- Resource Conservation and Recovery Act: California Code of Regulations, Title 22, §§ 66261.21; 66261.22(a)(1); 66261.23; 66261.24(a)(1); 66261.100; 66261.24(a)(1)(B); 66264.94(a)(1), (a)(3), (c), (d), and (e); 40 C.F.R. § 261.24(a)

In general, these requirements prohibit the taking or harassing of wildlife from hazardous waste sites. These requirements are ARARs because the evaluation of ecological and aquatic risk indicated that Site 7 posed a risk to wildlife (Section 2.5).

3.5 Removal Action Objectives

Based on CERCLA, the NCP, the ARARs evaluation, and the human health and ecological risk assessments, the RAOs for Site 7 are as follows:

- Reduce the potential for exposure of ecological receptors to landfill waste and potentially contaminated soil by increasing separation and/or eliminating exposure pathways (e.g., water seeps) of wastes to human and ecological receptors
- Restore habitat that is compatible with the Seal Beach NWR habitat
- Minimize impact to wetlands and improve conditions of remaining wetlands, to the extent practicable
- Control surface water runoff and reduce the potential for erosion of the landfill surface
- Comply with chemical-specific ARARs where exceedances have occurred due to waste releases (see Table 3-2)

To help achieve these RAOs, target cleanup goals (TCGs) were established for the areas where excavations would occur requiring confirmation sampling. Ecological risk-based TCGs were developed following the DTSC ecological risk assessment guidance (DTSC, 1996) and identifying the primary risks. For Areas 1 and 2, TCGs were developed based on the risks to representative site-specific terrestrial receptors, which include ground squirrel, kestrel, and sandpiper (SWDIV, 1999a). The receptor-specific TCGs are presented in Table 3-2.

Another primary risk identified at Site 7 involves the risks to aquatic ecological species due to the exposure of debris and tidal water seeps discharging from debris buried along the eastern shoreline of the Perimeter Pond (Area 5). These aquatic ecological risks are

described in the *Screening Aquatic Ecological Risk Assessment* (SWDIV, 2000). In aggregate, risks from sediment were minimal, but two spatially limited areas had concentrations of some chemicals exceeding sediment-screening benchmarks. Removal of the buried waste and shoreline sediments from the two slightly contaminated areas is proposed, but the primary RAO is to eliminate the tidal seeps emanating from the exposed debris in Area 5.

Generally, only the maximum concentrations of chemicals in sediment exceeded regional (anthropogenic) background values (SWDIV, 2000), and most of the shoreline had concentrations of most chemicals below levels of concern.

Lacking definitive risk-based cleanup goals for sediment, limits of excavation would be confirmed by visual inspection which would then be followed by backfilling with clean fine-grained soils.

As part of the removal action, groundwater monitoring would be performed where buried wastes are left in place to determine the long-term effectiveness of the removal action. A groundwater monitoring work plan would be prepared in advance to propose a program for establishing sampling and analytical protocols for monitoring groundwater quality at Site 7. Groundwater monitoring would be performed during the first year of the removal action to establish groundwater quality characteristics and to serve as the datum for subsequent monitoring to analyze for potential trends of offsite migration of chemicals from Areas 1 and 2. The purpose of this groundwater monitoring program is to provide a sentinel well network to monitor potential groundwater contaminant migration at Site 7. The wells would be strategically located between buried wastes at Site 7 and the nearest potential aquatic receptors. Thus, these groundwater monitoring wells would serve as an "early detection system." This program would be consistent with the recommendations of the groundwater monitoring study performed at Site 7 (SWDIV, 1999b).

TABLE 3-2. SOIL TARGET CLEANUP GOALS BASED ON RECEPTOR-SPECIFIC PRELIMINARY REMEDIATION GOALS (PRGS) FOR AREAS 1 AND 2
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Chemical	Units	Ecological PRGs[1]			Soil Target Cleanup Goals (Lower of the 3 PRGs)
		Ground Squirrel[3]	Kestrel	Sandpiper	
Arsenic	mg/kg	--	278[6]	--	278[6]
Cobalt[2]	mg/kg	17.5	--	--	17.5
Copper	mg/kg	345	39.3	--	39.3
Chromium	mg/kg	71	9,310	--	71
Lead	mg/kg	0.285	3.41	--	0.285
Mercury	mg/kg	17.8[6]	0.276[6]	--	0.276[6]
Selenium	mg/kg	4.55	0.328	--	0.328
Zinc	mg/kg	1,040	697	--	697
DDD	µg/kg	1 19	0.806	--	0.806
DDE	µg/kg	1.83	0.449	--	0.449
DDT	µg/kg	2.64	0.361	--	0 361
Total DDT	µg/kg	--	--	0.076 –0.344	0.076 –0.344
Chlordane	µg/kg	93.9	22.7[5]	--	22 7[5]
Heptachlor epoxide	µg/kg	--	--	--	--
Endosulfan	µg/kg	2.13	61.76[5]	--	2.13
Endrin	µg/kg	--	--	--	--
Endrin aldehyde	µg/kg	0.117	0.0092[5]	--	0 0092[5]
Endrin keytone	µg/kg	--	--	--	--
Dieldrin[2]	µg/kg	1.04	0.511	--	0.511
PCBs	µg/kg	62.3	4.45	0.743 – 1.982	0.743 – 1.982
Benzo(a)pyrene	µg/kg	15.1	--	--	15.1
Phenanthrene	µg/kg	41.5	46.6	--	41.5
Pyrene	µg/kg	606	7,800	--	606

[1] From Phase II Ecological Risk Assessment Validation Study (SWDIV, 1999a)
[2] Trenches only
[3] Lower of Site 1 or Site 7
[4] Lower of TEL or ER-L
[5] Site 1 values adjusted for higher site-use factor at Site 7
[6] From OU 4 and 5 Screening Aquatic Ecological Risk Assessment (SWDIV, 2000)
µg/kg – micrograms per kilogram
-- No value

4. Identification and Analysis of Removal Action Alternatives

Based on the RAOs presented in the previous section, four alternatives have been developed for the removal action at Site 7. A brief summary of the alternatives evaluated in this EE/CA are:

- Alternative 1: No Action.
- Alternative 2: Capping and Long-term Maintenance/Monitoring. Primary removal action activities involve capping Area 1 with a Title 27 compliant cap, surficial debris removal, and excavation and offsite disposal of waste, and performing long-term monitoring/maintenance.
- Alternative 3: Limited Repair of Existing Soil Cover and Groundwater Monitoring. Primary removal action activities involve performing limited soil cover repairs of Area 1, surficial debris removal, excavation and offsite disposal of waste, and groundwater monitoring.
- Alternative 4: Excavation and Offsite Disposal. Primary removal action activities involve excavation and offsite disposal of wastes for areas 1, 2, and 5, and surficial debris removal.

Removal action activities for Areas 3, 4, 5, and 6 are common for Alternatives 2, 3, and 4. Table 4-1 presents the removal actions proposed for Areas 1 through 6 under each of the above four alternatives. The headings for each alternative is a general descriptor of the alternative and does not imply that it is the explicit RAO for that alternative. Locations of the disposal areas are presented in Figure 2-9.

4.1 Evaluation Criteria

The four alternatives were evaluated based on the following evaluation criteria: (1) effectiveness, (2) implementability, and (3) cost. A brief description of the evaluation criteria is provided below.

4.1.1 Effectiveness

To evaluate effectiveness, consideration was given to the overall protection of public health and safety and the environment, and compliance with ARARs and other guidance. In addition, the removal action alternatives evaluation considered the following:

- Ability of the alternative to achieve RAOs
- Reduction of toxicity, mobility, or volume through treatment
- Long-term effectiveness and reliability in reducing long-term risks
- Short-term effectiveness

4.1.2 Implementability

Evaluation of the implementability of each alternative included consideration of the technical feasibility, commercial availability, and administrative feasibility. Anticipated State and community acceptance would also be evaluated. The latter acceptance evaluation would be updated based on the receipt of comments from the State and the community.

4.1.3 Cost

The cost evaluation is based upon estimates for capital costs, annual operation and maintenance (O&M) costs, duration of removal action, and present worth. Capital costs would include the costs for design, materials, construction, equipment, mobilization, and decommissioning.

Annual O&M costs include monitoring, minor repair, and replacement costs. The present worth for each alternative is the sum of capital cost and O&M cost based on a 5-year present worth analysis. A present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year. The present worth was calculated using the following equation:

$$P = A \frac{(1 + i)^n - 1}{i(1 + i)^n}$$

where,

P = present worth
A = monthly costs (annual costs/12)
i = interest rate of 7 percent (annual percentage rate[APR]), compounded monthly
n = 60 months (5 years)

The present worth allows the cost of removal action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. Inflation was not considered in this cost evaluation.

Brief descriptions of the four removal action alternatives and the alternatives evaluation discussions are presented in Subsections 4.2 to 4.6.

4.2 Common Removal Actions

As shown in Table 4-1, for Alternatives 2, 3, and 4, DON proposes the following common removal actions for Areas 3, 4, 5, and 6:

Areas 3, 4, and 6: Removal of Surface Debris, followed by a geophysical survey to confirm removal effectiveness.

TABLE 4-1. REMOVAL ACTION ALTERNATIVES FOR AREAS WITHIN SITE 7
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

		REMOVAL ACTION ALTERNATIVES**			
Area Description	**Estimated Volume of Waste Material (Cubic Yards)***	**Alternative 1: No Action**	**Alternative 2: Capping**	**Alternative 3: Existing Soil Cover Repair and Monitoring**	**Alternative 4: Excavation and Offsite Disposal**
Area 1 Landfill Area	34,032 CY (Buried)	No Action	Capping and Long-term Maintenance/ Monitoring	Limited Repair of Existing Soil Cover and Groundwater Monitoring	Excavation and Offsite Disposal
Area 2 Southern Perimeter Trench	3,660 CY (Buried)	No Action	Groundwater Monitoring	Groundwater Monitoring	Excavation and Offsite Disposal
Area 3	Surface Debris	No Action	Surface Debris Removal	Surface Debris Removal	Surface Debris Removal
Area 4	Surface Debris	No Action	Surface Debris Removal	Surface Debris Removal	Surface Debris Removal
Area 5 Perimeter Pond Trench	1,068 CY (Buried)	No Action	Excavation and Offsite Disposal	Excavation and Offsite Disposal	Excavation and Offsite Disposal
Area 6	Surface Debris	No Action	Surface Debris Removal	Surface Debris Removal	Surface Debris Removal

Notes:
* In-place waste volumes obtained from the Supplemental Characterization Report Installation Restoration Site 7 (SWDIV, 1999c).
**Headings of each alternative is a general descriptor for each alternative and does not imply the explicit removal action.

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Based on previous geophysical surveys and site visits, only surface debris is known to exist within Areas 3, 4, and 6; therefore, selective removal of debris from the top few feet of soil at the site is proposed in these areas. Successful removal would be confirmed by nonintrusive geophysical techniques. The debris material would be hauled offsite and disposed of at an approved landfill or recycled. Prior to commencement of debris removal activities, a survey of the affected vegetation habitat would be identified, relocated, and protected. After completion of the removal action activities, replanting would restore the vegetation habitat.

Area 5: Excavation and Offsite Disposal, followed by backfill with imported soil.

Based on long-term risks to aquatic receptors in the Perimeter Pond, excavation and offsite disposal of wastes in Area 5 are proposed as a common removal action for Alternatives 2, 3, and 4. The removal action would involve excavation of wastes and waste residuals (approximately 1,068 cubic yards [cy] in-place volume [SWDIV, 1999c]) below approximately 2 feet of overburden soil in the area to the extent of visual observations of waste are no longer identified (such as debris and discolored soils). The excavation volume, however, may vary significantly based on conditions encountered during excavation. It is anticipated that in-place excavation volumes (including waste and contaminated soils) at Area 5 could range from as low as 1,600 cy to as high as 14,700 cy. The wastes would then be transported offsite and disposed of in an approved landfill. Imported clean consisting of fine-grained soils would be used to backfill the excavation and then armoring the reconstructed shoreline surface with rip rap and geotextile for erosion protection.

4.2.1 Effectiveness

The common removal actions proposed at Areas 3 through 6 involve removal of the contaminant source by excavation/debris removal and offsite disposal. These removal actions afford the maximum reduction in long-term risks to ecological receptors from waste materials at the site. However, the short-term risks to workers are comparatively high because of excavation activities adjacent to a pond. Safe excavation and removal and hauling procedures would be implemented to minimize risks to workers and impacts to wetlands. Because this common removal action involves hauling waste materials and soils offsite and the transport of backfill to Site 7, the community would be subject to an increase of truck traffic, dust, and noise.

4.2.2 Implementability

The common removal actions are technically and administratively feasible. Although excavation of wastes and backfilling with clean soils adjacent to the Perimeter Pond is a challenging effort and requires specialized equipment and trained personnel, these services are readily available in Southern California. The removal actions would require close coordination with the RWQCB, CIWMB and the County of Orange to comply with California Code of Regulations (CCR) Title 27, as well as comply with health and safety requirements pertinent to excavation and offsite disposal of excavated waste materials.

4.2.3 Cost

The costs for the common removal actions have not been estimated individually. The costs for the common removal actions have been combined with costs of each of the four alternatives discussed in the following sections.

4.3 Alternative 1—No Action

Alternative 1 does not include additional characterization of the site or further action to remove waste materials or reduce risk posed by wastes at the site. A "no action" alternative is required by the NCP to be evaluated in detail as an alternative. This removal action alternative was retained as a baseline against which other response actions could be compared and allows evaluation of the effect of responses that directly address the mitigation of impacted media. Under this alternative, the buried waste and surface debris at Site 7 (Areas 1 through 6) are left in place.

The following subsections discuss the effectiveness, implementability, and cost for Alternative 1.

4.3.1 Effectiveness

The No Action alternative does not meet the RAOs stated in Section 3. Because no response actions are implemented, long-term ecological risks for the site would be the same as the baseline risks described in Subsection 4.2. At certain areas within Site 7, contaminants would remain in the soil at concentrations exceeding ecological screening criteria for wildlife protection. Although Site 7 ceased operation by about 1973, Alternative 1 would not meet current State closure requirements for landfills, since this alternative does not provide overall protection to humans and the environment. The buried waste (Areas 1, 2, and 5) would remain beneath a soil cover of variable thickness (estimated to range from zero to 2 feet) and leave inadequate cover soil in some areas. In addition, surface debris would remain scattered throughout the site (primarily Areas 3, 4, and 6). Because Alternative 1 does not comply with closure ARARs, waivers and justification would be required to select this alternative. It is unlikely that technical justification can be made for not complying with the closure ARARs. Because the site currently poses a threat to ecological receptors, this alternative would also not meet the Endangered Species Act, the Migratory Bird Treaty Act, and CDFG Code 2080 and 3005, which prohibit the taking or harassing of wildlife.

This alternative includes no controls to reduce the probability of exposure and no long-term management measures other than those that currently exist (i.e., because Site 7 lies within a naval facility, it benefits from the presence of military security and security fencing). All current and future risks would remain. This alternative provides no reduction in toxicity, mobility, or volume through treatment.

4.3.2 Implementability

There are no Implementability concerns posed by this alternative because no action is being taken. Since there is no construction or implementation phase for this alternative, there would be no additional short-term risks posed to the community, workers, or the environment as a result of excavation of buried waste and construction of the landfill cover and ancillary structures. However, it is anticipated that the No Action alternative would be unacceptable to both the community and the state regulators.

4.3.3 Costs

No costs are incurred under the No Action alternative for Site 7. Incidental administrative costs that may be required to gain agency and community acceptance, and to obtain ARAR waivers are not included.

4.4 Alternative 2—Capping

The following subsections provide a description and discussion of the effectiveness, Implementability, and cost for Alternative 2.

4.4.1 Description

Alternative 2 involves containment via capping and consists of the following removal actions for the different areas identified at Site 7:

- Area 1: Capping and long-term maintenance/monitoring
- Area 2: Groundwater monitoring
- Areas 3, 4, and 6: Surface debris removal
- Area 5: Excavation followed by offsite disposal and clean imported backfill

The location of the disposal areas are presented in Figure 2-9. As discussed above in Section 4.2, common removal actions involving excavation/surface debris removal are proposed for Areas 3, 4, 5, and 6. A description of removal actions proposed at Areas 1 and 2 are presented below.

Area 1 is approximately 8 acres, and the cap would be placed across this entire area in addition to soils required to meet slope requirements prescribed by CCR Title 27 closure regulations. The prescriptive Title 27 cover configuration consists of, from bottom to top, 2-foot minimum foundation soils, 1-foot minimum low-hydraulic conductivity [$k \leq 1 \times 10^{-6}$ centimeters/second], and 1-foot minimum vegetative soil layer. However, the RWQCB allows any alternative final cover design that would perform as to isolate the waste in the waste management unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards of CCR Title 27.

Therefore, for Area 1, capping with an engineered alternative cover consisting of a minimum of 2 feet of imported fill is proposed to provide adequate separation of the buried waste from receptors adjacent to and within Area 1 at Site 7. The general performance standards of the alternative cover would have the objective of complying with CCR Title 27 closure requirements to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and gas. However, as discussed in Section 2, past investigations have not detected landfill leachate or gas issues at Site 7.

Consistent with CCR 27 closure regulations, the removal action at Area 1 would consist of the following:

- Design and construction of a minimum 24-inch-thick engineered monolithic/ evapotranspirative soil cover layer (alternative final cover) consisting of a soil layer to provide for additional separation between the wastes and receptors, minimize erosion, and provide for adequate vegetative growth so that the overall performance is equivalent to the

prescriptive standards and would minimize infiltration from precipitation. Modeling of the proposed engineered alternative cover would be performed to evaluate if the proposed engineered alternative cover thickness is appropriate and adequate to meet the performance standards for minimizing the infiltration of precipitation into refuse under unsaturated conditions.

- Providing a minimum 3 percent slope on the top deck and maximum 3 to 1 (horizontal to vertical) on the side slopes, which would provide adequate slopes to minimize ponding on top of the landfill and promote surface water runoff.
- Revegetation of the soil cover for erosion control and re-establishing the ecological environment. The plant species selected would have rooting depths no greater than 2 feet and be consistent with the NAVWPNSTA Seal Beach Integrated Natural Resources Management Plan (INRMP).
- Construction of drainage ditches and channels to convey stormwater runoff from the surface of the landfill.
- Perform long-term monitoring/maintenance of the cover and drainage system and install and perform appropriate environmental control system monitoring.

The intent of the Alternative 2 cover design is to comply with the prescriptive standards of CCR Title 27 for monitoring and maintenance requirements.

Results of past investigations at Area 2 have indicated low risks to terrestrial receptors and humans from buried wastes; therefore, a groundwater sampling program to monitor the groundwater quality downgradient from buried wastes present in the area is proposed. In addition, significant risks to aquatic receptors are not likely due to the predominant groundwater flow away from the nearest surface water bodies at Site 7. Therefore, a groundwater monitoring program, which would add three new groundwater monitoring wells to the existing monitoring well, is proposed to demonstrate the low risks from groundwater at Area 2. The groundwater would be monitored for potential trends or offsite migration of chemicals from Area 2. The purpose of this groundwater monitoring program is to serve as a sentinel well network to monitor the potential for groundwater contamination migration from Site 7. These wells are strategically located between buried wastes at Site 7 and the nearest potential aquatic receptors. Thus, these groundwater monitoring wells would serve as an "early detection system." This program would be consistent with the recommendations of the groundwater monitoring study performed at Site 7.

4.4.2 Effectiveness

Alternative 2 is expected to meet the RAOs stated in Subsection 4.3. The capping alternative proposed at Area 1 would minimize infiltration of water into the waste by implementing a cover design to increase evapotranspiration and stormwater runoff, therefore minimizing the production of leachate and LFG. In addition, it would reduce long-term risks to ecological receptors by providing adequate separation between the buried material and the receptors using an engineered soil cover. The waste would be left in-place but would be isolated to prevent exposure and future migration. The cover is expected to be effective in preventing direct contact by receptors, as well as eliminating the migration of potential surface contamination through windblown dust or surface runoff. Land use restrictions and signs

would further control exposures to buried refuse, debris, and potentially contaminated soil by limiting future subsurface construction and excavation. The excavation of buried material at Area 5 and surface debris removal at Areas 3, 4 and 6 would also reduce the long-term risks to receptors at the site.

Alternative 2 is expected to meet, if not exceed, ARARs by complying with guidelines of CCR Title 27 for landfill closure and meeting the requirements of the Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, and the Resource Conservation and Recovery Act, listed in Section 3.4.2. Also, by preventing the exposure of wildlife to the buried refuse, surface debris, and potentially contaminated soil, this alternative would meet requirements of the Endangered Species Act, the Migratory Bird Treaty Act, and CDFG Code 2080, 2014, and 3005, which prohibit the taking or harassing of wildlife. The western portion of Site 7 is part of the NWR; DON would coordinate with USFWS, U.S. Army Corps of Engineers (ACOE), and CDFG during the removal action in this portion of the site, to comply with the National Wildlife Refuge System Administration Act. Portions of the eastern part of Site 7 have also been determined to qualify as wetlands (SWDIV, 1996). Alternative 2 would significantly impact these wetlands by potentially covering the wetlands with soil destroying sensitive habitat, grading, and overall construction activities. It would also be infeasible to minimize impact to some wetlands since they exist directly on top of Area 1 (Figure 4-1), therefore not complying with the requirements of the Protection of Wetlands (EO 11990). However, as practicable, feasible approaches to enhance remaining wetlands would be implemented. This alternative is also expected to meet SCAQMD requirements, because dust generated during implementation of the alternative would be controlled with dust suppression technologies.

For this alternative to remain effective over a long period, the cover, vegetation, its ancillary structures, and signs would need to be inspected, maintained, and repaired as necessary.

The adequacy and reliability of institutional controls, such as land use restrictions, are highly dependent on enforcement and maintenance by DON and state and local regulators. Institutional controls can be subject to changes in the political jurisdiction, legal interpretations, and the level of enforcement. Because this alternative would leave buried wastes onsite for an indefinite period, the land use restrictions would need to be reviewed and updated periodically to verify that the response action provides adequate protection for the environment.

Alternative 2 does not reduce toxicity, mobility, or volume of contaminants through treatment. In Areas 1 and 2, the buried refuse and potentially contaminated soil would remain onsite. In Areas 3, 4, 5, and 6, the buried refuse and/or surface debris would be excavated and transported offsite and disposed of in an approved landfill. However, none of these removal actions reduces toxicity, mobility, or volume of contaminants through treatment.

With Alternative 2 there is an added risk (in terms of dust, noise, traffic) associated with the excavation and capping activities, and associated transportation of large volumes of waste material or imported fill material. There is also potential for short-term risk to the nearby environment, community, and workers due to particulate emissions during the construction of the cover. Proper safety precautions, including dust control technologies, would be necessary.

4.4.3 Implementability

Alternative 2 is technically feasible and would be relatively easy to implement. No special techniques, equipment, materials, permits, or labor would be required to construct the cap. The materials and procedures are readily available and well established. Many contractors have the skill and experience to perform the earthwork and install the monolithic soil cover. The implementability of the removal actions in Areas 3 to 6 is discussed in Section 4.2.2.

The procedures for obtaining and enforcing land use restrictions will be consistent with those established for military bases. This alternative would require that the procedures for the placement and long-term implementation of land use restrictions, as well as the destruction of wetlands, be reviewed, coordinated, and verified with regulatory agencies and the DON's real estate branch. Since the proposed removal action involves excavation of portions of the adjacent NWR, DON would coordinate with USFWS, CDFG, and ACOE during the removal action.

4.4.4 Costs

The costs to implement Alternative 2 were estimated using vendor and contractor quotes and methodologies prescribed by EPA for Superfund sites. The cost range, in year 2001 dollars, is summarized below. A range of costs is provided because of the uncertainty involved in estimating the excavation volumes at Area 5.

Estimated Capital Cost ($): 4.6 to 7.5 million
Estimated Annual O&M Cost ($): 190,000 to 226,000
Estimated Present Worth ($): **4.8 to 7.8 million**

A breakdown of the costs by major task and the cost range is shown in Table 4-2. As shown, the cost of Alternative 2 appears to be reasonable, with a relatively moderate to high benefit-to-cost ratio.

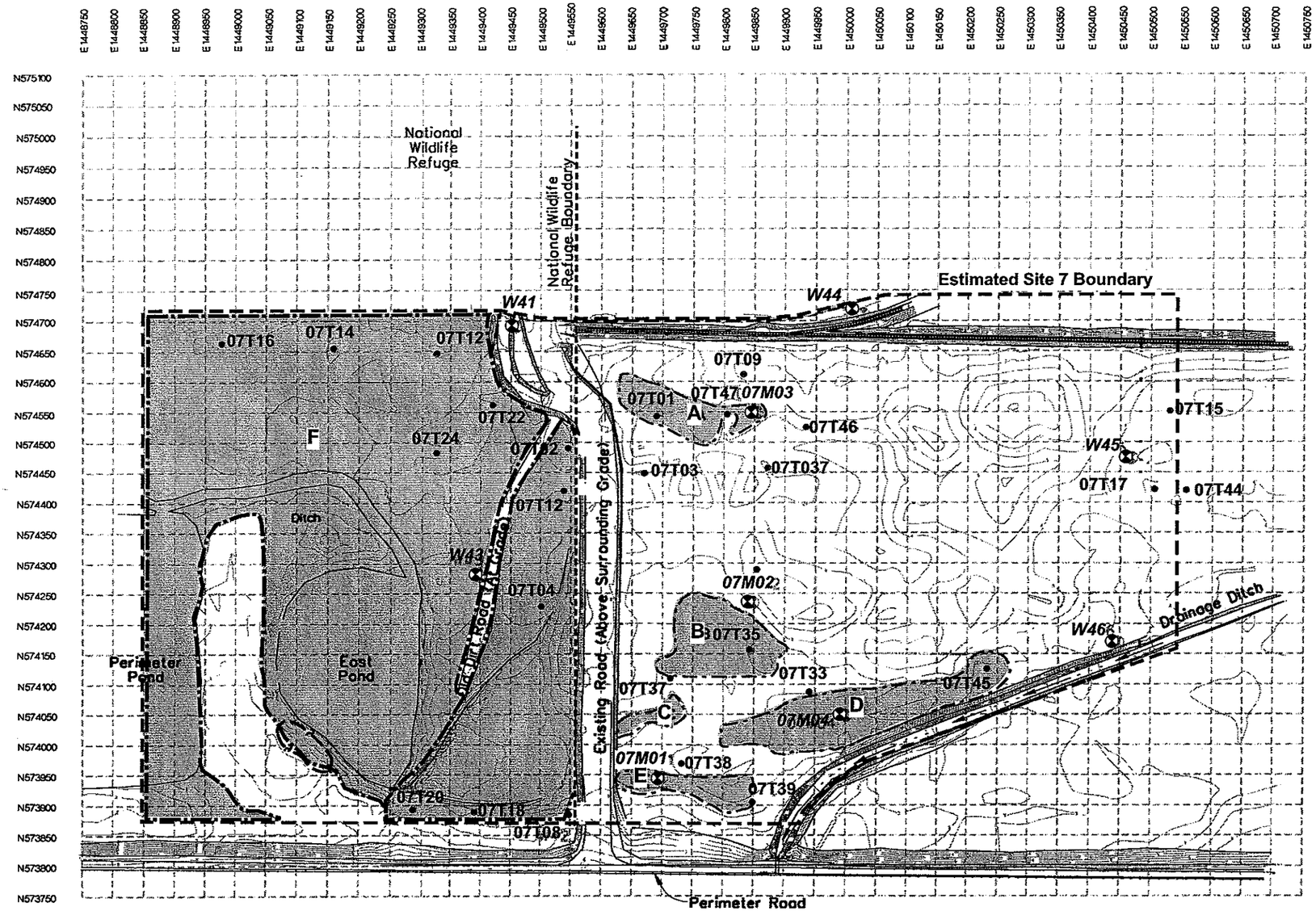
4.5 Alternative 3—Existing Soil Cover Repair and Groundwater Monitoring

The following subsections provide a description and discussion of the effectiveness, implementability, and cost for Alternative 3.

4.5.1 Description

Alternative 3 involves groundwater monitoring and other common removal actions as described in Section 4.2. Alternative 3 consists of the following removal actions for the different areas identified at Site 7:

- Area 1: Limited repair of existing soil cover and groundwater monitoring
- Area 2: Groundwater monitoring
- Areas 3, 4, and 6: Surface debris removal
- Area 5: Excavation followed by offsite disposal and clean imported backfill



LEGEND:

- 07M02 — Monitoring Well Location
- Surface Elevation Contour
- Railroad
- 07T16 — Approximate Location of Test Pit Evaluated for Wetland Delineation
- Limit of Buried Refuse (Dashed Where Approximate, Queried Where Uncertain)
- Surface Contours 0.5' Intervals)
- A — Boundary of Wetland Area Within Site

0 200 400
Scale in Feet

N

Figure 4-1
Wetland Areas
Site 7 Station Landfill
NAVWPNSTA Seal Beach
Site 7 EE/CA

SCO141948.02.40 WetlandAreas FH8 5/01

Table 4-2. Summary of Estimated Removal Action Costs by Major Task
Site 7 EE/CA
NAVWPNSTA Seal Beach.

Task	Units	Unit Costs	Alternative 1 - No Action	Alternative 2 - Capping w/ Monolithic Cover		Alternative 3 - Long-Term Monitoring		Alternative 4 - Excavation and Offsite Disposal	
			Cost	Low Cost	High Cost	Low Cost	High Cost	Low Cost	High Cost
Construction Direct Costs									
Mob/Demob/Operations	LS	-	$0	$138,182	$221,761	$56,932	$140,511	$509,037	$1,206,106
Survey	LS	-	$0	$4,800	$4,800	$4,800	$4,800	$4,800	$4,800
Site Preparation (access and clearing)	AC	$ 4,000	$0	$32,000	$32,000	$16,000	$16,000	$32,000	$32,000
Capping (vegetated soil cover) in Area 1	LS	-	$0	$1,432,000	$1,432,000	$98,000	$98,000	$0	$0
Excavation/Waste Handling in Area 1	CY	$ 7	$0	$0	$0	$0	$0	$503,300	$1,281,000
Excavation/Waste Handling in Area 2	CY	$ 7	$0	$0	$0	$0	$0	$51,800	$93,800
Common Removal Actions in Areas 3, 4, 5, and 6									
-Excavation/Waste Handling in Area 5	CY	$ 12	$0	$19,200	$176,400	$19,200	$176,400	$19,200	$176,400
-Sheet Piling at Area 5	SF	$ 12	$0	$306,000	$306,000	$306,000	$306,000	$306,000	$306,000
-Surface Debris Removal/Disposal in Area 3, 4, and 6	LS	$ 25,000	$0	$25,000	$100,000	$25,000	$100,000	$25,000	$100,000
-Geophysical Confirmation for Debris Removal	Day	$ 2,000	$0	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
-Relocation and Revegetation of Native Plant Species	AC	$ 20,000	$0	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
-Cleanfill for Area 5	CY	$ 18	$0	$5,985	$40,000	$5,985	$40,000	$5,985	$40,000
-Riprap Protection for Pond	SF	$ 50	$0	$50,000	$125,000	$50,000	$125,000	$50,000	$125,000
-Geotextile Layer	SF	$ 0.25	$0	$450	$1,125	$450	$1,125	$450	$1,125
Dewatering	MG	$ 1,000	$0	$100,000	$100,000	$100,000	$100,000	$300,000	$300,000
Water Treatment and Disposal	MG	$ 1.50	$0	$150,000	$150,000	$150,000	$150,000	$450,000	$450,000
Excavation Confirmation Sampling and Analysis	EA	$ 1,000	$0	$0	$0	$0	$0	$160,000	$320,000
Backfill Excavated Areas	CY	$ 18	$0	$0	$0	$0	$0	$1,427,400	$3,535,200
Drainage/Erosion Controls	LS	-	$0	$75,000	$75,000	$0	$0	$0	$0
Sampling for Waste Characterization and Segregation	EA	$ 2,570	$0	$51,400	$385,500	$51,400	$385,500	$411,200	$1,028,000
Offsite Transportation and Disposal of Non-Haz Wastes	CY	$ 54	$0	$97,200	$893,025	$97,200	$893,025	$4,914,675	$12,824,325
Offsite Transportation and Disposal of Haz Wastes	CY	$ 122	$0	$24,400	$224,175	$24,400	$224,175	$1,233,725	$3,219,275
Monitoring Well Installation	LF	$ 55	$0	$5,000	$5,000	$5,000	$5,000	$0	$0
Institutional Controls (access and deed restrictions)	LS	-	$0	$100,000	$100,000	$100,000	$100,000	$0	$0
Wetlands Mitigation Program	LS	-	$0	$200,000	$200,000	$0	$0	$200,000	$200,000
Construction Subtotal			***$0***	***$2,907,000***	***$4,662,000***	***$1,201,000***	***$2,956,000***	***$10,695,000***	***$25,334,000***
Indirect Costs									
Field Office	LS		$0	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Bid Contingency (15%)		15%	$0	$436,050	$699,300	$180,150	$443,400	$1,604,250	$3,800,100
Scope Contingency (20%)		20%	$0	$581,400	$932,400	$240,200	$591,200	$2,139,000	$5,066,800
Construction Total			***$0***	***$3,935,000***	***$6,304,000***	***$1,632,000***	***$4,001,000***	***$14,449,000***	***$34,211,000***
Permitting and Legal (3%)		3%	$0	$87,210	$139,860	$36,030	$88,680	$320,850	$760,020
Construction Quality Assurance (5%)		5%	$0	$145,350	$233,100	$60,050	$147,800	$534,750	$1,266,700
Services During Construction (8%)		8%	$0	$232,560	$372,960	$96,080	$236,480	$855,600	$2,026,720
Total Implementation Costs			***$0***	***$4,401,000***	***$7,050,000***	***$1,825,000***	***$4,474,000***	***$16,161,000***	***$38,265,000***
Engineering Design Costs (6%)		6%	$0	$174,420	$423,000	$72,060	$268,440	$641,700	$2,295,900
TOTAL CONSTRUCTION COSTS			**$0**	**$4,580,000**	**$7,480,000**	**$1,900,000**	**$4,750,000**	**$16,810,000**	**$40,570,000**
Annual O&M Costs - 5-year Duration									
Landfill Cover - Maintenance and Repair			$0	$9,600	$9,600	$4,800	$4,800	$0	$0
Drainage Channel - Maintenance and Repair			$0	$2,400	$2,400	$0	$0	$0	$0
Revegetation - Maintenance and Monitoring			$0	$2,400	$2,400	$0	$0	$2,400	$2,400
Inspections			$0	$3,200	$3,200	$3,200	$3,200	$0	$0
Wetlands Monitoring Program			$0	$5,000	$5,000	$0	$0	$5,000	$5,000
Groundwater Monitoring	Ea	$ 1,500	$0	$18,000	$18,000	$30,000	$30,000	$0	$0
Subtotal - 5-year Duration			***$0***	***$41,000***	***$41,000***	***$38,000***	***$38,000***	***$8,000***	***$8,000***
Contingency (10%)		10%	$0	$4,100	$4,100	$3,800	$3,800	$800	$800
Total Annual O&M			$0	$45,100	$45,100	$41,800	$41,800	$8,800	$8,800
O&M Present Worth for 5 yrs. @ 7%APR (compounded monthly)	7%	5	**$0**	**$190,000**	**$226,000**	**$176,000**	**$209,000**	**$38,000**	**$44,000**
REMOVAL ACTION-ESTIMATED COST			**$0**	**$4,800,000**	**$7,800,000**	**$2,100,000**	**$5,000,000**	**$16,900,000**	**$40,700,000**

The disposal areas proposed for removal actions are presented in Figure 2-9. As discussed earlier in Section 4.2, common removal actions involving excavation/surface debris removal are proposed for Areas 3, 4, 5, and 6. A description of removal actions proposed at Areas 1 and 2 are presented below.

Groundwater monitoring, involving a total of eight wells, is proposed at Areas 1 and 2 based on the minimal risks to receptors identified at the site. In addition, at Area 1, additional soils would be placed on areas with deficient soil cover to provide for an effective cap thickness that would reduce direct contact with buried onsite waste, as well as avoid destruction of wetlands and sensitive habitat. Similarly to Alternative 2, the cover is expected to be effective in preventing direct contact by receptors, as well as eliminating the migration of potential surface contamination through windblown dust or surface runoff. However, unlike Alternative 2, the objective of this cover design is not to minimize precipitation from infiltrating the cap. Based on previous investigations (Section 2.2) of the existing site conditions (shallow groundwater, tidal fluctuations, and generally poor groundwater quality, minimal ecological risk), minimizing infiltration to reduce the production of leachate and gas is not necessary.

In Area 1, a network of four existing groundwater monitoring wells is proposed to be used to collect groundwater samples and monitor for trends in chemical concentrations in groundwater. In Area 2, three additional monitoring wells are proposed, to monitor groundwater concentrations south of Area 2 between the buried wastes and the nearest surface water body. One existing monitoring well, north of Area 2, would also be included in the monitoring program. The groundwater would be monitored for potential trends or offsite migration of chemicals from Area 2. The purpose of this groundwater monitoring program is to serve as a sentinel well network to monitor the potential for groundwater contamination migration from Site 7. These wells are strategically located between buried wastes at Site 7 and the nearest potential aquatic receptors. Thus, these groundwater monitoring wells would serve as an "early detection system." This program would be consistent with the recommendations of the groundwater monitoring study performed at Site 7.

The following subsections provide a description and discussion of the effectiveness, implementability, and cost for Alternative 3.

4.5.2 Effectiveness

Alternative 3 is expected to meet the RAOs stated in Section 3. Similar to Alternative 2, Alternative 3 includes an engineered alternative cover design to the prescriptive cover design, as described in CCR Title 27, Section 20080 (b) and (c). Although the regulations require measures to protect groundwater quality, the intent of Alternative 3 is not to protect water quality by minimizing infiltration through the cover. The site conditions, as described previously, prohibit an effective cover system for this measure. The main intent of a cover in Alternative 3 is to protect humans and habitat from contact or exposure of surface trash and debris. Therefore, the engineered alternative cover design requires the repair of the existing soil cover proposed at Area 1 to reduce potential long-term risks to ecological receptors by providing adequate separation between the buried material and the receptors. The waste would be left in place but would be isolated to prevent exposure and future migration. The existing cover and the repaired cover are expected to be effective in preventing direct contact by receptors, as well as eliminating the migration of potential surface contamination through windblown dust or surface runoff. Land use restrictions and signs would further control

exposures to buried refuse and debris by limiting future subsurface construction and excavation. In addition, groundwater would be monitored for potential trends or offsite migration of chemicals. The excavation of buried material at Area 5 and surface debris removal at Areas 3, 4 and 6 would also reduce the long-term risks to receptors at the site.

Alternative 3 is expected to meet ARARs by providing protection of public health and welfare and the environment and complying with guidelines of CCR Title 27 for landfill closure. It would also meet the requirements of the Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, and the Resource Conservation and Recovery Act, listed in Section 3.4.2. Also, by preventing the exposure of wildlife to the buried refuse, surface debris, and potentially contaminated soil, this alternative would meet requirements of the Endangered Species Act, the Migratory Bird Treaty Act, and CDFG Code 2080, 2014, and 3005, which prohibit the taking or harassing of wildlife. The western portion of Site 7 is part of the NWR; DON would coordinate with USFWS, U.S. Army Corps of Engineers (ACOE), and CDFG during the removal action in this portion of the site, to comply with the National Wildlife Refuge System Administration Act. Portions of the eastern part of Site 7 (outside of the NWR) have also been determined to qualify as wetlands. Alternative 3 would minimize impact to wetlands and improve conditions of remaining wetlands, to the extent practicable to comply with the requirements of the Protection of Wetlands (EO 11990). Only soil cover areas indicating minimal soil cover and no impacts to wetland or sensitive habitat or indicating inadequate erosion controls would be repaired by placement of additional soils. Existing slopes and drainage conditions do not require site improvements to prevent infiltration or ponding of precipitation on the landfill cap. The existing groundwater conditions (shallow and poor quality groundwater) preclude the use of barriers or containment structures to improve site conditions.

DON would coordinate with USFWS, ACOE, and CDFG during the removal action. This alternative is also expected to meet SCAQMD requirements because dust generated during implementation of the alternative would be controlled with conventional dust suppression technologies. Vapor releases are not expected to be a problem based on past sampling experience.

For this alternative to remain effective over a long period, the cover, its ancillary structures, and signs would need to be inspected, maintained, and repaired as necessary. The adequacy and reliability of institutional controls, such as land use restrictions, are highly dependent on enforcement and maintenance by DON and state and local regulators. Institutional controls can be subject to changes in the political jurisdiction, legal interpretations, and the level of enforcement. Because this alternative would leave buried wastes onsite for an indefinite period, the land use restrictions would need to be reviewed and updated periodically to verify that the response action provides adequate protection for the environment.

Alternative 3 does not reduce toxicity, mobility, or volume of contaminants through treatment. In Areas 1 and 2, the buried refuse and potentially contaminated soil would remain onsite. In Areas 3, 4, 5, and 6, the buried refuse and/or surface debris would be excavated and transported offsite; however, none of these removal actions reduces toxicity, mobility, or volume of contaminants through treatment.

With Alternative 3, there is an added short-term risk (in terms of dust, noise, traffic) associated with the excavation activities and truck transport of large volumes of waste material or imported backfill material.

4.5.3 Implementability

Alternative 3 is technically feasible and would be relatively easy to implement. No special techniques, equipment, materials, permits, or labor would be required to repair the existing soil cover. The materials and procedures are readily available and well established. Many contractors have the skill and experience to perform the earthwork and patch the soil cover. Services and equipment for installation of monitoring wells are widely available. The implementability of the removal actions in Areas 3 through 6 is discussed in Section 4.2.2.

The procedures for obtaining and enforcing land use restrictions will be consistent with those established for military bases. This alternative would require that the procedures for the placement and long-term implementation of land use restrictions be reviewed, coordinated, and verified with regulatory agencies and the DON's real estate branch. Since the proposed removal action involves excavation of portions of the adjacent NWR, DON would coordinate with USFWS, CDFG, and ACOE during the removal action.

4.5.4 Costs

The costs to implement Alternative 3 were estimated using vendor and contractor quotes and methodologies prescribed by EPA for Superfund sites. The cost range, in year 2001 dollars, is summarized below. A range of costs is provided because of the uncertainty involved in estimating the excavation volumes at Area 5.

Estimated Capital Cost ($): 1.9 to 4.8 million
Estimated Annual O&M Cost ($): 176,000 to 209,000
Estimated Present Worth ($): **2.1 to 5.0 million**

A breakdown of the costs by major task and the cost range is shown in Table 4-2. As shown, the cost of Alternative 3 appears to be reasonable, with a relatively high benefit-to-cost ratio.

4.6 Alternative 4—Excavation of Waste Areas and Offsite Disposal

The following subsections provide a description and discussion of the effectiveness, Implementability, and cost for Alternative 4.

4.6.1 Description

Alternative 4 consists of the following removal actions for the different areas identified at Site 7:

- Area 1: Excavation followed by offsite disposal and clean imported backfill
- Area 2: Excavation followed by offsite disposal and clean imported backfill
- Areas 3, 4, and 6: Surface debris removal
- Area 5: Excavation followed by offsite disposal and clean imported backfill

As discussed previously, common removal actions involving excavation/surface debris removal are proposed for Areas 3, 4, 5, and 6. A description of removal actions proposed at Areas 1 and 2 is presented below. It is estimated that approximately 34,000 cy and 3,660 cy of

in-place waste volume exist in Areas 1 and 2, respectively (SWDIV, 1999c). The excavation volume, however, may vary significantly based on conditions encountered during excavation. It is anticipated that in-place excavation volumes (excavated soils and waste) in Area 1 could range from as low as 71,900 cy to as high as 183,000 cy. Similarly in Area 2, the in-place excavation volumes could range from as low as 7,400 cy to as high as 13,400 cy. Figure 2-9 presents the disposal areas proposed for removal actions.

The removal actions at Areas 1 and 2 comprise the following activities:

- Excavation of waste and soil within Areas 1 and 2.
- Offsite disposal of excavated waste and soil.
- Confirmation sampling to verify successful attainment of RAOs.
- Backfill with clean imported fill.
- Revegetating the imported fill for erosion control. The plant species selected would be consistent with the NAVWPNSTA Seal Beach INRMP.

4.6.2 Effectiveness

Alternative 4 would meet the RAOs stated in Subsection 4.3. The excavation alternative proposed at Area 1 would provide the maximum protection to public health and safety and the environment. Long-term risks to ecological receptors at Site 7 are eliminated because the source material would be excavated and disposed offsite. Imported clean material would be used to backfill the excavation. Magnitude of residual risks would be minimal because the excavation alternative would remove all waste and impacted soil with chemicals at concentrations higher than the target cleanup goals. No controls, such as access restrictions or land use restrictions, would be required.

Alternative 4 would meet ARARs by complying with guidelines of CCR Title 27 for landfill closure. It would also meet the requirements of the Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, and the Resource Conservation and Recovery Act, listed in Section 3.4.2. Removal of buried refuse, surface debris, and potentially contaminated soil from Site 7 would reduce exposure to wildlife. It would meet requirements of the Endangered Species Act, the Migratory Bird Treaty Act, and CDFG Code 2080, 2014, and 3005, which prohibit the taking or harassing of wildlife. DON would coordinate with USFWS, U.S. Army Corps of Engineers (ACOE), and CDFG during the removal action in this portion of the site, to comply with the National Wildlife Refuge System Administration Act. Also, other portions of Site 7 contain areas that qualify as wetlands. Alternative 4 would impact these wetlands; however, feasible approaches to minimizing impact to the remaining wetlands would be practiced to comply with the requirements in the Protection of Wetlands (EO 11990). This alternative is also expected to meet SCAQMD requirements because dust generated during implementation of the alternative would be controlled with dust suppression technologies.

Alternative 4 is highly reliable because the wastes are excavated offsite and do not pose a risk in the future. Alternative 4 does not reduce toxicity, mobility, or volume of contaminants through treatment. Though excavation and offsite disposal eliminates the source material, there is no reduction in toxicity, mobility, or volume through treatment.

With Alternative 4 there is an added short-term risk (in terms of dust, noise, traffic) associated with the excavation activities and truck transport of large volumes of waste material or imported fill material. There is also potential for short-term risk to the environment, community, and workers due to particulate emissions (and possibly vapor emissions) during excavation of wastes. Proper safety precautions, including dust control and precautionary vapor control technologies, would be necessary.

4.6.3 Implementability

Alternative 4 is technically feasible, though it would be quite challenging to implement because of the site conditions. The location of the excavation is adjacent to a large surface water body and flood control channel; in addition, a high groundwater table exists, which can result in significant dewatering issues. The water that seeps into the excavation would require treatment and proper disposal. Extensive coordination requirements and health and safety measures are required; however, no special techniques, equipment, materials, or labor would be required to excavate the wastes. The materials and procedures are readily available and well established. Many contractors have the skill and experience to perform the earthwork, temporary sheet-piling, dewatering, and the needed excavation-related construction activities.

4.6.4 Costs

The costs to implement Alternative 4 were estimated using vendor and contractor quotes and methodologies prescribed by EPA for Superfund sites. The cost range, in year 2001 dollars, is summarized below. A range of costs is provided because of the uncertainty involved in estimating the excavation volumes at Areas 1, 2, and 5.

Estimated Capital Cost ($): 16.8 to 40.6 million
Estimated Annual O&M Cost ($): 38,000 to 44,000
Estimated Present Worth ($): **16.9 to 40.7 million**

A breakdown of the costs by major task and the cost ranges are shown in Table 4-2. As shown, the cost of Alternative 4 is uneconomical, and the benefit-to-cost ratio is low. Also, the uncertainties associated with excavation volumes and nature of wastes are high, resulting in larger margins for cost uncertainties.

4.7 Uncertainties

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Due to the difficulty in completely characterizing and quantifying the contamination at Site 7, the scope of removal actions is based largely on assumptions. The estimates are based on representative cleanup actions comprised of example technologies. These are presented for the purpose of making comparative evaluations and cost estimates. They are not necessarily the specific technologies or methods that would be a part of the final design. The final costs of the project would depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, the firm selected for final engineering design, and other variable factors. As a result, the final project costs would vary from the estimates presented herein.

A source of uncertainty that would affect the cost estimates presented in this EE/CA is the volume of material that would be excavated from Areas 1, 2, and 5 at Site 7. As part of several investigations at Site 7, test pits were dug and additional geophysical testing was conducted at these areas to better delineate the extent of these areas. Nevertheless, uncertainties lie with these volume estimates because they employ indirect observational methodologies. The actual refuse volumes excavated from Areas 1, 2, and 5 may vary from the estimates presented in this EE/CA. The purpose of providing a cost range is expected to capture this cost uncertainty. In addition, the nature of the wastes excavated (California-regulated nonhazardous waste versus California-regulated hazardous wastes versus RCRA hazardous wastes) could also impact the costs significantly. For the purposes of the cost estimates presented in this EE/CA, the nature of wastes excavated from Site 7 are assumed to be 90 percent nonhazardous wastes (as defined by CCR Title 27) and 10 percent RCRA hazardous waste. The relatively lower percentage of hazardous waste assumed is based on the lack of contamination detected in soil, groundwater, soil gas, and air samples collected during previous investigations conducted at the site. However, because Site 7 was once used as a Station Landfill, the potential for encountering hazardous waste must be considered.

5. Comparative Analysis of Removal Action Alternatives

In this section, the alternatives analyzed in Section 4 are compared against each other in order to evaluate the relative performance of each alternative in relation to each of the criterion. The criteria used in this comparison are the same as in Section 4, namely effectiveness, implementability, and cost. Table 5-1 presents a detailed summary of this comparison.

5.1 Effectiveness of Alternatives

The effectiveness of each alternative was evaluated based on the overall protection of human health and the environment; long-term effectiveness and permanence; compliance with ARARs; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness.

5.1.1 Overall Protection of Human Health and the Environment

Alternative 1, No Action, provides no protection for human health and the environment. The other three alternatives offer a higher degree of protectiveness, with Alternative 4 offering the highest protection for human health and the environment. Alternatives 2 and 3 depend on the existence of a soil cover to prevent contact and exposure to buried wastes, whereas Alternative 4 involves excavation of all wastes and soil contaminated above TCGs. Therefore, Alternative 4 affords much greater protection among all the alternatives considered.

5.1.2 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence of Alternative 4 is the highest because no waste or soil remaining at Site 7 would pose residual risk to ecological receptors. The long-term effectiveness and permanence of Alternative 2 is equivalent to that of Alternative 3, because the addition of soil cover would provide separation between the wastes and potential receptors. The combination of increased cover thickness and slopes over Area 1 for Alternative 2 would, however, require periodic inspections, long-term monitoring and maintenance.

Alternatives 2 and 3 rely on institutional controls, such as land use restrictions, to prevent future exposure to contaminated soils. The adequacy and reliability of institutional controls are maintained and enforced by DON. Institutional controls can be subject to changes in the political jurisdiction, legal interpretations, and the level of enforcement.

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TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover and Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
Effectiveness				
• **Overall Protection of Human Health and the Environment**	Alternative 1 would not meet Removal Action Objectives (RAOs), and it provides the least overall protection of the environment compared to the alternatives considered. Surface debris and areas with inadequate soil cover would allow no or very little separation between wastes and humans and sensitive ecological receptors. A previous soil cover investigation indicates that the soil cover over Areas 1 and 2 ranges between zero and 2 feet. Areas 3 through 6 have surface debris exposed and allow immediate exposure as well as indirect exposure through stormwater runoff and/or wind erosion.	Alternative 2 would meet RAOs. At Areas 1 and 2, long-term risks to human and terrestrial ecological receptors are reduced by isolating the direct exposure pathway by adding additional soil cover over the entire surface area. Surface drainage improvements would be provided with adequate slopes. For Areas 3, 4, and 6, risks are reduced through removal of surface debris. At Area 5, risks are reduced through excavation of buried waste materials, offsite disposal of the waste at an approved facility, and backfilling with clean soils. Periodic maintenance and monitoring of the Area 1 proposed landfill cap would maintain overall protection of human health and the environment, including: • Monolithic soil cover and vegetation • Drainage and erosion controls • site access control • groundwater monitoring • stormwater monitoring	Alternative 3 would meet RAOs. The majority of the existing soil cover at Areas 1 and 2 should be adequate to reduce long-term risks to terrestrial receptors. However, areas with inadequate soil cover would be repaired to provide adequate separation between waste and humans and ecological receptors. The potential for long-term risks to humans and terrestrial ecological receptors is also provided by performing periodic groundwater monitoring. For Areas 3, 4, and 6, risks are reduced through removal of exposed surface debris. At Area 5, risks are reduced through excavation of buried waste materials, offsite disposal of the waste at an approved facility, and backfilling with clean soils.	Alternative 4 would meet RAOs. For Areas 1, 2 and 5, risks are reduced through excavation of buried waste materials and offsite disposal of the waste at an approved facility. For Areas 3, 4, and 6, risks are reduced through removal of exposed surface debris. This affords the maximum long-term protection to the environment. However, short-term risks during implementation are potentially high. Alternative 4 affords the greatest protection of the environment because Site 7 materials with concentrations exceeding background levels or target cleanup goals (TCGs) would be excavated and disposed offsite. Imported clean fill materials would be used to backfill the excavations.

TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
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Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover and Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
• **Compliance with applicable or relevant and appropriate requirements (ARARs)**	Alternative 1 would not comply with ARARs.	Alternative 2 would comply with ARARs, specifically CCR Title 27 for landfill closure and maintenance and monitoring. In a semiarid environment such as that at Site 7, an alternative cover consisting of at least a 24-inch- thick monolithic soil cover should satisfy ARARs. The design of the alternative cover is an engineered alternative that would meet the performance of the prescriptive standards, including: • Provide adequate thickness to minimize infiltration through the cover • Construction of minimum 3 percent slope on the top deck and maximum 3 to 1 (horizontal to vertical) slopes on the sideslopes • Providing adequate drainage and erosion control • Re-establishing vegetation • Performing routine monitoring of the landfill cap and its features • Periodically monitoring the environmental controls, such as groundwater, stormwater, and, if necessary, landfill gas	Alternative 3 would comply with ARARs to the extent that protection of humans and the environment would be provided. • Provide adequate protection by separation between waste and humans and ecological receptors • Provide adequate protection and minimize disturbance to the existing wetlands and ecological environment Extensive provisions to protect or improve existing water quality conditions are not required because of the existing hydrological conditions.	Alternative 4 would comply with ARARs for Clean Closure (CCR Title 27 and LEA Advisory No. 16). Clean closure would consist of the following: • Complete removal of waste and waste residuals, including contaminated soils • Waste materials and residuals would be removed to a point where remaining contaminant concentrations are at or below background levels or TCGs
Long-Term Effectiveness and Permanence				
• **Magnitude of Residual Risk**	Under No Action, the magnitude of residual risk would remain unchanged and be the highest among the four alternatives.	Under Alternative 2, the residual risk existing at Areas 1 and 2 is not reduced. However, the source of residual risks would be further isolated under the new vegetated soil cap and existing landfill cover at Area 1. For Areas 3 through 6, the magnitude of residual risk is reduced because buried waste materials and/or surface debris are excavated and disposed offsite at an approved facility.	Under Alternative 3, the magnitude of residual risk at Areas 1 and 2 would remain the same as the baseline risk. However, the source of residual risks would be isolated under the existing landfill cover and repaired landfill cover. For Areas 3 through 6, the magnitude of residual risk is reduced because buried waste materials and/or surface debris are excavated and disposed offsite at an approved facility.	Under Alternative 4, the magnitude of residual risk would be relatively low because buried waste materials and/or surface debris are excavated and disposed offsite at an approved facility.

TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover and Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
• Adequacy and Reliability of Controls	Alternative 1 would not provide adequate and reliable controls. The buried waste is currently beneath soil cover of variable thickness (estimated to be zero to 2 feet). The surface debris would remain scattered throughout the site.	Alternative 2 would provide adequate and reliable controls with the proposed capping design and ancillary structures. The monolithic soil cover design at Area 1 would be effective in deterring ecological receptors from burrowing to reach buried waste materials. For Area 2, the existing soil cover would be adequate in deterring ecological receptors from burrowing to reach buried waste materials. For Areas 3 through 6, the need for controls is eliminated by removal and offsite disposal of the buried waste and surface debris.	Alternative 3 would provide adequate and reliable controls to monitor chemicals in groundwater from the main disposal trenches to the nearest receptors. Patching of the existing cover to maintain adequate thickness of the soil cover would eliminate direct contact with ecological receptors. For Area 2, the existing soil cover would be adequate in deterring ecological receptors from burrowing to reach buried waste materials. For Areas 3 through 6, Alternative 2 eliminates the need for controls by removal and offsite disposal of the buried waste and surface debris.	Alternative 4 would not require any controls because buried waste materials and/or surface debris at Site 7 are excavated and disposed offsite at an approved facility.
Reduction of Toxicity, Mobility, and Volume Through Treatment				
• Treatment Processes Used and Materials Treated • Amount of Hazardous Materials Destroyed or Treated • Expected Reductions in Toxicity, Mobility, and Volume • Irreversibility of Treatment • Type and Quantity of Treatment Residual	Alternative 1 would not reduce toxicity, mobility, or volume of contaminants through treatment.	Alternative 2 does not propose removal actions that involve treatment; therefore, Alternative 2 would not reduce toxicity, mobility, or volume of contaminants through treatment.	Alternative 3 does not propose removal actions that involve treatment; therefore, Alternative 3 would not reduce toxicity, mobility, or volume of contaminants through treatment.	Alternative 4 does not propose removal actions that involve treatment; therefore, Alternative 4 would not reduce toxicity, mobility, or volume of contaminants through treatment.

TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover and Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
Short-Term Effectiveness				
• Protection of Community During Remedial Action • Protection of Workers During Removal Action • Environmental Impacts	Under No Action, unlike the other three active alternatives, there would not be any temporary risks posed to the community, workers, and the environment. However, risks from ongoing water seep discharges to the Perimeter Pond continue to exist.	Under Alternative 2, excavation of Area 5 would temporarily pose high short-term risks to the workers and the environment (ecological receptors at the site). The short-term risk is mainly due to excavation activities occurring adjacent to a pond. The capping activity at Area 1 is likely to present low to moderate risks to the workers operating heavy equipment. In general, there would be a moderate disturbance to the community during construction due to increased traffic and dust. Significant disturbance to the existing onsite environmental habitat would be impacted with elimination of wetlands because of construction activities during soil placement and grading requirements for Area 1.	Under Alternative 3, excavation of Area 5 would temporarily pose high short-term risks to the workers and the environment (ecological receptors at the site). The short-term risk is mainly from construction activities occurring adjacent to a pond. However, the long-term groundwater monitoring action at Area 1 does not pose risks to the community, workers, or the environment during construction.	Alternative 4 would temporarily pose the greatest short-term risks to the workers and the environment (ecological receptors at the site) among the alternatives considered. In general, there would be a significant disturbance to the community during construction due to increased traffic.
• Time Until RAOs are Achieved	Alternative 1 would not achieve the RAOs; therefore, the time taken would be indefinite.	It would take approximately 0.5 year to complete the removal action under Alternative 2. However, the RAOs would be achieved only after a minimum of 5 years of periodic monitoring at Area 2.	It would take approximately 0.5 year to complete the removal actions at Areas 3 through 6 under Alternative 3. However, the RAOs would be achieved only after a minimum of 5 years of periodic monitoring at Areas 1 and 2.	It would take approximately 1.5 years to complete the removal action under Alternative 4. The RAOs would be achieved upon completion of the excavation and backfilling activities.
Implementability				
• Technical Feasibility • Availability of Services and Materials	Alternative 1 would not have any technical implementability concerns because no action is being taken.	Under Alternative 2, the capping at Area 1 employs proven and demonstrated technologies and is feasible to implement. However, the excavation activity at Area 5 may require specialized equipment for excavation adjacent to a pond. Specialized excavation, sheetpiling, dewatering, and waste handling contractors are required; however, the required equipment and experienced contractors are widely available in Southern California.	Under Alternative 3, the long-term monitoring at Area 1 does not have any technical implementability concerns. However, the excavation activity at Area 5 may require specialized equipment for excavation adjacent to a pond. Specialized excavation, sheetpiling, dewatering, and waste handling contractors are required; however, the required equipment and experienced contractors are widely available in Southern California.	The excavation activity at Areas 1, 2, and 5 require specialized equipment for excavation. Due to the large area of excavation, dewatering, backfill quantities, and waste disposal become significant issues. Specialized excavation, sheetpiling, dewatering, and waste handling contractors are required; however, the required equipment and experienced contractors are widely available in Southern California.

TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover and Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
• Administrative Feasibility	Alternative 1 would not require any additional administration because no action is being taken.	Alternative 2 would require procedures to administer land use restrictions and regulatory approval for capping, excavation, and offsite disposal. Because the removal action involves excavation and offsite disposal of buried wastes and surface debris within the National Wildlife Refuge (NWR), the Department of the Navy (DON) would need to coordinate with the Department of Toxic Substances Control (DTSC), the Regional Water Quality Control Board (RWQCB), the South Coast Air Quality Management District (SCAQMD), the United States Fish and Wildlife Service (USFWS), the United States Army Corps of Engineers (ACOE), and the California Department of Fish and Game (CDFG) during the removal action.	Alternative 3 would require procedures to administer land use restrictions, and regulatory approvals for excavation and offsite disposal. Because the removal action involves excavation and offsite disposal of buried and surface debris within the NWR, DON would need to coordinate with DTSC, RWQCB, SCAQMD, USFWS, ACOE, and CDFG during the removal action.	Alternative 4 affords clean-closure of Site 7; therefore, there would be no land use restrictions. However, there would be extensive regulatory coordination issues for excavation and offsite disposal. Because the removal action involves excavation and offsite disposal of buried wastes and surface debris within the NWR and adjacent wetland areas, DON would need to coordinate with DTSC, RWQCB, SCAQMD, USFWS, ACOE, and CDFG during the removal action.
• State (or Other Support Agency) Acceptance	It is anticipated that Alternative 1 would not be acceptable to the regulatory agencies (i.e., DTSC, RWQCB, California Integrated Waste Management Board [CIWMB], USFWS, ACOE, and CDFG).	It is anticipated that DTSC, RWQCB, CIWMB, USFWS, ACOE, and CDFG would accept Alternative 2. However, the construction disturbance and site restoration may cause major concern. The capping at Area 1 reduces the potential risks to human and ecological receptors through direct contact. The results of the long-term monitoring at Areas 1 and 2 are expected to confirm past investigations at Site 7, that the wastes pose minimal risks to human and ecological receptors. In addition, at Areas 3 through 6, the excavation of waste material and surface debris removal would reduce risks to receptors within NWR.	It is anticipated that DTSC, RWQCB, CIWMB, USFWS, ACOE, and CDFG would accept Alternative 3. The results of the long-term monitoring at Areas 1 and 2 are expected to confirm past investigations at Site 7, that the wastes pose minimal risks to human and ecological receptors. At Areas 3 through 6, the excavation of waste material and surface debris removal would reduce risks to receptors within NWR. Site construction activities would cause less impact than Alternatives 2 and 4. In addition, site restoration would only impact those areas disturbed during construction.	It is anticipated that DTSC, RWQCB, CIWMB, USFWS, ACOE, and CDFG would accept Alternative 4. However, the construction disturbance and site restoration may cause major concern. The excavation of buried wastes and surface debris at Site 7 provides clean closure; therefore, this alternative would likely be the most favored alternative for regulators.

TABLE 5-1. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Capping	Alternative 3: Existing Soil Cover Repair and Monitoring	Alternative 4: Excavation and Offsite Disposal
	Area 1 through Area 6: No Action	Area 1: Capping and Long-term Maintenance/Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Limited Repair of Existing Soil Cover Groundwater Monitoring Area 2: Groundwater Monitoring Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal	Area 1: Excavation and Offsite Disposal Area 2: Excavation and Offsite Disposal Area 3: Surface Debris Removal Area 4: Surface Debris Removal Area 5: Excavation and Offsite Disposal Area 6: Surface Debris Removal
• Community Acceptance	It is anticipated Alternative 1 may not be acceptable to the community.	The community's issues and concerns for Alternative 2 would be addressed based on public comments on the Engineering Evaluation/Cost Analysis (EE/CA). However, it is anticipated that the community would likely consider this alternative favorably because of the further isolation of buried wastes. One issue may be the increase in off-Station traffic, noise, and dust because of the need to transport and dispose waste materials offsite. The collection of sufficient evidence to demonstrate minimal long-term risks within Area 2 may also be required. Use of railroad transport for transport of offsite waste hauling and onsite backfill would be a mitigating measure which would make traffic and noises issues less significant.	The community's issues and concerns for Alternative 3 would be addressed based on public comments on the EE/CA. However, it is anticipated that the community would likely consider this alternative favorably because of the minimal intrusive activities involved. Collection of sufficient evidence to demonstrate minimal long-term risks within Areas 1 and 2 may be required. The other issue may be the increase in off-Station traffic, noise, and dust because of the need to transport and dispose waste materials offsite, although Alternative 3 involves the least amount of intrusive construction activities of the three alternatives considered. Use of railroad transport for transport of offsite waste hauling and onsite backfill would be a mitigating measure which would make traffic and noises issues less significant.	The community's issues and concerns for Alternative 4 would be addressed based on public comments on the EE/CA. However, it is anticipated that the community would likely consider this alternative favorably because it involves removal of wastes at Site 7. One issue may be the increase in off-Station traffic, noise, and dust because of the need to transport and dispose waste materials offsite. Use of railroad transport for transport of offsite waste hauling and onsite backfill would be a mitigating measure which would make traffic and noises issues less significant.
Cost				
Estimated Capital Costs ($ range)	$0	$4.6 million to $7.5 million	$1.9 million to $4.8 million	$16.8 million to $40.6 million
Estimated Annual Operation and Maintenance (O&M) Costs	$0	$190,000 to 226,000	$176,000 to 209,000	$38,000 to 44,000
Estimated Present Worth ($ range)	$0	**$4.8 million to $7.8 million**	**$2.1 million to $5.0 million**	**$16.9 million to $40.7 million**

Notes:

ACOE	United States Army Corps of Engineers
ARARs	applicable or relevant and appropriate requirements
CDFG	California Department of Fish and Game
CIWMB	California Integrated Waste Management Board
DON	Department of the Navy
DTSC	Department of Toxic Substances Control
EE/CA	Engineering Evaluation/Cost Analysis
NWR	National Wildlife Refuge
O&M	Operation and Maintenance
RAOs	Removal Action Objectives
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
TCGs	target cleanup goals
USFWS	United States Fish and Wildlife Service

5.1.3 Compliance with ARARs

Of all the alternatives, Alternative 1 does not meet state landfill closure ARARs, Endangered Species Act, Migratory Bird Treaty Act, Protection of Wetlands (EO 11990), CDFG Code (2080, 2014, and 3005), Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, and the Resource Conservation and Recovery Act, ARARs listed in Section 3.4.2. Alternatives 2 and 3 would meet state landfill closure ARARs for the protection of public health and safety and the environment. However, because of the existing hydrologic conditions of Site 7 (proximity to the ocean and other surface water bodies, shallow groundwater, and generally nonpotable groundwater quality), water quality protection by the addition of soil cover, grading improvements, or installation of drainage conveyance systems for containment and/or a barrier over the entire Area 1 may not afford additional protection other than performing selective soil cover repairs, as proposed for Alternative 3. On the other hand, Alternative 2 removal actions may destroy wetlands and sensitive habitat, which may not meet Endangered Species Act, Migratory Bird Treaty Act, Protection of Wetlands (EO 11988), and CDFG ARARs. The excavation of waste and contaminated soils proposed in Alternative 4 activities would be carried out to a point where remaining contaminant concentrations are at or below background levels or regulatory agency-approved cleanup levels and meet the intent of "clean closure" requirements, as described in LEA Advisory No. 16.

5.1.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives evaluated would reduce toxicity, mobility, or volume of contaminants through treatment. The buried waste, surface debris, and potentially contaminated soil would remain onsite for Alternatives 1, 2, and 3. However, Alternatives 2, 3, and 4 would involve excavation and removal of the waste and contaminated soils from Areas 3 through 6 in the NWR portions of Site 7 for disposal at an approved landfill. This removal action does reduce the amount of buried waste for future risk management.

5.1.5 Short-Term Effectiveness

The short-term effectiveness is similar for Alternatives 2, 3, and 4. Surface debris removal and waste and contaminated soil excavation activities are included in Alternatives 2, 3, and 4 removal actions.

All three active alternatives (i.e., 2, 3, and 4) have the added risk associated with the truck transport of large volumes of imported fill material from an offsite source to the site. Alternative 2 requires a minimum of 2 feet of soil cover, revegetation, grading, drainage, and erosion controls over approximately 8 acres; Alternative 3 requires repair of the existing soil cover over selected areas; and Alternative 4 requires a large volume of soil backfill for Areas 1, 2, and 5. Alternatives 2, 3, and 4 also require excavation of waste and contaminated soil from Area 5 and transportation to an approved landfill for disposal. For all three active alternatives, proper safety precautions, including dust control technologies, would be necessary. The short-term effectiveness is the lowest for Alternative 1 because the RAOs are never met. Alternatives 2, 3, and 4 are assigned a high ranking because there are no mitigable risks to the community, workers, or the environment during construction

Among the three active alternatives, Alternative 3 would likely take the shortest time to meet RAOs because of the simplest cover design and the least construction time. Alternative 1 is not evaluated because there is no construction or implementation phase.

5.2 Implementability of Alternatives

All of the alternatives use proven and demonstrated technologies and are feasible to implement. Alternatives 2, 3, and 4 involve earthwork and dewatering activities that can be provided by many contractors, which can be locally provided. No special materials or labor are required for these alternatives. Alternatives 2 and 4 are slightly more complicated to implement than Alternative 3 because they involve either placement of a minimum of 2 feet of soil cover over the entire Area 1 or the entire excavation of waste and contaminated soil from Area 1. Only soil cover over selected areas of Area 1 would be placed to repair the existing soil cover under Alternative 3; no additional soils would be necessary to meet grading or drainage requirements. Although Alternatives 2, 3, and 4 require a common removal action of excavating Area 5, Alternatives 2 and 4 require more extensive earthwork because of the amount of waste excavation or placement of soils as well as dewatering equipment and site access to accommodate grading and sloped excavations.

In addition to the placement of soils, the western portion of Site 7 is part of the NWR and is sensitive to wildlife; portions of the eastern part of Site 7 are also determined to meet the definition of wetlands and require mitigation measures for disturbance or destruction of wetlands or sensitive habitat. Hydrogeological and physical site conditions, based on past groundwater studies (SWDIV, 1990, 1995b, and 1999b) and assessments (SWDIV, 1995b, 1999a, and 2000), do not warrant the need to impact the existing wetlands and ecological structure/habitat by completely capping or excavating Area 1. Repair of the existing cap and groundwater monitoring is sufficient to minimize risk to public health and safety and the environment.

5.3 Cost of Alternatives

The capital, O&M, and total present worth costs for each alternative are shown in Table 5-1. A breakdown of costs by major task is presented in Table 5-1. For Alternative 2, O&M long-term maintenance and monitoring costs are based on 30 years and includes inspection and maintenance of the cap, vegetation, drainage, and erosion controls. Monitoring requirements also include stormwater, groundwater, and landfill gas. For Alternative 3, groundwater monitoring is only proposed for the initial 5 years to evaluate trends in the groundwater quality. The net present worth was calculated assuming a 5 percent discount rate unadjusted for inflation. Alternative 1, No Action, has the lowest net present worth cost of all of the alternatives, as expected, because no activities would take place. Alternative 4 is the highest cost alternative, having a net present worth cost between $17 million and $41.0 million which includes the costs of disposal of excavated material and replacement backfill.

Alternative 2 is the next highest cost alternative, having a net present worth between $4.8 million and $7.8 million. The cost for Alternative 2 includes O&M costs, consisting of long-term maintenance and monitoring costs for maintaining the soil cap and vegetative

cover. Alternative 3 is the second lowest cost alternative, having a net present worth between $2.1 million and $5.0 million.

5.3.1 Sensitivity of Costs

The cost estimates were prepared assuming the following:

- Unit costs in 2001 dollars
- Local sources for soil import
- Transportation of waste to an approved landfill via rail haul
- Sloped excavations for excavating wastes and contaminated soils in Areas 1 and 5

5.4 Ranking

Ranking of the alternatives is presented in Table 5-2.

TABLE 5-2. RANKING OF REMOVAL ACTION ALTERNATIVES
NAVWPNSTA Seal Beach
Site 7 (Station) Landfill EE/CA

	REMOVAL ACTION ALTERNATIVES			
Alternative Evaluation Criteria	**Alternative 1: No Action**	**Alternative 2: Capping**	**Alternative 3: Existing Soil Cover Repair and Groundwater Monitoring**	**Alternative 4: Excavation and Offsite Disposal**
Overall Protectiveness	Low	High	High	High
Compliance with ARARs	Low	High	High	High
Long-Term Effectiveness	Low	High	High	High
Short-Term Effectiveness	High	Moderate	High	Low
Technical Feasibility	High	High	High	Low
Administrative Feasibility	Moderate	High	High	Low
Availability of Services and Materials	NA	High	High	Moderate
State and Community Acceptance	TBD	TBD	TBD	TBD
Cost	Low	High	Moderate	High

Notes:

ARARs – Applicable or relevant and appropriate requirements

NA – Not Applicable

TBD – To Be Determined

6. Recommended Removal Action Alternative

The EE/CA was performed in accordance with current EPA and DON guidance documents for a non-time critical removal action under CERCLA. The purpose of this EE/CA was to identify and analyze alternative removal actions to address buried wastes and surface debris at Site 7 at NAVWPNSTA Seal Beach. Four alternatives were identified, evaluated, and compared:

- Alternative 1—No Action
- Alternative 2—Capping and Long-term Maintenance/Monitoring
- Alternative 3—Existing Soil Cover Repair and Groundwater Monitoring
- Alternative 4—Excavation and Offsite Disposal

Based on the comparative analyses of the removal action alternatives completed in Section 5, the recommended removal action is **Alternative 3**. Alternative 3 consists of the following removal actions for the different areas identified at Site 7:

- Area 1: Existing soil cover repair and groundwater monitoring
- Area 2: Groundwater monitoring
- Areas 3, 4, and 6: Surface debris removal
- Area 5: Excavation followed by offsite disposal, and clean imported backfill

For Areas 1 and 2, groundwater monitoring is proposed based on the minimal risks to receptors identified at these locations under current site conditions. In addition, at Area 1, the existing soil cover would be repaired by placing additional soils to provide for a sufficient cap thickness that would reduce direct contact with buried waste onsite. Additional soils would be placed on areas with deficient soil cover to provide for an effective cap thickness that would reduce direct contact with buried onsite waste, but avoiding destruction of wetlands and sensitive habitat. Areas deficient in soil cover will be confirmed by pot-holing the landfill cap to verify the soil cover thickness. The objective of this cover design is not to minimize precipitation from infiltrating the cap but to prevent direct contact with receptors, as well as, eliminate the migration of potential surface contamination through windblown dust or surface runoff, and/or prevent ponding of surface water runoff. The existing site conditions preclude measures to significantly reduce infiltration of precipitation at the site because of the following factors:

- Shallow groundwater depth at the site is less than 5 feet bgs.
- The base of the buried refuse was determined to vary between 5 and 12 feet bgs and therefore the majority of the waste is below the water table.
- Groundwater quality at the site is generally poor due to natural conditions.
- Natural attenuation by tidal fluctuations appear to have been active over time, therefore no well defined plumes have been identified.

Additional soil placement is proposed on areas lacking 2-foot-minimum soil cover, except where wetlands or sensitive habitat exist. In Area 1, a network of four existing monitoring wells would be used to capture the chemical concentration data upgradient and downgradient of Area 1 to monitor for potential trends or release of chemicals into groundwater. In Area 2, three new monitoring wells are proposed to monitor groundwater concentrations south of Area 2. One existing monitoring well, north of Area 2, would also be included in the monitoring program. The groundwater would be monitored for potential trends or offsite migration of chemicals in Area 2. The purpose of this groundwater monitoring program is to serve as a sentinel well network to monitor potential groundwater contamination from Site 7. These wells are strategically located between buried wastes at Site 7 and the nearest potential aquatic receptors. Thus, these groundwater monitoring wells would serve as an "early detection system." This program would be consistent with the recommendations of the groundwater monitoring study performed at Site 7. The periodic groundwater monitoring proposed will monitor the status and conditions of the groundwater. If the status changes, appropriate actions will be taken at that time. In addition, the past investigations have shown no contaminated groundwater plume to be present.

For Areas 3, 4, and 6, selective removal of debris from the top few feet of soil at the site is proposed. The debris material would be hauled offsite and disposed of in an approved landfill or recycled. If unexpected contamination is observed that cannot be simply excavated and transported offsite for proper disposal, then the Navy will re-group to evaluate the appropriate cleanup method and schedule given the new findings.

The details for implementing the recommended alternative will be developed by the removal action contractor and will be discussed in the removal action work plan. Any proposed groundwater monitoring program will be conducted with concurrence from all appropriate regulatory agencies, including the RWQCB, DTSC Geologic Services Unit (GSU), and CIWMB.

For Area 5, adjacent to the Perimeter Pond, excavation and offsite disposal of wastes is proposed to mitigate possible long-term risks to aquatic receptors in the pond. The removal action would involve excavation of wastes and contaminated soil and sediment at two locations along the eastern shoreline of Perimeter Pond. The excavated material would then be hauled offsite and disposed of in an approved landfill. Imported earthfill would be used to backfill the excavation. Rip rap and geotextile would be placed to protect the shoreline from erosive wave actions.

Alternative 3, Existing Soil Cover Repair and Groundwater Monitoring, is the recommended removal action because this alternative:

- Adequately protects public health and safety and the environment.
- Complies with ARARs.
- Meets the RAOs.
- Provides moderate long-term effectiveness.

- Provides high short-term effectiveness because of low impacts on the community, workers, and the environment when compared with Alternatives 2 and 4.
- Provides adequate reliability and control with a few minor repairs to the existing cover.
- Provides high technical feasibility and low administrative requirements when compared with Alternatives 2 and 4.
- Provides high reasonableness of costs: This alternative offers the highest benefit in terms of achieving RAOs for the estimated cost.

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Appendix A
Applicable or Relevant and Appropriate Requirements

Section A1
INTRODUCTION

This appendix identifies and evaluates potential federal and state of California applicable or relevant and appropriate requirements (ARARs) from the universe of regulations, requirements, and guidance and sets forth the Department of the Navy (DON) determinations regarding those potential ARARs for each response action alternative retained for detailed analysis in this Engineering Evaluation/Cost Analysis (EE/CA) for Installation Restoration Program Site 7 Station Landfill at Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach).

This evaluation includes an initial determination of whether the potential ARARs actually qualify as ARARs, and a comparison for stringency between the federal and state regulations to identify the controlling ARARs. The identification of ARARs is an iterative process. The final determination of ARARs will be made by the DON in the record of decision (ROD) or action memorandum (AM), after public review, as part of the response action selection process.

A1.1 SUMMARY OF CERCLA AND NCP REQUIREMENTS

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 *United States Code* [U.S.C.] Section [§] 9621[d]), as amended, states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 *United States Code* [U.S.C.] Section [§] 9621[d]), as amended, states that remedial actions at CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate. Although Section 121 of CERCLA does not itself expressly require that CERCLA removal actions comply with ARARs, the United States Environmental Protection Agency (U.S. EPA) has promulgated a requirement in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) mandating that CERCLA removal actions "... shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws" (Title 40 *Code of Federal Regulations* [C.F.R.] § 300.415[j]) (40 C.F.R. § 300.415[j]). It is DON policy to follow this requirement. Certain specified waivers may be used for removal actions, as is the case with remedial actions.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than federal ARARs.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed response action and are well suited to the conditions of the site (U.S. EPA 1988a). A requirement must be determined to be both relevant and appropriate in order to be considered an ARAR.

The criteria for determining relevance and appropriateness are listed in 40 C.F.R. § 300.400(g)(2) and include the following:

- the purpose of the requirement and the purpose of the CERCLA action;
- the medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site;
- the substances regulated by the requirement and the substances found at the CERCLA site;
- any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site;
- the type of place regulated and the type of place affected by the release or CERCLA action;
- the type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action; and
- any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site.

According to CERCLA ARARs guidance (U.S. EPA 1988a), a requirement may be "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involve a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (U.S. EPA 1988b).

Tables included in this appendix present each potential ARAR with a determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or response action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria.

Negative determinations are documented in the tables of this appendix and are discussed in the text only for specific cases.

To qualify as a state ARAR under CERCLA and the NCP, a state requirement must be:

- a state law,
- an environmental or facility siting law,
- promulgated (of general applicability and legally enforceable),
- substantive (not procedural or administrative),
- more stringent than the federal requirement,
- identified in a timely manner, and
- consistently applied.

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or nonenvironmental, including permit requirements, are not considered to be ARARs. CERCLA 121(e)(1), 42 U.S.C. § 9621(e)(1), states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." The term *on-site* is defined for purposes of this ARARs discussion as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 C.F.R. § 300.5).

Nonpromulgated advisories or guidance issued by federal or state governments are not legally binding and do not have the status of ARARs. Such requirements may, however, be useful, and are "to be considered" (TBC). TBC (40 C.F.R. § 300.400[g][3]) requirements complement ARARs but do not override them. They are useful for guiding decisions regarding cleanup levels or methodologies when regulatory standards are not available.

Pursuant to U.S. EPA guidance (U.S. EPA 1988a), ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific requirements. This classification was developed to aid in the identification of ARARs; some ARARs do not fall precisely into one group or another. ARARs are identified on a site basis for remedial actions where CERCLA authority is the basis for cleanup.

As the lead federal agency, the DON has primary responsibility for identifying federal ARARs at NAVWPNSTA Seal Beach. Potential federal ARARs that have been identified for the Site 7 EE/CA are discussed in Section A1.2.2. Pursuant to the definition of the term *on-site* in 40 C.F.R. § 300.5, the on-station area that is part of this action includes Site 7, the former Station Landfill. The Site is bounded on the north by a railroad spur and oval laydown area, and on the south by a drainage ditch and Perimeter Road. The eastern boundary is not delineated but appeared in aerial photographs to

extend to the southern projection of the marshalling yard. The western boundary cuts north-south along the eastern shoreline of Perimeter Pond at the southeast corner of the NWR. See Figure 2-2. Based on exploratory drilling, the depth of debris is 10 feet below ground surface (bgs). Shallow groundwater was encountered between 3 and 5 feet bgs. The removal action will reduce risks to humans and the environment associated with waste contained in the disposal fill, to the extent practicable and reasonable.

For the purposes of this EE/CA, Site 7 is divided into areas designated from 1 to 6. These areas were designated based on information obtained from past investigations (see Section 2.2).

Area 1: This area lies in the northeast portion of the site. It covers approximately 8 acres. Most of the waste disposal and landfill activities took place in Area 1 in a series of unlined trenches lying in an east-west orientation. Reportedly, the trenches were excavated to a depth of 10 feet bgs and filled with debris (NEESA, 1985). However, exploration during a supplemental characterization indicated the bottoms of the debris burial depths varying between 5.5 and 9 feet bgs with an average bottom depth of 6.4 feet bgs (SWDIV, 1999c). Types of debris observed during exploratory drilling included diapers, clothing, wire, and rubber.

Area 2: This area lies along the southern boundary of the site adjacent to Perimeter Road. It is probably a single, contiguous trench approximately 600 feet long by 40 feet wide (about 0.6 acres). The bottom depths of debris range from 6 to 10 feet bgs (SWDIV, 1999c) with an average bottom depth of 7.5 feet bgs. During exploratory drilling, building materials such as wood, metal, and concrete were observed.

Area 3: This area lies in the northwest portion of Site 7. It is an irregularly shaped area that is approximately 1 acre. Site visits to Area 3 reveal surficial scattered rusted metal debris. This surficial metal debris accounts for the geophysical anomalies detected in this area during the pre-sampling activities of the RI (SWDIV, 1995b).

Area 4: This area lies in the northwest portion of Site 7 southeast of Area 3. It is similar to Area 3 in that it is also an irregularly shaped area littered with surficial rusted metal debris that is approximately 1 acre.

Area 5: This area forms the eastern shoreline of Perimeter Pond and lies between Perimeter Pond and East Pond (see Figure 2-9). Two north-south-oriented trenches lie in this area, with a portion of the western trench exposed to Perimeter Pond. Exposed debris observed includes materials such as concrete, metal banding, and lumber. Area 5 covers about 0.7 acres and has an average bottom debris depth of 7 feet (SWDIV, 1999c).

Area 6: This area lies to the southeast of Area 5. This area is similar to Areas 3 and 4 in that the debris found in this area appears to be surficial only. It lies along an unpaved access road between Perimeter Road and the eastern shore of Perimeter Pond. The debris, mostly pieces of lumber, appear to be debris that had fallen off of vehicles during the removal of portions of the exposed trench at Area 5. This area is irregular in shape and occupies about 0.1 acres.

Identification of potential state ARARs was initiated through DON requests that the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) identify potential state ARARs, an action described in more detail in Section A1.2.3. Potential state ARARs that have been identified for Site 7 are discussed below.

A1.2 METHODOLOGY DESCRIPTION

The process of identifying and evaluating potential federal and state ARARs is described in this subsection.

A1.2.1 General

As the lead federal agency, the DON has primary responsibility for identification of potential ARARs for Site 7. In preparing this ARARs analysis, the DON undertook the following measures, consistent with CERCLA and the NCP:

- identified federal ARARs for each response action alternative addressed in the EE/CA, taking into account site-specific information for Site 7;
- reviewed potential state ARARs identified by the state to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs;
- evaluated and compared federal ARARs and their state counterparts to determine which state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions; and
- reached a conclusion as to which federal and state ARARs are the most stringent and/or "controlling" ARARs for each alternative.

As outlined in Section 3.5 of this EE/CA report, the remedial action objectives for the Site 7 removal action are to:

- reduce the potential for exposure of ecological receptors to landfill waste and potentially contaminated soil by increasing separation and/or eliminating exposure pathways (e.g., water seeps) of wastes to human and ecological receptors;
- restore habitat that is compatible with the Seal Beach NWR habitat;
- minimize impact to wetlands and improve conditions of remaining wetlands, to the extent practicable;
- control surface water runoff and reduce the potential for erosion of the landfill surface; and
- comply with chemical-specific ARARs where exceedances have occurred due to waste releases.

The Site 7 removal action alternatives considered for detailed analysis, and for which an ARARs analysis is presented in this appendix, are as follows:

- Alternative 1: No Action.
- Alternative 2: Capping and Long-term Maintenance/Monitoring.
  Primary removal action activities involve capping Area 1 with a Title 27 compliant cap, surficial debris removal, and excavation and offsite disposal of waste, and performing long-term monitoring/maintenance.
- Alternative 3: Limited Repair of Existing Soil Cover and Groundwater Monitoring.
  Primary removal action activities involve performing limited soil cover repairs of Area 1, surficial debris removal, excavation and offsite disposal of waste, and groundwater monitoring.
- Alternative 4: Excavation and Offsite Disposal.
  Primary removal action activities involve excavation and offsite disposal of wastes for areas 1, 2, and 5, and surficial debris removal.

A1.2.2 Identifying and Evaluating Federal ARARs

The DON is responsible for identifying federal ARARs as the lead federal agency under CERCLA and the NCP. The final determination of federal ARARs will be made when the DON issues the ROD/AM. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act, the Safe Drinking Water Act, the Toxic Substances Control Act, and their implementing regulations, to name a few. See NCP preamble at 55 Fed. Reg. 8764–8765 (1990) for a more complete listing.

The proposed response action and alternatives were reviewed against all potential federal ARARs, including but not limited to those set forth at 55 Fed. Reg. 8764–8765 (1990), in order to determine if they were applicable or relevant and appropriate utilizing the CERCLA and NCP criteria and procedures for ARARs identification by lead federal agencies.

A1.2.3 Identifying and Evaluating State ARARs

The process of identifying and evaluating potential state ARARs by the state and the DON is described in this subsection.

A1.2.3.1 SOLICITATION OF STATE ARARs UNDER NCP

U.S. EPA guidance (U.S. EPA 1988b) recommends that the lead federal agency consult with the state when identifying state ARARs for remedial actions. In essence, the CERCLA/NCP requirements at 40 C.F.R. § 300.515 for remedial actions provide that the lead federal agency request that the state identify chemical- and location-specific state ARARs upon completion of site characterization. The requirements also provide that the lead federal agency request identification of all categories of state ARARs (chemical-, location-, and action-specific) upon completion of identification of remedial alternatives

for detailed analysis. The state must respond within 30 days of receipt of the lead federal agency requests. The remainder of this subsection documents the DON's efforts to date to identify and evaluate state ARARs.

The DON followed the procedures of the process set forth in 40 C.F.R. § 300.515 (d) and Section 7.7 of the Federal Facilities Site Remediation Agreement (FFSRA) for removal actions in seeking state assistance in identifying state ARARs.

A1.2.3.2 CHRONOLOGY OF EFFORTS TO IDENTIFY STATE ARARs

The following chronology summarizes the DON efforts to obtain state assistance in identifying state ARARs for the response action at NAVWPNSTA Seal Beach. Key correspondence between the DON and the state agencies relating to this effort has been included in the Administrative Record (AR) for this EE/CA.

The DON originally initiated the ARARs identification process with a letter (dated December 11, 1996) to the DTSC, requesting input on identification of action-specific state ARARs. DTSC had previously solicited chemical-specific and location-specific ARARs from state agencies as part of the 1995 Remedial Investigation report for Operable Units (OU) 1,2, and 3. The responses to the DTSC request were transmitted to the DON as enclosures with a letter dated March 14, 1997. Enclosed with this letter, the DON received input from:

- California EPA Integrated Waste Management Board (letter dated 28 January 1997);
- California Department of Fish and Game (letter dated 25 February 1997);
- California Department of Health Services (letter dated 13 January 1997);
- California Air Resources Board (letter dated 3 January 1997);
- California Regional Water Quality Control Board (letter dated 6 January 1997);
- City of Seal Beach (letter dated 23 January 1997) and
- South Coast Air Quality Management District (SCAQMD) (letter dated 14 January 1997).

With the exception of the California Department of Fish and Game proposed ARARs, the above ARARs were superceded when the removal action alternatives changes in 2000.

The latest request for identification of state action-specific ARARs specifically for Site 7 was presented in a letter dated 09 November 2000 to DTSC and a subsequent request was made on 23 March 2001. DTSC responded to DON's request for identification of state action-specific ARARs at Site 7 in a letter dated 24 January 2001. Additional responses were provided on 15 March and 24 April, 2001. Responses were provided by:

- South Coast Air Quality Management District (SCAQMD) (letter dated 15 December 2000).
- California Environmental Protection Agency Integrated Waste Management Board (letter dated 3 January 2001);

- California Environmental Protection Agency Air Resources Board (letter dated 5 January 2001);
- City of Seal Beach Developmental Services (letter dated 10 January 2001);
- County of Orange Health Care Agency (letter dated 12 January 2001);
- California Department of Transportation (letter dated 23 January 2001);
- California Department of Toxic Substances Control (letter dated 24 January 2001);
- California Regional Water Quality Control Board (letter dated 15 March 2001); and
- County of Orange Public Facilities and Resources Department (letter dated 24 April 2001)

Any additional input for action-specific ARARs received by DTSC will be incorporated into the final issuance of this EE/CA.

For the purposes of this EE/CA, only the year 2000 and 2001 responses are being considered for ARAR analysis because the previously proposed removal actions have significantly changed from 1997 to the current proposed removal actions, except for the California Department of Fish and Game (letter dated 25 February 1997). The applicable ARARs identification letters can be found in Appendix D.

A1.3 OTHER GENERAL ISSUES

General issues identified during the evaluation of ARARs for Site 7 are discussed in the following subsections.

A1.3.1 General Approach to Requirements of the Federal Resource Conservation and Recovery Act

The RCRA is a federal statute passed in 1976 to meet four goals: the protection of human health and the environment, the reduction of waste, the conservation of energy and natural resources, and the elimination of the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land disposal restrictions, and technical requirements. RCRA, as amended, contains several provisions that are potential ARARs for CERCLA sites.

Substantive RCRA requirements are applicable to response actions on CERCLA sites if the waste is an RCRA hazardous waste, and either:

- the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; or
- the activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA (U.S. EPA 1988a).

The preamble to the NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 Fed. Reg. 8666, 8742 [1990]). The state of California received approval for its base RCRA hazardous waste management program on 23 July 1992 (57 Fed. Reg. 32726 [1992]). The state of California "Environmental Health Standards for the Management of Hazardous Waste," set forth in Title 22 *California Code of Regulations*, Division 4.5 (Cal. Code Regs. tit. 22, div. 4.5), were approved by U.S. EPA as a component of the federally authorized state of California RCRA program.

The regulations of Cal. Code Regs. tit. 22, div. 4.5 are, therefore, a source of potential federal ARARs for CERCLA response actions. The exception is when a state regulation is "either broader in scope or more stringent" than the corresponding federal RCRA regulations. In that case, such regulations are not considered part of the federally authorized program or potential federal ARARs. Instead, they are purely state law requirements and potential state ARARs.

The U.S. EPA 23 July 1992 notice approving the state of California RCRA program (57 Fed. Reg. 32726 [1992]) specifically indicated that the state regulations addressed certain non-RCRA, state-regulated hazardous wastes that fell outside the scope of federal RCRA requirements. Cal. Code Regs. tit. 22, div. 4.5 requirements would be potential state ARARs for such non-RCRA, state-regulated wastes.

A key threshold question for the ARARs analysis is whether or not the contaminants at Site 7 constitute federal hazardous waste as defined under RCRA and the state's authorized program or qualify as non-RCRA, state-regulated hazardous waste. A discussion of waste characterization is included in Section A1.4.

A1.3.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) is applicable to state actions but not to actions of the federal government. Furthermore, U.S. EPA and the DON have determined that the requirements of the National Environmental Policy Act (NEPA) and CEQA are no more stringent than the requirements for environmental review under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). Pursuant to the provisions of CERCLA, the NCP, and other federal environmental impact evaluation requirements, selecting a remedial action with feasible mitigation measures and provision for public review is designed to assure that the proposed action provides for short- and long-term protection of the environment and public health. Hence, CERCLA performs the same function as, and is substantially parallel to, the state's requirements under CEQA.

For the reasons set forth above, NEPA and CEQA are not ARARs for CERCLA actions.

A1.4 WASTE CHARACTERIZATION

Selection of ARARs involves the characterization of wastes as described below.

A1.4.1 RCRA Hazardous Waste Determination

Federal RCRA hazardous waste determination is necessary to determine whether a waste is subject to RCRA requirements at Cal. Code Regs. tit. 22, div. 4.5 and other state requirements at Cal. Code Regs. tit. 23, div. 3, Chapter (ch.) 15. The first step in the RCRA hazardous waste characterization process is to evaluate contaminated media at the site(s) and determine whether it constitutes a "listed" RCRA waste. The preamble to the NCP states that "...it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste" (55 Fed. Reg. 8666, 8758 [1990]).

This approach is confirmed in U.S. EPA guidance for CERCLA compliance with other laws (U.S. EPA 1988a), as follows:

"To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many Superfund sites, no information exists on the source of wastes. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the nature of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available that allows the lead agency to determine that the wastes are listed RCRA hazardous wastes."

RCRA hazardous wastes that have been assigned U.S. EPA hazardous waste numbers (or codes) are listed in Cal. Code Regs. tit. 22, §§ 66261.30–66261.33. The lists include hazardous waste codes beginning with the letters "F," "K," "P," and "U."

Knowledge of the exact source of a waste is required for source-specific listed wastes ("K" waste codes). Some knowledge of the nature or source of the waste is required even for listed wastes from nonspecific sources, such as spent solvents ("F" waste codes) or commercial chemical products ("P" and "U" waste codes). These listed RCRA hazardous wastes are restricted to commercially pure chemicals used in particular processes such as degreasing.

P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-spec products (U.S. EPA 1991a). Not every waste containing a P or U chemical is a hazardous waste. To determine whether a CERCLA investigation-derived waste contains a P or U waste, there must be direct evidence of product use. In particular, all the following criteria must be met. The chemicals must be:

- discarded (as described in 40 CFR § 261.2[a][2]),
- either off-spec commercial products or a commercially sold grade,
- not used (soil contaminated with spilled unused wastes is a P or U waste), and
- the sole active ingredient in a formulation.

Available historical information were reviewed during the RI. Interviews were conducted with past and current NAVWPNSTA Seal Beach staff. No documentation of past waste disposal practices was found that would serve to classify the sources of

contamination at Site 7 with respect to the RCRA waste listings. Therefore, the DON has made the determination that the mere presence of VOCs should not classify contaminated soil as RCRA-listed hazardous wastes. By extension of this reasoning, the residuals generated during treatment of contaminated soil will not be classified as RCRA-listed hazardous wastes either.

The second step in the RCRA hazardous waste characterization process is to evaluate potential hazardous characteristics of the waste. The evaluation of characteristic waste is described in U.S. EPA guidance as follows (U.S. EPA 1988a):

"Under certain circumstances, although no historical information exists about the waste, it may be possible to identify the waste as RCRA characteristic waste. This is important in the event that (1) remedial alternatives under consideration at the site involve on-site treatment, storage, or disposal, in which case RCRA may be triggered as discussed in this section; or (2) a remedial alternative involves off-site shipment. Since the generator (in this case, the agency or responsible party conducting the Superfund action) is responsible for determining whether the wastes exhibit any of these characteristics (defined in 40 C.F.R. §§ 261.21–261.24), testing may be required. The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary.

"In determining whether to test for the toxicity characteristic using the extraction procedures (EP) toxicity test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration in soil is 20 times or less the EP toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case, RCRA requirements would not be applicable. In other instances, where it appears that the substances may be characteristic hazardous waste (ignitable, corrosive, reactive, or EP toxic), testing should be performed."

Hazardous waste characteristics, as defined in 40 C.F.R. §§ 261.21–261.24, are commonly referred to as ignitability, corrosivity, reactivity, and toxicity. California environmental health standards for the management of hazardous waste set forth in Cal. Code Regs. tit. 22, div. 4.5 were approved by U.S. EPA as a component of the federally authorized California RCRA program. Therefore, the characterization of RCRA waste is based on the state requirements.

The characteristics of ignitability, corrosivity, reactivity, and toxicity are defined in Cal. Code Regs. tit. 22, §§ 66261.21–66261.24. According to Cal. Code Regs. tit. 22, § 66261.24(a)(1)(A), "A waste that exhibits the characteristic of toxicity pursuant to subsection (a)(1) of this section has the EPA Hazardous Waste Number specified in Table I of this section which corresponds to the toxic contaminant causing it to be hazardous." Table I assigns hazardous waste codes beginning with the letter "D" to wastes that exhibit the characteristic of toxicity; D waste codes are limited to "characteristic" hazardous wastes.

According to Cal. Code Regs. tit. 22, § 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste provided that the waste has already been

reliably tested or if there is documentation of chemicals used. Soil contamination at Site 7 is not ignitable, corrosive, or reactive, as defined in Cal. Code Regs. tit. 22, §66261.21–66261.23. This determination was based on knowledge of the nature and concentrations of contaminants.

The requirements at Cal. Code Regs. tit. 22, § 66261.24 list the toxic contaminant concentrations that determine the characteristic of toxicity. The concentration limits are in milligrams per liter (mg/L). These units are directly comparable to total concentrations in waste groundwater and surface water. For waste soils, these concentrations apply to the extract or leachate produced by the toxicity characteristic leachate procedure (TCLP).

A waste is considered hazardous if the contaminants in the wastewater or in the soil TCLP extract equal or exceed the TCLP limits. TCLP testing is required only if total contaminant concentrations in soil equal or exceed 20 times the TCLP limits because TCLP uses a 20-to-1 dilution for the extract (U.S. EPA 1988a). Total concentrations of contaminated soil samples at the site were compared to the TCLP limits at Cal. Code Regs. tit. 22, § 66261.24(a)(1). None of the site concentrations exceeded 20 times the listed concentrations. Therefore, the contaminated soil at Site 7 is determined not to be an RCRA hazardous waste, based on the toxicity characteristic.

A1.4.2 California-Regulated, Non-RCRA Hazardous Waste

A waste determined not to be an RCRA hazardous waste may still be considered a state-regulated non-RCRA hazardous waste. The state is broader in scope in its RCRA program in determining hazardous waste. Cal. Code Regs. tit. 22, § 66261.24(a)(2) lists the total threshold limit concentrations (TTLCs) and the soluble threshold limit concentrations (STLCs) for non-RCRA hazardous waste. The state applies its own leaching procedure, WET, that uses a different acid reagent and has a different dilution factor (tenfold). There are other state requirements that may be broader in scope than federal ARARs for identifying non-RCRA wastes regulated by the state. These may be potential ARARs for wastes not covered under federal ARARs. See additional subsections of Cal. Code Regs. tit. 22, § 66261.24. A waste is considered hazardous if its total concentrations exceed the TTLCs or if the extract concentrations from the waste extraction test (WET) exceed the STLCs. A WET is required when the total concentrations exceed the STLC but are less than the TTLCs (Cal. Code Regs. tit. 22, div. 4.5, ch. 11, Appendix [app.] II [b]).

A1.4.3 Other California Waste Classifications

For waste discharged after 18 July 1997, solid waste classifications at Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230 are used to determine applicability of waste management requirements. These are summarized below.

A "designated waste" under Cal. Code Regs. tit. 27, § 20210 is defined at Cal. Water Code § 13173. Under Cal. Water Code § 13173, designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in

concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state.

A nonhazardous solid waste under Cal. Code Regs. tit. 27, § 20220 is all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid wastes, and other discarded waste (whether of solid or semisolid consistency), provided that such wastes do not contain wastes that must be managed as hazardous wastes or wastes that contain soluble pollutants in concentrations that exceed applicable water quality objectives or could cause degradation of waters of the state.

Under Cal. Code Regs. tit. 27, § 20230, inert waste is that subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives and does not contain significant quantities of decomposable waste.

Section A2

CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARs associated with particular response alternatives (such as closure or discharge) can be characterized as action-specific but include numerical values or methodologies to establish them so they fit in both categories (chemical- and action-specific). To simplify the comparison of numerical values, several criteria and standards for chemicals of concern are presented in Table A2-1.

This section presents ARARs determination conclusions addressing numerical values for groundwater, surface water, soil, sediment, and air, and a summary of the ARARs conclusions and a more detailed discussion of the ARARs for groundwater, surface water, soil, sediment, and air.

Potential federal and state chemical-specific ARARs are summarized in Tables A2-2 and A2-3, respectively, which are at the end of this section.

A2.1 SUMMARY OF ARARs CONCLUSIONS BY MEDIUM

Groundwater, surface water, soil, sediment, and air are the environmental media potentially affected by the Site 7 removal action. The conclusions for ARARs pertaining to these medium are presented in the following sections.

A2.1.1 Groundwater ARARs Conclusions

Shallow groundwater shows low levels and infrequent detections of COPCs, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, metals, asbestos, and cyanide; therefore, no chemicals of concern were identified for groundwater at Site 7. However, ARARs were still identified for groundwater at Site 7 because they could be potentially applicable or relevant and appropriate if higher levels of COPCs are detected. Historical information indicates the possibility of RCRA hazardous waste being disposed of at Site 7, Station Landfill.

The substantive provisions of the following requirements are the most stringent of the potential federal and state chemical-specific ARARs for groundwater at Site 7 (see Tables A2-2 and A2-3):

- RCRA definition of hazardous waste in Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100;
- RCRA definition of waste characterized as toxic in 40 C.F.R. § 261.24(a) and in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B);
- RCRA groundwater protection standards in Cal. Code Regs. tit. 22, § 66264.94 except 66264.94(a)(2) and 66264.94(b);
- Water Quality Control Plan (WQCP) for the Santa Ana Region (RWQCB, 1995): (establishes water quality objectives [WQOs], beneficial uses, waste discharge limitations), Chapters 4 and 5;
- SWRCB Resolution (Res.) 68-16, Res. 88-63, and Res. 89-42;

- Porter-Cologne Water Quality Control Act, Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360;
- Waste characteristics for discharge of waste to land, Cal. Code of Regs. tit. 27, div. 2, subdivision 1 (includes Cal. Code of Regs. tit. 27, div. 2, chapter 3).

A2.1.2 Surface-Water ARARs Conclusions

Surface-water discharge is included as a potential component of dewatering activities as part of the removal action for Site 7 and the presence of water seeps which will be eliminated as part of the Site 7 removal action. The substantive provisions of the following requirements are the most stringent of the potential federal and state chemical-specific ARARs for groundwater at Site 7 (see Table A2-2):

- RCRA definition of hazardous waste in Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100;
- RCRA definition of waste characterized as toxic in 40 C.F.R. § 261.24(a) and in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B);
- Water Quality Control Plan (WQCP) for the Santa Ana Region (RWQCB, 1995): (establishes water quality objectives [WQOs], beneficial uses, waste discharge limitations), Chapters 4 and 5;
- SWRCB Resolution (Res.) 68-16, Res. 88-63, and Res. 89-42;
- Porter-Cologne Water Quality Control Act, Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360;
- Waste characteristics for discharge of waste to land, Cal. Code of Regs. tit. 27, div. 2, subdivision 1 (includes Cal. Code of Regs. tit. 27, div. 2, chapter 3).

A2.1.3 Soil ARARs Conclusions

Soil excavation is included as a potential component of the removal action for Site 7. Historical information indicates the possibility of RCRA hazardous waste being disposed of at Site 7, Station Landfill. Previous analytical results indicate that chemical levels in soils are well below the requirements of RCRA hazardous waste; hazardous waste determination will be made at the time of generation. The substantive provisions of the following requirements are the most stringent of the potential federal and state chemical-specific ARARs for groundwater at Site 7 (see Table A2-2):

- RCRA definition of hazardous waste in Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100;
- RCRA definition of waste characterized as toxic in 40 C.F.R. § 261.24(a) and in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B);
- RCRA groundwater protection standards in Cal. Code Regs. tit. 22, § 66264.94 except 66264.94(a)(2) and 66264.94(b);
- Definitions of designated waste, nonhazardous waste, and inert waste, Cal. Code of Regs. tit. 27, § 20210, 20220, and 20230;

- Waste characteristics for discharge of waste to land, Cal. Code of Regs. tit. 27, div. 2, subdivision 1 (includes Cal. Code of Regs. tit. 27, div. 2, chapter 3).

A2.1.4 Sediment ARARs Conclusions

Sediment excavation is included as a potential component of the removal action for Site 7. Historical information indicates the possibility of RCRA hazardous waste being disposed of at Site 7, Station Landfill. Previous analytical results indicate that chemical levels in sediments are well below the requirements of RCRA hazardous waste; hazardous waste determination will be made at the time of generation. No site-specific data indicates that sediment is impacting the surface water quality. The substantive provisions of the following requirements are the most stringent of the potential federal and state chemical-specific ARARs for groundwater at Site 7 (see Table A2-2):

- RCRA definition of hazardous waste in Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100;
- RCRA definition of waste characterized as toxic in 40 C.F.R. § 261.24(a) and in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B);
- Definitions of designated waste, nonhazardous waste, and inert waste, Cal. Code of Regs. tit. 27, § 20210, 20220, and 20230;
- Waste characteristics for discharge of waste to land, Cal. Code of Regs. tit. 27, div. 2, subdivision 1 (includes Cal. Code of Regs. tit. 27, div. 2, chapter 3).

A2.1.5 Air ARARs Conclusions

Release of emissions into the atmosphere during excavation must comply with the SCAQMD rules. SCAQMD Rules 401, 403, 404, 405, 407, 408, 431.1, 431.2, and 431.3 in Regulation IV, and Rule 1150 in Regulation XI are potential ARARs for removal alternatives being considered under this action. These SCAQMD Rules are potentially applicable state requirements because they are not included in the State Implementation Plan (SIP). More specific information on these requirements is provided in the discussion of action-specific ARARs.

A2.2 DETAILED DISCUSSION OF ARARs BY MEDIUM

The following subsections provide a detailed discussion of federal and state ARARs by medium.

A2.2.1 Groundwater ARARs

At Site 7, shallow groundwater was encountered between 3 and 5 feet below ground surface. The underlying shallow groundwater is saline to hypersaline (TDS ranging between 24,000 and 57,000 mg/L) and cannot reasonably be regarded as a potential drinking water source. A connection between the shallow groundwater and the lower aquifer system (deeper main drinking water source) appears to be unlikely.

A2.2.1.1 FEDERAL

One of the significant issues in identifying ARARs for groundwater under the SDWA and RCRA is whether the groundwater at the site can be classified as a source of drinking water. U.S. EPA groundwater policy is set forth in the preamble to the NCP (55 Fed. Reg. 8666, 8752–8756 [1990]). This policy uses the groundwater classification system set forth in the draft U.S. EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (U.S. EPA 1986). Under this policy, groundwater is classified in one of three categories (Class I, II, or III), based on ecological importance, replaceability, and vulnerability considerations. Irreplaceable groundwater that is currently used by a substantial population or groundwater that supports a vital habitat is considered to be Class I. Class II consists of groundwater that is currently being used or that might be used as a source of drinking water in the future. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. The U.S. EPA guidelines define Class III groundwater as groundwater with total dissolved solids (TDS) concentrations over 10,000 milligrams per liter (mg/L) and a yield of less than 150 gallons per day (U.S. EPA 1986). Class III groundwater can also be classified based on economic or technological treatability tests as well as quality or quantity (both criteria are not needed, just one or the other).

For aquifers with Class III characteristics, MCLs are neither applicable nor relevant and RCRA Hazardous Waste appropriate and are not used to determine preliminary response action goals (U.S. EPA 1986; 55 Fed. Reg. 8666, 8750–8754 [1990]).

The aquifer underlying Site 7 at NAVWPNSTA Seal Beach (Santa Ana Pressure Subbasin) is classified as a Class III aquifer and is designated by RWQCB Santa Ana Region as water that cannot be used for drinking water because the underlying shallow groundwater is saline- to hypersaline and yields less than 150 gallons per day.

According to the Water Quality Control Plan for the Santa Ana River Basin, the Santa Ana Pressure Subbasin is designated as having the following beneficial uses: Municipal and domestic supply, agricultural supply, industrial service and industrial process supply. These beneficial use designations are assigned to tall areas of the subbasin. The RWQCB Santa Ana Region recognizes, however, that the uppermost groundwater zone in this area is unlikely to be used as a source of drinking water, because of its poor mineral quality and low yield.

Safe Drinking Water Act

For aquifers with Class III characteristics, drinking water standards (MCLs, MCLGs, secondary MCLs) are neither applicable nor relevant and appropriate.

RCRA Hazardous Waste

The federal RCRA requirements at 40 C.F.R. pt. 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs (see Section A1.3.1). The applicability of RCRA requirements depends on whether the waste is an RCRA hazardous waste, whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement, and whether the activity at the site constitutes treatment,

storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is an RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the toxicity characteristic leaching procedure (TCLP). The maximum concentrations allowable for the TCLP listed in § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (see Section A1.4.1).

RCRA Groundwater Protection Standards

Groundwater concentration limits for RCRA-regulated units are promulgated at Cal. Code Regs. tit. 22, § 66264.94. For corrective action programs, Cal. Code Regs. tit. 22, § 66264.94(c) states that the concentrations of compounds must not exceed the background level of that constituent in groundwater or, if achieving background is shown to be technologically or economically infeasible, some higher concentration limit that is set as part of the corrective action program. In no event shall a concentration limit greater than background exceed MCLs established under the federal SDWA (Cal. Code Regs. tit. 22, §§ 64431 and 64444).

These standards are not "applicable" because Site 7 is not a RCRA waste management unit, and the wastes being addressed by the Site 7 actions are not classified as RCRA hazardous wastes. Additionally, analytical results indicate that concentrations of COPCs are well below hazardous waste levels.

However, substantive provisions of Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are "relevant and appropriate" federal ARARs for groundwater at Site 7 because a study indicates the possible past disposal of RCRA hazardous waste at the site.

The groundwater at Site 7 will be monitored under Alternatives 2 and 3. The groundwater will be monitored for potential trends or offsite migration of chemicals from Areas 1 and 2 of Site 7. The monitoring results will be compared to previous sampling results, which will serve as background levels.

CERCLA Alternative Concentration Levels

Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing any discharge to surface water. Therefore, exposure-based CERCLA ACLs are not considered to be ARARs for this action.

Federal Ambient Water Quality Criteria

Section 304(a)(1) of the Clean Water Act (CWA) (33 U.S.C. § 1314[a][1]) directs U.S. EPA to publish and periodically update federal ambient water quality criteria (FAWQC). These standards are intended to protect human health and aquatic life from contamination in surface water. The FAWQC are updated in the *Federal Register*. The latest list of the National Water Quality Criteria through June 2000 was published in the *Federal Register* on 10 December 1998 with amendments in 64 Fed. Reg. 19781 (1999). These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation. These criteria serve as guidance to states in adopting water quality standards under Section 303(c) (33 U.S.C. § 1313[c]) of the CWA that protect aquatic life from acute and chronic effects.

The applicability of surface water criteria to groundwater is discussed in CERCLA Section 121(d)(2)(B)(i) (42 U.S.C. § 9621[d][2][B][i]), 40 C.F.R. § 300.430(e), and the NCP preamble (55 Fed. Reg. 8666, 8754–8755 [1990]). Although the FAWQC are nonenforceable guidelines, they may be potentially relevant and appropriate for groundwater only in the absence of promulgated MCLs or MCLGs. In such cases, the FAWQC may be adjusted to reflect only drinking water use and be used as cleanup goals for the response action.

FAWQC is not relevant and appropriate because groundwater remediation is not in the scope of the removal action and the aquifer at Site 7 is a Class III aquifer. Also, it is not relevant and appropriate for any groundwater discharge to surface water; although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.

Water Quality Standards

On 22 December 1992, U.S. EPA promulgated federal water quality standards under the authority of the federal CWA Section 303(c)(2)(B), 33 U.S.C. ch. 26, § 1313(c)(2)(B), in order to establish water-quality standards required by the CWA where the state of California and other states had failed to do so (57 Fed. Reg. 60848 [1992]). These standards have been amended over the years in the *Federal Register* including amendments of the National Toxics Rule (60 Fed. Reg. 22228 [1995]). These water quality standards, as amended, are codified at 40 C.F.R. § 131.36. Additional and revised water quality standards for salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary were codified at 40 C.F.R. § 131.37.

U.S. EPA promulgated a rule on 18 May 2000 to fill a gap in California water quality standards that was created in 1994 when a state court overturned the state's water quality control plans that contained water quality criteria for priority toxic pollutants. The rule is commonly called the California Toxics Rule (CTR). The rule is codified at 40 C.F.R. § 131.38. These federal criteria are legally applicable in the state of California for inland surface waters and enclosed bays and estuaries for all purposes and programs under the CWA.

The water quality standards contained in 40 C.F.R. § 131.36, 131.37, and 131.38 are potential applicable federal ARARs for groundwater cleanup response actions that

discharge to surface water. These regulations are discussed further in Section A2.2.2 Surface Water ARARs.

A2.2.1.2 STATE

The state has identified the following ARARs for groundwater cleanup at the site:

- California Water Code §§ 13260-13274 (div. 7, chapter 4, article 4);
- Porter-Cologne Water Quality Control Act, Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360 (identified as an action-specific ARAR, but included here for convenience);
- Comprehensive Water Quality Plan for the Santa Ana Basin, Chapters 4 and 5 (Basin Plan, 1995);
- SWRCB Resolution (Res.) 68-16 and Res. 92-49;
- SWRCB Resolution (Res.) 88-63 and Res. 89-42 (identified as location-specific ARAR, but included here for convenience);
- County of Orange, Public Facilities and Resources Department, CRWQCB, Santa Ana Region, Order No. 96-31, NPDES Permit No. CAS618030, page 7 item 23;
- California Code of Regulations Title 27, Division 2, Chapter 3;
- California Code of Regulations Title 27, Division 2, Subdivision 1.

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) became Division 7 of the California Water Code in 1969. The Porter-Cologne Act requires each regional board to formulate and adopt Basin Plans for all areas within the region (Cal. Water Code § 13240). It also requires each regional board to establish WQOs that will protect the beneficial uses of the water basin (Cal. Water Code § 13241 and to prescribe waste discharge requirements that would implement the Basin Plan for any discharge of waste to the waters of the state (Cal. Water Code § 13263[a]).

Other sections of the Porter-Cologne Act include Cal. Water Code § 13243, which allows regional boards to specify conditions or areas where waste discharge is not permitted. Cal. Water Code § 13269 provides the boards authority for waivers for reports or compliance with requirements as long as it is not against the public interest. Cal. Water Code § 13360 specifies circumstances for regional boards to order compliance in a specific manner.

The DON accepts the substantive provisions of Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act as enabling legislation as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the WQCP for the Santa Ana Region, SWRCB Res. 68-16 and Res. 88-63, and state primary MCLs as potential state ARARs. Where waste discharge requirements are specified in general permits, the substantive requirements in the permits, but not the permits themselves, are potential ARARs.

Cal. Water Code § 13304 sets forth enforcement authority and an enforcement process (orders issued by the state) and is procedural in nature. It does not constitute an ARAR because it does not itself establish or contain substantive environmental "standards, requirements, criteria, or limitations" (CERCLA § 121 [42 U.S.C. § 9621]) and is not in itself directive in intent. Through its enforcement authority and procedures, substantive state environmental standards set forth in other statutes, regulations, plans, and orders are enforced. In addition, Cal. Water Code § 13304 is no more stringent than the substantive requirements of the potential state ARARs identified in the above paragraphs or potential federal ARARs for groundwater.

Comprehensive Water Quality Control Plan for Santa Ana Region (Basin Plan). The DON accepts the substantive provisions in Chapters 3 to 5 of the Basin Plan for the Santa Ana Region (RWQCB 1995), including beneficial use, WQOs, and waste discharge requirements, as potential ARARs. The uses designated for the Santa Ana Pressure Subbasin Aquifer are ARARs for this EE/CA.

The Basin Plan for the Santa Ana Region was prepared and implemented by the RWQCB Santa Ana Region to protect and enhance the quality of the waters in the Santa Ana Region. The Basin Plan establishes location-specific beneficial uses and WQOs for the surface water and groundwater of the region and is the basis of the RWQCB Santa Ana Region regulatory programs. The Basin Plan includes both numeric and narrative WQOs for specific groundwater subbasins. The WQOs are intended to protect the beneficial uses of the waters of the region and to prevent nuisance.

Beneficial use and reuse of water are key aspects of the Basin Plan for the Santa Ana Region. NAVWPNSTA Seal Beach Site 7 is located in the Santa Ana Pressure Subbasin. The Santa Ana Pressure Subbasin has the following beneficial use designations (California Regional Water Quality Control Plan for the Santa Ana River Basin, RWQCB 1995):

- municipal and domestic supply,
- agricultural supply,
- industrial service supply, and
- industrial process supply.

WQOs have been established for the Santa Ana Pressure Subbasin. These are listed in Table A2-1.

Table A2-1
Selected Water Quality Objectives for the Santa Ana Pressure Subbasin in the NAVWPNSTA Seal Beach Project Area (units reported in milligrams per liter)

Subbasin	TDS	Hardness	Sodium	Chloride	Nitrate	Sulfate
Santa Ana Pressure	500	240	45	55	3	100

Source:
RWQCB 1995, p. 4-41

Acronym/Abbreviation:
NAVWPNSTA – Naval Weapons Station

As noted in Section 2.3, the shallow groundwater underlying NAVWPNSTA Seal Beach Site 7 contains elevated concentrations of TDS, which is thought to result from the tidal inflow of ocean water. In addition, naturally occurring concentrations of sodium, chloride, nitrate, and sulfate exceed water quality objectives established by the RWQCB for the Santa Ana Pressure Subbasin. Remediation of these inorganic constituents to below background water quality conditions is not required by the SWRCB under the Porter-Cologne Act. SWRCB Res. 68-16 of the State Water Board, and the Water Quality Control Plans of the state and regional water quality control boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions (SWRCB 1994a).

State Water Resources Control Board Res. 92-49 and 68-16.

State Water Resources Control Board Res. 92-49 (as Amended on 21 April 1994 and 02 October 1996) is titled Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304. This resolution contains policies and procedures for the regional boards that apply to all investigations and cleanup and abatement activities for all types of discharges subject to Cal. Water Code § 13304.

SWRCB Res. 68-16 Statement of Policy With Respect to Maintaining High Quality of Waters in California, establishes the policy that high-quality waters of the state "shall be maintained to the maximum extent possible" consistent with the "maximum benefit to the people of the state." It provides that whenever the existing quality of water is better than the required applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure that a) pollution or a nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the state will be maintained (SWRCB 1968).

Cleanup to below background water quality conditions is not required by the SWRCB under the Porter-Cologne Act. SWRCB Res. 92-49 II.F.1 provides that regional boards may require cleanup and abatement to "conform to the provisions of the Resolution No. 68-16 of the State Water Board, and the Water Quality Control Plans of the State and Regional Water Quality Control Boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions."

DON's Position Regarding SWRCB Res. 92-49 and 68-16.

The DON recognizes that the key substantive requirements of Cal. Code Regs. tit. 22, § 66264.94 (and the identical requirements of Cal. Code Regs tit. 23, § 2550.4 and

Section III.G of SWRCB Res. 92-49) require cleanup to background levels of constituents unless such restoration proves to be technologically or economically infeasible and an alternative cleanup level of constituents will not pose a substantial present or potential hazard to human health or the environment. In addition, the DON recognizes that these provisions are more stringent than corresponding provisions of 40 C.F.R. § 264.94 and, although they are federally enforceable via the RCRA program authorization, they are also independently based on state law to the extent that they are more stringent than the federal regulations.

The DON has also determined that SWRCB Res. 68-16 is not a chemical-specific ARAR for determining response action goals. However, SWRCB Res. 68-16 is an action-specific ARAR for regulating discharged treated groundwater back into the aquifer. The DON has determined that further migration of already-contaminated groundwater is not a discharge governed by the language in Res. 68-16. More specifically, the language of SWRCB Res. 68-16 indicates that it is prospective in intent, applying to new discharges in order to maintain existing high-quality waters. It is not intended to apply to restoration of waters that are already degraded.

The DON's position is that SWRCB Res. 68-16 and 92-49 and Cal. Code Regs. tit. 23, § 2550.4 do not constitute chemical-specific ARARs for this response action because they are state requirements and are not more stringent than federal ARAR provisions of Cal. Code Regs. tit. 22, § 66264.94. The NCP set forth in 40 C.F.R. § 300.400(g)(4) provides that only state standards more stringent than federal standards may be ARARs (see also CERCLA § 121(d)(2)(A)(ii) [42 U.S.C. § 9621(d)(2)(A)(ii)]).

The substantive technical standard in the equivalent state requirements (i.e., Cal. Code Regs. tit. 23, div. 3, ch. 15 and SWRCB Res. 92-49 and 68-16) is identical to the substantive technical standard in Cal. Code Regs. tit. 22, § 66264.94. This section of Cal. Code Regs. tit. 22 will likely be applied in a manner consistent with equivalent provisions of other regulations, including SWRCB Res. 92-49 and 68-16.

State of California's Position Regarding SWRCB Res. 92-49 and 68-16.

The state does not agree with the DON determination that SWRCB Res. 92-49 and 68-16 and certain provisions Cal. Code Regs. tit. 23, div. 3, ch. 15 are not ARARs for this response action. SWRCB has interpreted the term "discharges" in the California Water Code to include the movement of waste from soils to groundwater and from contaminated to uncontaminated water (SWRCB 1994a). However, the state agrees that the proposed action would comply with SWRCB Res. 92-49 and 68-16, and compliance with the Cal. Code Regs. tit. 22 provisions should result in compliance with the Cal. Code Regs. tit. 23 provisions. The state does not intend to dispute the ROD, but reserves its rights if implementation of the Cal. Code Regs. tit. 22 provisions is not as stringent as state implementation of Cal. Code Regs. tit. 23 provisions. Because Cal. Code Regs. tit. 22 regulation is part of the state's authorized hazardous waste control program, it is also the state's position that Cal. Code Regs. tit. 22, § 66264.94 is a state ARAR and not a federal ARAR (United States v. State of Colorado, 990 F.2d 1565 [1993]).

Whereas the DON and the state of California have not agreed on whether SWRCB Res. 92-49 and 68-16 and Cal. Code Regs. tit. 23, § 2550.4 are ARARs for this response

action, this EE/CA documents each of the parties' positions on the resolutions but does not attempt to resolve the issue.

State Water Resources Control Board Res. 88-63, Adoption of Policy Entitled "Sources of Drinking Water." SWRCB Res. 88-63 establishes criteria to help RWQCBs identify potential sources of drinking water. According to this resolution, all groundwater in California is considered suitable or potentially suitable for domestic or municipal freshwater supply except in cases where any one of the following water quality and production criteria cannot be met.

- TDS exceed 3,000 mg/L (or electrical conductivity is greater than 5,000 micromhos per centimeter) and the RWQCB does not reasonably expect the groundwater to supply a public supply system.
- Groundwater is contaminated, either by natural processes or by human activity unrelated to a specific pollution incident, and cannot reasonably be treated for domestic use either by best management practices or best economically available treatment practices.
- The groundwater does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gallons per day.

SWRCB Res. 88-63 has been incorporated by reference into the Basin Plan (RWQCB 1995). The DON has determined that the substantive provisions of this policy are potential state ARARs for this EE/CA, but may not be controlling ARARs for reasons discussed below.

Currently, only groundwater in the regional aquifer that is not significantly impacted by tidal water, is used or likely to be used for drinking water supply or the other beneficial uses assigned by the Basin Plan. Shallow groundwater at NAVWPNSTA Seal Beach typically contains much higher levels of TDS than the Santa Ana Pressure Subbasin and could not be used for most beneficial uses without treatment. By applying the criteria of SWRCB Res. 88-63, an argument could be made that the shallow aquifer beneath NAVWPNSTA Seal Beach is not a potential source of drinking water due to its high TDS content and elevated background concentrations of inorganic constituents such as sodium, chloride, nitrate, and sulfate.

Cal. Code Regs. tit. 27, div. 2, subdiv. 1, §§ 20380(a), 20400(a), (c), (d), (e), and (g), and 20405.

The DON has reviewed the provisions of Cal. Code Regs. tit. 27, §§ 20380(a) and 20400(a), (c), (d), (e), and (g), and 20405. These sections address the concentration limits and POC for monitoring at waste management units for other than hazardous wastes. The DON has determined that these provisions are identical to those found in Cal. Code Regs. tit. 22, §§ 66264.94(d)(1), (2), and (4), and (e)(1) and (2) and 66264.95. The requirements at Cal. Code Regs. tit. 27, §§ 20380(a), 20400(a), (c), (d), (e) and (g), and 20405 are therefore not ARARs because they are not more stringent than federal ARARs at Cal. Code Regs. tit. 22, § 66264.94(d)(1), (2), and (4), and (e)(1) and (2) and Cal. Code Regs. tit. 22, § 66264.95.

A2.2.2 Surface-Water ARARs

Discharge to surface water is included as an element of a potential response action for Site 7. Potential federal and state ARARs for surface water are detailed in the following subsections.

A2.2.2.1 FEDERAL

Safe Drinking Water Act.

There are no surface waters at or near Site 7 that are potential sources of drinking water.

Water Quality Standards.

On 22 December 1992, U.S. EPA promulgated federal water quality standards under the authority of the federal CWA Section 303(c)(4)(B), 33 U.S.C., ch. 26, § 1313, in order to establish water-quality standards required by the CWA where the state of California and other states had failed to do so (57 Fed. Reg. 60848 [1992]). These standards have been amended over the years in the *Federal Register* including the amendments of the National Toxics Rule (60 Fed. Reg. 22228 [1995]). The water quality standards, as amended, are codified at 40 C.F.R. § 131.36. The water quality standards contained in 40 C.F.R. § 141.36(a) are potential applicable federal ARARs for discharge to or cleanup of surface water. Additional and revised water quality standards for salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary were codified at 40 C.F.R. § 131.37.

U.S. EPA promulgated a rule on 18 May 2000 to fill a gap in California water quality standards that was created in 1994 when a state court overturned the state's water quality control plans that contained water quality criteria for priority toxic pollutants. The rule is commonly called the California Toxics Rule (CTR). The rule is codified at 40 C.F.R. § 131.38. These federal criteria are legally applicable in the state of California for inland surface waters and enclosed bays and estuaries for all purposes and programs under the CWA. They are also potential applicable requirements for groundwater that discharges to surface waters (see Section A2.2.1.1).

These standards of the CTR apply to the state's designated uses and "supersede any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular use in which case the State's criteria will continue to apply."

Other CWA Requirements.

CWA 301(b) requires that all direct dischargers meet technology-based requirements including the best control technology (BCT) and the best available technology (BAT) economically achievable. These requirements are made on a case-by-case basis using best professional judgment.

Federal Ambient Water Quality Criteria. Section 304(a)(1) of the Clean Water Act (33 U.S.C. § 1314[a][1]) directs U.S. EPA to publish and periodically update ambient water quality criteria. The FAWQC are updated in the *Federal Register*. The latest list of the National Water Quality Criteria through June 2000 was published in the *Federal Register* on 10 December 1998 with amendments in 64 Fed. Reg. 19781 (1999). If

criteria are not listed for a pollutant, U.S. EPA does not have any national recommended water quality criteria.

These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation. These criteria serve as guidance to states in adopting water quality standards under Section 303(c) of the CWA that protect human life and aquatic life from acute and chronic effects.

FAWQC may be potentially relevant and appropriate for surface water depending on the designated use and whether the criteria are intended to be protective of that use. FAWQC may be used to establish cleanup goals for surface water that is considered a potential source of drinking water only in the absence of promulgated MCLs or MCLGs. However, if the surface water's designated beneficial use requires protection of aquatic life, the FAWQC may be more stringent than the MCL, MCLG, or other cleanup standard for non-drinking-water sources and the more stringent standard would be the controlling ARAR.

FAWQC are not ARARs; no groundwater discharge to surface water. Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.

Alternative Concentration Limits.

Alternative Concentration Limits (ACLs) are not ARARs for Site 7. Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further discharge to surface water.

RCRA Hazardous Waste and Groundwater Protection Standards.

Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of COPCs discharging to Perimeter Pond. However, this water does not meet the toxicity characterization definition of RCRA hazardous waste and therefore is not classified as RCRA hazardous waste.

These standards are not "applicable" because Site 7 is not a permitted RCRA waste management unit, and the wastes being addressed by the Site 7 actions are not classified as RCRA hazardous wastes. Additionally, analytical results indicate that concentrations of COPCs are well below hazardous waste levels.

However, substantive provisions of Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are "relevant and appropriate" federal ARARs for groundwater at Site 7 because a study indicates the possible past disposal of RCRA hazardous waste at the site.

The groundwater at Site 7 will be monitored under Alternatives 2 and 3. The groundwater will be monitored for potential trends or offsite migration of chemicals from Area 2 of Site 7. The monitoring results will be compared to historical trends from previous sampling results, which will serve as background levels.

A2.2.2.2 State

Comprehensive Water Quality Control Plan for Santa Ana Basin (Basin Plan). The substantive provisions of the Basin Plan for the Santa Ana Region (RWQCB, 1995) at Chapters 4 and 5 are potential state ARARs for cleanup of or discharges to surface water.

SWRCB Res. 68-16, Statement of Policy With Respect to Maintaining High Quality of Waters in California. SWRCB Res. 68-16 is not an ARAR for cleanup of already impacted surface water. This policy may be a potential state ARAR for discharges to surface waters that result from the response action.

SWRCB Res. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304. The DON has determined that the substantive provisions of this policy are no more stringent than federal ARARs at Cal. Code Regs. tit. 22, § 66264.94. See Section A2.2.1.2 for further discussion that applies to surface water as well.

SWRCB Res. 88-63, Sources of Drinking Water. SWRCB Res. 88-63 states that water sources that contain TDS exceeding 3,000 mg/L (or having electrical conductivity of greater than 5,000 micromhos per centimeter) or a yield of less than 200 gallons per day are not reasonably expected by the RWQCBs to supply a public water system. The substantive provisions of SWRCB Res. 88-63 are potential state ARARs for surface water that is a source of drinking water.

NPDES Permit Requirements. The SWRCB and RWQCB can issue general permits in accordance with the CWA for discharges to surface water. CERCLA response actions are not subject to permit requirements as provided under CERCLA § 121(e) (42 U.S.C. § 9621[e]).

The DON will comply with substantive effluent limitations of CRWQCB, Santa Ana Region, Order No. 96-31, NPDES Permit No. CAS618030 as a means of demonstrating compliance with other state water quality ARARs identified in this document. Therefore, the substantive provisions of CRWQCB, Santa Ana Region, Order No. 96-31, NPDES Permit No. CAS618030, page 7 item 23 are TBCs for this removal action.

A2.2.3 Soil ARARs

The key threshold question for soil ARARs is whether or not the wastes located at Site 7 would be classified as hazardous waste. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state-regulated hazardous waste. If the soil is determined to be hazardous waste, the appropriate requirements will apply.

A2.2.3.1 Federal

RCRA Hazardous Waste and Groundwater Protection Standards. The federal RCRA requirements at 40 C.F.R. pt. 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs (see Section A1.3.1). The applicability of RCRA requirements depends on whether the waste is an RCRA hazardous waste, whether the waste was initially treated, stored, or disposed after the effective date of the particular

RCRA requirement, and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is an RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the toxicity characteristic leaching procedure (TCLP). The maximum concentrations allowable for the TCLP listed in § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (see Section A1.4.1).

The requirements at Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are potential federal ARARs for the vadose zone (i.e., the unsaturated zone contamination). These sections set concentration limits for the unsaturated zone as well as for groundwater and surface water. These requirements are considered to be potential federal ARARs because they are part of the approved state RCRA program.

RCRA land disposal restrictions (LDRs) at Cal. Code Regs. tit. 22, § 66268.1(f) are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land unless (1) it is treated in accordance with the treatment standards of Cal. Code Regs. tit. 22, § 66268.40 and the underlying hazardous constituents meet the Universal Treatment Standards at Cal. Code Regs. tit. 22, § 66268.48; (2) it is treated to meet the alternative soil treatment standards of Cal. Code Regs. tit. 22, § 66268.49; or a treatability variance is obtained under Cal. Code Regs. tit. 22, § 66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program. RCRA Treatment Standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs but they may be relevant and appropriate state ARARs.

Toxic Substances Control Act. The Toxic Substances Control Act (TSCA) regulates the storage and disposal of PCBs. U.S. EPA designed self-implementing procedures for a general, moderate-size site where there should be low residual environmental impact from remedial activities. The requirements at 40 C.F.R. § 761.61(a) are not binding for CERCLA response actions (40 C.F.R. § 761.61[a][1][ii]), and are therefore not applicable ARARs. However, the substantive cleanup levels at 40 C.F.R. § 761.61(a)(4) may be relevant and appropriate for soil response actions. Under 40 C.F.R. § 761.61(a)(4)(i)(A), the cleanup level for bulk PCB remediation waste in high-occupancy areas is less than or equal to 1 ppm without further conditions. The cleanup level for bulk PCB remediation waste in low-occupancy areas is less than or equal to 25 ppm under 40 C.F.R. § 761.61(a)(4)(i)(B)(1). These self-implementing cleanup levels cannot be used for the following: surface or ground waters, sediments in marine and freshwater ecosystems,

sewers or sewage treatment systems, any private or public drinking-water sources or distribution systems, grazing lands, or vegetable gardens.

Military Munitions Rule. The Military Munitions Rule identifies when conventional and chemical military munitions become a hazardous waste under RCRA. It also provides for safe storage and transport of such waste. The requirements for military munitions have been consolidated into 40 C.F.R. § 266 subpt. M with appropriate references to other requirements (e.g., treatment and disposal). The substantive provisions of these requirements are potential federal ARARs for response actions that include the treatment, storage, and disposal of munitions or waste that contains munitions until such time as state regulations are approved as part of the RCRA authorization process. The substantive provisions of these requirements are potential ARARs for military munitions and need to be evaluated for site-specific ARAR status.

A2.2.3.2 State

SWRCB Res. 92-49. The DON has determined that the substantive provisions of this policy are no more stringent than federal ARARs at Cal. Code Regs. tit. 22, § 66264.94. See Section A2.2.1.2 for further discussion that applies to surface water as well.

Cal. Code Regs. tit. 27, div. 2, subdiv. 1. Former Cal. Code Regs. tit. 23, div. 3, ch. 15 requirements that have been repealed and went into effect on 18 July 1997, the following sections define waste characteristics for discharge of waste to land. These requirements may be applicable for soil left in place that was discharged after the effective date of the requirements. They are not potentially applicable to discharges before that date but may be relevant and appropriate. Landfill operations reportedly began operations some time between October 1955 and December 1957 and operated until 1973.

Cal. Code Regs. tit. 27, § 20230(a) defines inert waste as waste "that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." Cal. Code Regs. tit. 27, § 20230(b) states that "inert wastes do not need to be discharged at classified waste management units." Cal. Code Regs. tit. 27, § 20230(a) and (b) may be potential state ARARs for soil that meets the definition of inert waste.

Cal. Code Regs. tit. 27, §§ 20210 and 20220 are state definitions for designated waste and nonhazardous waste, respectively. These may be ARARs for soil that meets the definitions. These soil classifications determine state classification and siting requirements for discharging waste to land.

Cal. Code Regs. tit. 27, § 20400(a), (c), (d), (e), and (g) have been identified by the state as potential monitoring and cleanup concentration limit ARARs for waste soil other than hazardous waste. This section is also not more stringent than federal ARARs at Cal. Code Regs. tit. 27, § 66264.94(a)(1) and (3), (c), (d), and (e). Therefore, Cal. Code Regs. tit. 27, § 20400 is not an ARAR for soil at Site 7. See Table A4-3 for a comparison of Chapter 15 requirements with parallel Cal. Code Regs. tit. 22 requirements.

A2.2.4 Sediment ARARs

A threshold question for sediment ARARs is whether or not the sediment either *in situ* or excavated would be classified as federal hazardous waste as defined by RCRA or as non-RCRA, state-regulated, hazardous waste. Contaminated sediments that are subject to a permit that has been issued under Section 404 of the CWA or under Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA, also known as the Ocean Dumping Act) are excluded from the definition of federal hazardous waste under the Dredged Material Exclusion of 40 C.F.R. § 261.4(g). Permits under either law will govern management of sediments destined for off-site discharge into waters of the United States. Any discharge of contaminated sediments that occurs in upland areas that have no return flow to waters of the United States is not subject to the exclusion of 40 C.F.R. § 261.4(g). (See 63 Fed. Reg. § 65874 for further details). If these sediments are determined to be hazardous waste, the appropriate RCRA requirements will apply.

A2.2.4.1 FEDERAL

RCRA Hazardous Waste and Land Disposal Restriction Requirements. U.S. EPA and the states have been slow to develop criteria for the protection of human or ecological receptors in sediments. While U.S. EPA proposed national sediment criteria in 1998 to set pollution thresholds that sediments could not exceed, those criteria were withdrawn after consultation with the U.S. Army Corps of Engineers. Accordingly, the only federal ARARs for sediments are RCRA hazardous waste and land disposal restrictions and water quality standards and FAWQC under the CWA. The applicability of RCRA requirements depends on whether the sediments contain listed or characteristic RCRA hazardous waste, whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement, and whether the activity at the site constitutes generation, treatment, storage, or disposal as defined by RCRA. Excavation of sediments containing RCRA hazardous waste constitutes generation of waste, to which RCRA requirements apply. RCRA requirements may also be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, and disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is an RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the TCLP. The maximum concentrations allowable for the TCLP listed in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values it is determined to be a characteristic RCRA hazardous waste. See Section *X*1.4.1 for a more complete discussion of hazardous waste determination.

RCRA LDRs at Cal. Code Regs. tit. 22, § 66268.1(f) are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land

unless (1) it is treated in accordance with the treatment standards of Cal. Code Regs. tit. 22, § 66268.40 and the underlying hazardous constituents meet the Universal Treatment Standards at Cal. Code Regs. tit. 22, § 66268.48; (2) it is treated to meet the alternative soil treatment standards of Cal. Code Regs. tit 22, § 66268.49; or (3) a treatability variance is obtained under Cal. Code Regs. tit. 22, § 66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program. RCRA Treatment Standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs but they may be relevant and appropriate state ARARs.

Water Quality Standards and Federal Ambient Water Quality Criteria.

These are not ARARs since no site-specific data indicates that sediment is impacting the surface water quality.

National Oceanic and Atmospheric Administration Toxicity-Based Thresholds. The National Oceanic and Atmospheric Administration (NOAA) developed effects range-low (ER-L) and effects range-median (ER-M) toxicity-based thresholds for sediment (Long and Morgan 1991; Long et al. 1995). NOAA derived these values using data from estuarine and marine sediment using modeling techniques, as well as laboratory and field studies. For each chemical, the chemical concentrations associated with observed biological effects were sorted. The ER-L for a given chemical is the concentration associated with the lower 10th percentile in the data. The ER-M is the median concentration. The ER-L and ER-M values may be used to predict the potential for adverse biological effects. Adverse biological effects include mortality or sublethal effects (such as reduced growth or reduced reproductive success). While ER-Ls and ER-Ms have been applied to CERCLA sites, the current trend is away from using them even as screening tools. They are viewed cautiously because they represent only probabilities that reported levels of contaminants can be associated with adverse biological effects. They do not establish any level of contamination that actually causes toxicity to benthic or upper trophic organisms in a given environment. Therefore, while regulatory agencies may still accept ER-Ls and ER-Ms as screening tools, they are inappropriate for determining action levels or remediation goals.

U.S. EPA Ecotox Thresholds. U.S. EPA's Superfund program has initiated a project to develop media-specific benchmark values for contaminants commonly found in surface water and sediment (values for soil are still being developed). These values are referred to as Ecotox Thresholds (ETs), and are defined as *media-specific contaminant concentrations above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation.* ETs are designed to provide a tool to identify contaminants that may pose a threat to ecological receptors and focus further site activities on those contaminants and the media in which they are found. ETs are meant to be used for screening purposes only; they are **not** regulatory criteria, site-specific cleanup standards, or remediation goals. Nevertheless, ETs may be useful in deriving remediation goals.

Dredged Material Quality Assessment Guidance. For disposal in the ocean, implementation guidance is provided by the *Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual*, also known as the "Green Book" (U.S. EPA and

USACE 1991). For disposal sites in, or potentially affecting, inland waters, draft guidance is given in the draft report *Evaluation of Dredged Material for Discharge in Inland and Near Coastal Waters – Testing Manual* (U.S. EPA and USACE 1998). The testing scheme and evaluation procedures are essentially the same as those defined in the Green Book.

A2.2.4.2 STATE

SWRCB Res. 92-49. Section II.G of SWRCB Res. 92-49, The Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304, has been identified as the substantive portion that could potentially pertain to sediment. However, this resolution section is essentially the same as Cal. Code Regs. tit. 22, § 66264.94. Since the substantive provisions of SWRCB Res. 92-49 are not more stringent than federal ARARs, SWRCB Res. 92-49 is not an ARAR.

Cal. Code Regs. tit. 27, div. 2, subdiv. 1. Cal. Code Regs. tit. 27, div. 2, subdiv. 1 went into effect on 18 July 1997. The following sections define waste characteristics for discharge of waste to land. These requirements may be applicable for sediment left in place that was discharged after the effective date of the requirements. They are not potentially applicable to discharges before that date but may be relevant and appropriate. Landfill operations reportedly began operations some time between October 1955 and December 1957 and operated until 1973.

Cal. Code Regs. tit. 27, § 20230(a) defines inert waste as waste "that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." Cal. Code Regs. tit. 27, § 20230(b) states, "inert wastes do not need to be discharged at classified waste management units." Cal. Code Regs. tit. 27, § 20230(a) and (b) may be potential state ARARs for sediment that meets the definition of inert waste.

Cal. Code Regs. tit. 27, §§ 20210 and 20220 are state definitions for designated waste and nonhazardous waste, respectively. These may be ARARs for sediment that meets the definitions. These definitions determine state classification and siting requirements for discharging waste to land.

A2.2.5 Air ARARs

Previous air monitoring conducted as part of the Remedial Investigation of Site 7 (i.e., soil gas, integrated surface sampling, and ambient air sampling) indicated the presence of few VOCs (including methane) detected at concentrations significantly below those found at typical Southern California landfills. The results of migration gas sampling indicate there is no significant migration of landfill gas. Nevertheless, air quality monitoring will be conducted as part of the removal action. Removal action activities involving excavation will implement standard dust control measures to minimize fugitive dust emissions and have VOC and odor control foams as a precaution.

ARARs for air are discussed in greater detail under action-specific requirements in Section 4.0.

A2.2.5.1 FEDERAL

Clean Air Act. The CAA establishes the National Ambient Air Quality Standards (NAAQS) in 40 C.F.R. § 50.4–50.12. NAAQS are not enforceable in and of themselves; they are translated into source-specific emissions limitations by the state (U.S. EPA 1990a). Substantive requirements of the SCAQMD rules that have been approved by U.S. EPA as part of the SIP under the CAA are potential federal ARARs for air emissions (CAA Section 110). The SIP includes rules for emissions restrictions for particulates, organic compounds, and hazardous air pollutants, as well as standards of performance for new sources.

The SCAQMD rules are discussed further under action-specific ARARs in Section 4.0.

A2.2.5.2 STATE

RCRA requirements for non-RCRA, state-regulated hazardous wastes and SCAQMD rules are described below.

State RCRA requirements included within the U.S. EPA-authorized RCRA program for California are considered to be potential federal ARARs and are discussed above. When state regulations are broader in scope than their federal counterparts, they are considered potential state ARARs. State requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 Fed. Reg. 32726 [1992]).

SCAQMD Rules 401, 403, 404, 405, 407, 408, 431.1, 431.2, and 431.3 in Regulation IV, and Rule 1150 in Regulation XI were identified by the state as ARARs for the potential air emissions at Site 7. These are not potential federal ARARs because they are not included in the SIP (see discussion of federal ARARs under the CAA above).

Table A2-2
Potential Federal Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		GROUNDWATER		
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]–300[j]-26)[c]				
National primary drinking water standards are health-based standards for public water systems (MCLs).	Public water system.	40 C.F.R. § 141.11–141.13, excluding § 141.11(d)(3), 141.15, 141.16, 141.61(a) and (c), and 141.62(b)	Not an ARAR	The NCP defines MCLs as relevant and appropriate for groundwater determined to be a current or potential source of drinking water in cases where MCLGs are not ARARs. The Santa Ana RWQCB has not designated groundwater in the vicinity of Site 7 as a potential source of drinking water and the removal action objectives do not include groundwater remediation.
MCLGs pertain to known or anticipated adverse health effects (also known as recommended MCLs).	Public water system.	40 C.F.R. § 141.50–141.51	Not an ARAR	MCLGs that have nonzero values are relevant and appropriate for groundwater determined to be a current or potential source of drinking water (40 CFR 300.430[e][2][i][B] through [D]). The Santa Ana RWQCB has not designated groundwater in the vicinity of Site 7 as a potential source of drinking water and the removal action objectives do not include groundwater remediation.
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system.	40 C.F.R. § 143.3	Not an ARAR	SMCLs are nonenforceable federal contaminant levels intended as guidelines for the states. Because they are nonenforceable, federal SMCLs are not ARARs. Also, the SMCLs are not TBCs because surface waters and groundwater at Site 7 are not potential sources of drinking water and the removal action objectives do not include groundwater remediation.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste.	Waste.	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous. Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern are well below RCRA hazardous waste levels
A solid waste is characterized as toxic based on the TCLP, if the waste exceeds the TCLP maximum concentrations	Waste	40 C.F.R. § 261.24(a) Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B)	Applicable	Applicable for determining whether waste is hazardous. Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern would not be characterized as toxic based on TCLP.
Groundwater protection standards: Owners/operators of RCRA treatment, storage, or disposal facilities must comply with conditions in this section that are designed to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern set forth under Cal. Code Regs. tit. 22, § 66264.94 in the uppermost aquifer underlying the waste management area of concern at the POC	A regulated unit that receives or has received hazardous waste before 26 July 1982 or regulated units that ceased receiving hazardous waste prior to 26 July 1982 where constituents in or derived from the waste may pose a threat to human health or the environment.	Cal. Code Regs. tit. 22, § 66264.94, except 66264.94(a)(2) and 66264.94(b)	Relevant and Appropriate	Not applicable because Site 7 is not a permitted RCRA waste management unit, and the wastes being addressed by this removal action are not classified as RCRA hazardous wastes. However, substantive provisions of Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are relevant and appropriate federal ARARs for groundwater at Site 7 because results from past investigations indicate the possibility of encountering RCRA hazardous constituents given the past disposal history of the landfill. With the exceptions of Alternatives 1 and 4, groundwater monitoring is proposed as part of the removal action

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
The POC is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit.	Hazardous waste treatment of disposal	Cal. Code Regs. tit 22, § 66264.95	Not an ARAR	Not an ARAR; groundwater cleanup is not in the scope the Site 7 removal action
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C., ch. 103, §§ 9601–9675)[c]				
ACLs using a point of exposure beyond the facility boundary.	Known or projected points of entry from groundwater to surface water.	CERCLA § 121(d)(2)(B)(ii) 42 U.S.C., ch. 103, § 9621	Not an ARAR	Not an ARAR; groundwater cleanup is not in the scope the Site 7 removal action.
Clean Water Act of 1977, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
Federal ambient water quality criteria.	Discharges to waters of the United States and groundwater.	33 U.S.C. § 1314(a) and 42 U.S.C. § 9621(d)(2) 64 Fed. Reg. 19781 (22 April 1999)	Not an ARAR.	Not an ARAR because groundwater remediation is not in the scope of the removal action and the aquifer at Site 7 is a Class III aquifer. Not relevant and appropriate for any groundwater discharge to surface water; although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Water quality standards	Discharges to waters of the United States.	40 C.F.R. § 131.36(b) and 131.38	Not an ARAR	Federal water quality standards would be applicable for any discharges to surface waters. Discharges to surface water (from contaminated groundwater) should be evaluated here. Not an ARAR for any groundwater discharge to surface water; although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.
SURFACE WATER				
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Groundwater protection standards: Owners/operators of RCRA treatment, storage, or disposal facilities must comply with conditions in this section that are designed to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern set forth under Cal. Code Regs. tit. 22, § 66264.94 in the uppermost aquifer underlying the waste management area of concern at the POC.	A regulated unit that receives or has received hazardous waste before 26 July 1982 or regulated units that ceased receiving hazardous waste prior to 26 July 1982 where constituents in or derived from the waste may pose a threat to human health or the environment.	Cal. Code Regs. tit. 22, § 66264.94, except 66264.94(a)(2) and 66264.94(b)	Not an ARAR	Not an ARAR; no contaminated surface water discharging to groundwater at Site 7. Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]--300[j]-26)[c]				
National primary drinking water standards are health-based standards for public water systems (MCLs).	Public water system.	40 C.F.R. § 141.11–141.13, excluding § 141.11(d)(3), 141.15, 141.16, 141.61(a) and (c), and 141.62(b)	Not an ARAR	The NCP defines MCLs as relevant and appropriate for surface water determined to be a current or potential source of drinking water in cases where MCLGs are not ARARs. There are no surface or ground waters at or near Site 7 that are potential sources of drinking water.
Ensure safety of public water systems; remedial actions must meet cleanup standards; MCLGs pertain to known or anticipated health effects (also known as recommended MCLs)	Public water system; remedial activities impacting groundwater; groundwater that is a potential source of drinking water.	40 C.F.R. § 141.50–141.51	Not an ARAR	MCLGs that have nonzero values are relevant and appropriate for surface water determined to be a current or potential source of drinking water (NCP Section 300.430[e][2][i][B] through [D]). See Section A2.2.1.1 for definition of drinking water source. There are no surface or ground waters at or near Site 7 that are potential sources of drinking water.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system.	40 C.F.R. § 143.3	Not an ARAR	SMCLs are nonenforceable federal contaminant levels intended as guidelines for the states. Because federal SMCLs are nonenforceable they are not ARARs. They are not TBCs because there are no surface or ground waters at or near Site 7 that are potential sources of drinking water
Clean Water Act, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
Water quality standards	Discharges to waters of the United States	40 C.F.R. § 131.36(b)	Not an ARAR	Not an ARAR; no groundwater discharge to surface water. Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.
Effluent limitations that meet technology-based requirements, including BCPCT and BAT economically achievable.	Discharges to waters of the United States.	33 U.S.C., ch. 26, § 1311(b)(2)	TBC	The DON accepts substantive provisions of CRWQCB, Santa Ana Region, Order No. 96-31, NPDES Permit No. CAS618030 (see Table A2-3).

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Federal ambient water quality criteria	Discharges to waters of the United States and groundwater	33 U.S.C., ch. 26, § 1314(a) and 42 U.S.C., ch. 103, § 9621(d)(2) 64 Fed. Reg. 19781 (22 April 1999)	Not an ARAR	Not an ARAR; no groundwater discharge to surface water. Although water seeps have been observed in Area 5 of Site 7, Alternatives 2, 3, and 4 each involve eliminating the source of these water seeps (i.e., excavating and backfilling the trenches in Area 5), discontinuing further groundwater discharge to surface water.
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C., ch. 103, §§ 9601–9675)[c]				
ACLs using a point of exposure beyond the facility boundary.	Known or projected points of entry from groundwater to surface water	CERCLA Section 121(d)(2)(B)(ii) 42 U.S.C., ch. 103, § 9621	Not an ARAR	Not an ARAR; groundwater cleanup is not in the scope the Site 7 removal action.
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste.	Waste	Cal. Code Regs tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous. Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern are well below RCRA hazardous waste levels.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations	Waste	40 C.F.R. pt. 261.24(a) Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B)	Applicable	Applicable for determining whether waste is hazardous. Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern would not be characterized as toxic based on TCLP.
SOIL				
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste	Waste.	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous. Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. However, analytical results indicate that concentrations of chemicals of concern are well below RCRA hazardous waste levels. Hazardous waste determinations will be made at the time of waste generation.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste.	40 C.F.R. pt. 261 24(a) Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B)	Applicable	Applicable for determining whether waste is hazardous Potentially Applicable for Site 7 The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7 However, analytical results indicate that concentrations of chemicals of concern would not be characterized as toxic based on TCLP. Hazardous waste determinations will be made at the time of waste generation.
Groundwater Protection Standards: requirements to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern in the uppermost aquifer underlying the waste management area of concern at the POC.	A regulated unit that receives or has received hazardous waste before 26 July 1982 or regulated units that ceased receiving hazardous waste prior to 26 July 1982 where constituents in or derived from the waste may pose a threat to human health or the environment.	Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3), (c), (d), and (e)	Relevant and Appropriate	Not applicable because Site 7 is not a permitted RCRA waste management unit, and the wastes being addressed by this removal action are not classified as RCRA hazardous wastes. However, substantive provisions of Cal Code Regs tit 22, § 66264 94(a)(1), (a)(3), (c), (d), and (e) are relevant and appropriate federal ARARs for the vadose (unsaturated) zone at Site 7 because results from past investigations indicate the possibility of encountering RCRA hazardous constituents given the past disposal history of the landfill. With the exceptions of Alternatives 1 and 4, groundwater monitoring is proposed as part of the removal action.
LDRs prohibit disposal of hazardous waste unless treatment standards are met	Hazardous waste land disposal.	Cal. Code Regs. tit. 22, § 66268.1(f)	Not an ARAR	Not an ARAR; no on-site discharge of soil to land
Treatment standards including technology requirements before hazardous waste can be disposed to land.	Hazardous waste land disposal	Cal. Code Regs. tit. 22, § 66268.40	Not an ARAR	Not an ARAR; no on-site discharge of soil to land.
Universal Treatment Standards used to comply with treatment standards.	Hazardous waste land disposal.	Cal. Code Regs. tit. 22, § 66268.48	Not an ARAR	Not an ARAR; no on-site discharge of soil to land

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Toxic Substances Control Act (15 U.S.C., ch. 53, §§ 2601–2692)[c]				
Regulates storage and disposal of PCBs.	Soils, debris, sludge, or dredged materials contaminated with PCBs at concentrations greater than 50 ppm.	40 C.F.R. § 761.61(a)(4)	Not an ARAR	Not an ARAR; PCB levels are well below 50 ppm
Military Munitions Rule (40 C.F.R. pt. 266 subpt. M)[c]				
Identification of hazardous waste munitions and treatment and storage requirements for hazardous waste munitions.	Storage of military munitions.	40 C.F.R. pt. 266, subpt. M	Not an ARAR	Not an ARAR; no military munitions at Site 7
Guidance for range UXO	Applies to inactive, closed, or transferring ranges.	Range Rule Risk Methodology: Tools, Models, and Protocols (R3M)	Not an ARAR	Not an ARAR; Site 7 was not a range.
SEDIMENT				
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste	Waste	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern are well below RCRA hazardous waste levels. Hazardous waste determinations will be made at the time of waste generation.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations	Waste	40 C.F.R. pt. 261.24(a) Cal. Code Regs tit. 22, § 66261.24(a)(1)(B)	Applicable	Applicable for determining whether waste is hazardous Potentially Applicable for Site 7. The 1985 Initial Assessment Study indicates the possible past disposal of RCRA hazardous waste at Site 7. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond. However, analytical results indicate that concentrations of chemicals of concern would not be characterized as toxic based on TCLP. Hazardous waste determinations will be made at the time of waste generation
Clean Water Act, as Amended (33 U.S.C., ch. 26, §§ 1251-1387)[c]				
Federal ambient water quality standards.	Discharges to waters of the United States	40 C.F.R. § 131.36(b)	Not an ARAR	No site-specific data indicates that sediment is impacting the surface water quality.

(table continues)

Table A2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		AIR		
Clean Air Act (42 U.S.C., ch. 85, §§ 7401–7671)[c]				
NAAQS: Primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead)	Contamination of air affecting public health and welfare	40 C.F.R. § 50.4–50.12	Not an ARAR	Not enforceable and therefore not an ARAR. Also, not a TBC because air pollutants covered by NAAQS are not emitted under current conditions
Resource Conservation and Recovery Act Air Emissions Requirements (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Air emission standards for process vents or equipment leaks	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations that manage hazardous wastes with organic concentrations of at least 10 ppm_w	Cal. Code Regs. tit. 22, § 66264.1030–66264.1034, excluding .1030(c), .1033(j), .1034(c)(2), .1034(d)(2) Cal. Code Regs. tit. 22, § 66264.1050–66264.1063, excluding .1050(c), (d), .1057(g)(2), .1060, .1063(d)(3)	Not an ARAR	Volatile organic compounds are not a significant component of the wastes at Site 7 based on past investigations

(table continues)

Table A2-2 (continued)

Notes:

[a] many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

[b] only the substantive provisions of the requirements cited in this table are potential ARARs

[c] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:

ACL – alternative concentration limit
APCD – Air Pollution Control District
ARAR – applicable or relevant and appropriate requirement
BAT – best available technology
BCPCT – best conventional pollution control technology
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
ch. – chapter
COC – chemical of concern
DoD – Department of Defense
DON – Department of the Navy
Fed. Reg. – Federal Register
LDR – land disposal restriction
MCL – maximum contaminant level
MCLG – maximum contaminant level goal
NAAQS – National Ambient Air Quality Standards (primary and secondary)
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NPDES – National Pollutant Discharge Elimination System
OU – operable unit
PCB – polychlorinated biphenyl
POC – point of compliance
ppm – parts per million
ppm_w – parts per million by weight
pt. – part
RCRA – Resource Conservation and Recovery Act
RWQCB – (California) Regional Water Quality Control Board [Santa Ana]
§ – section
SIP – State Implementation Plan
SMCL – secondary maximum contaminant level
subpt. – subpart
TBC – to be considered
TCLP – toxicity characteristic leaching procedure
tit. – title
TSD – treatment, storage, and disposal
U.S.C. – *United States Code*
U.S. EPA – United States Environmental Protection Agency
UXO – unexploded ordnance
VOC – volatile organic compound

Table A2-3
Potential State and Local Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
GROUNDWATER, SURFACE WATER, OR SOIL				
Cal-EPA Department of Toxic Substances Control[c]				
Definition of "non-RCRA hazardous waste."	Waste.	Cal. Code Regs. tit. 22, § 66261.22(a)(3) and (4), § 66261.24(a)(2)–(a)(8), § 66261.101, § 66261.3(a)(2)(C) or § 66261.3(a)(2)(F)	Not an ARAR	DON and the State did not identify as an ARAR
State MCL list	Source of drinking water.	Cal. Code Regs. tit. 22, §§ 64431 and 64444	Not an ARAR	DON and the State did not identify as an ARAR; surface and groundwater at Site 7 are not potential sources of drinking water.
State secondary MCL list.	Source of drinking water.	Cal. Code Regs. tit. 22, § 64449(a)	Not an ARAR	DON and the State did not identify as an ARAR; surface and groundwater at Site 7 are not potential sources of drinking water.

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
State and Regional Water Quality Control Boards[c]				
Authorizes the SWRCB and RWQCB to establish in water quality control plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality Authorizes regional water boards to issue permits for discharges to land or surface or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality		Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act)	Applicable	The DON accepts the substantive provisions of §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act enabling legislation, as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the Basin Plan for the Santa Ana region, as potential ARARs. Other provisions of Porter-Quality Water Quality Control Act are not ARARs. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond.
Requires submission of information regarding waste discharges and states that requirements shall be placed to implement water quality control plans Technical or monitoring reports may be required for investigation of water quality Provides penalties for non-compliance.		Cal Water Code, div 7, §§ 13260-13274 (chapter 4, article 4)	Applicable (certain sections only – see comment)	The DON accepts §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act) as applicable ARARs (listed above); other provisions of the Porter-Quality Water Quality Control Act are not ARARs.

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Authorizes the SWRCB and RWQCB to establish in water quality control plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality. Authorizes regional water boards to issue permits for discharges to land or surface or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality		Cal. Water Code, div. 7, § 13304	Not an ARAR	DON and the State did not identify as an ARAR. Section 13304 does not constitute an ARAR because it does not itself establish or contain substantive environmental "standards, requirements, criteria or limitations" (CERCLA 121) and is not in itself directive in intent. In addition, Section 13304 is not more stringent than the substantive requirements of the potential state and federal ARARs identified in this table and Table A2-2.
Describes the water basins in Santa Ana region, establishes beneficial uses of groundwater and surface water, establishes WQOs, including narrative and numerical standards, establishes implementation plans to meet WQOs and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Comprehensive Water Quality Control Plan for the Santa Ana Region Basin Plan (Cal. Water Code § 13240), Chapters 4 and 5	Applicable	Substantive requirements pertaining to beneficial uses, WQOs, and certain statewide water quality control plans are potentially applicable for the surface water and groundwater components of this response action. Sampling of water seeps from Area 5 of Site 7 indicates elevated concentrations of chemicals of concern discharging to Perimeter Pond.

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Establishes the policy that high-quality waters of the state "shall be maintained to the maximum extent possible" consistent with the "maximum benefit to the people of the State." It provides that whenever the existing quality of water is better than that required by applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge		Statement of Policy With Respect to Maintaining High Quality of Waters in California, SWRCB Res. 68-16	Applicable	Affects discharges from treatment systems and migration of contaminated or polluted water into high quality waters. Any discharge of lesser water quality than the receiving body, will be treated prior to discharge.
Describes requirements for RWQCB oversight of investigation and cleanup and abatement activities resulting from discharges of hazardous substances. RWQCB may decide on cleanup and abatement goals and objectives for the protection of water quality and beneficial uses of water within each region. Establishes criteria for "containment zones" where cleanup to established water-quality goals is not economically or technically practicable.		Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304. SWRCB Res 92-49	Not an ARAR	Not an ARAR; the DON has rejected Res 92-49 when Cal Code Regs tit. 22, § 66264.94 requirements have been determined to be federal ARARs (see Table A2-2)

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Incorporated into all regional board basin plans. Designates all groundwater and surface waters of the state as drinking water except where the TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.		SWRCB Res. 88-63 and 89-42 (Sources of Drinking Water Policy)	Applicable	State identified as a location ARAR. The Santa Ana RWQCB has designated the aquifer beneath Site 7 as a Class III aquifer. The underlying shallow groundwater contains TDS exceeding 3,000 ppm and the well yield is less than 200gpd per well
Establishes concentration limits for cleanup actions, including groundwater, surface water, and the unsaturated zones for other than hazardous waste at background. Allows a higher cleanup limit (but not to exceed MCLs) if background is not technically or economically achievable.		Cal. Code Regs. tit. 27, §§ 20380(a); 20400(a), (c), (d), (e), and (g)	Not an ARAR	Not an ARAR. Not more stringent than federal regulations at Cal. Code Regs. tit. 22, § 66264.94. See Section A2.2.1.2 for additional discussion
Establishes concentration limits for cleanup actions, including groundwater, surface water, and the unsaturated zones for hazardous waste at background. Allows a higher cleanup limit (but not to exceed MCLs) if background is not technically or economically achievable		Cal. Code Regs. tit. 23, §§ 2550(a); 2550.4(d), (e), and (f)	Not an ARAR	DON and the State did not identify as an ARAR Cal. Code Regs. tit. 23, § 2550(a) addresses the general applicability of other standards in Chapter 15 and does not contain standards itself. Cal. Code Regs. tit. 23, §§ 2550.4(d), (e), and (f) are not more stringent than federal ARARs at Cal. Code Regs. tit. 22, § 66264.94. See Section A2.2.1.2 for additional discussion

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Establishes beneficial uses of ocean waters, numerical and narrative WQOs, effluent quality objectives including toxic material limitations, and discharge prohibitions		California Ocean Plan, Water Quality Control Plan for Ocean Waters of California, SWRCB Res. 97-026 (Cal Water Code § 13170.2)	Not an ARAR	DON and the State did not identify as an ARAR
Requires analysis for each priority pollutant to determine if water-quality-based effluent limitation is required. Provides effluent limitation development methodology.	Discharges of toxic priority pollutants into inland surface waters, bays, or estuaries	Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Inland Surface Waters Plan) (SWRCB 2000), §§ 1.3 and 1.4	Not an ARAR	DON and the State did not identify as an ARAR.
Definitions of designated waste, nonhazardous waste, and inert waste.		Cal. Code Regs tit 27, §§ 20210, 20220, and 20230	Relevant and Appropriate	Substantive provisions of Cal Code Regs. tit. 27, div 2, chapter 3 (includes §§ 20210, 20220, and 20230) as relevant and appropriate. Not applicable since waste was discharged before 18 July 1997 Potentially relevant and appropriate for classifying waste and determining ARAR status of other requirements.
Specifies water quality monitoring and response programs for waste management units Requires establishment of concentration limits for groundwater, surface water, and the unsaturated zone. Monitoring points and POC shall be specified in the requirements.		Cal. Code Regs. tit. 27, div. 2, chapter 3 (included in Cal. Code Regs tit 27, div. 2, subdivision 1)	Relevant and Appropriate	Substantive provisions may be relevant and appropriate for Site 7

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Establishes waste and siting classification systems and minimum waste management standards for discharges of waste to land for treatment, storage, and disposal. Engineered alternatives that are consistent with Title 27 performance goals may be considered. Establishes corrective action requirements for responding to leaks and other unauthorized discharges.		Cal. Code Regs. tit. 27, div. 2, subdivision 1 (includes Cal. Code Regs. tit. 27, div. 2, chapter 3)	Relevant and Appropriate	Not applicable since waste was discharged before 18 July 1997. Potentially relevant and appropriate for classifying waste and determining ARAR status of other requirements. The DON accepts as substantive provisions as relevant and appropriate.

(table continues)

Table A2-3 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
County of Orange, Public Facilities & Resources Department*				
Disposal of groundwater to storm drain.	Groundwater	County of Orange, Public Facilities & Resources Department cites CRWQCB, Santa Ana Region, Order No 96-31, NPDES Permit No CAS618030, issued to the County of Orange, the Orange County Flood Control District and the City of Seal Beach (March 8, 1996), and the State General Permit for Stormwater Discharges Associated with Construction Activity, requires states that entities discharging to the storm drain systems or any surface water bodies may be required to participate in this area-wide permit (have appropriate controls for the proper management of stormwater runoff and also, to work cooperatively with the County of Orange to manage urban stormwater runoff) or obtain individual stormwater discharge permits, pursuant to 40 CFR 122.26(a).	Not an ARAR	Not an ARAR; no disposal of groundwater to storm drains

Table A2-3 (continued)

Notes:

[a] many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

[b] only the substantive provisions of the requirements cited in this table are potential ARARs

[c] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of specific citations are considered potential ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
Cal-EPA – California Environmental Protection Agency
Cal. Water Code – California Water Code
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
div. – division
DON – Department of the Navy
gpd – gallons per day
MCL – maximum contaminant level
NPDES – National Pollutant Discharge Elimination System
OU – operable unit
ppm – parts per million
RCRA – Resource Conservation and Recovery Act
Res. – Resolution
RWQCB – (California) Regional Water Quality Control Board
§ – section
SIP – State Implementation Plan
SWRCB – (California) State Water Resources Control Board
TDS – total dissolved solids
tit. – title
WQO – water quality objective

Section A3

LOCATION-SPECIFIC ARARs

Potential location-specific ARARs are identified and discussed in this section. The discussions are presented based on various attributes of the site location, such as whether it is within a floodplain. Additional surveys will be performed in connection with the response action design and response action to confirm location-specific ARARs where inadequate siting information currently exists, or in the event of changes to planned facility locations.

A3.1 SUMMARY OF LOCATION-SPECIFIC ARARs

Wetlands protection, floodplain management, hydrologic resources, biological resources, coastal resources, other natural resources, and geologic characteristics are the resource categories relating to location-specific requirements potentially affected by the Site 7 response actions. The conclusions for ARARs pertaining to these resources are presented in the following sections.

A3.1.1 Cultural Resources ARARs Conclusions

The areas to be disturbed during the removal action at Site 7 do not have any associated cultural ARARs based on the findings of a 1996 cultural resources reconnaissance of Site 7 (Bissell, 1996).

A3.1.2 Wetlands Protection and Floodplain Management Conclusions

The area in Site 7 is within a potential floodplain, however, this removal action will not adversely impact the location. A portion of the site is located within a wetland; therefore, the remediation contractor will include the substantive requirements of typical ACOE 404 permits in their construction activities to prevent degradation or damage to the adjacent wetland areas. Potential federal ARARs include Executive Order No. 11990 and 11988.

A3.1.3 Hydrologic Resources Conclusions

The areas to be disturbed during the removal action at Site 7 do not have any associated hydrologic resource federal ARARs, excluding the wetland ARARs discussed in Section A3.1.2. Potential state ARARs include:

- SWRCB Resolution (Res.) 68-16, Res. 88-63 and Res. 89-42;
- California Code of Regulations Title 27, §§ 20950, 21090, 22207(a), 22212(a), and 22222;
- California Code of Regulations Title 27, §§ 20390, 20395, 20400, and 20410;
- California Code of Regulations Title 27, Division 2, Subdivision 1 (includes California Code of Regulations Title 27, Division 2, Chapter 3).

A3.1.4 Biological Resources Conclusions

A portion of Site 7 is located within a National Wildlife Refuge area. The removal action could potentially disturb endangered species and breeding of migratory birds. Overall, the removal action is expected to mitigate potential threats to endangered species. Potential federal ARARs include: the Endangered Species Act of 1973 (16 U.S.C. §§1531-1543); the Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703-712); and the national Wildlife Refuge System Administration Act of 1966 (16 U.S.C. §§ 668dd-668ee). Potential state ARARs include: §§ 2014; 2080; 5650(a), (b), and (f); and 3005. The DON will coordinate with USFWS during the planning and implementation of the removal action.

A3.1.5 Coastal Resources Conclusions

Although Site 7 is within a coastal zone area, the DON does not view the procedure of preparing a formal coastal consistency document and seeking California Coastal Commission concurrence as a valid ARAR. This is based on the Federal Consistency Branch of the California Coastal Commission advisory that federal "land" be exempt from obtaining a "consistency determination." Therefore, neither the Coastal Zone Management Act (16 U.S.C. §§ 1451-1464) and the California Coastal Act of 1976 (Cal. Pub. Res. Code §§ 30000-30900; Cal. Code Regs. tit. 14, §§ 13001-13666.4) are potential ARARs for Site 7.

A3.1.6 Geologic Characteristics Conclusions

The areas to be disturbed during the removal action at Site 7 do not have any associated geologic characteristic ARARs.

A3.2 DETAILED DISCUSSION OF ARARs

The following subsections provide a detailed discussion of federal and state ARARs by location-specific resources. Pertinent and substantive provisions of the potential ARARs listed and described below were reviewed to determine whether they are potential federal or state ARARs for the Site 7 soil FS.

Requirements that are determined to be ARARs or TBCs are identified in Table A3-1 (federal) and Table A3-2 (state) at the end of this section. ARARs determinations are presented in the column denoted by the heading ARAR Determination. Determinations of status for location-specific ARARs were generally based on consultation of maps or lists included in the regulation or prepared by the administering agency. References to the document or agency consulted are provided in the Comments column and may be provided in footnotes to the table. Specific issues concerning some of the requirements are discussed in the following sections.

A3.2.1 Cultural Resources ARARs

The areas to be disturbed during the removal action at Site 7 do not have any associated cultural ARARs based on the findings of a 1996 cultural resources reconnaissance of Site 7 (Bissell, 1996).

A3.2.1.1 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED

Pursuant to Sections 106 and 110(f) of the National Historic Preservation Act (NHPA) (16 U.S.C. §§ 470–470x-6, and its implementing regulations [36 C.F.R. pt. 800]), as amended, CERCLA remedial actions are required to take into account the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places (National Register). The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Section 110(f) of the National Historic Preservation Act of 1966, as amended, requires that before approval of any federal undertaking that may directly and adversely affect any National Historic Landmark, the head of the responsible federal agency will, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to the landmark, and will afford the Advisory Council a reasonable opportunity to comment on the undertaking.

The National Historic Preservation Act requires federally funded projects to identify and mitigate impacts of project activities on properties included in or eligible for the National Register of Historic Places. No areas in Site 7 are potentially eligible for the National Register of Historic Places. Therefore, the National Historic Preservation Act is not a potential ARAR.

A3.2.1.2 ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT

The Archaeological and Historic Preservation Act, 16 U.S.C. § 469–469c-1, provides for the preservation of historical and archaeological data that might otherwise be lost as a result of dam construction or alterations of the terrain. If activities in connection with any federal construction project or federally approved project may cause irreparable loss to significant scientific, prehistorical, or archaeological data, the act requires the agency undertaking that project to preserve the data or request the Department of the Interior (DOI) to do so. This act differs from the NHPA in that it encompasses a broader range of resources than those listed on the National Register and mandates only the preservation of the data (including analysis and publication).

The Archaeological and Historic Preservation Act requires that for federally approved projects that may cause irreparable loss to significant scientific, prehistoric, historic, or archaeological data, the data must be preserved by the agency undertaking the project or the agency undertaking the project may request DOI to do so. The DON performed a site-specific archaeological resources survey in 1996 and no significant findings were reported for Site 7 (Bissell, 1996). In addition, NAVWPNSTA Seal Beach has standard contingency provisions in place for the site activities should unexpected, but significant, archaeological resources be encountered during the removal.

A3.2.1.3 HISTORIC SITES, BUILDINGS, AND ANTIQUITIES ACT OF 1935

The purpose of the Historic Sites, Buildings, and Antiquities Act (16 U.S.C. §§ 461–467) and its implementing regulations (40 C.F.R. § 6.301[a]) is to encourage the long-term preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States, including historic landmarks (36 C.F.R. § 65) and natural landmarks (36 C.F.R. § 62). Properties designated as National Historic Landmarks in California are listed in the National Register. Natural landmarks are nationally significant examples of a full range of ecological and geological features that constitute the nation's natural heritage. In conducting an environmental review of a proposed action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 C.F.R. § 62.6(d) to avoid undesirable impacts on such landmarks. These requirements are not substantive and are not potential ARARs. However, if it is determined that areas to be disturbed during the response action are potentially eligible for the National Natural Historic Landmark Program, the State Historic Preservation Officer should be contacted.

The areas to be disturbed during the removal action are not potentially eligible for the National Register of Historic Places.

A3.2.1.4 ARCHAEOLOGICAL RESOURCES PROTECTION ACT OF 1979

Public Law (Pub. L. No.) 96-95 (16 U.S.C. § 470aa–470mm) was enacted in 1979 and amended in 1988 and applies to all lands to which the fee title is held by the United States. The purpose of this statute is to provide for the protection of archaeological resources on federal and Indian lands. The act prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such activity is pursuant to a permit issued under Section 470cc.

The DON performed a site-specific archaeological resources survey in 1996 and no significant findings were reported for Site 7 (Bissell, 1996). In addition, NAVWPNSTA Seal Beach has standard contingency provisions in place for the site activities should unexpected, but significant, archaeological resources be encountered during the removal.

A3.2.2 Wetlands Protection and Floodplains Management ARARs

The area in Site 7 is within a potential floodplain, however, this removal action will not adversely impact the location. A portion of the site is located within a wetland; therefore, the remediation contractor will include the substantive requirements of typical ACOE 404 permits in their construction activities to prevent degradation or damage to the adjacent wetland areas.

A3.2.2.1 FEDERAL

Protection of Wetlands, Exec. Order No. 11990

Exec. Order No. 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of

wetlands; and avoid support of new construction in wetlands if a practicable alternative exists.

Portions of Site 7 meet the definition of "wetland." The remediation contractor will include the substantive requirements of typical ACOE 404 permits in their construction activities to prevent degradation or damage to the adjacent wetland areas.

Floodplain Management, Exec. Order No. 11988

Under 40 C.F.R. § 6.302(b), federal agencies are required to evaluate the potential effects of action they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.

The area in Site 7 is within a potential floodplain, however, this removal action will not adversely impact the floodplain since the site will be restored following the removal action.

Clean Water Act (33 U.S.C. § 1344)

Section 404 of the Clean Water Act of 1977 governs the discharge of dredged and fill material into waters of the United States, including adjacent wetlands. Wetlands are areas that are inundated by water frequently enough to support vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mudflats, natural ponds and similar areas. Both the U.S. EPA and the U.S. Army Corps of Engineers have jurisdiction over wetlands. U.S. EPA's Section 404 guidelines are promulgated in 40 C.F.R. § 230, and the U.S. Army Corps of Engineer's guidelines are promulgated in 33 C.F.R. § 320.

Discharge of dredged or fill material to a wetland is not planned as part of the removal action at Site 7.

Resource Conservation and Recovery Act (33 U.S.C. §§ 6901–6991[i])

Under Cal. Code Regs. tit. 22, § 66264.18(b), any hazardous waste facility located in a 100-year floodplain or within the maximum high tide must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood or maximum high tide, unless the owner or operator can demonstrate that procedures are in effect that will cause the waste to be removed safely, before flood or tidewater can reach the facility.

The Site 7 removal action does not involve construction or substantial modification of a new treatment, storage, or disposal facility within the 100-year floodplain.

A3.2.2.2 STATE

The state RCRA requirements for floodplains are evaluated above as potential federal ARARs. The California Fish and Game Commission Wetlands Policy is evaluated as a potential State ARAR.

A3.2.3 Hydrologic Resources ARARs

The areas to be disturbed during the removal action at Site 7 do not have any associated hydrologic resource ARARs, excluding the wetland ARARs discussed in Section A3.1.2. There will be no discharge to hydrologic resources or construction that will impact hydrologic resources.

A3.2.3.1 FEDERAL

WILD AND SCENIC RIVERS ACT

The Wild and Scenic Rivers Act (WSRA) (16 U.S.C. §§ 1271–1287) establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory to be studied for inclusion on the national system. In accordance with Section 7 of the act, a federal agency may not assist, through grant, loan, license, or otherwise, the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values for which a river on the national system or a study river on the National Rivers Inventory was established. The act also covers indirect effects from construction of water resources projects below or above rivers or their tributaries that are in the national system or under study on the National Rivers Inventory, such as a dam on a tributary and construction or development on adjacent shorelines. Adverse impacts must be mitigated, and coordination may be required with the National Park Service and Department of Agriculture.

No wild, scenic, or recreational rivers are located at or in the vicinity of Site 7.

FISH AND WILDLIFE COORDINATION ACT

The Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c) was enacted to protect fish and wildlife when federal actions result in the control or structural modification of a natural stream or body of water. The statute requires federal agencies to take into consideration the effect a water-related project would have on fish and wildlife and take action to prevent loss or damage to these resources.

This removal action does not modify a stream or other water body and does not affect fish or wildlife.

RIVERS AND HARBORS ACT OF 1899

Section 10 of the Rivers and Harbors Act of 1899 prohibits the creation of any obstruction not authorized by Congress to the navigable capacity of any of the waters of the United States (33 U.S.C. §§ 401–413). It prohibits construction of wharves, piers, booms, weirs, breakwaters, bulkheads, jetties, or other structures in a port unless the construction is approved by the U.S. Army Corps of Engineers. In addition, excavation or filling of any port, harbor, channel, lake, or any navigable water is prohibited without authorization. Section 10 permits are required for these activities. Section 10 permits cover construction, excavation, or deposition of materials in, over, or under navigable

waters, or any work that would affect the course, location, condition, or capacity of those waters.

Site 7 is not located on or in the immediate vicinity of navigable waters.

A3.2.3.2 STATE

The state has identified the following potential ARARs at Site 7:

- California Water Code §§ 13260-13274 (div. 7, chapter 4, article 4);
- SWRCB Resolution (Res.) 68-16 and Res. 92-49;
- SWRCB Resolution (Res.) 88-63 and Res. 89-42;
- California Code of Regulations Title 27, §§ 20950, 22207(a), 22212(a), and 22222;
- California Code of Regulations Title 27, §§ 20385-20435;
- California Code of Regulations Title 27, § 21090;
- California Code of Regulations Title 27, §§ 20385, 20390, and 20395;
- California Code of Regulations Title 27, Division 2, Chapter 3;
- California Code of Regulations Title 27, Division 2, Subdivision 1;
- County of Orange, Public Facilities and Resources Department, OCC Sections 6-1-122, 6-3-41, and 6-4-377.

Several of these were not determined to be ARARs for Site 7: SWRCB Resolution (Res.) 92-49 is not more stringent than a federal ARAR; only specific sections of California Water Code §§ 13260-13274 (div. 7, chapter 4, article 4) were determined to be ARARs; only specific sections of California Code of Regulations §§ 20385-20435 were determined to be ARARs; and County of Orange, Public Facilities and Resources Department, OCC Sections 6-1-122, 6-3-41, and 6-4-377 (see Table A3-2).

A3.2.4 Biological Resources ARARs

A portion of Site 7 is located within a National Wildlife Refuge area. The removal action could potentially disturb endangered species and breeding of migratory birds. Overall, the removal action is expected to mitigate potential threats to endangered species.

A3.2.4.1 FEDERAL

Endangered Species Act of 1973

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531–1543) provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction. The ESA defines an endangered species and provides for the designation of critical habitats. Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. Under Section 7(a) of the ESA, federal agencies must carry out conservation programs for listed species. The Endangered Species Committee may grant an exemption for agency action

if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented. Consultation regulations at 50 C.F.R. § 402 are administrative in nature and are therefore not ARARs. However, they may be TBCs to comply with the substantive provisions of the ESA.

Table A3-1 lists federal requirements for the protection of threatened and endangered species that are potential ARARs for CERCLA actions at NAVWPNSTA Seal Beach. The rare, threatened, and endangered species and species of special concern are reported in Section 2.5.4 of the EE/CA report for Site 7.

Seven species of birds known to be resident or migrants at NAVWPNSTA Seal Beach are listed by either federal or state agencies, or both, as threatened or endangered. They include the California brown pelican (*Pelicanus occidentalis californicus*), Swainson's hawk (*Buteo swainsoni*), Peregrine falcon (*Falco peregrinus anatum*), Aleutian Canada goose (*Branta canadensis leucopareia*), Western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) (Recon, 1997). Because of the rapidly disappearing habitat on the coast of Southern California, two species of federally listed endangered birds, the California least tern and the light-footed clapper rail, rely on the Seal Beach NWR tidal salt marsh habitat for their nesting grounds.

The results of past ecological assessments indicate there is no threat to endangered species from biota, soil, and sediment at Site 7. However, Federally-listed endangered species probably use Site 7 to some extent; the DON will coordinate with USFWS during the planning and implementation of the removal action. The removal action is expected to mitigate potential threats to endangered species.

Migratory Bird Treaty Act of 1972

The Migratory Bird Treaty Act (16 U.S.C. §§ 703–712) prohibits at any time, using any means or manner, the pursuit, hunting, capturing, and killing or attempting to take, capture, or kill any migratory bird. This act also prohibits the possession, sale, export, and import of any migratory bird or any part of a migratory bird, as well as nests and eggs. A list of migratory birds for which this requirement applies is found at 50 C.F.R. § 10.13.

Migratory birds have been observed at NAVWPNSTA Seal Beach, but the removal action is not expected to impact the migratory bird. The breeding season at the National Wildlife Refuge is typically between 31 March and 15 September; the removal action is expected to be implemented outside of the breeding season. The removal action is expected to mitigate potential threats from Site 7 to wildlife. Dust will be controlled during implementation of the removal action at Site 7.

Marine Mammal Protection Act

The Marine Mammal Protection Act (16 U.S.C. §§ 1361–1421h) prohibits the taking of a marine mammal on the high seas or in a harbor or other place under the jurisdiction of the United States. It prohibits the possession, transport, and sale of a mammal or marine

mammal product, unless authorized under law. The prohibitions that are potentially pertinent to CERCLA actions are at 16 U.S.C. § 1372(a)(2).

Marine mammals are not present at Site 7 since it is located inland.

Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended

The purpose of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801–1882) is to conserve and manage the fishery resources found off the coasts of the United States, the anadromous species, and the continental shelf fishery resources of the United States. It establishes a fishery conservation zone within which the United States has exclusive fishery management prerogatives.

Site 7 is located inland. Removal action will have no impact on potential fisheries.

National Wildlife Refuge System Administration Act of 1966

The National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee) and its implementing regulations at 50 C.F.R. §§ 25–37 establish wildlife refuges that are maintained for the primary purpose of developing a national program of wildlife and ecological conservation and rehabilitation. These refuges are established for the restoration, preservation, development, and management of wildlife and wild land habitats; protection and preservation of endangered or threatened species and their habitats; and management of wildlife and wild lands to obtain the maximum benefit from these resources.

The National Wildlife Refuge System Administration Act contains the following substantive requirements that are potential ARARs. The act prohibits any person from disturbing, injuring, cutting, burning, removing, destroying, or possessing any property within any area of a wildlife refuge. The act also prohibits the taking or possessing of any fish, bird, mammal or other wild vertebrate or invertebrate animals, or nest or eggs within any refuge area or otherwise occupying any such area unless such activities are done with a permit or permitted by express provision of law. The act also regulates the use of audio equipment as well as motorized vehicles, aircraft, and boats in wildlife refuges. It prohibits construction activities, disposal of waste, and the introduction of plants and animals into any wildlife refuge. The prohibitions under the act are codified at 50 C.F.R. § 27.

A portion of Site 7 extends approximately 700 feet into the Seal Beach NWR. Following the removal action, the excavation will be restored to surrounding grade using clean backfill material and will be revegetated with native plant species. The removal action at Site 7 could potentially disturb breeding Belding's Savannah sparrows and light-footed Clapper rails that nest in the area. Both species' breeding seasons are from March through August at NAVWPNSTA Seal Beach. Timing the removal action to coincide with non-breeding periods (i.e., September through February) will eliminate the potential for harming these endangered species.

Wilderness Act

The Wilderness Act (16 U.S.C. § 1131) and its accompanying implementing regulations (50 C.F.R. § 35.1–35.14) create the National Wilderness Preservation System. The intent of the law is to administer and manage units of this system (i.e., wilderness areas) in order to preserve their wilderness character and to leave them unimpaired for future use as wilderness.

NAVWPNSTA Seal Beach and Site 7 are not located in a federally-owned wilderness area.

A3.2.4.2 STATE

California Endangered Species Act

The list of plants and animals of California declared to be endangered are found in Cal. Code Regs. tit. 14, §§ 670.2 and 670.5. These requirements are not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation" (CERCLA § 121, 42 U.S.C. § 9621). Therefore, Cal. Code Regs. tit. 14, §§ 670.2 and 670.5 are not potential ARARs. The lists are incorporated by reference into other potential state ARARs (e.g., Cal. Fish & Game Code § 2080).

The State identified §§ 2090-2096 as TBC. These sections are not effective after January 1994, but will be evaluated as an TBC.

California Fish and Game Code

The State identified the following sections as potential ARARs: §§ 1600; 1601; 1603; 2014; 2080; 5650(a), (b), and (f); 3005; and the Commission Wetlands Policy. Sections 1600, 1601, 1603, and the Commission Wetlands Policy were determined not to be ARARs; Section 1600 and the Commission Wetlands Policy as TBCs (see Table A3-2). The other four sections were determined to be potentially relevant and appropriate for the protection of aquatic and wildlife species/habitats.

A3.2.5 Coastal Resources ARARs

Although Site 7 is within a coastal zone area, the DON does not view the procedure of preparing a formal coastal consistency document and seeking California Coastal Commission concurrence as a valid ARAR. This is based on the Federal Consistency Branch of the California Coastal Commission advisory that federal "land" be exempt from obtaining a "consistency determination".

A3.2.5.1 FEDERAL

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) (16 U.S.C. §§ 1451–1464) and the accompanying implementing regulations in 15 C.F.R. § 930 require that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with the approved state coastal zone

management programs. A state coastal zone management program (developed under state law and guided by the CZMA) sets forth objectives, policies, and standards to guide public and private uses of lands and water in the coastal zone.

The Federal Consistency Branch of the California Coastal Commission advised that federal "land" is exempt from obtaining a "consistency determination". This direction is consistent with Section 304 of this Act, which states that "Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers, or agents ..." The DON does not view the procedure of preparing a formal coastal consistency document as a valid ARAR. As a result, it is not likely that a consistency determination will be required.

A3.2.5.2 STATE

California Coastal Act of 1976

The Public Resources Code (Cal. Pub. Res. Code §§ 30000–30900) and Cal. Code Regs. tit. 14, §§ 13001–13666.4 regulate activities associated with development to control direct significant impacts on coastal waters and to protect state and national interests in California coastal resources. The California Coastal Act policies set forth in the act constitute the standards used by the California Coastal Commission in its coastal development permit decisions and for the review of local coastal programs. These policies contain the following substantive requirements: protection and expansion of public access to the shoreline and recreation opportunities (Cal. Pub. Res. Code §§ 30210–30224); protection, enhancement and restoration of environmentally sensitive habitats including intertidal and nearshore waters, wetlands, bays and estuaries, riparian habitat, grasslands, streams, lakes, and habitat for rare or endangered plants or animals (Cal. Pub. Res. Code §§ 30230–30240), protection of productive agricultural lands, commercial fisheries, and archaeological resources (Cal. Pub. Res. Code §§ 30234, 30241–30244), protection of the scenic beauty of coastal landscapes (Cal. Pub. Res. Code § 30251), and provisions for expansion, in an environmentally sound manner, of existing industrial ports and electricity-generating power plants (Cal. Pub. Res. Code § 30264).

The California Coastal Act maintains jurisdiction over coastal wetlands and requires activities within such wetlands to be consistent with the Act. The California Coastal Commission oversees the implementation of the California Coastal Act, and as such typically requires a consistency determination. However, the Federal Consistency Branch of the California Coastal Commission advised that federal "land" is exempt from obtaining a "consistency determination." This direction is consistent with Section 30008 of the Act, which recognizes that certain lands are excluded from the coastal zone by Federal law.

The DON does not view the procedure of preparing a formal coastal consistency document and seeking California Coastal Commission concurrence as a valid ARAR. As a result, and as a result of the above information received from the CCC, it is not likely that a consistency determination will be required.

A3.2.6 Geologic Characteristics ARARs

The areas to be disturbed during the removal action at Site 7 do not have any associated geologic characteristic ARARs.

A3.2.6.1 FEDERAL

Resource Conservation and Recovery Act (33 U.S.C. §§ 6901–6991[i])

Hazardous waste facilities must be sited in accordance with the following requirements:

- Seismic considerations (Cal. Code Regs. tit. 22, § 66264.18(a) – portions of new facilities or facilities undergoing substantial modification where transfer, treatment, storage or disposal of hazardous waste will be conducted shall not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time.

- Salt dome formations, salt bed formations, underground mines and caves (Cal. Code Regs. tit. 22, § 66264.18[c]) – the placement of any noncontainerized or bulk liquid hazardous waste in any salt dome formation, salt bed formation, or underground mine or cave is prohibited.

Site 7 is not located within 61 meters of a Holocene fault and no discharge is proposed to a salt dome formation, salt bed formation, or underground mines or caves. Therefore, the requirements at Cal. Code Regs. tit. 22, § 66264.18(a) and § 66264.18(c) are not potential ARARs for this response action.

A3.2.6.2 STATE

The state location-specific RCRA requirements for geologic characteristics are evaluated above as potential federal ARARs.

Table A3-1
Potential Federal Location-Specific ARARs

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470–470x-6)[b]					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places.	16 U.S.C. § 470–470x-6 36 C.F.R. pt. 800 40 C.F.R. § 6.301(b)	Not an ARAR	The areas to be disturbed during the response action at Site 7 are not potentially eligible for the National Register of Historic Places. No designated historic sites located on or adjacent to Site 7 (Bissell, 1996).
Archaeological and Historic Preservation Act (16 U.S.C. § 469–469c-1)[b]					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Construction on previously undisturbed land would require an archaeological survey of the area. Data recovery and preservation would be required if significant archaeological or historical data were found on-site. The responsible official or Secretary of the Interior is authorized to undertake data recovery and preservation.	Regulated alteration of terrain caused as a result of a federal construction project or federally licensed activity or program where action may cause irreparable harm, loss, or destruction of significant artifacts.	16 U.S.C. § 469–469c-1) 40 C.F.R. § 6.301(c)	Not an ARAR	The area of the removal action is not anticipated to contain any significant, prehistoric, historic, or archaeological data. The DON performed an archaeological resources survey and no significant findings were reported for Site 7 (Bissell, 1996). In addition, NAVWPNSTA Seal Beach has standard contingency provisions in place for the site activities should unexpected, but significant, archaeological resources be encountered during the removal.

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Historic Sites, Buildings, and Antiquities Act of 1935 (16 U.S.C. §§ 461–467)[b]					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites	16 U.S.C. §§ 461–467 40 C.F.R. § 6.301(a)	Not an ARAR	The areas to be disturbed during the removal action are not potentially eligible for the National Register of Historic Places. No designated historic sites located on or adjacent to Site 7 (Bissell, 1996)
Archaeological Resources Protection Act of 1979, as Amended (16 U.S.C. § 470aa–470mm)[b]					
Archaeological resources on federal land	Prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such action is conducted pursuant to a permit	Archaeological resources on federal land.	Pub. L. No. 96-95 16 U.S.C. § 470aa–470mm	Not an ARAR	The area of the removal action is not anticipated to contain any significant, prehistoric, historic, or archaeological data. The DON performed an archaeological resources survey and no significant findings were reported for Site 7 (Bissell, 1996). In addition, NAVWPNSTA Seal Beach has standard contingency provisions in place for the site activities should unexpected, but significant, archaeological resources be encountered during the removal.

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Exec. Order No. 11990, Protection of Wetlands[b]					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands.	Wetland meeting definition of Section 7	40 C.F.R. § 6 302(a)	Relevant and Appropriate	Substantive provisions may be potentially relevant and appropriate for actions at or near a wetland. Under Section 404 of the Clean Water Act (CWA), the Army Corps of Engineers (ACOE) is responsible for managing wetland resources associated with waters of the United States. To conduct construction activities within jurisdictional wetlands, a permit from ACOE is required. The limit of ACOE jurisdictional authority under Section 404 of the CWA is identified as "waters of the United States." A portion of Site 7 is located within wetlands and extends into the Seal Beach NWR's saltmarsh. Based on data collected on 30 January 1996 and 5 - 9 February 1996 in support of a wetland delineation for Site 7. In addition, under the National Contingency Plan (NCP), CERCLA removal actions are required to comply with the substantive requirements of a regulation (permit conditions), but the administrative function of obtaining an actual permit is not required. The remediation contractor will include the substantive requirements of typical ACOE 404 permits in their construction activities to prevent degradation or damage to the adjacent wetland areas.

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Clean Water Act of 1977, as Amended, Section 404 (33 U.S.C. § 1344)[b]					
Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit	Wetland as defined by Exec. Order No. 11990 Section 7	33 U.S.C. § 1344	Not an ARAR	Not an ARAR; no discharge of dredged or fill material to a wetland is planned as part of the Site 7 removal action
Exec. Order No. 11988, Floodplain Management[b]					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain (i.e., lowlands) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 C.F.R. § 6 302(b)	Relevant and Appropriate	The area in Site 7 is within a potential floodplain However, this the floodplain will not be adversely impacted since the site will be restored following the removal action
Resource Conservation and Recovery Act (33 U.S.C. §§ 6901–6991[i])[b]					
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	Cal. Code Regs. tit 22, § 66264 18(b)	Not an ARAR	The Site 7 removal action does not involve construction or substantial modification of a new TSD facility within the 100-year floodplain
Wild and Scenic Rivers Act (16 U.S.C. §§ 1271–1287)[b]					
Within area affecting national wild, scenic, or recreational river	Avoid taking or assisting in action that will have direct adverse effect on scenic river.	Activities that affect or may affect any of the rivers specified in 16 U.S.C. §1276(a)	16 U.S.C §§ 1271–1287	Not an ARAR	No wild, scenic, or recreational rivers are located at or in the vicinity of Site 7.
Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)[b]					
Area affecting stream or other water body	Action taken should protect fish or wildlife.	Diversion, channeling, or other activity that modifies a stream or other water body and affects fish or wildlife.	16 U.S.C. § 662	Not an ARAR	This removal action does not modify a stream or other water body and does not affect fish or wildlife

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401–413)[b]					
Navigable waters	Permits required for structures or work in or affecting navigable waters	Activities affecting navigable waters	33 U.S.C. § 403 33 C.F.R. § 322	Not an ARAR	Site 7 is not located on or in the immediate vicinity of navigable waters.
Endangered Species Act of 1973 (16 U.S.C. §§ 1531–1543)[b]					
Habitat upon which endangered species or threatened species depend	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented.	Determination of effect upon endangered or threatened species or its habitat. Critical habitat upon which endangered species or threatened species depend.	16 U.S.C. § 1536(a), (h)(1)(B)	Applicable	Federally-listed endangered species are known to inhabit NAVWPNSTA Seal Beach, the Seal Beach NWR, and its associated wetlands. The results of past ecological assessments indicate there is no threat to endangered species from biota, soil, and sediment at Site 7. However, Federally-listed endangered species probably use Site 7 to some extent; the DON will coordinate with USFWS for the removal action. The removal action is expected to mitigate potential threats to endangered species.

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703–712)[b]					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 U.S.C. § 703	Applicable	Migratory birds have been observed at NAVWPNSTA Seal Beach. The breeding season at the NWR is typically between 31 March and 15 September. The removal action is expected to be implemented outside of the breeding season. The removal action is expected to mitigate potential threats from Site 7 to wildlife.
Marine Mammal Protection Act (16 U.S.C. §§ 1361-1421h)[b]					
Marine mammal area	Protects any marine mammal in the U.S. except as provided by international treaties from unregulated "take."	Presence of marine mammals	16 U.S.C § 1372(a)(2)	Not an ARAR	Site 7 is located inland and , therefore, marine mammals are not present
Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended (16 U.S.C. §§ 1801–1882)[b]					
Fishery under management	Provides for conservation and management of specified fisheries within specified fishery conservation zones.	Presence of managed fisheries	16 U.S.C §§ 1801–1882	Not an ARAR	Site 7 is located inland. Removal action will have no impact on potential fisheries

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
National Wildlife Refuge System Administration Act of 1996 (16 U.S.C. § 668dd–668ee)[b]					
Wildlife refuge	No person shall take any animal or plant on any national wildlife refuge, except as authorized under 50 C.F.R. § 27.51. The disposing or dumping of wastes is prohibited	Area designated as part of National Wildlife Refuge System.	16 U.S.C. § 668dd–668ee Substantive provisions of 50 C.F.R. § 27.11–27.97	Applicable	A portion of Site 7 extends approximately 700 feet into the east portion of the Seal Beach NWR. Following the removal action, the excavation will be restored to surrounding grade using clean backfill material and will be revegetated with native plant species. The removal action at Site 7 could potentially disturb breeding Belding's Savannah sparrows and light-footed Clapper rails that nest in the area. Both species' breeding seasons are from 31 March through 15 September at NAVWPNSTA Seal Beach. Timing the removal action to coincide with non-breeding periods (i.e., September through March) will eliminate the potential for harming these endangered species; the DON will coordinate with USFWS for the removal action.

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Wilderness Act (16 U.S.C. §§ 1131–1136)[b]					
Wilderness area	Area must be administered in such a manner as will leave it unimpaired as wilderness and preserve its wilderness character.	Federally owned area designated as wilderness area.	16 U.S.C. §§ 1131–1136 50 C.F.R. §§ 35.1–35.14	Not an ARAR	NAVWPNSTA Seal Beach and Site 7 are not located in a federally owned wilderness area.
Resource Conservation and Recovery Act (33 U.S.C. §§ 6901–6991[i])[b]					
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage, or disposal of hazardous waste prohibited.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste	Cal. Code Regs. tit. 22, § 66264.18(a)	Not an ARAR	The Site 7 removal action does not involve construction or substantial modification of a new TSD facility within 61 meters of a fault displaced in Holocene time.
Within salt dome formation, underground mine, or cave	Placement of noncontainerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement.	Cal. Code Regs. tit. 22, § 66264.18(c)	Not an ARAR	Site 7 contains no salt domes, mines, or caves.

(table continues)

Table A3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Coastal Zone Management Act (16 U.S.C. §§ 1451–1464)[b]					
Within coastal zone	Conduct activities in a manner consistent with approved state management programs.	Activities affecting the coastal zone including lands thereunder and adjacent shore land	16 U.S.C § 1456(c) 15 C.F.R § 930	Not an ARAR	The Coastal Zone Management Act (Section 307[c] of 16 USC) and 15 CFR 930 and 923 45, requires a federal agency typically to conduct activities within a "coastal zone" in a manner consistent with approved state management programs, in this case the California Coastal Act. However, the Federal Consistency Branch of the California Coastal Commission advised that federal "land" is exempt from obtaining a "consistency determination". This direction is consistent with Section 304 of this Act, which states that "Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers, or agents ." The DON does not view the procedure of preparing a formal coastal consistency document and seeking California Coastal Commission concurrence as a valid ARAR. As a result, and as a result of the above information received from the CCC, it is not likely that a consistency determination will be required.

(table continues)

Table A3-1 (continued)

Note:

[a] only the substantive provisions of the requirements cited in this table are potential ARARs

[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
CCC -- California Coastal Commission
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
DON – Department of the Navy
Exec. Order No. – executive order number
FEMA – Federal Emergency Management Agency
Pub. L. No. – public law number
RCRA – Resource Conservation and Recovery Act
§ – section
U.S. – United States
U.S.C. – *United States Code*

Table A3-2
Potential State and Local Location-Specific ARARs

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Endangered Species Act (Cal. Fish & Game Code §§ 2050–2116)[b]					
Endangered species habitat	Department policy and legislative findings and definitions for significant natural areas.	Activity taking place in an endangered species habitat and significant natural area.	Cal. Fish & Game Code §§ 2050–2068	Not an ARAR	DON and the State did not identify as an ARAR Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation "
Endangered species habitat	Procedures for listing endangered species.	Threatened or endangered species determination.	Cal. Fish & Game Code § 2070	Not an ARAR	DON and the State did not identify as an ARAR Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Endangered species habitat	Ensures that action taken will not jeopardize the survival and reproduction of any threatened or endangered species.	Threatened or endangered species determination or a candidate species with proper notification.	Cal. Fish & Game Code §§ 2090–2096	To Be Considered	Not applicable since not effective after 01 January 1994; actions will be taken to protect endangered species habitat, so it is a TBC
Endangered species habitat	No person shall import, export, take, possess, or sell any endangered or threatened species or part or product thereof.	Threatened or endangered species determination on or before 01 January 1985 or a candidate species with proper notification.	Cal. Fish & Game Code § 2080	Relevant and Appropriate	Federal- and State-listed endangered species are known to inhabit NAVWPNSTA Seal Beach, the Seal Beach NWR, and its associated wetlands. The results of past ecological assessments indicate there is no threat to endangered species from biota, soil, and sediment at Site 7. However, Federal- and State-listed endangered species (Belding's savannah sparrow) probably use Site 7 to some extent; the DON will coordinate with USFWS for the removal action. The removal action is expected to mitigate potential threats to endangered species

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Fish and Game Code[b]					
Wildlife species/habitats	Action must be taken for the general protection and conservation of fish and wildlife resources		Cal. Fish & Game Code §1600	To Be Considered	Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation "
Streambed	The Department must propose reasonable modifications to public construction projects that would alter the bed, channel or bank of any river, stream or lake and may substantially adversely affect an existing fish or wildlife resource.		Cal. Fish & Game Code §1601	Not an ARAR	Not an ARAR; no streambeds present at Site 7
Streambed	Any streambed may not be altered without first notifying the Department		Cal. Fish & Game Code §1603	Not an ARAR	Not an ARAR; no streambeds present at Site 7
Aquatic and wildlife species/habitats	Action may be taken to collect damages for the taking of birds, mammals, fish, reptiles, or amphibia.		Cal. Fish & Game Code § 2014	Potentially Relevant and Appropriate	The Screening Aquatic ERA evaluates the potential effects of the site on aquatic ecological receptors (SWDIV, 2000). The RI and ERA Phase II Validation Study evaluates the potential effects of the site on terrestrial ecological receptors at Site 7 (SWDIV, 1995 and 1999)
Aquatic and wildlife species/habitats	Action may be taken if toxic materials area placed where they can enter waters of the State. There can be no releases that would have a deleterious effect on species habitat		Cal. Fish & Game Code § 5650 (a), (b), and (f)	Potentially Relevant and Appropriate	Some available data indicates that contamination from Site 7 may have entered waters of the State, although at concentrations well below levels considered to be hazardous.

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Wildlife Species	Action must be taken to prohibit the taking of birds and mammals, including taking by poison		Cal. Fish & Game Code § 3005	Potentially Relevant and Appropriate	Site 7 may have wildlife species present during the removal action.
Wetlands	Actions must be taken to assure that there is "no net loss" of wetlands acreage or habitat value Action must be taken to preserve, protect, restore, and enhance California's wetland acreage and habitat values.		Cal Fish and Game Commission Wetlands Policy (adopted 1987) included in Fish and Game Code Agenda	To Be Considered	A portion of Site 7 is located within wetlands and extends into the Seal Beach NWR's salt marsh habitat Not an ARAR since not a regulatory program

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Coastal Act of 1976[b]					
Coast	Regulates activities associated with development to control direct significant impacts on coastal waters and to protect state and national interests in California coastal resources	Any activity which could impact coastal waters and resources	Cal. Pub. Res. Code §§ 30000–30900; Cal Code Regs. tit. 14, §§ 13001--13666.4	Not an ARAR	The California Coastal Act maintains jurisdiction over coastal wetlands and requires activities within such wetlands to be consistent with the Act The California Coastal Commission oversees the implementation of the California Coastal Act, and as such typically requires a consistency determination However, the Federal Consistency Branch of the California Coastal Commission advised that federal "land" is exempt from obtaining a "consistency determination" This direction is consistent with Section 30008 of the Act, which recognizes that certain lands are excluded from the coastal zone by Federal law The DON does not view the procedure of preparing a formal coastal consistency document and seeking California Coastal Commission concurrence as a valid ARAR As a result, and as a result of the above information received from the CCC, it is not likely that a consistency determination will be required.

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
State and Regional Water Quality Control Boards[b]					
Water Bodies	Establishes the policy that high-quality waters of the state "shall be maintained to the maximum extent possible" consistent with the "maximum benefit to the people of the State " It provides that whenever the existing quality of water is better than that required by applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge		Statement of Policy With Respect to Maintaining High Quality of Waters in California, SWRCB Res. 68-16	Applicable	Affects discharges from treatment systems and migration of contaminated or polluted water into high quality waters. Discharges of lesser water quality than the receiving body will be treated prior to discharge

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Water Bodies	Incorporated into all regional board basin plans Designates all groundwater and surface waters of the state as drinking water except where the TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices		SWRCB Res. 88-63 and 89-42 (Sources of Drinking Water Policy)	Applicable	The Santa Ana RWQCB has designated the aquifer beneath Site 7 as a Class III aquifer. The underlying shallow groundwater contains TDS exceeding 3,000 ppm and the well yield is less than 200gpd per well.
Water Bodies	Describes requirements for RWQCB oversight of investigation and cleanup and abatement activities resulting from discharges of hazardous substances RWQCB may decide on cleanup and abatement goals and objectives for the protection of water quality and beneficial uses of water within each region. Establishes criteria for "containment zones" where cleanup to established water-quality goals is not economically or technically practicable		Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304. SWRCB Res. 92-49	Not an ARAR	The DON has rejected Res. 92-49 when Cal. Code Regs. tit. 22, § 66264.94 requirements have been determined to be federal ARARs (see Table A2-2)

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Water Bodies	Requires submission of information regarding waste discharges and states that requirements shall be placed to implement water quality control plans. Technical or monitoring reports may be required for investigation of water quality Provides penalties for non-compliance		Cal. Water Code, div. 7, §§ 13260-13274 (chapter 4, article 4)	Applicable (certain sections only – see comment)	The DON accepts §§ 13241, 13243, 13263(a), 13269, and 13360 as applicable ARARs; other provisions of Division 7 (Porter-Cologne Water Quality Control Act) are not ARARs.
Water Bodies	Specifies water quality monitoring and response programs for waste management units Requires establishment of concentration limits for groundwater, surface water, and the unsaturated zone Monitoring points and POC shall be specified in the requirements.		Cal Code Regs tit. 27, div. 2, chapter 3 (included in Cal. Code Regs. tit. 27, div. 2, subdivision 1)	See Comment	Substantive provisions may be ARARs. ARAR determination for specific citations are identified in this table
Water Bodies	General closure requirements, including continued maintenance of waste containment, drainage controls, and groundwater monitoring throughout the closure and post-closure maintenance periods		Cal. Code Regs. tit 27, §§ 20950, 22207(a), 22212(a), and 22222	Applicable	Applicable to partial or final closure of Site 7
Water Bodies	Requires a final cover constructed in accordance with specific prescriptive standards, to be maintained as long as wastes pose a threat to water quality.		Cal. Code Regs. tit 27, § 21090	Relevant and Appropriate	Relevant and appropriate for areas of Site 7 where waste has been discharged to land and water quality is threatened

(table continues)

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Water Bodies	Where groundwater monitoring is required under 2510 or 2511 of Chapter 15 (and equivalent for Title 27), Article 5 applies to authorized waste management units as well as unauthorized discharges of waste to land and to closed abandoned or inactive units.		Cal. Code Regs. tit 27, Article 1, §§20385-20435	See Comment	Sections 20390, 20395, 20400, and 20410 are relevant and appropriate; other sections are not ARARs since Cal. Code Regs. 66264 91-66264 100 are more stringent (see Table A4-2). Applicable to all areas in which waste has been discharged to land and threatens to water quality at Site 7
Water Bodies	Requires detection monitoring. Once a significant release has occurred, site investigation and remediation, with evaluation or corrective action monitoring, are required		Cal. Code Regs. tit 27, § 20385	See Comment	Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.91(a) and (c) which is identified as an ARAR (see Table A4-1).
Water Bodies	Requires establishment of a water quality protection standard consisting of a list of constituents of concern, concentration limits, compliance monitoring points, and all monitoring points. This section further specifies the time period during which the standard shall apply.		Cal. Code Regs. tit 27, § 20390	Relevant and Appropriate	Substantive provisions may be relevant and appropriate for the removal action at Site 7.
Water Bodies	Requires the development of a list of constituents of concern which include all waste constituents, that are reasonably expected to be present in the soil from discharges to land, and could adversely affect water quality.		Cal. Code Regs. tit. 27, § 20395	Relevant and Appropriate	Substantive provisions may be relevant and appropriate for the removal action at Site 7.

Table A3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
County of Orange Public Facilities & Resources Department[b]					
Construction or access to County right-of-ways	Requires that a Public Property Encroachment Permit be obtained for any work conducted in the right-of-ways and facilities administered by the County's Public Facilities and Resources Department		OCC Sections 6-1-13, 6-1-122, 6-3-41, and 6-4-377	Not an ARAR	Not relevant to the scope of removal action

Note:

[a] only the substantive provisions of the requirements cited in this table are potential ARARs

[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs follow each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
Cal. Fish & Game Code -- California Fish and Game Code
Cal. Gov't Code -- California Government Code
Cal. Pub Res. Code – California Public Resources Code
CCC – California Coastal Commission
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
DON – Department of the Navy
§ – section

Section A4
ACTION-SPECIFIC ARARs

This EE/CA report evaluates removal action alternatives for Site 7 at NAVWPNSTA Seal Beach. This ARARs analysis is based on four alternatives for the site. Alternative 1 is no action, Alternative 2 is capping with long-term maintenance/monitoring, Alternative 3 is limited repair of existing soil cover and groundwater monitoring, and Alternative 4 is excavation and off-site disposal. Detailed descriptions of the removal alternatives are provided in the main text of this EE/CA report (see Section 4).

Tables A4-1 and A4-2 at the end of this section present and evaluate federal and state potential action-specific ARARs for Site 7, respectively. A discussion of the requirements determined to be pertinent to each alternative being evaluated for Site 7 action is presented in this section. A discussion of how the alternative complies with each identified ARAR is also provided.

The Site 7 removal action alternatives considered for detailed analysis, and for which an ARARs analysis is presented in this appendix, are as follows:

- Alternative 1: No Action.
- Alternative 2: Capping and Long-term Maintenance/Monitoring.
  Primary removal action activities involve capping Area 1 with a Title 27 compliant cap, surficial debris removal, and excavation and offsite disposal of waste, and performing long-term monitoring/maintenance.
- Alternative 3: Limited Repair of Existing Soil Cover and Groundwater Monitoring.
  Primary removal action activities involve performing limited soil cover repairs of Area 1, surficial debris removal, excavation and offsite disposal of waste, and groundwater monitoring.
- Alternative 4: Excavation and Offsite Disposal.
  Primary removal action activities involve excavation and offsite disposal of wastes for areas 1, 2, and 5, and surficial debris removal.

A4.1 ALTERNATIVE 1 – NO ACTION

There is no need to identify ARARs for the no-action alternative because ARARs apply to "any removal or remedial action conducted entirely on-site" and "no action" is not a removal or remedial action (CERCLA Section 121(e), 42 U.S.C. § 9621[e]). CERCLA § 121 (42 U.S.C. § 9621) cleanup standards for selection of a Superfund remedy, including the requirement to meet ARARs, are not triggered by the no-action alternative (U.S. EPA 1991b). Therefore, a discussion of compliance with action-specific ARARs is not appropriate for this alternative.

A4.2 ALTERNATIVE 2 – CAPPING AND LONG-TERM MAINTENANCE/MONITORING

Primary removal action activities involve capping Area 1 with a Title 27 compliant cap, surficial debris removal from areas 3, 4, and 6, and excavation and offsite disposal of waste in area 5, and performing long-term monitoring/maintenance in areas 1 and 2.

A4.2.1 Capping

Under Cal. Code Regs. tit. 22, § 66264.310(a)(7), a variance is allowed from any of the prescriptive cap requirements as long as it is demonstrated that the prescriptive cap is not necessary to protect public health, water quality, or other environmental quality.

Under Cal. Code Regs. tit. 27, § 20080(b) and tit. 23, § 2510(b), engineered alternatives to the prescriptive landfill cover are allowed when the discharger can demonstrate that the construction or prescriptive standard is not feasible and there is a specific engineered alternative. The specific engineered alternative must be consistent with the performance goal addressed by the particular construction or prescriptive standard and must afford equivalent protection against water quality impairment. Under Cal. Code Regs. tit. 27, § 20080(c) and tit. 23, § 2510(c), to demonstrate that compliance with prescriptive standards is not feasible, the discharger shall demonstrate that compliance with a prescriptive standard either: (1) is unreasonably and unnecessarily burdensome and will cost substantially more than engineered alternatives; or (2) is impractical and will not promote attainment of applicable performance standards considering all relevant technical and economic factors. These factors include present and projected costs of compliance, potential costs for response action in the event that waste or leachate is released to the environment, and the extent to which groundwater resources could be affected.

Under Cal. Code Regs. tit. 27, § 21090, the RWQCB can allow any alternative final cover that it finds will continue to isolate the waste and irrigation at least as well as would a final cover built in accordance with applicable prescriptive standards.

Landfill closure and postclosure requirements are contained in 40 C.F.R. § 258 and Cal. Code Regs. tits. 22, 23, and 27. Because the landfill addressed in this EE/CA ceased operation prior to the effective date of any of these four sets of similar but not identical regulations, they are not "applicable" ARARs. Therefore, the DON reviewed them to determine whether any of the regulations were potentially "relevant and appropriate" ARARs. Because these regulations contain overlapping requirements, this EE/CA report for Site 7 contains a table that compares 40 C.F.R. § 258 and Cal. Code Regs. tits. 22, 14, and 23 and identifies the most stringent, or controlling, ARARs. The purpose of this table is to facilitate identification of ARARs for removal action. When federal and state regulations were considered to be equally stringent, federal regulations were selected as controlling ARARs. The table contained in this EE/CA report reflects the promulgation of Cal. Code Regs. tit. 27 and repeal of portions of Titles 14 and 23, and is shown as Table A4-4. The controlling action-specific ARARs are also identified in Table A4-4.

Capping or covering of the landfill is evaluated for Site 7. Federal and state requirements for landfill closure are the primary sources of ARARs for this action.

A4.2.1.1 FEDERAL ARARs

Federal requirements that are potential ARARs for capping/cover actions are described in the following sections.

RCRA

Site 7 would not be classified as a hazardous waste landfill because there is no record of RCRA hazardous waste disposal. However, because some of the wastes in these landfills may contain hazardous constituents, certain provisions of RCRA may be relevant and appropriate for landfill closure.

The RCRA landfill closure requirements (Cal. Code Regs. tit. 22, § 66264.111 and 66264.310) are general performance standards that eliminate the need for further maintenance and control and eliminate postclosure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products. The grading conducted for the capping/cover options at Site 7 does not constitute placement or disposal under RCRA and, therefore, the generator requirements for hazardous waste determinations contained in Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.111 are not triggered.

CRITERIA FOR MUNICIPAL WASTE LANDFILLS, 40 C.F.R. § 258

Landfill closure requirements for municipal waste landfills are set forth in 40 C.F.R. § 258, subpt. F. Because Site 7 did not receive wastes after the effective date of these requirements (09 October 1991), these requirements would not be applicable. However, the substantive portions of these requirements would be considered potentially relevant and appropriate because Site 7 received domestic wastes from NAVWPNSTA Seal Beach similar or identical to wastes managed in municipal solid waste landfills.

Provisions in 40 C.F.R. § 258.60(a) and (b) require that the final cover system be designed to minimize infiltration and erosion. This section provides specific technical standards for cover design but allows for alternative cover designs if it is demonstrated that the alternative designs will achieve the same level of performance.

Section 258.61 requires postclosure maintenance for 30 years unless it can be demonstrated that a shorter or longer period of maintenance is required. If it can be demonstrated that the site poses no threat to public health and safety or to the environment, the postclosure maintenance period may be eliminated.

CLEAN AIR ACT

Grading activities associated with placement of the cap and excavation of the local soil may generate fugitive dust, which needs to be controlled to comply with SCAQMD requirements. SCAQMD Rules that have been incorporated into the State Implementation Plan (SIP) and are considered to be federal ARARs include Rules 212, 402, and 1303. These requirements and their applicability to Alternative 2 is discussed below.

Rule 212

Rule 212 is the Standard for Approving Permits. Its substantive requirements are listed below.

- Equipment should be designed, controlled, or equipped with such air pollution control equipment that it may be expected to operate without emitting air contaminants in violation of the Cal. Health & Safety Code §§ 41700, 41701, or 44300 (et seq.) or of the SCAQMD rules. (See Table A4-2 for further description of the referenced H&SC requirements.)

This rule was not identified as an ARAR for Alternative 2 because the Site 7 removal action does not qualify as a significant project based on the following criteria:

- the emission source is not located within 1,000 feet of the outer boundary of any school (K-12);
- the risk is not greater than the allowed risk;
- the emissions are not greater than the values listed in Rule 1304, Table A:

VOCs	4 tons/year
NO_X	4 tons/year
SO_X	4 tons/year
PM_{10}	4 tons/year
CO	29 tons/year

Rule 1303

SCAQMD Rule 1303 requires that all new sources of air pollution that result in a net increase of any nonattainment air contaminant or any halogenated hydrocarbons employ the best available control technology (BACT). Current SCAQMD policy (SCAQMD 1988) sets the threshold of net emissions increase at one pound per day of any nonattainment air contaminant for any permitted unit when BACT is required. SCAQMD guidelines list carbon adsorption as the BACT for air strippers for groundwater treatment (SCAQMD 1988). Because there are no major sources of air pollutants associated with this removal action, Rule 1303 was not identified as an ARAR.

Rule 402

Rule 402 was also identified as a potential ARAR and is a part of the SIP. Rule 402 prohibits the discharge of any air emissions in quantities that may cause injury, detriment, nuisance, or annoyance to the public. The DON is troubled by the vague and subjective nature of the nuisance rule and the lack of objective "standards, requirements, criteria or limitations" within the meaning of Section 121(d)(2) of CERCLA. DON also notes that Section 121(d)(2) of CERCLA and the NCP at 40 C.F.R. § 300.5 require that a state ARAR be an "environmental or facility siting" law or regulation. The nuisance rule includes objective, nonenvironmental criteria such as "annoyance," "comfort," and "repose." In addition, the DON has determined that a "nuisance" condition as set forth in Rule 402 does not exist in Site 7 and is not posed by the remedial alternatives. For these

reasons, Rule 402 does not qualify as an ARAR for this response action. Other federal and state ARARs addressing actual and potential air emissions will assure adequate protection of human health and the environment.

A4.2.1.2 STATE ARARs

State requirements that are potential ARARs for capping/cover actions are described in the following sections.

SOLID WASTE AND CAPPING (CAL. CODE REGS. TIT. 27, DIV. 2)

The following regulations were identified as potential ARARs for Alternative 2: Cal. Code Regs. tit. 27, division 2, subdivision 1, §§ 20650; 20820; 21130; 21090; 20210; 20220; 20230; 20310; 20320; 20950(a), (d), (e); 21769, 20090(d), 20950, 22207(a), 22212(a), and 22222. See Table A4-2 for ARAR determination.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT REQUIREMENTS

The removal action for Site 7 needs to comply with the South Coast Air Quality Management District (SCAQMD) requirements. Requirements that have not been incorporated into the State Implementation Plan (SIP) are considered to be state ARARs. The following rules were identified as potential ARARs: SCAQMD Rules 401, 403, 404, 405, 407, 408, 431.1, 431.2, and 431.3 in Regulation IV; and Rule 1150 in Regulation XI. See Table A4-2 for ARAR determination.

CALIFORNIA FISH AND GAME CODE

The following regulations were identified as potential ARARs for Alternative 2: Cal. Fish & Game Code §§ 2014; 2080; 3005, and 5650(a), (b), and (f). See Table A4-2 for ARAR determination.

LANDFILL/WASTE MANAGEMENT CLOSURE REQUIREMENTS

The following regulations were identified as potential ARARs for Alternative 2: Cal. Water Code §13176; Chapter 4, Article 4; Chapter 5, Article 1;SWRCB Order No. 97-03-DWQ. See Table A4-2 for ARAR determination.

A4.2.1.3 CONCLUSIONS

The substantive provisions of the following regulations were determined to be controlling ARARs for landfill capping and closure for Alternative 2:

Potential federal ARARs (see Table A4-1)

Cal. Code Regs. tit 22, §§ 66262.10(a); 66262.11; 66264.13(a), (b); 66262.34; 66264.111(a), (b); and 66264.114;

Potential state ARARs (see Table A4-2)

Cal. Code Regs. tit. 27, division 2, subdivision 1, §§ 20650; 20820; 21130; 21090; 20310; 20320; 20950(a), (d), (e); 21769; 20090(d); 20950; 22207(a); 22212(a); and 22222;

Cal. Water Code §13176; Chapter 4, Article 4; Chapter 5, Article 1; SWRCB Order No. 97-03-DWQ;

SCAQMD Rules 401, 403, 404, 405, 407, 408, 431.1, 431.2, and 431.3 in Regulation IV; and Rule 1150 in Regulation XI;

Cal. Fish & Game Code §§ 2014; 2080; 3005, and 5650(a), (b), and (f).

Alternative 2 will comply with these ARARs.

A4.2.2 Groundwater Monitoring

Federal and state requirements that pertain to groundwater monitoring for corrective action programs are described in the following sections.

A4.2.2.1 FEDERAL ARARs

Portions of the RCRA groundwater protection standards contained in Cal. Code Regs. tit. 22 are considered to be relevant and appropriate for the groundwater potentially impacted by releases from Site 7 because the hazardous constituents being addressed by this action are similar or identical to those found in RCRA hazardous wastes. In addition to concentration limits for groundwater, Cal. Code Regs. tit. 22, § 66264.100 requires that a water quality monitoring program be established to demonstrate the effectiveness of a corrective action program (CAP). Substantive provisions of the following requirements apply to the development and implementation of a monitoring program:

- constituents of concern (Cal. Code Regs. tit. 22, § 66264.93),
- concentration limits (Cal. Code Regs. tit. 22, § 66264.94),
- monitoring points and points of compliance (Cal. Code Regs. tit. 22, § 66264.95),
- monitoring parameters (Cal. Code Regs. tit. 22, § 66294.98),
- statistical method for detecting a release (Cal. Code Regs. tit. 22, § 66264.97[e]), and
- method for determining background (Cal. Code Regs. tit. 22, § 66264.97[e][11]).

RCRA requirements for identification and management of solid and hazardous wastes are also potential federal action-specific ARARs identified for Alternative 2. Soil cuttings and water generated in the course of installing and developing monitoring wells would be subject to RCRA requirements at Cal. Code Regs. tit. 22, § 66262.10(a) and § 66262.11 to determine whether such wastes should be classified as hazardous.

The DON has determined that soil and well development water at Site 7 would not be classified as RCRA-listed hazardous wastes. However, testing would still be required to classify these materials with respect to the RCRA hazardous waste characteristics. This determination would be made at the time the waste is generated. The appropriate requirements outlined in Table A4-1 for storing, manifesting, and transporting this

material for final disposal would need to be followed only in the unlikely event that the soil cuttings and well development water are found to be classified as RCRA characteristic hazardous wastes.

The soil cuttings and well development water generated under Alternative 2 would also be subject to state action-specific requirements to determine if these materials are non-RCRA hazardous waste. The appropriate management requirements of Cal. Code Regs. tit. 22, § 66264 would be followed should testing unexpectedly classify these materials as non-RCRA hazardous waste.

Potential federal ARARs identified for groundwater monitoring at Alternative 2 include the following: Cal. Code Regs. tit. 22, §§ 66264.91 (a), (c); 66264.95; 66264.97; 66264.98; 66264.99; 66264.100(a), (b), (c), (d), (g)(1) and (3). See Table A4-1 for ARAR determination.

A4.2.2.2 STATE ARARs

The DTSC and RWQCB Santa Ana Region identified the following requirements for the development of a CAP monitoring program for landfill closure:

- constituents of concern (Cal. Code Regs. tit. 27, § 20395 and tit. 23, § 2550.3),
- concentration limits (Cal. Code Regs. tit. 27, § 20400 and tit. 23, § 2550.4),
- monitoring points and points of compliance (Cal. Code Regs. tit. 27, § 20405 and tit. 23, § 2550.5),
- compliance period (Cal. Code Regs. tit. 27, § 20410 and tit. 23, § 2550.8),
- statistical method for detecting a release (Cal. Code Regs. tit. 27, § 20415[e] and tit. 23, § 2550.7[e]),
- detection monitoring program (Cal. Code Regs. tit. 27, § 20420),
- method for determining background (Cal. Code Regs. tit. 27, § 20415[e][10] and tit. 23, § 2550.7[e][11]), and
- corrective action monitoring (Cal. Code Regs. tit. 27, § 20430).

The DON has reviewed these provisions and has determined that they are identical to the corresponding Cal. Code Regs. tit. 22 sections cited above as potential federal ARARs, except for the more prescriptive sampling requirements found at Cal. Code Regs. tit. 23, § 2550.7(e)(12)(B). The DON accepts the substantive provisions of the more prescriptive requirements of Cal. Code Regs. tit. 23, § 2550.7(e)(12)(B) as potential state ARARs. See Table A4-3 for comparison of monitoring ARARs for Cal. Code Regs. tit. 22, 23, and 27.

Additional potential state ARARs identified for groundwater monitoring for Alternative 2 include the substantive provisions of the following: 40 C.F.R. § 131.12; Chapters 3, 4, and 5 of the Santa Ana Regional Water Quality Control Board Basin Plan; SWRCB Res. 68-16; Cal. Water Code, division 7, chapter 3, §§ 13240; 13241; 13242; 13243; 13263(a); 13360; 13140; Chapter 4, Article 4; Chapter 10, Article 3; Cal. Code Regs. tit. 27, § 20080(g). See Table A4-2 for ARAR determination.

A4.2.2.3 CONCLUSIONS

The substantive provisions of requirements for detection monitoring at Cal. Code Regs. tit. 22, § 66264.98 are determined to be potential federal relevant and appropriate requirements for this response action. The equivalent state requirements at Cal. Code Regs. tit. 23, § 2550.8 and at Cal. Code Regs. tit. 27, § 20420 are not more stringent than the federal ARARs and are, therefore, not ARARs for this removal action.

The substantive provisions of the following regulations were determined to be controlling ARARs for groundwater monitoring for Alternative 2:

Potential federal ARARs (see Table A4-1)

Cal. Code Regs. tit. 22, §§ 66264.91 (a), (c); 66264.93; 66264.94; 66264.95; 66264.97; 66264.98; 66264.99; 66264.100(a), (b), (c), (d), (g)(1) and (3);

Potential state ARARs (see Table A4-2)

40 C.F.R. § 131.12; Chapters 3, 4, and 5 of the Santa Ana Regional Water Quality Control Board Basin Plan; SWRCB Res. 68-16; Cal. Water Code, division 7, chapter 3, §§ 13240; 13241; 13242; 13243; 13263(a); 13360; 13140; Chapter 4, Article 4; Chapter 10, Article 3; Cal. Code Regs. tit. 27, § 20080(g); 20390; and 20410.

Alternative 2 will comply with these ARARs.

A4.2.3 Excavation and Temporary Storage of Waste

A4.2.3.1 FEDERAL ARARs

If, based on the hazardous waste determination described under federal chemical-specific ARARs discussion, wastes are determined to be hazardous under RCRA, substantive requirements of Cal. Code Regs. tit. 22, § 66262.34 (pertaining to hazardous waste accumulation) will be applicable (or relevant and appropriate if waste does not meet the definition of hazardous waste but is similar to RCRA hazardous waste). Alternatives 2 involves the stockpiling of excavated materials while waste characterization is performed. As such, the substantive requirements of Cal. Code Regs. tit. 22, §§ 66264.251, 66264.258(a) and (b), 66264.111, and 66264.114 (pertaining to the control of run-on and runoff and closure of waste piles) are relevant and appropriate requirements for the temporary storage of stockpiled materials. In addition, substantive requirements of 49 C.F.R. §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and 172.504 (pertaining to the Department of Transportation requirements for transport of hazardous materials) would be relevant and appropriate for transport of materials on-site.

A4.2.3.2 STATE ARARs

RCRA

If the excavated soil is determined to be neither RCRA nor non-RCRA hazardous waste, a designated waste determination must be made prior to disposal in accordance with the

substantive provisions of Cal. Code Regs. tit. 27, § 20200. Alternative 2 involves the temporary stockpiling of excavated materials while waste characterization is performed.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT REQUIREMENTS

Fugitive dust may be generated during the excavation and handling of the contaminated soil. The removal action for Site 7 needs to comply with the South Coast Air Quality Management District (SCAQMD) requirements. Requirements that have not been incorporated into the State Implementation Plan (SIP) are considered to be state ARARs. The following rules were identified as potential ARARs: SCAQMD Rules 401, 403, 404, 405, 407, 408, 431.1, 431.2, and 431.3 in Regulation IV; and Rule 1150 in Regulation XI. See Table A4-2 for ARAR determination.

CALIFORNIA FISH AND GAME CODE

The following regulations were identified as potential ARARs for landfill capping and closure for Alternative 2: Cal. Fish & Game Code §§ 2014; 2080; 3005, and 5650(a), (b), and (f). See Table A4-2 for ARAR determination.

A4.2.3.3 CONCLUSIONS

The substantive provisions of the following regulations were determined to be controlling ARARs for excavation and temporary storage of wastes for Alternative 2:

Potential federal ARARs (see Table A4-1)

Cal. Code Regs. tit 22, §§ 66262.10(a); 66262.11; 66264.13(a), (b); 66262.34; 66264.111(a), (b); 66264.114; 66264.251 (except 251[j], 251[e][11]); 66264.553(b), (d); and 264.554;

Potential state ARARs (see Table A4-2)

Cal. Code Regs. tit. 27, division 2, subdivision 1, §§ 20950(a), (d), (e); 20950; 22207(a); 22212(a); and 22222;

Cal. Fish & Game Code §§ 2014; 2080; 3005, and 5650(a), (b), and (f).

Alternative 2 will comply with these ARARs.

A4.2.4 Disposal to Land

When disposing waste to land the following regulations should be evaluated as potential ARARs.

- RCRA Land Disposal Restrictions at Cal. Code Regs. tit. 22, § 66268.40. For example, RCRA LDRs may be triggered when hazardous waste is treated and waste is placed in an on-site landfill.
- Universal treatment standards at Cal. Code Regs. tit. 22, § 66268.48.
- Landfill requirements at 40 C.F.R. § 258; Cal. Code Regs. tit. 22, § 66264.250; Cal. Code Regs. tit. 23, div. 3, ch. 15; and Cal. Code Regs. tit. 27, div. 2 subdiv. 1.
- State land disposal restrictions at Cal. Health & Safety Code § 25157.8.

If the contaminated soil is determined to be a hazardous waste, it must be disposed in a landfill that meets the design and operating requirements of Cal. Code Regs. tit. 22, § 66264.300–.310. Additionally, if it is classified as an RCRA hazardous waste, the soil will be subject to the LDRs established in Cal. Code Regs. tit. 22, § 66268.40 (for RCRA hazardous waste) or Cal. Code Regs. tit. 22, § 66268.105 (for non-RCRA hazardous waste). These standards must be attained prior to land disposal of the waste. LDRs are considered to be potential ARARs for Alternative 2.

If the soil is determined to be nonhazardous but it contains pollutants that could be released and cause degradation of groundwater, state regulations regarding waste discharge to land (Cal. Code Regs. tit. 27, div. 2, subdiv. 1) may be ARARs. Cal. Code Regs. tit. 27, § 20240 of these regulations require designated waste to be discharged only to approved waste management units.

The substantive provisions of the following regulations were determined to be controlling ARARs for disposal of wastes to land for Alternative 2:

Potential federal ARARs (see Table A4-1)

Cal. Code Regs. tit 22, §§ 66262.10(a); 66262.11; 66264.13(a), (b); 66262.30; 66262.31; 66262.32; 66262.33;

49 C.F.R. §§ 171.2(f), (g); 172.300; 172.301; 172.302; 172.303; 172.304; 172.312; 172.400; and 172.504;

Potential state ARARs (see Table A4-2)

Cal. Code Regs. tit. 27, division 2, subdivision 1, §§ 20210; 20220; 20200(c); and 20230.

Alternative 2 will comply with these ARARs.

A4.2.5 Institutional Controls

Institutional controls are required to maintain the integrity of the landfill by preventing excavations or increased infiltration of surface waters, preventing land use that presents unacceptable risk to human health due to residual contamination, preventing use of groundwater that may be affected from soil contamination, protecting groundwater monitoring equipment, and preserving access to the sites and associated monitoring equipment for the DON and the FFSRA signatories. Such institutional controls shall consist of land-use restrictions designed to protect the landfill remedy. It is important to note that Site 7 will not be transferred to a nonfederal agency.

A4.3 ALTERNATIVE 3: LIMITED REPAIR OF EXISTING SOIL COVER AND GROUNDWATER MONITORING

Primary removal action activities involve performing limited soil cover repairs of area 1, surficial debris removal from areas 3, 4, and 6, excavation and offsite disposal of waste in area 5, and groundwater monitoring in areas 1 and 2.

A4.3.1 Capping – Same as Section A4.2.1.

Since Alternative 3 only involves the limited repair of existing soil cover, the following regulations reported in Section A4.2.1 would not be ARARs for this alternative: Cal. Code Regs. tit 27, §§ 20310; 20320; 20650; 21130 (final grading only); and 20820. See Table A4-2 for ARAR determination.

A4.3.2 Groundwater Monitoring – Same as Section A4.2.2.

A4.3.3 Excavation and Temporary Storage – Same as Section A4.2.3.

A4.3.4 Disposal to Land – Same as Section A4.2.4.

A4.3.5 Institutional Controls – Same as Section A4.2.5.

A4.4 ALTERNATIVE 4: EXCAVATION AND OFFSITE DISPOSAL

Primary removal action activities involve excavation and offsite disposal of wastes for areas 1, 2, and 5, and surficial debris removal from areas 3, 4, and 6.

A4.4.1 Excavation and Temporary Storage of Waste

A4.4.1.1 FEDERAL ARARs – Same as Section A42.3.1.

Alternative 4 involves the clean closure of Site 7. Therefore, in addition to the potential ARARs listed in Section A2.3.1, Cal. Code Regs. tit 22, § 66264.258(a) and (b) [except references to procedural requirements] have also been identified as potential federal ARARs for Alternative 4. See Table A4-1 for ARAR determination.

A4.4.1.2 STATE ARARs – Same as Section A42.3.2.

The following regulations for landfill/waste management unit closure were identified as potential ARARs for Alternative 4: Cal. Water Code §13176; Chapter 4, Article 4; Chapter 5, Article 1;SWRCB Order No. 97-03-DWQ. See Table A4-2 for ARAR determination.

Alternative 4 involves the clean closure of Site 7. Therefore, in addition to the potential ARARs listed in Section A2.3.1 and above, Cal. Code Regs. tit. 27, § 21090(f) has also been identified as a potential state ARAR for Alternative 4. See Table A4-2 for ARAR determination.

A4.4.1.3 CONCLUSIONS

The substantive provisions of the following regulations were determined to be controlling ARARs for excavation and temporary storage of wastes for Alternative 2:

Potential federal ARARs (see Table A4-1)

Cal. Code Regs. tit 22, §§ 66262.10(a); 66262.11; 66264.13(a), (b); 66262.34; 66264.111(a), (b); 66264.114; 66264.251 (except 251[j], 251[e][11]); 66264.553(b), (d); 264.554; and 66264.258(a), (b) [except references to procedural requirements];

Potential state ARARs (see Table A4-2)

Cal. Code Regs. tit. 27, division 2, subdivision 1, §§ 20950(a), (d), (e); 20950; 22207(a); 22212(a); 22222; 21090(f).

Alternative 4 will comply with these ARARs.

A4.4.2 Disposal to Land – Same as Section A4.2.4.

A4.4.3 Institutional Controls – Same as Section A4.2.5.

Table A4-1
Potential Federal Action-Specific ARARs

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])*							
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generator of waste.	Cal. Code Regs. tit. 22, § 66262.10(a), 66262.11	2,3,4			Applicable for any operation where waste is generated.
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers or tanks, on drip pads, inside buildings, is labeled and dated, etc.	Accumulate hazardous waste.	Cal. Code Regs. tit. 22, § 66262.34	2,3,4			Potential ARAR; substantive requirements are applicable for accumulation of wastes for less than 90 days if the waste is hazardous waste and is stored on-site. Storage of wastes for more than 90 days is not pertinent to the removal action.
Site closure	Minimize the need for further maintenance controls and minimize or eliminate, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to groundwater or surface water or to the atmosphere.	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.111(a) and (b)		2,3,4		Relevant and Appropriate. Site 7 is not classified as a hazardous waste landfill because there is no record of hazardous waste disposal. However, because some of the wastes may contain hazardous constituents, certain provisions of RCRA may be relevant and appropriate for landfill closure.
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	Cal. Code Regs. tit. 22, § 66264.13(a) and (b)	2,3,4			Applicable for any operation where waste is generated.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Pretransport requirements	Hazardous waste must be packaged in accordance with DOT regulations prior to transporting.	Any operation where hazardous waste is generated.	Cal. Code Regs tit. 22, § 66262.30	2,3,4			Applicable for any operation where waste is generated and transported offsite for disposal.
	Hazardous waste must be labeled in accordance with DOT regulations prior to transporting.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.31	2,3,4			Applicable for any operation where waste is generated and transported offsite for disposal
	Provides requirements for marking hazardous waste prior to transporting	Any operation where hazardous waste is generated	Cal. Code Regs. tit. 22, § 66262.32	2,3,4			Applicable for any operation where waste is generated and transported offsite for disposal.
Pretransport requirements (continued)	A generator must ensure that the transport vehicle is correctly placarded prior to transport of hazardous waste.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.33	2,3,4			Applicable for any operation where waste is generated and transported offsite for disposal.
Clean closure	During the partial and final closure periods, all contaminated equipment, structures and soils shall be properly disposed or decontaminated by removing all hazardous waste and residues	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.114		2,3,4		Relevant and Appropriate. Site 7 is not classified as a hazardous waste landfill because there is no record of hazardous waste disposal. However, because some of the wastes may contain hazardous constituents, certain provisions of RCRA may be relevant and appropriate for landfill closure
Container storage	Containers of RCRA hazardous waste must be: • maintained in good condition, • compatible with hazardous waste to be stored, and • closed during storage except to add or remove waste	Storage of RCRA hazardous waste not meeting small-quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere, in a container.	Cal. Code Regs. tit. 22, § 66264.171, .172, .173				Not an ARAR; storage of containerized RCRA hazardous wastes for more than 90 days is not pertinent to the removal action.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Container storage (continued)	Inspect container storage areas weekly for deterioration.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere, in a container	Cal. Code Regs tit. 22, § 66264.174				Not an ARAR; storage of containerized RCRA hazardous wastes for more than 90 days is not pertinent to the removal action.
	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system	Storage in a container of RCRA hazardous waste not meeting small-quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere	Cal. Code Regs. tit. 22, § 66264.175(a) and (b)				Not an ARAR; storage of containerized RCRA hazardous wastes for more than 90 days is not pertinent to the removal action.
	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line	Ignitable or reactive waste.	Cal. Code Regs. tit. 22, § 66264.176				Not an ARAR; storage of containerized RCRA hazardous wastes for more than 90 days is not pertinent to the removal action
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier		Cal. Code Regs. tit. 22, § 66264.177				Not an ARAR; storage of containerized RCRA hazardous wastes for more than 90 days is not pertinent to the removal action.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Container storage (continued)	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.		Cal. Code Regs tit. 22, § 66264.178				Not an ARAR; container storage for greater than 90 days is not pertinent to the removal action at Site 7
Use of tanks or piping	Requirements for secondary containment of tank systems.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.193(b), (c), (d), and (e)				Not an ARAR; not pertinent to the scope of the removal action at Site 7.
	Requirements for secondary containment of ancillary equipment.	Tank systems for transferring, storing or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264 193(f)				Not an ARAR; not pertinent to the scope of the removal action at Site 7.
Placement of waste in land disposal units	Movement of excavated materials to new location and placement in or on land will trigger LDRs for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to LDRs are placed in another unit	Cal. Code Regs tit. 22, § 66268 40				Not an ARAR; no onsite placement of RCRA hazardous waste in the removal action. Temporary waste piles may be used until wastes are sent to an offsite disposal facility; offsite management of hazardous wastes will follow applicable laws and regulations
	Treatment of waste subject to ban on land disposal must attain levels achievable by BDAT for each hazardous constituent in each listed waste, if residual is to be land disposed.	Placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, or underground mine or cave.	Cal. Code Regs tit. 22, § 66268 42				Not an ARAR; no onsite placement of RCRA hazardous waste in the removal action. Temporary waste piles may be used until wastes are sent to an offsite disposal facility; offsite management of hazardous wastes will follow applicable laws and regulations.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Placement of waste in land disposal units (continued)	BDAT standards for spent solvent wastes and dioxin-containing wastes are based on one of four technologies or combinations: for wastewaters, (1) steam stripping, (2) biological treatment, or (3) carbon absorption; and for all other wastes, (4) incineration. Any technology may be used, however, if it will achieve the concentration levels specified	Solvent or dioxin-containing wastes	Cal. Code Regs. tit. 22, § 66268.30, § 66268.31				Not an ARAR; no spent solvent waste and any soil contaminated with dioxin will be transported off-site for disposal
Clean closure	Remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste. If waste is left on site, closure and postclosure care requirements are necessary.	Surface impoundments, container or tank liners, and hazardous waste residues or contaminated soil (including soil from dredging or soil disturbed in the course of drilling or excavation) returned to land. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated *in situ* or consolidated within the area of contamination.	Cal. Code Regs. tit. 22, § 66264.228(a), (b), (e)–(k), (m), (o)–(q) except as it cross-references procedural requirements such as closure plans and annual reports.				Not an ARAR; not pertinent to the removal action at Site 7 since no surface impoundments are involved
Waste pile	Use a single liner and leachate collection system. Waste put into waste pile is subject to land ban regulations.	RCRA hazardous waste, noncontainerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	Cal. Code Regs. tit. 22, § 66264.251 (except 251[j], 251[e][11])	2,3,4			Substantive provisions are potentially applicable for waste that has been determined to be RCRA hazardous waste. Hazardous waste determination will be made at the time of generation.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Waste pile (continued)	Alternative requirements that are protective of human health or the environment may replace design, operating, or closure standards for temporary tanks and container storage areas.		Cal Code Regs. tit. 22, § 66264 553(b) and (d)	2,3,4			Substantive provisions are potentially applicable for temporary tanks used during dewatering operations.
	Allows generators to accumulate solid remediation waste in a U S EPA-designated pile for storage only, up to 2 years, during remedial operations without triggering LDRs	Hazardous remediation waste temporarily stored in piles.	40 C.F.R. § 264 554	2,3,4			Substantive provisions are potentially applicable for staging piles used during the removal action at Site 7.
	Prevent run-on and control and collect runoff from a 24-hour 25-year storm (waste piles, land treatment facilities, landfills). Prevent overtopping of surface impoundments.	RCRA hazardous waste treated, stored, or disposed after the effective date of the requirements	Cal. Code Regs tit. 22, § 66264.221(c), (e), (h); § 66264.251(c), (d), (f), (g), (h), (k); § 66264.273(c), (d), (j)(1); § 66264.301(c), (d), (f), (g)				Not an ARAR; not pertinent to the removal action at Site 7 since no surface impoundments, land treatment, or onsite landfilling is involved

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Closure of waste pile	At closure, owner shall remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste. If waste is left on-site, perform postclosure care in accordance with the closure and postclosure care requirements that apply to landfills.	Waste pile used to store hazardous waste	Cal. Code Regs. tit. 22, § 66264.258(a) and (b) except references to procedural requirements	4			Substantive provisions are potentially applicable, for waste that has been determined to be RCRA hazardous waste, to Area 1 under Alternative 4; soil sampling will be conducted following excavation of Area 1. Hazardous waste determination will be made at the time of generation
CAMU	An area at an RCRA facility may be designated as a CAMU. Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes nor creation of a unit subject to minimum technology requirements or LDRs.	RCRA CAMU	Cal. Code Regs. tit. 22, § 66264.552(c) and (e)				Not an ARAR. Removal action will not involve creation of a CAMU

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Incineration	Waste analysis, pretreatment, operating, and monitoring requirements and performance standards for hazardous waste incinerators	Facility that incinerates hazardous wastes	Cal. Code Regs tit. 22, § 66264.341, 66264.342, 66264.343, 66264.345, and 66264.347				Not an ARAR; no incineration
Thermal treatment	Establishes requirements for owners and operators of interim status facilities that thermally treat hazardous waste in devices other than those that use flame combustion	RCRA hazardous waste treatment.	Cal. Code Regs. tit. 22, § 66265.370–66265.383				Not an ARAR; no treatment of soil by thermal desorption
Incineration	Owner or operator shall remove all hazardous waste and waste residues from the incinerator site and manage residues as hazardous waste unless they are demonstrated not to be hazardous waste.	Facility that incinerates hazardous waste	Cal. Code Regs. tit. 22, § 66264.351				Not an ARAR; no incineration

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Use of equipment that contacts hazardous waste with organic concentrations greater than 10 percent by weight	Air emission standards for process vents or equipment leaks.	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations that manage hazardous wastes with organic concentrations of at least 10 ppm_w.	Cal. Code Regs tit. 22, § 66264.1030–1034 (excluding 1030[c], 1033[j], 1034[c][2], 1034[d][2]); 66264.1050–1063 (excluding 1050[c], 1050[d], 1057[g][2], 1061[d], 1063[d][3])				Not an ARAR; no hazardous wastes are present with organic concentrations of at least 10 percent by weight
Treatment in a miscellaneous unit	Design and operating standards for unit in which hazardous waste is treated.	Treatment of hazardous waste in a unit	Cal. Code Regs. tit. 22, § 66264.601				Not an ARAR; no treatment in a miscellaneous unit.
Discharge to groundwater from regulated unit	Owners/operators of RCRA surface impoundment, waste pile, land treatment unit, or landfill shall conduct a monitoring and response program for each regulated unit.	Surface impoundment, waste pile, land treatment unit, or landfill for which constituents in or derived from waste in the unit may pose a threat to human health or the environment	Cal. Code Regs tit. 22, § 66264.91(a) and (c), except as it cross-references permit requirements		2,3		Relevant and appropriate to groundwater monitoring. Not an ARAR for the removal action at Area 5 of Site 7 because the source of groundwater contamination will be excavated. Not ARAR to Alternative 4 after clean closure.
Discharge to groundwater from regulated unit	Constituents of concern are the waste constituents, reaction products, and hazardous waste constituents that are reasonably expected to be in or derived from waste contained in the regulated unit.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.93		2,3		Relevant and appropriate to discharge to groundwater and monitoring; not applicable because Site 7 is not a permitted facility.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Discharge to groundwater from regulated unit	For each constituent of concern, the concentration should not exceed the background limit unless it is shown to be technically and economically infeasible to treat to the background level. If the background level is exceeded, then that value should not exceed other applicable regulations.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.94(a)(1) and (3), (c), (d), and (e)		2,3		Relevant and appropriate to discharge to groundwater and monitoring; not applicable because Site 7 is not a permitted facility
Point of compliance	The POC is a vertical surface, located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.95		2,3		Substantive provisions of the POC regulations are potentially relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility and groundwater cleanup is not in the scope of the removal action. The groundwater will be monitored for potential trends or offsite migration of chemicals from Areas 1 and 2 of Site 7. The monitoring results will be compared to historical trends from previous sampling results, which will serve as background levels
Monitoring	Requirements for monitoring groundwater, surface water, and the vadose zone.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.97		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility
	Requirements for a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.98		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Requirements for an evaluation monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit 22, § 66264.99		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility
Corrective action	The owner or operator required to take corrective action under Cal Code Regs tit. 22, § 66264.91 shall take corrective action to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit 22, § 66264 100(a) and (b)		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility Not an ARAR for the removal action at Area 5 of Site 7 because the source of groundwater contamination will be excavated. Not ARAR to Alternative 4 after clean closure.
	The owner or operator shall implement corrective action measures that ensure that constituents of concern achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions of the affected zone that extend beyond the facility boundary, by removing the waste constituents or treating them in place. The owner or operator shall take other action to prevent noncompliance due to a continued or subsequent release including, but not limited to, source control.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.100(c)		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility. Not an ARAR for the removal action at Area 5 of Site 7 because the source of groundwater contamination will be excavated. Not ARAR to Alternative 4 after clean closure.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Monitoring	The owner or operator shall establish and implement, in conjunction with the corrective action measures, a water quality monitoring program that will demonstrate the effectiveness of the corrective action program and be effective in determining compliance with the water quality protection standard and in determining the success of the corrective action measures under subsection (c) of this section	Hazardous waste treatment, storage, or disposal facility	Cal. Code Regs. tit. 22, § 66264 100(d)		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility Not an ARAR for the removal action at Area 5 of Site 7 because the source of groundwater contamination will be excavated. Not ARAR to Alternative 4 after clean closure.
Completion of response action	Completion of the corrective action program must be demonstrated to be in compliance with the water quality protection standard based on the results of sampling and analysis for all constituents of concern for a period of 1 year and establish a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs tit. 22, § 66264.100(g)(1) and (3)		2,3		Relevant and appropriate to groundwater monitoring; not applicable because Site 7 is not a permitted facility. Not an ARAR for the removal action at Area 5 of Site 7 because the source of groundwater contamination will be excavated. Not ARAR to Alternative 4 after clean closure.
Military Munitions Rule (40 C.F.R. pt. 266 subpt. M)*							
Military munitions	Standards for transportation and storage of solid waste military munitions and treatment and disposal of waste military munitions.	Management of military munitions.	40 C F.R. § 266.203, 266.205, and 266.206				Not an ARAR; no military munitions at Site 7.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Safe Drinking Water Act (42 U.S.C. § 300[f]–300[j]-26)*							
Injection	The UIC program prohibits injection activities that allow movement of contaminants into underground sources of drinking water that may result in violations of MCLs or adversely affect health.	An approved UIC program is required in states listed under SDWA Section 1422. Class I wells and Class IV wells are the relevant classifications for CERCLA sites. Class I wells are used to inject hazardous waste beneath the lowermost formation that contains a USDW within 0.25 mile of the well.	40 C.F.R § 144 12, excluding the reporting requirements in § 144.12(b) and 144.12(c)(1)				Not an ARAR; no injection of treated or untreated wastes at Site 7.
	The UIC program regulates construction of new Class IV wells and operation and maintenance of existing wells.	Class IV wells are used to inject hazardous or radioactive waste into or above a formation that contains a USDW within 0.25 mile of the well.	40 C.F.R § 144 13				Not an ARAR; no injection of treated or untreated wastes at Site 7.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Injection (continued)	Class IV wells are banned except for reinjection of treated groundwater into the same formation from which it was withdrawn, as part of a CERCLA cleanup or RCRA corrective action		40 C.F.R. § 144.13(c)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	The director of the UIC program in a state may lessen the stringency of 40 C.F.R. § 144.52 construction, operation, and manifesting requirements for a well if injection does not occur into, through, or above a USDW or if the radius of endangering influence is less than or equal to the radius of the well		40 C.F.R. § 144.16				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Prepare, maintain, and comply with plugging and abandonment plan	Class I wells.	40 C.F.R. § 144.28(c), § 144.51(e)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Monitor Class I wells by: • frequent analysis of injection fluid; • continuous monitoring of injection pressure, flow rate, and volume; and • installation and monitoring of groundwater monitoring wells.	Class I wells are used to inject hazardous waste beneath the lowermost formation that contains a USDW within 0.25 mile of the well.	40 C.F.R. § 144.28(g)				Not an ARAR; no injection of treated or untreated wastes at Site 7.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Injection (continued)	Applicants for Class I permits must: • identify all injection wells within the area of review; and • take action as necessary to ensure that such wells are properly sealed, completed, or abandoned to prevent contamination of a USDW.		40 C.F.R. § 144.55 (§ 144.55[b][4] is applicable only for Class III wells)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Criteria for determining whether an aquifer may be determined to be an exempted aquifer include current and future use, yield, and water quality characteristics.		40 C.F.R. § 146.4				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Case and cement all Class I wells to prevent movement of fluids into USDW, taking into consideration well depth, injection pressure, hole size, composition of injected waste, and other factors		40 C.F.R. § 144.28(e)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Conduct appropriate geologic drilling logs and other tests during construction		40 C.F.R. § 146.12(d), excluding the reporting requirements				Not an ARAR; no injection of treated or untreated wastes at Site 7.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Injection (continued)	Injection pressure may not exceed a maximum level designed to ensure that injection does not initiate new fractures or propagate existing ones and cause the movement of fluids into a USDW. Continuously monitor injection pressure, flow rate, and volume, and annual pressure, if required. Demonstration of mechanical integrity is required every 5 years. Groundwater monitoring may also be required.		40 C.F.R. § 146.13(a), (b), (d)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Comply with state underground injection requirements		40 C.F.R. § 147				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Wastes that no longer exhibit a hazardous characteristic are not prohibited if the wastes are disposed into a nonhazardous or hazardous injection well as defined under 40 C.F.R. § 146.6(a).	Characteristically hazardous wastewaters	40 C.F.R. § 148.1(d)				Not an ARAR; no injection of treated or untreated wastes at Site 7
	Hazardous waste to be injected is subject to land ban regulations. Treated groundwater that meets the definition of hazardous waste and is to be injected also is subject to land ban regulations		40 C.F.R. § 268.2				Not an ARAR; no injection of treated or untreated wastes at Site 7.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Toxic Substances Control Act (15 U.S.C. §§ 2601–2692)*							
Marking of PCBs	The following must be marked as designated in 40 C.F.R. § 761.45: PCB containers containing greater than 50 ppm PCBs, PCB articles (see 40 C.F.R. § 761.45), PCB article containers, storage areas used to store PCBs, and PCB items for disposal All marks must be on the exterior of PCB container and must be clearly visible	PCB article described in 40 C.F.R. § 761.45.	40 C.F.R. § 761.40				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
Disposal of PCBs	Provides expanded decontamination procedures and disposal options for PCBs. Ensures consistency with RCRA land disposal restriction.	Remedial actions involving PCBs.	40 C.F.R. § 761.50				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
	Nonliquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil, rags, or other debris shall be disposed in a TSCA-approved incinerator or in a TSCA-approved chemical waste landfill or by a TSCA-approved alternative disposal method		40 C.F.R. § 761.60(e)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Disposal of PCBs	All PCB articles or containers must be removed and disposed within 1 year of storage.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater	40 C.F.R. § 761.65(a)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
PCB storage on-site prior to disposal	Storage facilities must be constructed with adequate roof and walls; with a floor and curb of impervious materials; without drain valves, floor drains, expansion joints, sewer lines, or other openings; and above the 100-year floodwater level	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. 761.65(b)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm
	Temporary storage (30 days or less) need not comply with above storage regulations for the following items: PCB articles and equipment that are nonleaking; leaking articles and equipment placed in nonleaking containers; PCB containers containing nonliquid PCBs, such as soil, rags, and debris; or liquid PCBs between 50 to 500 ppm if covered by spill prevention, control, and countermeasure plan	Temporary storage of PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(c), except § 761.65(c)(9)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
PCB storage on-site prior to disposal (continued)	All storage areas must be properly marked	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(c)(3)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
	No item of movable equipment used to handle PCBs that comes in contact with PCBs shall be moved from the storage area unless it has been decontaminated as specified in 40 C.F.R. § 761.79.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater	40 C.F.R. § 761.65(c)(4)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
	All stored articles must be checked for leaks every 30 days.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(c)(7)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
	Containers must be dated when they are placed in storage.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(c)(8)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Cleanup of PCB spills	Cleanup of PCBs to different levels depending upon spill location, potential exposure to residual PCBs after cleanup, concentrations originally spilled, and the nature and size of the population potentially exposed.	Spills of PCBs that occur after 04 May 1987 and result from release of materials containing PCBs at concentrations of 50 ppm or greater.	40 C.F.R. § 761.120; 761.123; 761.125 except 125(a)(1), 125(b)(3), and record-keeping requirements in 125(c) such as 125(c)(1)(iii), 125(c)(5); 761.130; 761.135				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm.
	Additional cleanup may be required to prevent unreasonable risk to human health and the environment.	Spills at sites warranting additional cleanup due to human-health risk, shallow groundwater, or other factors.	40 C.F.R. § 761.120(b)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm
	For low-concentration spills (less than 500 ppm PCBs), solid surfaces should be double-washed/rinsed and all soil within the spill area, plus a 1-foot buffer, should be excavated, and the ground restored to its original configuration by backfilling with clean soil (containing less than 1 ppm PCBs).	Low-concentration spill that involves less than 1 pound PCBs by weight.	40 C.F.R. § 761.125(b)(1)				Not an ARAR; there is no PCB contamination at Site 7 exceeding 50 ppm

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Clean Air Act (42 U.S.C. §§ 7401–7671)*							
Discharge to air	Provisions of SIP approved by U.S. EPA under Section 110 of CAA	Major sources of air pollutants	40 U.S.C § 7410; portions of 40 C.F.R § 52.220				Not an ARAR; no major sources of air pollutants.
	NAAQS – primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead)	Contamination of air affecting public health and welfare	40 C.F.R § 50.4–50.12				Not an ARAR. Federal NAAQS are nonenforceable standards.
	Requires distribution of a public notice to each address within a 0.25-mile radius of the project for any significant project	Definition of significant projects.	SCAQMD Rule 212				Not an ARAR; the Site 7 removal action does not qualify as a significant project.
Discharge of any nonattainment air contaminant or any halogenated hydrocarbons	All new sources of air pollution that may result in a net emission increase of any nonattainment air contaminant or any halogenated hydrocarbons are to employ BACT	Net emissions increase of any nonattainment air contaminant or any halogenated hydrocarbons.	SCAQMD Rule 1303				Not an ARAR; no major sources of air pollutants
Discharge to air	Analysis of impairment to visibility, soils, and vegetation using U.S. EPA methods required. Must provide analysis of ambient air quality if located in attainment or unclassifiable area and other information required for analysis.	Source requires authority to construct under Rule 10, and the daily emissions increase, calculated using Rule 20.1(c)(4), is at or greater than listed amounts for pollutants in designated attainment or unclassified area	SDAPCD Rule 20.3(c) and (e)(1) and (2), excluding references to procedural or permit requirements				Not an ARAR; no major sources of air pollutants

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Discharge to air (continued)	Must not exceed or contribute to an exceeded NAAQS	New major source of organic compounds or any air contaminant.	SDAPCD Rule 20.4(a)(1), excluding references to procedural or permit requirements				Not an ARAR; no major sources of air pollutants.
	Applicant must certify that all major stationary sources owned or operated by such person in the state are in compliance, carry out the SIP for applicable pollutant, make the new source comply with LAER, conduct air quality analysis in accordance with Rule 20.3, and show that these sources do not interfere with attainment of NAAQS	Any source for which an NAAQS is exceeded	SDAPCD Rule 20.4(b)(1), (2), (3), and (4), excluding references to procedural or permit requirements				Not an ARAR; no major sources of air pollutants.
	Applicant must submit alternative site analysis to demonstrate that benefits outweigh environmental and social costs.	New stationary source may emit carbon gases, nitrogen oxides, or carbon monoxide.	SDAPCD Rule 20.4(b)(7)				Not an ARAR; no major sources of air pollutants.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 -- Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Federal Hazardous Materials Transportation Law (49 U.S.C. §§ 5101–5127)*							
Transportation of hazardous material	No person shall represent that a container or package is safe unless it meets the requirements of 49 U.S.C. §§ 5101–5127	Interstate carriers transporting hazardous waste and substances by motor vehicle. Transportation of hazardous material under contract with any department of the executive branch of the federal government	49 C.F.R. § 171.2(f)		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
	No person shall unlawfully alter or deface labels, placards or descriptions, packages, containers, or motor vehicles used for transportation of hazardous materials.		49 C.F.R. § 171.2(g)		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Hazardous materials marking, labeling, and placarding	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 C.F.R. § 172.300		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
	Each person offering nonbulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee's name and address		49 C.F.R. § 172.301		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
Hazardous materials marking, labeling, and placarding (continued)	Hazardous materials for transportation in bulk packages must be labeled with proper ID number, specified in 49 C.F.R. § 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.		49 C.F.R. § 172.302		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
	No package marked with a proper shipping name or ID number may be offered for transport or transported unless the package contains the identified hazardous material or its residue		49 C.F.R. § 172.303		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Hazardous materials marking, labeling, and placarding (continued)	The markings must be durable, in English, in contrasting colors, unobscured, and away from other markings.		49 C.F.R § 172.304		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
	Nonbulk combination packages containing liquid hazardous materials must be packed with closures upward, and marked with arrows pointing upward.		49 C.F.R. § 172.312		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements
Hazardous materials marking, labeling, and placarding (continued)	Labeling of hazardous material packages shall be as specified in the list.		49 C.F.R. § 172.400		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.
	Each bulk packaging or transport vehicle containing any quantity of hazardous material must be placarded on each side and each end with the type of placards listed in Tables 1 and 2 of 49 C.F.R. § 172.504.	Each person who offers for transport or transports any hazardous materials shall comply with these placarding requirements	49 C.F.R § 172.504		2,3,4		Substantive portions of these requirements would be relevant and appropriate for transport of hazardous materials on-site. Off-site transport must comply with both substantive and administrative requirements.

(table continues)

Table A4-1 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Solid waste disposal facility	A facility or practice shall not: contaminate an underground drinking water source beyond the solid waste boundary or a court- or state-established alternative; cause a discharge of pollutants into waters of the United States that is in violation of the substantive requirements of the NPDES under CWA Section 402, as amended; cause a discharge of dredged material or fill material to waters of the United States that is in violation of the substantive requirements of CWA Section 404; or cause nonpoint source pollution of waters of the United States that violates applicable legal substantive requirements implementing an areawide or statewide water quality management plan approved by the Administrator under CWA Section 208, as amended.	Solid waste disposal facility and practices except agricultural wastes, overburden resulting from mining operations, land application of domestic sewage, location and operations of septic tanks, solid or dissolved materials in irrigation return flows, industrial discharges that are point sources subject to permits under CWA, source special nuclear or by-product material as defined by the Atomic Energy Act, hazardous waste disposal facilities that are subject to regulation under RCRA subtitle C, disposal of solid waste by underground well injection, and municipal solid waste landfill units	40 C.F.R. § 257.3–257.4 and Appendix I				Not an ARAR; groundwater beneath Site 7 is not a designated drinking water source. Additionally, there will be no on-site disposal of solid waste

(table continues)

Table A4-1 (continued)

Note:

* statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs

Acronyms/Abbreviations:

A – applicable
AQMD – Air Quality Management District
ARAR – applicable or relevant and appropriate requirement
BACT – best available control technology
BDAT – best demonstrated available technology
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
CAMU – corrective action management unit
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
CWA – Clean Water Act
DON – Department of the Navy
DOT – Department of Transportation
EE/CA – Engineering Evaluation/Cost Analysis
FS – feasibility study
IR – Installation Restoration (Program)
LAER – lowest achievable emission rate
LDR – land disposal restriction
MCAS – Marine Corps Air Station
MCL – maximum contaminant level
NAAQS – National Ambient Air Quality Standards (primary and secondary)
NPDES – National Pollutant Discharge Elimination System
OU – operable unit
PCB – polychlorinated biphenyl
POC – point of compliance
ppm – parts per million
ppm_w – parts per million by weight
RA – relevant and appropriate
RAO – remedial action objective
RCRA – Resource Conservation and Recovery Act
RI – remedial investigation
§ – section
SCAQMD – South Coast Air Quality Management District

(table continues)

Table A4-1 (continued)

Acronyms/Abbreviations: (continued)
SDAPCD – San Diego Air Pollution Control District
SDWA – Safe Drinking Water Act
SIP – State Implementation Plan
subpt. – subpart
TBC – to be considered
TCE – trichloroethene
tit. – title
TSCA – Toxic Substances Control Act
UIC – underground injection control
U.S.C. – *United States Code*
USDW – underground source of drinking water
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table A4-2
Potential State and Local Action-Specific ARARs

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
State Water Resources Control Board and Regional Water Quality Control Board*							
Actions affecting water quality	Authorizes the SWRCB and RWQCB to establish in Water Quality Control Plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality. Authorizes regional water boards to issue permits for discharges to land or surface water or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality		Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), and 13360 (Porter-Cologne Water Quality Control Act); other provisions are not ARARs	2,3,4			Substantive provisions of §§ 13241, 13243, 13263(a), and 13360 as implemented through the beneficial uses, water quality objectives, and waste discharge requirements of the Water Quality Control Plan for the Santa Ana River basin are applicable for this action. This includes substantive requirements contained in permits, but not the permits themselves.
Actions affecting water quality (continued)	Describes the water basins in the Santa Ana region, establishes beneficial uses of surface water and groundwater, establishes water quality objectives, including narrative and numerical standards, establishes implementation plans to meet water quality objectives and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Comprehensive Water Quality Control Plan for the Santa Ana Region	2,3,4			Applicable for Chapters 3, 4, and 5. The removal action at Site 7 may involve discharge of water from the dewatering of excavation.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
State Water Resources Control Board and Regional Water Quality Control Board*							
Discharges to high-quality waters	Incorporated into all Regional Board Basin Plans. Requires that quality of waters of the state that is better than needed to protect all beneficial uses be maintained unless certain findings are made. Discharges to high quality waters must be treated using best practicable treatment or control necessary to prevent pollution or nuisance and to maintain the highest quality water. Requires cleanup to background water quality or to lowest concentrations technically and economically feasible to achieve Beneficial uses must, at least, be protected.		SWRCB Res. 68-16 (Policy With Respect to Maintaining High Quality of Waters in California) (Cal. Water Code § 13140, CWA regulations 40 C.F.R. § 131.12)	2,3,4			Applicable to discharge from dewatering of excavation; not an ARAR for the migration of contaminated or polluted water. However, the state does not agree with the DON position regarding the non-applicability to groundwater. See Section A2.2.1.2 for a complete discussion

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Actions affecting water quality	Provides water quality criteria for classifying the beneficial use of groundwater as municipal/domestic Criteria outlined as follows: total dissolved solids ≤ 3,000 mg/L or yielding 200 gallons per day or serving as a public water system.	Applies in determining beneficial uses for waters that may be affected by discharges of waste.	SWRCB Res. 88-63 ("Sources of Drinking Water Policy") (as contained in the Basin Plans)				State identified as a location-specific ARAR; see Table A3-2.
	Establishes policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste which affect or threaten water quality. Requires cleanup of all waste discharged and restoration of affected water to background conditions. Requires actions for cleanup and abatement to conform to Res. 68-16 and applicable provisions of Cal. Code Regs. tit. 23, div. 3, ch. 15 as feasible.	Cleanup and discharge of groundwater to groundwater or surface water and establishment of containment zones.	SWRCB Res. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304) (Cal. Water Code § 13307) (02 October 1996)				Not an ARAR, not more stringent than Cal. Code Reg. Tit. 22, §66264.94 (see Table A4-1).

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Discharge to ocean	Describes policy for protection of ocean water quality. Includes beneficial use designations, water quality objectives, general requirements, compliance criteria, and discharge prohibitions. All discharges to the ocean must comply with criteria set forth in the Ocean Plan.	Plan is applicable to point source discharges to the ocean and nonpoint sources of waste discharge. Plan provides water quality objectives for receiving waters. Plan does not apply to discharges to enclosed bays and estuaries.	SWRCB Res 97-026, California Ocean Plan (23 July 1997), policy set forth in Cal Water Code, div. 7, §§ 13000, 13170, and 13170.2			2,3,4	Not an ARAR; standards are no more restrictive than the FAWQC. However, since the removal action at Site 7 may involve discharge of water from dewatering of excavation, these regulations may be TBCs.
Discharge to inland surface waters	Establishes concentration levels for volatile organic constituents and TPH for discharge to inland surface waters designated for municipal supply and complies with the Basin Plan and RWQCB Res 68-16		San Diego RWQCB Order No. 91-10				Not an ARAR; DON and the State did not identify as an ARAR No discharge to inland surface waters designated for municipal supply during the Site 7 removal action.
State Water Resources Control Board and Regional Water Quality Control Board*							
Closure of waste management unit	Prior to closure, inactive waste management units must comply with the substantive requirements for eliminating most nonstormwater discharges, developing and implementing a stormwater pollution prevention plan, and performing monitoring of stormwater discharges		SWRCB Order No. 91-13-DWQ, as amended by Order No. 92-12-DWQ (General Industrial Storm Water Permit)			2,3,4	Not a potential ARAR; DON and the State did not identify as an ARAR Permits are not required under CERCLA (see end of Section A2.2.1.2). However, Substantive provisions may be considered TBC guidance for complying with ARARs (such as BPT/BAT and WQOs) and beneficial uses

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Closure of waste management unit	Regulates pollutants in discharge of storm water associated with hazardous waste treatment, storage, and disposal facilities, wastewater treatment plants, landfills, land application sites and open dumps. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards. Regulates pollutants in discharge of storm water associated with construction activity (clearing, grading, or excavation) involving the disturbance of 5 acres or more. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.		40 CFR Parts 122, 123, 124, NPDES, implemented by SWRCB Order No. 97-03-DWQ (California Storm Water Permit for Industrial Activities)			2,3,4	TBC for stormwater discharge; stormwater management to be implemented during construction.
Landfill closure	Requires the analysis of material to be performed in a state-certified laboratory		Cal. Water Code §13176	2,3,4			Applicable to waste classification of excavated soil
Landfill closure	Requires submission of information regarding waste discharges and states that requirements shall be placed to implement water quality control plans. Technical or monitoring reports may be required for investigation of water quality. Provides for penalties for non-compliance.		Cal. Water Code, Chapter 4, Article 4		2,3,4		Substantive provisions may be relevant and appropriate for the removal action at Site 7.
Landfill closure	Requires cleanup and abatement of conditions of pollution or nuisance or threatened pollution or nuisance.		Cal. Water Code, Chapter 5, Article 1		2,3,4		Substantive provisions may be relevant and appropriate for the removal action at Site 7.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Monitoring	Specifies requirements for water wells, monitoring wells, and cathodic protection wells.		Cal. Water Code, Chapter 10, Article 3		2,3		Substantive provisions may be relevant and appropriate for Alternatives 2 and 3, but not Alternative 4 which is clean closure.
Monitoring	Establishes water quality objectives, including narrative and numerical standards, that protect the beneficial uses of surface waters and groundwater in the Region Describes control measures designed to ensure compliance with state plans and policies and provide comprehensive water quality planning Includes implementation actions for setting soil cleanup levels for soils that threaten water quality.		Cal. Water Code §§ 13240, 13241, 13242, 13243				Not an ARAR; DON and the State did not identify as an ARAR.
Closure of waste management unit (continued)	Waste management units that are going through final closure, with 5 acres of disturbance or more, must comply with the substantive requirements for eliminating most nonstormwater discharges, developing and implementing a stormwater pollution prevention plan, and performing monitoring to stormwater discharges		SWRCB Order No. 92-08-DWQ (General Construction Activity Storm Water Permit)				Not an ARAR; DON and the State did not identify as an ARAR Permits are not required under CERCLA (see end of Section A2 2.1 2). However, Substantive provisions may be considered TBC guidance for complying with ARARs (such as BPT/BAT and WQOs) and beneficial uses.
Waste piles	Resolution conditionally waiving adoption of waste discharge requirements for temporary discharge of contaminated soils to waste piles Provision for 90-day waiver for stockpiling of nonhazardous soil	Nonhazardous waste stockpiling.	San Diego RWQCB Res 95-96				Not an ARAR; DON and the State did not identify as an ARAR. Site 7 is not located in the San Diego Region

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Landfill closure	Establishes general waste discharge requirements for postclosure maintenance of inactive nonhazardous waste landfills within the San Diego Region.	Nonhazardous waste landfills within the San Diego Region.	San Diego RWQCB Order No. 97-11 (general waste discharge requirements for inactive landfills)				Not an ARAR; DON and the State did not identify as an ARAR. Site 7 is not located in the San Diego Region
Discharge to surface waters	Establishes numerical water quality objectives for the protection of human health and freshwater aquatic life for a large number of toxic pollutants. It also establishes narrative objectives and toxicity objectives. It provides a program of implementation and specifies proposals to adopt numerical standards for water bodies that are dominated by reclaimed water and agricultural drainage.	Discharge to surface waters, enclosed bays, and estuaries.	Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan)				Not an ARAR; DON and the State did not identify as an ARAR.
	Establishes prohibitions on discharges to cold interstate waters and maximum temperature changes to other waters to protect natural receiving water temperatures; includes site-specific temperature objectives for certain water bodies	Discharge to surface waters, enclosed bays, and estuaries	Cal. Water Code §§ 13140, 13142.5 (Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California)				Not an ARAR; DON and the State did not identify as an ARAR.

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop. 65)*							
Discharge to drinking water source	Prohibits discharge of known human carcinogens or reproductive toxins to source of drinking water or on land where it could pass into a source of drinking water Chemicals and applicable regulatory levels are listed in Cal Code Regs. tit 22, § 12000–14000	Discharge of known human carcinogens or reproductive toxins	Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65), Cal. Health & Safety Code, div. 20, § 25249.5–.13				Not an ARAR; DON and the State did not identify as an ARAR See Section A2.2.1.2 for discussion
California Environmental Quality Act*							
Actions by state	Requires analysis of environmental impacts of response actions, comparison of alternative actions, and implementation of appropriate mitigation measures. No hazardous substances may remain on-site unless further mitigation is not feasible.	State actions	CEQA, California Pub. Res. Code §§ 21100–21178, 15000, and 15002				Not an ARAR; DON and the State did not identify as an ARAR. Requirements of CEQA are applicable to state actions and not those of the federal government. The CERCLA process fulfills these requirements. See Section A1 for more discussion.
California Underground Storage Tank Program*							
Corrective action for underground tanks	Regulates permitting and testing of underground tanks and specifies requirements for corrective action of discharges from tanks.	Underground tank	Cal. Code Regs tit. 23, div 3, ch. 16 (underground tank regulations)				Not an ARAR; DON and the State did not identify as an ARAR. No underground tanks involved with the Site 7 removal action.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Corrective action for aboveground tanks	Regulates use and discharges from aboveground petroleum tanks, including testing and corrective action requirements	Aboveground petroleum tank	Cal. Health & Safety Code, div. 20, ch 6.6.7, § 25270–25270 13 (Aboveground Petroleum Storage Act)				Not an ARAR; DON and the State did not identify as an ARAR No aboveground petroleum tanks involved with the Site 7 removal action
Action at solid waste disposal site	Authorizes the RWQCB to implement the SWAT program with respect to water quality The purpose of the SWAT program is to identify solid waste disposal sites that may be leaking hazardous wastes and threatening water quality.	Solid waste disposal site	Cal. Water Code § 13273 (SWAT program)				Not an ARAR; DON and the State did not identify as an ARAR.
Toxic Pits Cleanup Act*							
Action at surface impoundment	Authorizes the RWQCB to regulate surface impoundments containing hazardous waste, as defined in Cal. Code Regs. tit. 22 Prohibits discharges to such surface impoundments unless they meet specified siting and design requirements Requires compliance with specific investigation, remediation, and reporting requirements.	Surface impoundment	Cal Health & Safety Code § 25208 (Toxic Pits Cleanup Act)				Not an ARAR; DON and the State did not identify as an ARAR. No surface impoundment involved with the Site 7 removal action.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
State Water Resources Control Board*							
Landfill capping	Alternatives to construction or prescriptive standards	Cal. Code Regs. tit. 27 requirements are only applicable for waste discharged after 18 July 1997 unless otherwise noted	Cal. Code Regs. tit. 27, §21090		2,3		Not applicable because wastes discharged at Site 7 before 18 July 1997. Relevant and appropriate for Alternatives 2 and 3 for landfill capping.
Monitoring	Persons responsible for discharges at units that were closed, abandoned, or inactive on or before 27 November 1984 may be required to develop and implement a monitoring program in accordance with subdiv. 1, subch. 3, art. 1, (Cal. Code Regs. tit 27, §§ 20380–20435).	Closed, inactive, or abandoned waste management unit before 27 November 1984.	Cal. Code Regs. tit. 27, § 20080(g)		2,3		Substantive provisions may be relevant and appropriate for Alternatives 2 and 3, but not Alternative 4 which is clean closure; Site 7 stopped receiving wastes around 1973
Disposal of waste	Requires that designated waste as defined at Cal. Water Code § 13173 be discharged to Class I or Class II waste management units.	Discharges of designated waste after 18 July 1997 (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment, storage, or disposal	Cal. Code Regs. tit. 27, § 20210	2,3,4			Potentially applicable for designated waste discharged to land for storage or disposal
Disposal of waste	Requires that non-hazardous solid waste be discharged to a classified waste management unit.	Discharge of nonhazardous solid waste after 18 July 1997 to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20220	2,3,4			Potentially applicable for non-hazardous waste discharged to land from storage or disposal.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.
1 – No action; 2 – Capping; 3 -- Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Disposal of waste	Requires that nonhazardous solid waste as defined at § 20220(a) be discharged to a classified waste management unit.	Discharge of nonhazardous solid waste after 18 July 1997 to land for treatment, storage, or disposal.	Cal. Code Regs tit 27, § 20200(c)	2,3,4			Potentially applicable for designated waste discharged to land for storage or disposal
Disposal of waste	Inert waste as defined at § 20230(a) need not be discharged at a classified unit.	Applies to discharges of inert waste to land after 18 July 1997 for treatment, storage, or disposal.	Cal. Code Regs tit 27, § 20230	2,3,4			Potentially applicable for waste classified as inert wastes; applies to discharges to land for storage or disposal.
Landfill capping	General construction criteria and general criteria for containment structures.	Waste discharged after 18 July 1997	Cal. Code Regs. tit. 27, §§ 20310 and 20320		2		Substantive provisions may be relevant and appropriate for the removal action at Site 7
Closure of a waste management unit	General closure and postclosure maintenance standards	Waste discharged after 18 July 1997.	Cal. Code Regs. tit. 27, § 20950(a), (d), and (e)		2,3		Substantive provisions may be relevant and appropriate for Alternatives 2 and 3, but not an ARAR for Alternative 4 since that is a clean closure
Landfill closure	Classified waste management units shall be closed in accordance with an approved closure and postclosure maintenance plan, which provides for continued compliance with the applicable standards for waste containment and precipitation and drainage controls and monitoring requirements.	Waste discharged after 18 July 1997.	Cal. Code Regs tit 27, § 21769		2, 3		Substantive provisions may be relevant and appropriate for Alternatives 2 and 3, but not an ARAR for Alternative 4 since that is a clean closure

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Landfill closure	Actions taken by public agencies to cleanup unauthorized releases are exempt from Title 27, except wastes removed from immediate place of release and discharged to land must be managed in accordance with classification (Title 27, CCR, Section 20200) and wastes contained or left in place must comply with Title 27 to the extent feasible.		Cal. Code Regs. tit. 27, § 20090(d)		2,3,4		Substantive provisions may be relevant and appropriate for the removal action at Site 7.
Landfill closure	General closure requirements, including continued maintenance of waste containment, drainage controls, and groundwater monitoring throughout the closure and post-closure maintenance periods.		Cal. Code Regs tit. 27, § 20950, 22207(a), 22212(a), and 22222		2,3,4		Substantive provisions may be relevant and appropriate for the removal action at Site 7.
Monitoring	Specifies water quality monitoring and response programs for waste management units. Requires establishment of concentration limits for groundwater, surface water, and the unsaturated zone. Monitoring points and POC shall be specified in the requirements.		Cal. Code Regs. tit. 27, division 2, chapter 3				Substantive provisions may be ARARs. ARAR determination for specific citations are identified above

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Landfill closure	Establishes waste and siting classification systems and minimum waste management standards for discharges of waste to land for treatment, storage, and disposal. Engineered alternatives that are consistent with Title 27 performance goals may be considered. Establishes corrective action requirements for responding to leaks and other unauthorized discharges.		Cal. Code Regs. tit. 27, division 2, subdivision 1				Substantive provisions may be ARARs. ARAR determination for specific citations are identified above.
Monitoring	Requires detection monitoring. Once a significant release has occurred, evaluation or corrective action monitoring is required.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20385(a)(1) and (a)(2)				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.91(a) and (c) which is identified as an ARAR (see Table A4-1).
Groundwater monitoring	Requires establishment of a water quality protection standard consisting of a list of constituents of concern, concentration limits, compliance monitoring points, and all monitoring points. This section further specifies the time period during which the standard shall apply.		Cal. Code Regs. tit. 27, § 20390		2,3,4		Substantive provisions may be relevant and appropriate for the removal action at Site 7.
Groundwater monitoring	Requires the development of a list of constituents of concern which includes all waste constituents, that are reasonably expected to be present in the soil from discharges to land, and could adversely affect water quality.		Cal. Code Regs. tit. 27, § 20395				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.93 which is identified as an ARAR (see Table A4-1)

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Groundwater monitoring	Cleanup levels must be set at background concentration levels, or, if background levels are not technologically and economically feasible. Specific factors must be considered in setting cleanup levels Cleanup levels above background levels shall be evaluated every five years. If the actual concentration of a constituent is lower than its associated cleanup level, the cleanup level shall be lowered to reflect existing water quality.		Cal. Code Regs tit 27, § 20400				Not an ARAR; not more stringent than Cal Code Regs. tit. 22, § 66264.94 (a)(1) and (3), (c), (d), and (e) which are identified as an ARAR (see Table A4-1).
Groundwater cleanup	Requires identification of the point of compliance, hydraulically downgradient from the area where waste was discharged to land.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs tit 27, § 20405				Not an ARAR; not more stringent than Cal. Code Regs tit. 22, § 66264.95 which is identified as an ARAR (see Table A4-1).
Monitoring	Requires monitoring for compliance with remedial action objectives for 3 years from the date of achieving cleanup levels.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit 27, § 20410		2, 3		Relevant and appropriate for Alternatives 2 and 3, but not an ARAR for Alternative 4 since that is a clean closure.
	Requires general soil, surface water, and groundwater monitoring.	Discharge of waste to land after 18 July 1997	Cal. Code Regs tit 27, § 20415				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.97 which is identified as an ARAR (see Table A4-1).

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Groundwater monitoring	Provides minimum requirements for a groundwater detection monitoring program.	Discharge of waste to land after 18 July 1997	Cal. Code Regs. tit. 27, § 20420				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.98 which is identified as an ARAR (see Table A4-1)
	Requires evaluation monitoring once a significant release is detected.	Discharge of waste to land after 18 July 1997	Cal. Code Regs tit. 27, § 20425				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.99 which is identified as an ARAR (see Table A4-1).
Corrective action	Requires implementation of corrective action measures that ensure that cleanup levels are achieved throughout the zone affected by the release by removing the waste constituents or treating them in place. Source control may be required. Also requires monitoring to determine the effectiveness of the corrective actions	Discharge of waste to land after 18 July 1997.	Cal. Code Regs tit. 27, § 20430 except § 20430(g)(2)				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.100 which is identified as an ARAR (see Table A4-1).
	Requires demonstration of completion of the corrective action to include eight evenly distributed sampling events throughout the year.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20430(g)(2)				Not an ARAR; not more stringent than Cal. Code Regs. tit. 22, § 66264.100(g) which is identified as an ARAR (see Table A4-1).
Groundwater monitoring	Provides requirements for unsaturated zone monitoring.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20435				Not applicable since waste was not discharged after 1997; not relevant and appropriate since unsaturated zone monitoring is not in the scope of the removal action

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Clean closure	When the discharger has successfully completed clean closure, the landfill shall no longer be subject to the SWRCB-promulgated requirements of this title; otherwise, the discharger shall close the landfill and carry out postclosure maintenance as though the discharger had not attempted clean closure. For the purpose of this paragraph, the discharger shall have successfully clean-closed a landfill only if all waste materials, contaminated components of the containment system, and affected geologic materials—including soils and rock beneath and surrounding the unit and groundwater polluted by a release from the unit—are either removed and discharged to an appropriate unit or treated to the extent that they no longer pose a threat to water quality; and all remaining containment features are inspected for contamination and, if contaminated, discharged in accordance with para. (f)(1)		Cal. Code Regs. tit. 27, § 21090(f)		4		Not applicable because wastes discharged at Site 7 before 18 July 1997. Relevant and appropriate for Alternative 4 for excavation and offsite disposal
Monitoring	Detection monitoring program may be required at CAI sites before the effective date of these requirements.	CAI site before 27 November 1984.	Cal. Code Regs. tit. 23, § 2510(g)				Not an ARAR; DON and the State did not identify as an ARAR

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Detection monitoring	Detection monitoring program	Cal Code Regs. tit. 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs. tit. 23, § 2550.8				Not an ARAR; DON and the State did not identify as an ARAR Not more stringent than Cal. Code Regs. tit. 22, § 66264.98 which is identified as an ARAR (see Table A4-1).
Evaluation monitoring	Evaluation monitoring program	Cal Code Regs. tit 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs tit. 23, § 2550.9				Not an ARAR; DON and the State did not identify as an ARAR. Not more stringent than Cal. Code Regs. tit 22, § 66264.99 which is identified as an ARAR (see Table A4-1)
Monitoring	Corrective action monitoring.	Cal. Code Regs tit 23 requirements are only applicable to waste discharges to land after 27 November 1984	Cal. Code Regs tit 23, § 2550.10				Not an ARAR; DON and the State did not identify as an ARAR. Not more stringent than Cal. Code Regs. tit 22, § 66264.100 which is identified as an ARAR (see Table A4-1).
Groundwater cleanup	Point of compliance	Cal. Code Regs tit 23 requirements are only applicable to waste discharges to land after 27 November 1984	Cal. Code Regs tit 23, § 2550.5				Not an ARAR; DON and the State did not identify as an ARAR. Not more stringent than Cal. Code Regs. tit 22, § 66264.95 which is identified as an ARAR (see Table A4-1)

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Cal-EPA Department of Toxic Substances Control*							
CAMU	Media impacted by RCRA hazardous waste must be considered for corrective action regardless of the date of original impact.	Consolidated hazardous waste.	Cal. Code Regs tit. 22, § 66264.101(a)				Not an ARAR; DON and the State did not identify as an ARAR.
CAMU (continued)	Corrective action, where appropriate, must be performed not only at the facility, but also beyond the facility boundary.	Consolidated hazardous waste	Cal. Code Regs. tit. 22, § 66264.101(c)				Not an ARAR; DON and the State did not identify as an ARAR
Disposal of non-RCRA waste	Land disposal restrictions for non-RCRA, California-regulated hazardous waste.	Non-RCRA, California-regulated hazardous waste disposal.	Cal. Code Regs. tit. 22, § 66268.105				Not an ARAR; DON and the State did not identify as an ARAR.
California Civil Code*							
Land-use controls	Provides conditions under which land-use restrictions will apply to successive owners of land.	Transfer property from the DON to a nonfederal agency.	Cal. Civ. Code § 1471				Not an ARAR; DON and the State did not identify as an ARAR Site 7 will not be transferred to a nonfederal agency.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
California Health and Safety Code*							
Land-use controls	Allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses.	Transfer property from the DON to a nonfederal agency	Cal. Health & Safety Code § 25202.5				Not an ARAR; DON and the State did not identify as an ARAR. Site 7 will not be transferred to a nonfederal agency
	Provides a streamlined process to be used to enter into an agreement to restrict specific use of property in order to implement the substantive use restrictions of Cal. Health & Safety Code § 25232(b)(1)(A)–(E)	Transfer property from the DON to a nonfederal agency	Cal. Health & Safety Code § 25222.1				Not an ARAR; DON and the State did not identify as an ARAR. Site 7 will not be transferred to a nonfederal agency
Land-use controls (continued)	Prohibits certain uses of land containing hazardous waste without a specific variance	Hazardous waste property	Cal. Health & Safety Code § 25232(b)(1)(A)–(E)				Not an ARAR; DON and the State did not identify as an ARAR.
	Provides a process for obtaining a written variance from a land-use restriction.	Transfer property from the DON to a nonfederal agency	Cal. Health & Safety Code § 25233(c)				Not an ARAR; DON and the State did not identify as an ARAR. Site 7 will not be transferred to a nonfederal agency

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emissions	No person shall discharge from any source whatsoever such quantities of air contaminants or other material that causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endangers the comfort, repose, health, or safety of any such persons or the public, or that causes, or has a natural tendency to cause, injury or damage to business or property	Air emissions	Cal. Health & Safety Code § 41700				Not an ARAR; DON and the State did not identify as an ARAR See Section A4.5.2.1 for the DON's position on similar regulations of nuisance air emissions.
	No person shall discharge into the atmosphere from any source whatsoever any air contaminant, other than uncombined water vapor, for a period or periods aggregating more than 3 minutes in any 1 hour that is as dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the United States Bureau of Mines, or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke.	Air emissions	Cal. Health & Safety Code § 41701				Not an ARAR; DON and the State did not identify as an ARAR.
Waste disposal	Wastes that contain total lead in excess of 350 ppm, copper in excess of 2,500 ppm, or nickel in excess of 200 ppm must be disposed in a Class I landfill.	Waste containing total lead, copper, or nickel in excess of specified levels.	Cal. Health & Safety Code § 25157.8				Not an ARAR; DON and the State did not identify as an ARAR. Waste containing total lead, copper, or nickel, are not in excess of specified levels.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
California Fish and Game Code*							
Species conservation and enhancement	Conservation objectives and policy.		Cal. Fish & Game Code § 2014		2,3,4		Relevant and appropriate; the DON will coordinate with USFWS for the removal action.
Actions affecting wildlife resource	Requires streambed alterations to not substantially adversely affect an existing fish or wildlife resource	Waters of the state	Cal. Fish & Game Code §§ 1601 and 1603				Not an ARAR; no streambed alterations in the scope of the Site 7 removal action.
Actions impacting endangered species	Projects within the state shall not jeopardize the existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with preserving the species or its habitat that would prevent jeopardy	Endangered or threatened species.	Cal. Fish & Game Code §§ 2080 and 2090 - 2096		2,3,4	2,3,4	Potentially relevant and appropriate; Federally-and State-listed endangered species are known to inhabit NAVWPNSTA Seal Beach, the Seal Beach NWR, and its associated wetlands. The results of past ecological assessments indicate there is no threat to endangered species from biota, soil, and sediment at Site 7. However, Federally- and State-listed endangered species probably use Site 7 to some extent; the DON will coordinate with USFWS for the removal action. The removal action is expected to mitigate potential threats to endangered species.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Actions impacting birds or mammals	Prohibits the taking of birds and mammals, including the taking by poison.	Birds and mammals	Cal. Fish & Game Code § 3005		2,3,4		Potentially relevant and appropriate; more stringent than Federal ARARs at 22 CCR 66264.228
Discharge to waters of the state	Prohibits the passage of enumerated substances or materials into waters of the state deleterious to fish, plant life, or birds.		Cal. Fish & Game Code §§ 5650(a), (b), and (f)		2,3,4		Relevant and appropriate. The removal action at Site 7 may involve discharge of water from the dewatering of excavation
Wetlands	Actions must be taken to assure that there is "no net loss" of wetlands acreage or habitat value. Action must be taken to preserve, protect, restore, and enhance California's wetland acreage and habitat values	Uses USFWS definition of a wetland	Cal. Fish & Game Commission Wetlands Policy (adopted 1987) included in Fish and Game Code Addenda			2,3,4	Portions of Site 7 contains wetlands and extends into the Seal Beach NWR's salt marsh habitat. This policy is not a regulatory program and therefore is included as a TBC
Air Quality Management District/Air Pollution Control District*							
Air emission	T-BACT must be employed for new stationary equipment when the operation of that equipment results in a higher than allowable maximum individual cancer risk.	Stationary source that emits carcinogenic air contaminants	SCAQMD Regulation XIV, Rule 1401				Not an ARAR; no stationary sources involved in the removal action

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emission	A person shall not build, erect, install, alter or replace any equipment, the use of which may cause the issuance of air contaminants or the use of which may eliminate, reduce or control the issuance of air contaminants without first obtaining written authorization for such construction from the Executive Officer. A permit to construct shall remain in effect until the permit to operate the equipment for which the application was filed is granted or denied, or the application is cancelled.		SCAQMD Regulation II, Rule 201				Not an ARAR; procedural, not substantive. However, mobile equipment used for the removal action will have the appropriate permits.
Air emission	A person shall not operate or use any equipment, the use of which may cause the issuance of air contaminants, or the use of which may reduce or control the issuance of air contaminants, without first obtaining a written permit to operate from the Executive Officer or except as provided in Rule 202. The equipment shall not be operated contrary to the conditions specified in the permit to operate		SCAQMD Regulation II, Rule 203				Not an ARAR; procedural, not substantive However, mobile equipment used for the removal action will have the appropriate permits.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emission	Visible emissions standard that states a person shall not discharge any air contaminant into the atmosphere from any single source of emission for a period or periods aggregating more than 3 minutes in a 60-minute period, which is (a) as dark or darker in shade as that designated No. 1 on the Ringelmann Chart, or (b) of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in (a)		SCAQMD Regulation IV, Rule 401	2,3,4			Fugitive dust emissions of particulate matter are expected from the excavation and waste handling Measures will be taken during construction to control fugitive dust emissions.
Air emission	Prohibits the discharge of any air contaminant or other material (including odorous compounds) that causes injury or annoyance to the public, endangers the comfort, response, health or safety of the public or causes damage to business or property. In general, a notice of violation may be issued upon receipt of six verified complaints or for any property damage or personal injury (Ref. Health and Safety Code 41700).		SCAQMD Regulation IV, Rule 402				Not an ARAR. The requirements of 40 C.F.R. § 300.5 specify that an ARAR must be an environmental or facility siting requirement or limitation. Rule 402 does not fall within the definition of those terms and is therefore not an ARAR.
Air emission	Shall not cause or allow the emissions of fugitive dust such that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source and shall not cause or allow PM_{10} levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples.		SCAQMD Regulation IV, Rule 403	2,3,4			Fugitive dust emissions of particulate matter are expected from the excavation and waste handling. Measures will be taken during construction to control fugitive dust emissions

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emission	Limits equipment from discharging particulate emissions in excess of 0.01 to 0.196 grain per cubic foot based on a given volumetric (dry standard cubic feet per minute) exhaust gas flow rate averaged over one hour or one cycle of operation.		SCAQMD Regulation IV, Rule 404	2,3,4			Fugitive dust emissions of particulate matter are expected from the excavation and waste handling. Measures will be taken during construction to control fugitive dust emissions.
Air emission	Limits equipment from discharging particulate emissions in excess of 0 99 to 30 pounds per hour based on a give process weight.		SCAQMD Regulation IV, Rule 405	2,3,4			Fugitive dust emissions of particulate matter are expected from the excavation and waste handling. Measures will be taken during construction to control fugitive dust emissions.
Air emission	Limits equipment from discharging carbon monoxide emissions in excess of 2000 ppm and sulfur dioxide emissions of 500 ppm or greater averaged over 15 minutes. It excludes stationary internal combustion engines, propulsion of mobile equipment or emergency venting		SCAQMD Regulation IV, Rule 407	2,3,4			Potentially applicable depending on the type of equipment used.
Air emission	Prohibits a person from building, erecting, installing or using any equipment, the use of which reduces or conceals an emission which would otherwise constitute a violation of these rules or Chapter 3 (starting with 41700) of Part 4, of Division 26 of the Health and Safety Code.		SCAQMD Regulation IV, Rule 408	2,3,4			Applicable to Alternatives 2, 3, and 4

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Air emission	Limits the emissions for particulate matter from the exhaust of a combustion source (such as a gas turbine) to 0.23 grams per cubic meter (0.1 grains per standard cubic foot) at 12 percent CO_2 averaged over 15 minutes. It excludes internal combustion engines.		SCAQMD Regulation IV, Rule 409				Not an ARAR; internal combustion engines are the only combustion sources expected to be used for the removal action
Air emission	Limit sulfur compounds from combustion of gaseous fuels not to exceed 40 ppm, 0.05 percent by weight for liquid fuels and 0.56 pounds of sulfur per million BTU for solid fossil fuels.		SCAQMD Regulation IV, Rule 431.1, 431.2, 431.3	2,3,4			Applicable to Alternatives 2, 3, and 4.
Air emission	Limits the concentration of oxides of nitrogen (as NO_2) averaged over 15 minutes, from any non-mobile fuel burning equipment, to a range of 125 to 300 ppm for gaseous fuels and 225 to 400 ppm for solid and liquid fuels depending on equipment size.		SCAQMD Regulation IV, Rule 474				Not an ARAR; no stationary sources involved in the removal action
Air emission	Implements the provisions of Part 61, Chapter I, Title 40 of the Code of Federal Regulations (CFR) under the supervision for the AQMD Executive Officer. It specifies emissions testing, monitoring procedures or handling of hazardous pollutants such as beryllium, benzene, mercury, vinyl chloride, and asbestos.		SCAQMD Regulation X, National Emission Standards for Hazardous Air Pollutants				Not an ARAR; emissions of hazardous air pollutants not expected.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 -- No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Air emission	Requires person excavating a landfill to identify mitigation measures to ensure that a public nuisance condition does not occur		SCAQMD Regulation XI, Rule 1150	2,3,4			Fugitive dust emissions of particulate matter are expected from the excavation and waste handling Measures will be taken during construction to control fugitive dust emissions
Air emission	Limits the emissions of volatile organic compounds from contaminated soil to less than 50 ppm For contaminated soil with 50 ppm or greater, an approved mitigation plan, describing removal methods and mitigation measures, must be obtained from the District prior to proceeding with the excavation Uncontrolled spreading of contaminated soil is not permitted		SCAQMD Regulation XI, Rule 1166				Not an ARAR; soil decontamination is not in the scope of the removal action
Air emission	Applies to any new or modified equipment which may cause the issuance of any non-attainment air contaminant, ozone-depleting compound or ammonia It requires all equipment to be constructed with BACT (Best Available Control Technology) For non-attainment emission increases, it requires the emission increases to be offset and substantiated with modeling that the equipment will not cause a significant increase in concentrations of non-attainment contaminants		SCAQMD Regulation XIII				Not an ARAR; no new or modified equipment expected for the removal action

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emission	This document was compiled by SCAQMD. Although a guideline, it set up BACT requirements for various types of equipment or processes. BACT is determined on a permit-by-permit basis based on the definition of BACT. IN essence, BACT is the most stringent emission limit or control technology that is found in a state implementation plan (SIP), or achieved in practice, or is technologically feasible and cost effective. For practical purposes, at this time, nearly all AQMD BACT determinations will be based on achieved in practice BACT because it is generally more stringent than BACT based on SIP, and because state law constrains AQMD from using the third approach.		Best Available Control Technology (BACT) Guidelines document				Not an ARAR; not promulgated.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.
1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
California Integrated Waste Management Board*							
	Weight/Volume Records: The weight or volume of waste accepted must be determined in accuracy of ±10%.	Waste management operations	27 CCR 20510(a), Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20510(a), Disposal Site Operating Records				Not an ARAR; pertains to active units only.
	Excavation Records: Records shall be maintained for excavations which may affect the safe and proper operation of the site or cause damage to adjoining properties.	Waste management operations	California Integrated Waste Management Board (DTSC/OMF), 27 CCR 20510(a), Div 2, Subdiv 1, Ch 3, Subch. 4, Art 1, Sec. 20510(b), Disposal Site Operating Records				Not an ARAR; pertains to active units only.
	Site Security: The site shall be designed to discourage unauthorized access by persons or vehicles by using a perimeter barrier or topographic constraints. Areas within the site where open storage or ponding of hazardous materials occurs shall be separately fenced.	Waste management unit	27 CCR 20530 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20530, Site Security				Not an ARAR; pertains to active units only.
	Roads: Landfill roads must minimize dust and tracking of materials onto public roads. Such roads shall be kept in safe condition and maintained such that vehicle access and unloading can be conducted during inclement weather.	Waste management unit	27 CCR 20540 Div 2, Subdiv. 1, Ch. 3, Subch. 4, Art 1, Sec. 20540, Roads				Not an ARAR; pertains to active units only.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Confined Unloading: unloading of solid wastes shall be confined to as small an area as possible without resulting in traffic, personnel or public safety hazards. Requires normal deposition of waste at toe of fill.	Waste management unit	27 CCR 20630 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art 1, Sec. 20630, Confined Unloading				Not an ARAR; pertains to active units only.
	Spreading and Compacting: Requires spreading and compacting of refuse layers	Waste management unit	27 CCR 20640 Div. 2, Subdiv. 1, Ch 3, Subch. 4, Art. 1, Sec. 20640, Spreading and Compacting				Not an ARAR; pertains to active units only.
	Grading of Fill Surface: Covered surfaces of the disposal area shall be graded to promote run-off and prevent ponding, accounting for future settlement.	Waste management unit	27 CCR 20650 Div 2, Subdiv 1, Ch. 3, Subch. 4, Art. 1, Sec. 20650, Grading of Fill Surface	2			Applicable; not an ARAR for Alternatives 3 and 4 since not pertinent to the scope of the removal action.
	Stockpiling: Requires stockpiled cover material and unsuitable native materials to be placed so as not to cause problems or interference with site operations	Waste management unit	27 CCR 20660 Div 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec 20660, Stockpiling				Not an ARAR; pertains to active units only.
	Intermediate Cover: Requires compacted earthen material of at least	Waste management unit	27 CCR 20700 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art 1, Sec. 20700, Intermediate Cover				Not an ARAR; pertains to active units only.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
	12 inches on all surfaces of the fill where no additional solid waste will be deposited within 180 days	Waste management unit	27 CCR 20700 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. Intermediate Cover				Not an ARAR; pertains to active units only.
	Scavenging: Scavenging is prohibited	Waste management unit	27 CCR 20710(a) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(a), Scavenging, Salvaging, and Storage				Not an ARAR; pertains to active units only.
	Salvaging Permitted: Salvaging is permitted in a planned and controlled manner	Waste management unit	27 CCR 20710(b)0 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(b), Scavenging, Salvaging and Storage				Not an ARAR; pertains to active units only.
	Storage of Salvage: Salvage material must be safely isolated for storage.	Waste management unit	27 CCR 20710(c) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(c), Scavenging, Salvaging and Storage				Not an ARAR; pertains to active units only.
	Removal: Storage time for salvage materials that shall be limited to a duration specified by the enforcement agency.	Waste management unit	27 CCR 20710(c) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(c), Scavenging, Salvaging and Storage				Not an ARAR; pertains to active units only.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Non-Salvageable items: Items capable of impairing public health shall not be salvaged without approval by the agencies	Waste management unit	27 CCR 20720 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art 1, Sec 20720, Non-Salvageable Items				Not an ARAR; pertains to active units only.
	Volume Reduction and Energy Recovery: Volume reduction and energy recovery are permitted in planned and controlled manners. Processing area shall be confined to specified, clearly identifiable areas of the site.	Waste management unit	27 CCR 20730 Div 2, Subdiv. 1, Ch 3, Subch. 4, Art. 1, Sec. 20730, Volume Reduction and Energy Recovery				Not an ARAR; pertains to active units only.
	Nuisance Control: Each site shall be operated and maintained so as not to create a public nuisance.	Waste management unit	27 CCR 20760(c) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(c), Nuisance Control				Not an ARAR; pertains to active units only.
	Burning Wastes: Burning wastes shall be extinguished	Waste management unit	27 CCR 20780(b) Div. 2, Subdiv. 1, Ch 3, Subch. 4, Art. 1, Sec. 20780(b), Burning Wastes				Not an ARAR; pertains to active units only
	Emergency Response: Potential emergency conditions that may exceed the design of the site and could endanger the public health or environment must be anticipated. Response procedures for these conditions must be addressed in the RD/RA plans.	Waste management unit	27 CCR 21130, Ch 3, Subch 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Site Security: All points of access to the site must be restricted, except permitted entry points. All monitoring, control, and recovery systems shall be protected from unauthorized access.	Waste management unit	27 CCR 21130, Ch 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only
	Structure Removal: Site structures and leachate and gas control systems not intended for reuse will be dismantled and removed at the time of closure to protect public health and safety.	Waste management unit	27 CCR 21130, Ch 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only
	Final Cover: The final cover shall function with minimum maintenance and provide waste containment to protect public health and safety by controlling at a minimum, vectors, fire, odor, litter, and landfill gas migration. The final cover shall also be compatible with postclosure land uses.	Waste management unit	27 CCR 21130, Ch. 3, Subch 5, Art 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	2, 3			Applicable; soil cover to be placed to provide separation of waste from potential receptors
	Final Grading: Final grades must be designed and maintained to reduce impacts to health and safety and take into consideration any postclosure land use	Waste management unit	27 CCR 21130, Ch 3, Subch. 5, Art 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	2			Applicable; not an ARAR for Alternatives 3 and 4 since not pertinent to the scope of the removal action.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Slope Stability: The operator shall ensure the integrity of final slopes under both static and dynamic conditions to protect public health & safety and prevent damage to postclosure land uses, roads, structures; to prevent public contact with waste and leachate; to ensure integrity of gas monitoring and control systems; to prevent safety hazards; and to prevent exposure of waste.	Waste management unit	27 CCR 20921 - 20937, Ch. 3, Subch. 4, Art. 6, Closure & Postclosure Maint Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only.
	Landfill Gas Control and Leachate Contact: landfill gas control shall be implemented and maintained; leachate must be collected and controlled in a manner which prevents public contact and controls vectors, nuisance and odor.	Waste management unit	27 CCR 21180, Ch. 3, Sub. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only
	Gas Monitoring and Control During Closure and Postclosure: to protect public health and safety and the environment, landfill gases generated at a disposal site will be controlled to ensure that: 1) concentrations of methane gas do not exceed 1 25% by volume in air within on-site structures, 2) concentrations of methane do not exceed 5% by volume in air at the property or designated landfill boundary, and 3) trace gases do not pose an acute or chronic exposure to toxic or carcinogenic compounds.	Waste management unit	27 CCR 20921 - 20937, Ch. 3, Subch. 4, Art. 6, Closure & Postclosure Maint Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
	Postclosure Maintenance: The landfill must be maintained and monitored for no less than 30 years following closure	Waste management unit	27 CCR 21180, Ch. 3, Sub 5, Art. 2, Closure & Postclosure Maint Standards for Disposal Sites and Landfills				Not an ARAR; pertains to active units only
	Postclosure Land Use: Site Closure Design shall show one or more proposed used of the closed site or show development that is compatible with open space. Changes in postclosure land use must be approved by the appropriate State agency prior to implementation	Waste management unit	27 CCR 21190, Ch. 3, Sub. 5, Art 2, Closure & Postclosure Maint Standards for Disposal Sites and Landfills				Not an ARAR; no development planned
	Provides the content requirements for closure plans for solid waste disposal sites.	Waste management unit	27 CCR 21800, Ch 4, Subch. 4, Final Closure Plan Contents				Not an ARAR; pertains to active units only.
	Provides the content requirements for postclosure maintenance plans for solid waste disposal sites		27 CCR 21830, Ch. 4, Subch. 4, Final Closure Plan Contents				Not an ARAR; pertains to active units only.
	Provides the content requirements to obtain certification that the solid waste disposal sites has closed pursuant to state standards	Waste management unit	27 CCR 21880, Ch. 4, Subch. 4, Final Closure Plan Contents				Not an ARAR; pertains to active units only.
	Leachate Control: The operator shall ensure that leachate is controlled to prevent contact with the public.	Waste management unit	27 CCR 20790, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20790, Nuisance Control				Not an ARAR; pertains to active units only

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Dust Control: The operator shall take adequate measures to minimize the creation of dust and prevent safety hazards due to obscured visibility.	Waste management unit	27 CCR 20800, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20800, Dust Control				Not an ARAR; pertains to active units only.
	Vector and Bird Control: The operator shall take adequate measures to control or prevent the propagation, harborage, or attraction of flies, rodents, or other vectors, and to minimize bird problems.	Waste management unit	27 CCR 21810, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20810, Dust Control				Not an ARAR; pertains to active units only.
	Drainage and Erosion Control: The drainage system shall be designed and maintained to: ensure integrity of roads, structures, and gas monitoring and control systems; prevent safety hazards; and prevent exposure of waste.	Waste management unit	27 CCR 20820, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20820, Drainage and Erosion Control	2			Applicable; not an ARAR for Alternatives 3 and 4 since not pertinent to the scope of the removal action.
	Litter Control: Litter and loose materials shall be routinely collected and disposed of properly.	Waste management unit	27 CCR 20830, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20830, Grading of Fill Surface				Not an ARAR; pertains to active units only.
	Gas Control: The operator shall cause the site to be monitored for the presence and movement of landfill gas and take any necessary action to control such gases in the event that the gas causes a hazard or nuisance	Waste management unit	27 CCR 20919, Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 6, Sec. 20919, Gas Control				Not an ARAR; pertains to active units only.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
	Report of Disposal Site Information: The planning and procedural requirements necessary to ensure that solid waste is handled and disposed in manners that protect public health and safety and the environment must be conducted.	Waste management unit	27 CCR 21600, Div. 2, Subdiv. 1, Ch. 4, Subch 3, Art. 2, Sect. 21600, Report of Disposal Site Info.[1]				Not an ARAR; pertains to active units only.
	Landfill Gas Control and Leachate Contact: landfill gas control shall be implemented and maintained; leachate must be collected and controlled in a manner which prevents public contact and controls vectors, nuisance and odor.	Waste management unit	27 CCR 21180, Ch 3, Sub. 5, Art. 2, Closure & Postclosure Maint Standards for Disposal Sites and Landfills				Not an ARAR; not pertinent to the scope of the removal action. Presence of high groundwater levels.
	Gas Monitoring and Control During Closure and Postclosure: to protect public health and safety and the environment, landfill gases generated at a disposal site will be controlled to ensure that: 1) concentrations of methane gas do not exceed 1.25% by volume in air within on-site structures, 2) concentrations of methane do not exceed 5% by volume in air at the property or designated landfill boundary, and 3) trace gases do not pose an acute or chronic exposure to toxic or carcinogenic compounds.	Waste management unit	27 CCR 20921 - 20937, Ch. 3				Not an ARAR; not pertinent to the scope of the removal action. Presence of high groundwater levels. Previous investigations did not indicate presence of landfill gas.

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
California Department of Transportation*							
	Caltrans right-of-way	Impacts to Caltrans right-of-way	Encroachment Permit				Not an ARAR; offsite disposal will comply with applicable laws and regulations
	If waste materials are transported via Caltrans right-of-way, measures must be taken during excavation and removal to contain all vehicle loads and avoid any tracking of materials, which may fall or blow onto Caltrans roadways or facilities	Transportation of waste					Not an ARAR; offsite disposal will comply with applicable laws and regulations

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 — Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
County of Orange, Public, Facilities & Resources Department*							
	Stormwater management during construction	Excavations, soil removal, grading	County of Orange, Public Facilities & Resources Department cites CRWQCB, Santa Ana Region, Order No 96-31, NPDES Permit No. CAS618030, issued to the County of Orange, the Orange County Flood Control District and the City of Seal Beach (March 8, 1996), and the State General Permit for Stormwater Discharges Associated with Construction Activity, requires the implementation of structural/siltation and contaminated run-off from construction sites			2, 3, 4	The DON accepts as an TBC for substantive provisions only. Stormwater management to be implemented during construction
County of Orange Health Care Agency*							
	Pertain to excavation of disposal sites	Clean Closure	CIWMB LEA Advisory #16			2, 3, 4	TBC for the excavation of waste.

(table continues)

Table A4-2 (continued)

Alternative numbers indicate applicability of a requirement for an individual alternative under ARAR determination.

1 – No action; 2 – Capping; 3 – Monitoring; 4 – Excavation and Offsite Disposal

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
City of Seal Beach*							
	Performance of an environmental analysis in accordance		California Environmental Quality Act, Section 21000, and the Guidelines for the Implementation of the California Environmental Quality with Discussions (prepared by the Governors Office of Planning and Research)				Not an ARAR; not pertinent to the scope of the removal action. NEPA requirements are functionally equivalent to CEQA and NEPA requirements are satisfied under the IRP.

Note:

* statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific actions are considered potential ARARs.

Acronyms/Abbreviations:

A – applicable
APCD – Air Pollution Control District
AQMD – Air Quality Management District
ARAR – applicable or relevant and appropriate requirement
BACT – best available control technology
BAT – best available technology
BPT – best practicable treatment
CAI – closed, abandoned, or inactive
Cal. Code Regs. – *California Code of Regulations*

(table continues)

Table A4-2 (continued)

Acronyms/Abbreviations: (continued)

Cal-EPA – California Environmental Protection Agency
Cal. Water Code – California Water Code
CAMU – correction action management unit
CEQA – California Environmental Quality Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
CWA – Clean Water Act
DON – Department of the Navy
DTSC – (Cal-EPA) Department of Toxic Substances Control
EE/CA – engineering evaluation/cost analysis
FAWQC – Federal Ambient Water Quality Control
FS – feasibility study
LDR – land disposal restriction
mg/L – micrograms per liter
NPDES – National Pollutant Discharge Elimination System
PM_{10} – particulate matter, less than 10 micrometers in diameter
ppm – parts per million
Prop. – proposition
RA – relevant and appropriate
RAO – removal action objective
RCRA – Resource and Recovery Act
Res. – resolution
RI – remedial investigation
RWQCB – Regional Water Quality Control Board [Santa Ana Region]
§ – section
SCAQMD – South Coast Air Quality Management District
SIP – State Implementation Plan
SWAT – Solid Waste Assessment Test
SWRCB – (California) State Water Resources Control Board
T-BACT – best available control technology for toxics
TBC – to be considered
tit. – title
TPH – total petroleum hydrocarbons
U.S.C – *United States Code*
UST – underground storage tank
VOC – volatile organic compound
WQO – water quality objective

Table A4-3
Comparison of Monitoring ARARs

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Monitoring	§ 66264.91(a)(1) Institute a detection monitoring program under § 66264 98 for each unit; (2) institute an evaluation monitoring program under § 66264 99 whenever there is statistically significant evidence of a release from the regulated unit during a detection monitoring program; or (3) whenever there is significant physical evidence of a release from the regulated unit, including unexplained volumetric changes in surface impoundments, unexplained stress in biological communities, unexplained changes in soil coloration, visible signs of leachate migration, unexplained water table mounding beneath or adjacent to the regulated unit, and any other change to the environment that could reasonably be expected to be the result of a release from the regulated unit; and (4) institute a corrective action program under § 66264 100 when it is determined pursuant to § 66264 99 that the assessment of the nature and extent of the release and the design of the corrective action program have been satisfactorily completed (b) For each regulated unit, include one or more of the programs identified in subsection (a) of this section in the facility permit as may be necessary to protect human health or the environment and specify the circumstances under which each of the programs will be required In deciding whether to institute a particular program, consider the potential adverse effects on human health or the environment that might occur before final administrative action on a permit modification application to incorporate such a program could be taken.	§ 2550 1(a)(1) The discharger shall institute a detection monitoring program under § 2550 8 for each waste management unit; (2) the discharger shall institute an evaluation monitoring program under § 2550 9 whenever there is statistically significant evidence of a release from the waste management unit during a detection monitoring program; or (3) whenever there is significant physical evidence of a release from the waste management unit, including unexplained volumetric changes in surface impoundments, unexplained stress in biological communities, unexplained changes in soil characteristics, visible signs of leachate migration, and unexplained water table mounding beneath or adjacent to the waste management unit and any other change to the environment that could reasonably be expected to be the result of a release from the waste management unit; and (4) the discharger shall institute a corrective action program under § 2550 10 when, pursuant to § 2550 9, the assessment of the nature and extent of the release and the design of a corrective action program has been satisfactorily completed. (b) One or more of the programs identified in subsection (a) of this section that are appropriate for the prevailing state of containment at the waste management unit may be required In deciding whether a particular program is required, potential adverse effects on human health or the environment that might occur shall be considered before program action could be taken. (c) In conjunction with an evaluation monitoring program or a corrective action	§ 20385(a)(1)The discharger shall institute a detection monitoring program (under § 20420) for each unit; (2) the discharger shall institute an evaluation monitoring program (under § 20425) whenever there is "measurably significant" evidence of a release from the unit during a detection monitoring program (under § 20420); or (3) whenever there is significant physical evidence of a release from the unit, including unexplained volumetric changes in surface impoundments, unexplained stress in biological communities, unexplained changes in soil characteristics, visible signs of leachate migration, and unexplained water table mounding beneath or adjacent to the unit, and any other change to the environment that could reasonably be expected to be the result of a release from the unit; and (4) the discharger shall institute a corrective action program under § 20430 when the assessment of the nature and extent of the release and the design of a corrective action program has been satisfactorily completed (b) For each unit, one or more of the programs identified in ¶(a) that are appropriate for the prevailing state of containment at the unit shall be required, and the circumstances will be specified under which each of the programs will be required In deciding whether to require the discharger to be prepared to institute a particular program, the RWQCB shall consider the potential adverse effects on human health or the environment that might occur before final administrative action on an amended report of waste discharge to incorporate such a program could be taken	Cal. Code Regs , tit 22, § 66264 91(a)(1), (2), (3), (4), (b), and (c)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Monitoring (continued)	(c) In conjunction with an evaluation monitoring program or a corrective action program, continue to conduct a detection monitoring program under § 66264 98 as necessary to provide the best assurance of the detection of subsequent releases from the regulated unit	program, the discharger shall continue to conduct a detection monitoring program under § 2550 8 as necessary to provide the best assurance of the detection of subsequent releases from the waste management unit	(c) In conjunction with an evaluation monitoring program or a corrective action program, the discharger shall continue to conduct a detection monitoring program as necessary to provide the best assurance of the detection of subsequent releases from the unit	
COCs	§ 66264 93 COCs are the waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the regulated unit	§ 2550 3 COCs are the waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the waste management unit	§ 20395(a) The COC list shall include all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the unit	Cal. Code Regs , tit. 22, § 66264 93
Concentration limits	§ 66264 94(a)(1) and (3) For each COC the owner or operator shall propose for each medium (groundwater, surface water, and the unsaturated zone) monitored a concentration limit not to exceed the background value or a CLGB established for a corrective action program	§ 2550 4(a)(1) and (3) For each COC, the discharger shall propose for each medium (including groundwater, surface water, and the unsaturated zone) monitored a concentration limit not to exceed the background value or a CLGB established for a corrective action program	20400(a)(1) and (3) For each COC, the discharger shall propose for each medium (including groundwater, surface water, and the unsaturated zone) monitored: a concentration limit not to exceed the background value or a CLGB established for a corrective action program	Cal. Code Regs , tit. 22, § 66264 94(a)(1) and (3)
	§ 66264.94(c) A concentration limit that is greater than the background value can only be used if demonstrated that it is technologically or economically infeasible to achieve the background value and the COC will not pose a substantial present or potential hazard to human health or the environment	§ 2550 4(c) A concentration limit that is greater than the background value can be used only if it is technologically or economically infeasible to achieve the background value and the COC will not pose a substantial present or potential hazard to human health or the environment	§ 20400(c) For a corrective action program, a CLGB can be used only if it is technologically or economically infeasible to achieve the background value and it will not pose a substantial present or potential hazard to human health or the environment.	Cal. Code Regs , tit. 22, § 66264 94(c)
	§ 66264 94(d) In establishing a CLGB, the following factors shall be considered: potential adverse effects on groundwater and surface water quality; any identification of underground sources of drinking water; risk being evaluated for groundwater as if exposure would occur at the point of compliance.	§ 2550 4(d) In establishing a CLGB, groundwater and surface water quality shall be considered.	§ 20400(d) In establishing a CLGB for a COC, the RWQCB shall consider groundwater and surface water quality	Cal. Code Regs , tit. 22, § 66264 94(d)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Concentration limits (continued)	§ 66264 94(e) In no event shall a concentration limit greater than background exceed other applicable statutes or regulations (e g , an MCL) and the lowest concentration demonstrated to be technologically and economically achievable	§ 2550 4(e) In no event shall a concentration limit greater than background exceed the lowest concentration that the discharger demonstrates is technologically and economically achievable No concentration limit greater than background may exceed the maximum concentration that would be allowed under other applicable statutes or regulations (e g , MCLs)	§ 20400(e) In no event shall a CLGB exceed the lowest concentration that the discharger demonstrates is technologically and economically achievable No provision of this section shall be taken to allow a CLGB to exceed the maximum concentration that would be allowed under other applicable statutes or regulations (e g , MCLs)	Cal. Code Regs , tit. 22, § 66264 94(e)
Point of compliance	§ 66264 95(a) The point of compliance is a vertical surface, located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit	§ 2550.5(a) The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management unit that extends through the uppermost aquifer underlying the unit	§ 20405 The point of compliance is a vertical surface located at the hydraulically downgradient limit of the unit that extends through the uppermost aquifer underlying the unit	Cal. Code Regs , tit. 22, § 66264 95(a)
Groundwater monitoring	§ 66264 97(b)(1) The owner or operator shall establish a groundwater monitoring system for each regulated unit and include (A) a sufficient number of background monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater that has not been affected by a release from the regulated unit; (B) for a detection monitoring program under § 66264.98: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and to allow for the detection of a release from the regulated unit; (2) a sufficient number of monitoring points installed at additional locations and depths to yield groundwater samples from the uppermost aquifer as necessary to provide the best assurance of the earliest possible detection of a release from the regulated unit; and (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield	§ 2550 7(b)(1) The discharger shall establish a groundwater monitoring system for each waste management unit (A) and include a sufficient number of background monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater that has not been affected by a release from the waste management unit; (B) for a detection monitoring program under § 2550 8 of this article: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and to allow for the detection of a release from the waste management unit; (2) a sufficient number of monitoring points installed at additional locations and depths to yield groundwater samples from the uppermost aquifer to provide the best assurance of the earliest possible detection of a release from the waste management unit; (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and	§ 20415(b)(1) The discharger shall establish a groundwater monitoring system for each unit (A) and include a sufficient number of background monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater that has not been affected by a release from the unit; (B) for a detection monitoring program under § 20420: (1) a sufficient number of monitoring points (as defined in § 20164) installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and to allow for the detection of a release from the unit; (2) a sufficient number of monitoring points installed at additional locations and depths to yield groundwater samples from the uppermost aquifer to provide the best assurance of the earliest possible detection of a release from the unit; (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from portions of	Cal. Code Regs , tit. 22, § 66264.97(b)(1)(A), (B)(1), (2), (3), (C)(1), (2), (D)(1), (2), (b)(2), (4), (5), (6), and (7)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Groundwater monitoring (continued)	groundwater samples from other aquifers, low-yielding saturated zones, and zones of perched water as necessary to provide the best assurance of the earliest possible detection of a release from the regulated unit; (C) for an evaluation monitoring program under § 66264.99: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance, and at other locations in the uppermost aquifer as necessary, to provide the data needed to evaluate changes in water quality due to the release from the regulated unit; and (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from other aquifers, low-yielding saturated zones, and zones of perched water as necessary to provide the data needed to evaluate changes in water quality due to the release from the regulated unit; (D) for a corrective action program under § 66264 100 of this article: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance, and at other locations in the uppermost aquifer as necessary, to provide the data needed to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program; and (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from other aquifers, low-yielding saturated zones, and	depths to yield groundwater samples from portions of the zone of saturation, including other aquifers, not monitored pursuant to subsections (b)(1)(B)1 and (b)(1)(B)2 of this section to provide the best assurance of the earliest possible detection of a release from the waste management unit; (4) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from zones of perched water to provide the best assurance of the earliest possible detection of a release from the waste management unit; and (5) monitoring point locations and depths that include the zone(s) of highest hydraulic conductivity in each groundwater body monitored pursuant to this subsection (C) for an evaluation monitoring program under § 2550 9 of this article: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and at other locations in the uppermost aquifer to provide the data needed to evaluate changes in water quality due to the release from the waste management unit; (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from portions of the zone of saturation, including other aquifers, not monitored pursuant to subsection (b)(1)(C)1 of this section to provide the data needed to evaluate changes in water quality due to the release from the waste management unit; and (3) a sufficient number of monitoring points and background monitoring points installed at	the zone of saturation, including other aquifers, not monitored pursuant to ¶(b)(1)(B)1 and ¶(b)(1)(B)2, to provide the best assurance of the earliest possible detection of a release from the unit; (4) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from zones of perched water to provide the best assurance of the earliest possible detection of a release from the unit; and (5) monitoring point locations and depths that include the zone(s) of highest hydraulic conductivity in each groundwater body monitored pursuant to this subsection [i e., under ¶(b), inclusive] (C) for an evaluation monitoring program under § 20425: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and at other locations in the uppermost aquifer to provide the data needed to evaluate changes in water quality due to the release from the unit; (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from portions of the zone of saturation, including other aquifers, not monitored pursuant to ¶(b)(1)(C)1, to provide the data needed to evaluate changes in water quality due to the release from the unit; and (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from zones of perched water to provide the data needed to evaluate changes in water quality due to the release from the unit; and (D) for a corrective	

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Groundwater monitoring (continued)	zones of perched water as necessary to provide the data needed to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program. (b)(2) The groundwater monitoring system may include background monitoring points that are not hydraulically upgradient of the regulated unit if the owner or operator demonstrates to the satisfaction of the Department that sampling at other monitoring points will provide samples that are representative of the background quality of groundwater or are more representative than those provided by the upgradient monitoring points (b)(4) All monitoring wells shall be cased and constructed in a manner that maintains the integrity of the monitoring well borehole and prevents the borehole from acting as a conduit for contaminant transport (b)(5) The sampling interval of each monitoring well shall be appropriately screened and fitted with an appropriate filter pack to enable collection of representative groundwater samples (b)(6) For each monitoring well the annular space (i e., the space between the borehole and well casing) above and below the sampling interval shall be appropriately sealed to prevent entry of contaminants from the surface, entry of contaminants from the unsaturated zone, cross-contamination of saturated zones, and contamination of samples (b)(7) All monitoring wells shall be adequately developed to enable collection of representative groundwater samples.	appropriate locations and depths to yield groundwater samples from zones of perched water to provide the data needed to evaluate changes in water quality due to the release from the waste management unit; and (D) for a corrective action program under § 2550 10 of this article: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and at other locations in the uppermost aquifer to provide the data needed to evaluate the effectiveness of the corrective action program; (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from portions of the zone of saturation, including other aquifers, not monitored pursuant to subsection (b)(1)(D)1 of this section to provide the data needed to evaluate the effectiveness of the corrective action program; and (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from zones of perched water to provide the data needed to evaluate the effectiveness of the corrective action program. (b)(2) The groundwater monitoring system may include background monitoring points that are not hydraulically upgradient of the waste management unit if the discharger demonstrates to the satisfaction of the regional board that sampling at other monitoring points will provide samples that are representative of the background quality of groundwater or are more representative than those provided by the upgradient monitoring points.	action program under § 20430: (1) a sufficient number of monitoring points installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and at other locations in the uppermost aquifer to provide the data needed to evaluate the effectiveness of the corrective action program; (2) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from portions of the zone of saturation, including other aquifers, not monitored pursuant to ¶(b)(1)(D)1, to provide the data needed to evaluate the effectiveness of the corrective action program; and (3) a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from zones of perched water to provide the data needed to evaluate the effectiveness of the corrective action program (2) Alternate Background Locations—The groundwater monitoring system may include background monitoring points that are not hydraulically upgradient of the unit if the discharger demonstrates to the satisfaction of the RWQCB that sampling at other background monitoring points will provide samples that are representative of the background quality of groundwater or are more representative than those provided by the upgradient background monitoring points. (4)(A) All monitoring wells shall be cased and constructed in a manner that maintains the integrity of the monitoring well borehole and prevents the borehole from acting as a conduit for contaminant transport	

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Groundwater monitoring (continued)		(b)(4) All monitoring wells shall be cased and constructed in a manner that maintains the integrity of the monitoring well borehole and prevents the borehole from acting as a conduit for contaminant transport (b)(5) The sampling interval of each monitoring well shall be appropriately screened and fitted with an appropriate filter pack to enable collection of representative groundwater samples (b)(6) For each monitoring well, the annular space (i e , the space between the borehole and well casing) above and below the sampling interval shall be appropriately sealed to prevent entry of contaminants from the ground surface, entry of contaminants from the unsaturated zone, cross-contamination between portions of the zone of saturation, and contamination of samples (b)(7) All monitoring wells shall be adequately developed to enable collection of representative groundwater samples	(4)(B) The sampling interval of each monitoring well shall be appropriately screened and fitted with an appropriate filter pack to enable collection of representative groundwater samples (4)(C) For each monitoring well, the annular space (i e , the space between the borehole and well casing) above and below the sampling interval shall be appropriately sealed to prevent entry of contaminants from the ground surface, entry of contaminants from the unsaturated zone, cross-contamination between portions of the zone of saturation, and contamination of samples (4)(D) All monitoring wells shall be adequately developed to enable collection of representative groundwater samples	
Surface water monitoring	§ 66264 97(c)(1) The owner or operator shall establish a surface-water monitoring system to monitor each surface-water body that could be affected by a release from the regulated unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield samples from each surface-water body to represent the quality of the surface water that has not been affected by a release from the regulated unit; (B) for a detection monitoring program under § 66264 98, a sufficient number of monitoring points established at appropriate locations and depths to yield	§ 2550 7(c)(1) The discharger shall establish a surface-water monitoring system to monitor each surface-water body that could be affected by a release from the waste management unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield samples from each surface-water body that represent the quality of surface water that has not been affected by a release from the waste management unit; (B) for a detection monitoring program under § 2550 8 of this article, a sufficient number of monitoring points established at appropriate locations and	§ 20415(c)(1) The discharger shall establish a surface-water monitoring system to monitor each surface-water body that could be affected by a release from the unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield samples from each surface-water body that represent the quality of surface water that has not been affected by a release from the unit; (B) for a detection monitoring program (under § 20420), a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the best	Cal. Code Regs , tit. 22, § 66264.97(c)(1), (2)(A), (B), (C), (D)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Surface water monitoring (continued)	samples from each surface-water body that provide the best assurance of the earliest possible detection of a release from the regulated unit; (C) for an evaluation monitoring program under § 66264.99, a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the data necessary to evaluate changes in water quality due to the release from the regulated unit; and (D) for a corrective action program under § 66264 100, a sufficient number of monitoring points established at appropriate locations and depths to yield samples that provide the data necessary to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program	depths to yield samples from each surface-water body that provide the best assurance of the earliest possible detection of a release from the waste management unit; (C) for an evaluation monitoring program under § 2550 9 of this article, a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the data to evaluate changes in water quality due to the release from the waste management unit; and (D) for a corrective action program under § 2550 10 of this article, a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the data to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program	assurance of the earliest possible detection of a release from the unit; (C) for an evaluation monitoring program (under § 20425), a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the data to evaluate changes in water quality due to the release from the unit; and (D) for a corrective action program (under § 20430), a sufficient number of monitoring points established at appropriate locations and depths to yield samples from each surface-water body that provide the data to evaluate compliance with the Water Standard (of § 20390) and to evaluate the effectiveness of the corrective action program.	
Unsaturated zone monitoring	§ 66264 97(d)(1) The owner or operator shall establish an unsaturated zone monitoring system for each regulated unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that represent the quality of soil-pore liquid that has not been affected by a release from the regulated unit; (B) for a detection monitoring program under § 66264 98, a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the best assurance of the earliest possible detection of a release from the regulated unit; (C) for an evaluation monitoring program under § 66264.99, a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore	§ 2550 7(d)(1) The discharger shall establish an unsaturated zone monitoring system for each waste management unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that represent the quality of soil-pore liquid that has not been affected by a release from the waste management unit; (B) for a detection monitoring program under § 2550 8 of this article, a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the best assurance of the earliest possible detection of a release from the waste management unit; (C) for an evaluation monitoring program under § 2550 9 of this article, a sufficient number of monitoring points established at appropriate locations and depths to yield	20415(d)(1) The discharger shall establish an unsaturated zone monitoring system for each unit including (2)(A) a sufficient number of background monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that represent the quality of soil-pore liquid that has not been affected by a release from the unit; (B) for a detection monitoring program (under § 20420), a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the best assurance of the earliest possible detection of a release from the unit; (C) for an evaluation monitoring program (under § 20425), a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the data to	Cal. Code Regs., tit 22, § 66264 97(d) (1), (2)(A), (B), (C), (D), (3), (4), (5)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Unsaturated zone monitoring (continued)	liquid measurements as necessary to provide the data needed to evaluate changes in water quality due to the release from the regulated unit; and (D) for a corrective action program under § 66264.100, a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements as necessary to provide the data needed to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program (3) Background monitoring points shall be installed at a background plot having soil characteristics similar to those of the soil underlying the regulated unit (4) Liquid recovery types of unsaturated zone monitoring (e g , the use of lysimeters) are required unless the owner or operator demonstrates to the satisfaction of the Department that such methods of unsaturated zone monitoring cannot provide an indication of a release from the regulated unit The Department shall require complementary or alternative (nonliquid recovery) types of unsaturated zone monitoring as necessary to provide the best assurance of the earliest possible detection of a release from the regulated unit. (5) Unsaturated zone monitoring is required at all new regulated units unless the owner or operator demonstrates to the satisfaction of the Department that no method for unsaturated zone monitoring can provide any indication of a release from that regulated unit For a regulated unit that has operated or has received all permits necessary for construction and	soil-pore liquid samples or soil-pore liquid measurements that provide the data to evaluate changes in water quality due to the release from the waste management unit; and (D) for a corrective action program under § 2550 10 of this article, a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the data to evaluate compliance with the water quality protection standard and to evaluate the effectiveness of the corrective action program (3) Background monitoring points shall be installed at a background plot having soil characteristics similar to those of the soil underlying the waste management unit (4) Liquid recovery types of unsaturated zone monitoring (e g., the use of lysimeters) are required unless the discharger demonstrates to the satisfaction of the regional board that such methods of unsaturated zone monitoring cannot provide an indication of a release from the waste management unit The regional board shall require complementary or alternative (nonliquid recovery) types of unsaturated zone monitoring to provide the best assurance of the earliest possible detection of a release from the waste management unit (5) Unsaturated zone monitoring is required at all new waste management units unless the discharger demonstrates to the satisfaction of the regional board that there is no unsaturated zone monitoring device or method designed to operate under the subsurface conditions existent at that waste management unit For a waste management unit that has operated or has received all permits necessary for	evaluate changes in water quality due to the release from the unit; and (D) for a corrective action program (under § 20430), a sufficient number of monitoring points established at appropriate locations and depths to yield soil-pore liquid samples or soil-pore liquid measurements that provide the data to evaluate compliance with the Water Standard (of § 20390) and to evaluate the effectiveness of the corrective action program. (3) background monitoring points shall be installed at a background plot having soil characteristics similar to those of the soil underlying the unit (4) Liquid recovery types of unsaturated zone monitoring (e g., the use of lysimeters) are required unless the discharger demonstrates to the satisfaction of the RWQCB that such methods of unsaturated zone monitoring cannot provide an indication of a release from the unit. The RWQCB shall require complementary or alternative (nonliquid recovery or remote sensing) types of unsaturated zone monitoring to provide the best assurance of the earliest possible detection of a release from the unit. (5) Unsaturated zone monitoring is required at all new units unless the discharger demonstrates to the satisfaction of the RWQCB that there is no unsaturated zone monitoring device or method designed to operate under the subsurface conditions existent at that unit For a unit that has operated or has received all permits necessary for construction and operation before 01 July 1991, unsaturated zone monitoring is required unless the discharger demonstrates that either	

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Unsaturated zone monitoring (continued)	operation before 01 July 1991, unsaturated zone monitoring is required unless the owner or operator demonstrates that either there is no unsaturated zone monitoring device or method designed to operate under the subsurface conditions existent at that waste management unit or the installation of unsaturated zone monitoring devices would require unreasonable dismantling or relocating of permanent structures	construction and operation before 01 July 1991, unsaturated zone monitoring is required unless the discharger demonstrates that either there is no unsaturated zone monitoring device or method designed to operate under the subsurface conditions existent at that waste management unit or that installation of unsaturated zone monitoring devices would require unreasonable dismantling or relocating of permanent structures	there is no unsaturated zone monitoring device or method designed to operate under the subsurface conditions existent at that unit or that installation of unsaturated zone monitoring devices would require unreasonable dismantling or relocating of permanent structures	
General monitoring	§ 66264 97(e)(1) All monitoring systems shall be designed and certified by a registered geologist or a registered civil engineer (3) If a facility contains contiguous regulated units, separate groundwater monitoring systems are not required for each such unit if the owner or operator demonstrates to the satisfaction of the Department that the water quality monitoring program for each unit will enable the earliest possible detection and measurement of a release from that unit (5) The water quality monitoring program shall include appropriate sampling and analytical methods for groundwater, surface water, and the unsaturated zone that accurately measure the concentration of each COC and the concentration or value of each monitoring parameter (6) For each regulated unit, the owner or operator shall collect all data necessary for selecting the appropriate statistical method pursuant to subsections (e)(7), (e)(8), and (e)(9) of this section and for establishing the background values pursuant to subsection (e)(11) of this section. At a minimum, these data shall include analytical data obtained during quarterly sampling of all background monitoring points for a period of 1 year, including the times of expected highest and lowest annual elevations of the	§ 2550 7(e)(1) All monitoring systems shall be designed and certified by a registered geologist or a registered civil engineer (3) If a facility contains contiguous waste management units, separate groundwater monitoring systems are not required for each such unit if the discharger demonstrates to the satisfaction of the regional board that the water quality monitoring program for each unit will enable the earliest possible detection and measurement of a release from that unit (5) The water quality monitoring program shall include appropriate sampling and analytical methods for groundwater, surface water, and the unsaturated zone that accurately measure the concentration of each COC and the concentration or value of each monitoring parameter (6) For each waste management unit, the discharger shall collect all data necessary for selecting the appropriate statistical methods pursuant to subsections (e)(7), (e)(8), and (e)(9) of this section and for establishing the background values specified pursuant to subsection (e)(11) of this section At a minimum, these data shall include analytical data obtained during quarterly sampling of all background monitoring points for a period of 1 year, including the times of expected highest and lowest annual elevations	§ 20415(e)(1) All monitoring systems shall be designed and certified by a registered geologist or a registered civil engineer (3) If a facility contains contiguous units, separate groundwater monitoring systems are not required for each such unit if the discharger demonstrates to the satisfaction of the RWQCB that the water quality monitoring program for each unit will enable the earliest possible detection and measurement of a release from that unit (5) The water quality monitoring program shall include appropriate sampling and analytical methods for groundwater, surface water, and the unsaturated zone that accurately measure the concentration of each COC and the concentration or value of each monitoring parameter (6) For each unit, the discharger shall collect all data necessary for selecting the appropriate data analysis methods pursuant to ¶(e)(7–9) and for establishing the background values specified pursuant to ¶(e)(10). At a minimum, these data shall include analytical data obtained during quarterly sampling of all background monitoring points for a period of 1 year, including the times of expected highest and lowest annual elevations of the groundwater surface. For a new unit, these data shall be collected before wastes are discharged	Cal. Code Regs , tit. 22, § 66264.97(e)(1), (3), (5), and (6)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
General monitoring (continued)	groundwater surface. For a new regulated unit, these data shall be collected before wastes are discharged at the unit and background soil-pore liquid data shall be collected from beneath the unit before the unit is constructed	of the groundwater surface. For a new waste management unit, these data shall be collected before wastes are discharged at the unit and background soil-pore liquid data shall be collected from beneath the unit before the unit is constructed.	at the unit and background soil-pore liquid data shall be collected from beneath the unit before the unit is constructed.	
	§ 66264.97(e)(12)(B) The sampling method (including the sampling frequency and the interval of time between successive samples) shall be appropriate for the medium from which samples are taken (e.g., groundwater, surface water, and soil-pore liquid). The sampling method shall include a sequence of at least four samples collected at least semiannually from each monitoring point and each background monitoring point and statistical analysis performed at least semiannually. Samples shall be taken at an interval that assures, to the greatest extent possible, that an independent sample is obtained. More frequent sampling and statistical analysis may be required when necessary to protect human health and the environment. For groundwater, the sampling frequency and the interval between successive sampling events shall be based on the rate of groundwater flow, and on any variation in groundwater flow rate and direction. The rate of groundwater movement shall be calculated by reference to the aquifer's effective porosity, hydraulic conductivity, and hydraulic gradient. An alternative sampling method is allowed if it provides for the collection of not less than one sample quarterly from each monitoring point and background monitoring point and statistical analysis performed at least quarterly	§ 2550.7(e)(12)(B) The discharger shall propose the sampling methods to be used to establish background values and the sampling methods to be used for monitoring pursuant to this article. For groundwater, sampling shall be scheduled to include the times of expected highest and lowest elevations of the potentiometric surface and shall assure, to the greatest extent possible, that independent samples are obtained. In addition to any presampling purge prescribed in the sampling and analysis plan, groundwater monitoring wells shall be purged immediately after sampling is completed in order to remove all residual water that was in the wellbore during the sampling event so as to assure the independence of samples from successive sampling events. The volume of well water to be withdrawn from the wellbore for the postsampling purge shall be determined by the same method used to determine adequate presampling purging. The sampling method selected shall include either: a sequence of at least four samples collected at least semiannually from each monitoring point and background monitoring point and statistical analysis carried out at least semiannually or more frequent sampling and statistical analysis where necessary to protect human health or the environment; or not less than one sample collected quarterly from each monitoring point and background monitoring point and statistical analysis performed at least quarterly.	§ 20415(e)(12)(B) The sampling method (including the sampling frequency and the interval of time between successive samples) shall be appropriate for the medium from which samples are taken (e.g., groundwater, surface water, and soil-pore liquid). For groundwater, sampling shall be scheduled to include the times of expected highest and lowest elevations of the potentiometric surface. The sampling method shall assure, to the greatest extent possible, that independent samples are obtained. For groundwater, the discharger can use a postsampling purge to assure sample independence whenever the time between successive sampling events (for a given COC or monitoring parameter) is insufficient to assure sample independence, in which case the volume of well water to be withdrawn from the wellbore for the postsampling purge shall be determined by the same method used to determine adequate presampling purging. The sampling method selected shall include collection of at least the appropriate number of new data points (pursuant to ¶[e][12][A]) at least semiannually from each monitoring point and background monitoring point and data analysis carried out at least semiannually. More frequent sampling and statistical analysis may be required where necessary to protect human health or the environment.	Cal. Code Regs., tit. 27, § 20415(e)(12)(B)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Detection monitoring	§ 66264 98(b) and (c) The owner or operator shall install appropriate water quality detection monitoring systems and shall establish a background value in accordance with § 66264 97 for each monitoring parameter and COC	§ 2550 8(b) and (c) The discharger shall install appropriate water quality detection monitoring systems and establish a background value pursuant to § 2550.7 for each monitoring parameter and COC	§ 20420(b) and (c) The discharger shall install appropriate water quality detection monitoring systems and shall establish a background value pursuant to § 20415 for each monitoring parameter and COC	Cal. Code Regs , tit. 22, § 66264 98(b) and (c)
	§ 66264 98(f) The owner or operator shall conduct sampling and analyses for the monitoring parameters. For groundwater, sampling shall be scheduled to include the times of expected highest and lowest annual elevations of the groundwater surface	§ 2550 8(f) The discharger shall monitor for the parameters listed in the waste discharge requirements pursuant to subsection (e) of this section	§ 20420(f) The discharger shall monitor for the monitoring parameters listed in the WDRs pursuant to ¶(e)	Cal. Code Regs , tit. 22, § 66264 98(f)
	§ 66264.98(g) In addition to monitoring for the monitoring parameters, the owner or operator shall periodically monitor for all COCs and determine whether there is statistically significant evidence of a release for any COC pursuant to § 66264 97. Monitoring pursuant to this subsection shall be conducted at least every 5 years.	§ 2550 8(g) In addition to monitoring for the monitoring parameters, the discharger shall periodically monitor for all COCs and determine whether there is statistically significant evidence of a release for any COC pursuant to § 2550.7. Monitoring pursuant to this subsection shall be conducted at least every 5 years	§ 20420(g) In addition to monitoring for the monitoring parameters, the discharger shall periodically monitor for COCs specified in the WDRs, and shall determine whether there is "measurably significant" evidence of a release for any COC pursuant to § 20415 Monitoring pursuant to this paragraph shall be conducted at least every 5 years	Cal. Code Regs , tit. 22, § 66264 98(g)
	§ 66264 98(i) For each monitoring point, the owner or operator shall determine whether there is statistically significant evidence of a release from the regulated unit for any monitoring parameter	§ 2550 8(i) For each monitoring point, the discharger shall determine whether there is statistically significant evidence of a release from the waste management unit for any monitoring parameter	§ 20420(i) For each monitoring point, the discharger shall determine whether there is "measurably significant" evidence of a release from the unit for any monitoring parameter (or COC)	Cal. Code Regs , tit. 22, § 66264 98(i)
Evaluation monitoring	§ 66264.99(b) The owner or operator shall collect and analyze all data necessary to assess the nature and extent of the release from the regulated unit This assessment shall include a determination of the spatial distribution and concentration of each COC throughout the zone affected by the release The owner or operator shall complete and submit this assessment to the Department within 90 days of establishing an evaluation monitoring program.	§ 2550 9(b) The discharger shall collect and analyze all data necessary to assess the nature and extent of the release from the waste management unit This assessment shall include a determination of the spatial distribution and concentration of each COC throughout the zone affected by the release. The discharger shall complete and submit this assessment within 90 days of establishing an evaluation monitoring program	§ 20425(b) The discharger shall collect and analyze all data necessary to assess the nature and extent of the release from the unit This assessment shall include a determination of the spatial distribution and concentration of each COC throughout the zone affected by the release The discharger shall complete and submit this assessment within 90 days of establishing an evaluation monitoring program For MSW landfills, the discharger shall comply with the additional notification	Cal. Code Regs , tit. 22, § 66264 99(b)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Evaluation monitoring (continued)			and monitoring system requirements incorporated by reference into SWRCB Res. 93-62, regarding notification and monitoring relative to off-site or potential off-site migration of waste constituents (see § 258.55[g][1][ii] and [iii] of 40 C.F.R. § 258)	
	§ 66264.99(c) Based on the data collected pursuant to subsections (b) and (e) of this section, the owner or operator shall update the engineering feasibility study required under § 66264.98(k)(6). The owner or operator shall submit this engineering feasibility study to the Department within 90 days of establishing an evaluation monitoring program.	§ 2550.9(c) Based on the data collected pursuant to subsections (b) and (e) of this section, the discharger shall update the engineering feasibility study for corrective action required pursuant to § 2550.8(k)(6) of this article. The discharger shall submit this engineering feasibility study to the regional board within 90 days of establishing an evaluation monitoring program.	§ 20425(c) Based on the data collected pursuant to ¶(b) and ¶(e), the discharger shall update the engineering feasibility study for corrective action required pursuant to § 20420(k)(6). The discharger shall submit this updated engineering feasibility study to the RWQCB within 90 days of establishing an evaluation monitoring program.	Cal. Code Regs., tit. 22, § 66264.99(c)
	66264.99(e) The owner or operator shall monitor groundwater, surface water, and the unsaturated zone to evaluate changes in water quality resulting from the release from the regulated unit. (2) The list of monitoring parameters for each medium shall include all hazardous constituents that have been detected in that medium and shall include those physical parameters, waste constituents, and reaction products that provide a reliable indication of changes in water quality resulting from the release from the regulated unit to that medium. (3) The owner or operator shall conduct sampling and analyses for the monitoring parameters. (4) The owner or operator shall periodically monitor for all COCs specified in the facility permit and evaluate changes in water quality due to the release from the regulated unit. The Department shall specify the frequencies for monitoring pursuant to this subsection after considering the degree of certainty associated with the demonstrated correlation between values for monitoring parameters and values	§ 2550.9(e) The discharger shall monitor groundwater, surface water, and the unsaturated zone to evaluate changes in water quality resulting from the release from the waste management unit; (2) the list of monitoring parameters for each medium shall include all hazardous constituents that have been detected in that medium and those physical parameters, waste constituents, and reaction products that provide a reliable indication of changes in water quality resulting from any release from the waste management unit to that medium; (3) the discharger shall monitor for the monitoring parameters; (4) the discharger shall periodically monitor for all COCs and evaluate changes in water quality due to the release from the waste management unit. Frequencies for monitoring will consider the degree of certainty associated with the demonstrated correlation between values for monitoring parameters and values for the COCs; (5) the discharger shall maintain a record of water quality analytical data as measured and in a form necessary for the	§ 20420(e) The discharger shall monitor groundwater, surface water, and the unsaturated zone to evaluate changes in water quality resulting from the release from the unit; (2) the list of monitoring parameters for each medium shall include all hazardous constituents that have been detected in that medium and those physical parameters, waste constituents, and reaction products that provide a reliable indication of changes in water quality resulting from any release from the unit to that medium; (3) the discharger shall monitor for the monitoring parameters listed; (4) in addition to monitoring for the monitoring parameters specified pursuant to ¶(e)(3), at least every 5 years, the discharger shall periodically monitor for all COCs specified in the WDRs to evaluate changes in water quality due to the release from the unit. The discharger shall use data analysis methods for conducting data analyses that comply with § 20415 for evaluating changes in water quality due to the release from the unit; (5) the discharger shall maintain a record of water	Cal. Code Regs., tit. 22, § 66264.99(e)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Evaluation monitoring (continued)	for the COCs (5) The owner or operator shall maintain a record of water quality analytical data as measured and in a form necessary for the evaluation of changes in water quality due to the release from the regulated unit	evaluation of changes in water quality due to a release from the waste management unit; (6) the discharger shall analyze samples from all monitoring points in the affected medium for all constituents contained in Cal Code Regs tit 22, app IX, div 4 5, ch 14 (Appendix IX) at least annually to determine whether additional hazardous constituents are present and, if so, at what concentration(s) If the discharger finds Appendix IX constituents in the groundwater, surface water, or the unsaturated zone that are not already identified in the WDRs as COCs, the discharger may resample within 1 month and repeat the analysis for those constituents If the second analysis confirms the presence of new constituents, the discharger shall report the concentration of these additional constituents to the regional board by certified mail within 7 days after the completion of the second analysis and the regional board shall add them to the list of COCs specified in the WDRs unless the discharger demonstrates to the satisfaction of the regional board that the constituent is not reasonably expected to be in or derived from waste in the waste management unit If the discharger does not resample, then the discharger shall report the concentrations of these additional constituents to the regional board by certified mail within 7 days after completion of the initial analysis and the regional board shall add them to the list of COCs specified in the WDRs unless the discharger demonstrates to the satisfaction of the regional board that the constituent is not	quality analytical data as measured and in a form necessary for the evaluation of changes in water quality due to a release from the unit	

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Evaluation monitoring (continued)		reasonably expected to be in or derived from waste in the waste management unit		
	§ 66264 99(f) If the owner or operator demonstrates to the satisfaction of the Department that a source other than the regulated unit caused the evidence of a release or that the evidence is an artifact caused by an error in sampling, analysis, or statistical evaluation, or by natural variation in groundwater, surface water, or the unsaturated zone, the owner or operator shall submit an application for a permit modification to reinstitute a detection monitoring program meeting the requirements of § 66264 98. This application shall include specifications for all appropriate changes to the monitoring program	§ 2550 9(f) The discharger may demonstrate that a source other than the waste management unit caused the evidence of a release or that the evidence is an artifact caused by an error in sampling, analysis, or statistical evaluation, or by natural variation in groundwater, surface water, or the unsaturated zone Upon a successful demonstration the regional board shall specify that the discharger shall reinstitute a detection monitoring program meeting the requirements of § 2550 8	§ 20425(f) The discharger may demonstrate that a source other than the unit caused the evidence of a release or that the evidence is an artifact caused by an error in sampling, analysis, or statistical evaluation, or by natural variation in groundwater, surface water, or the unsaturated zone Upon a successful demonstration, the RWQCB shall specify that the discharger shall reinstitute a detection monitoring program meeting the requirements of § 20420.	Cal. Code Regs , tit. 22, § 66264 99(f)
	§ 66264 99(g) Interim corrective action measures shall be required where necessary to protect human health or the environment	§ 2550 9(g) Interim corrective action measures shall be required where necessary to protect human health or the environment	§ 20425(g) Interim corrective action measures shall be required where necessary to protect human health or the environment	Cal. Code Regs , tit. 22, § 66264 99(g)
Corrective action monitoring	§ 66264 100(b) The owner or operator shall take corrective action to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard	§ 2550.10(b) The discharger shall take corrective action to remediate releases from the waste management unit and to ensure that the waste management unit achieves compliance with the water quality protection standard	§ 20430(b) The discharger shall take corrective action to achieve the following goals: to remediate releases from the unit; to ensure that the discharger achieves compliance with the Water Standard	Cal. Code Regs , tit. 22, § 66264 100(b)
	§ 66264 100(c) The owner or operator shall implement corrective action measures that ensure that COCs achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions of the affected zone that extend beyond the facility boundary, by removing the waste constituents or treating them in place The owner or operator shall take other action to prevent noncompliance due to a continued or subsequent release including but not limited to source control	§ 2550.10(c) The discharger shall implement corrective action measures that ensure that COCs achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions thereof that extend beyond the facility boundary, by removing the waste constituents or treating them in place The discharger shall take other action to prevent noncompliance with those limits due to a continued or subsequent release from the waste management unit, including but not limited to source control	§ 20430(c) The discharger shall implement corrective action measures that ensure that COCs achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions thereof that extend beyond the facility boundary, by removing the waste constituents or treating them in place The discharger shall take other action to prevent noncompliance due to a continued or subsequent release from the unit, including but not limited to source control.	Cal. Code Regs , tit. 22, § 66264 100(c)

(table continues)

Table A4-3 (continued)

Action	California Code of Regulations Title 22	California Code of Regulations Title 23	California Code of Regulations Title 27	Controlling ARARs
Corrective action monitoring (continued)	§ 66264.100(g)(1) Compliance "demonstration shall be based on the results of sampling and analysis for all constituents of concern for a period of one year."	§ 2550.10(g)(1) For compliance demonstration each "must have remained at or below its respective concentration limit during a proof period of at least one year . and (2) each monitoring point must have been evenly distributed throughout the proof period and have consisted of no less than eight sampling events per year per monitoring point."	§ 20430(g)(1) For compliance demonstration each "must have remained at or below its respective concentration limit during a proof period of at least one year . and (2) each Monitoring Point must have been evenly distributed throughout the proof period and have consisted of no less than eight sampling events per year per Monitoring Point"	Cal. Code Regs., tit. 22, § 66264.100(g)(1); Cal. Code Regs., tit. 23, § 2550.10(g)(2); and Cal. Code Regs tit. 27, § 20430(g)(2)

Acronyms/Abbreviations:
- app. – appendix
- ARAR – applicable or relevant and appropriate requirement
- Cal. Code Regs. – *California Code of Regulations*
- ch. – chapter
- CLGB – concentration limit greater than background
- COC – constituent of concern
- div. – division
- MCL – maximum containment level
- MSW – municipal solid waste
- ¶ – paragraph
- res. – resolution
- RWQCB – (California) Regional Water Quality Control Board
- § – section
- SWRCB – (California) State Water Resources Control Board
- tit. – title
- WDR – waste discharge requirement

Table A4-4
Comparison of Potential Closure and Postclosure Requirements for Landfill Sites[a]

Closure Activity	POTENTIAL FEDERAL ARARs: Cal. Code Regs. tit. 22, RCRA	POTENTIAL FEDERAL ARARs: 40 C.F.R. pt. 258, subpt. F	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 27	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 23	Controlling[b] ARARs
Location	§ 66264.309(a): A map must be prepared showing the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks with horizontal and vertical controls.	Not specified.	§ 20950(d): Closed waste management units shall be provided with at least two permanent monuments (to be installed by a licensed land surveyor or a registered civil engineer) from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the postclosure period. § 21090(e)(1): An aerial photographic survey must be conducted to include closed portions of the unit and its immediate surrounding area, including the surveying monuments. This survey shall be used to produce a topographic map showing the as-closed topography and to allow early detection of any differential settlement.	§ 2580(d): Closed waste management units shall be provided with at least two permanent monuments installed by a licensed land surveyor or a registered civil engineer, from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the postclosure maintenance period.	Cal. Code Regs. tit. 27, § 20950(d) and 21090(e)(1)
Security	§ 66264.117(c): Continue security requirements specified in §66264.14, which require 24-hour surveillance, a barrier surrounding entire facility, entry control, and placarding if hazardous waste remains exposed after final closure or if access by public or livestock may pose a threat to human health.	Not specified.	§ 21135(f) and (g): All points of access to the site must be restricted. All monitoring, control, and recovery systems shall be protected from unauthorized access. Once closure activities are complete, site access by the public may be allowed in accordance with the approved postclosure maintenance plan.	Not specified.	Cal. Code Regs. tit. 27, § 21135(f) and (g).
Final grading	§ 66264.228(e)(13): Permanent disposal areas shall be graded at closure so that, with allowance for settling and subsidence, the slope of the land surface above all portions of the cover shall be sufficient to prevent ponding of water.	Not specified.	§ 21090(b)(1): The final cover of closed landfills shall be designed, graded, and maintained to prevent ponding and to prevent site erosion due to high runoff velocities. Slopes should be at least 3 percent.	§ 2546(f): Cover materials shall be graded to divert precipitation from the waste management unit, to prevent ponding of surface water over wastes, and to resist erosion as a result of precipitation with the return frequency specified in Table 4.1 of this article.	Cal. Code Regs. tit. 27, § 21090(b)(1).

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs		POTENTIAL STATE ARARs		Controlling[b] ARARs
	Cal. Code Regs. tit. 22, RCRA	40 C.F.R. pt. 258, subpt. F	Cal. Code Regs. tit. 27	Cal. Code Regs. tit. 23	
Permeability (continued)				(1) At least 30 percent of the material, by weight, shall pass a No 200 U.S Standard sieve	
Landfill gas	§ 66264 310(c): The owner or operator shall provide a control system designed to prevent migration of gas unless it is demonstrated that no gas or vapor will be emitted by waste and no gas will be emitted capable of disrupting cover or causing other property damage	§ 258 61(a)(4): Maintain and operate the gas monitoring system in accordance with §258 23, which requires monitoring to assure less than 25 percent lower explosive limit for methane in site facilities and less than the lower explosive limit for methane at the facility property boundary	§ 20921(a)(1), (2), and (3): The operator shall ensure that landfill gases generated at a disposal site are controlled Methane must not exceed 1.25 percent by volume in air within on-site structures, concentrations of methane gas migrating from the landfill must not exceed 5 percent by volume in air at the property boundary, and trace gases shall be controlled to prevent adverse acute and chronic exposure to toxic and/or carcinogenic compounds	Not specified	Cal. Code Regs tit. 27, § 20921(a)(1), (2), and (3)
Landfill leachate	§ 66264.310(b)(2): Continue to operate leachate collection and removal system until leachate is no longer detected	§ 258 61(a)(2): Maintain and operate the leachate collection system	§ 21160(a) and (c): During the postclosure maintenance period, the owner/operator shall assure that leachate collection and control is done in a manner that prevents public contact and controls vectors, nuisance, and odors § 21090(c)(2): Continue to operate the leachate collection and removal system as long as leachate is generated and detected.	Not specified	Cal. Code Regs tit. 22, § 66264.310(b)(2) and Cal. Code Regs tit. 27, § 21160(a) and (c)
Groundwater monitoring	§ 66264 310(b)(3): After final closure, maintain and monitor the groundwater system and comply with all other applicable requirements of art. 6, ch. 14	§ 258 61(a)(3): Monitor the groundwater in accordance with requirements of subpt E of this part and maintain as applicable	§ 21090(c)(3): Maintain monitoring systems and monitor groundwater, surface water, and the unsaturated zone in accordance with applicable requirements of art 1, subch 3, ch 3, subdiv 1 (§20380 et seq.)	§ 2580(a): Classified waste management units shall be closed according to an approved closure and postclosure maintenance plan that provides for continued compliance with the applicable standards for the monitoring program requirements in art 5 of this chapter, throughout the closure and postclosure maintenance period.	Cal. Code Regs tit. 22, § 66264 310(b)(3)

(table continues)

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs: Cal. Code Regs. tit. 22, RCRA	POTENTIAL FEDERAL ARARs: 40 C.F.R. pt. 258, subpt. F	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 27	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 23	Controlling[b] ARARs
Compaction	§ 66264 228(e)(1): If waste is to remain in a unit, the unit shall be compacted before any portion of the final cover is installed	Not specified	Not specified	Not specified	Cal. Code Regs tit 22, § 66264 228(e)(1)
Cover seismic requirements	§ 66264 310(a)(5): The final cover shall accommodate lateral and vertical shear forces generated by the maximum credible earthquake so that the integrity of the cover is maintained	Not specified	§ 20370: Hazardous waste and designated waste management units shall be designed to withstand the maximum credible earthquake and nonhazardous waste management units must be designed to withstand the maximum probable earthquake without damage to the foundation or the structures that control leachate, surface drainage, erosion, or gas §§ 21145(a) and 21750(f)(5): The owner shall assure the integrity of final slopes under both static and dynamic conditions. A stability analysis shall be performed to assure the integrity of the unit The report must indicate a factor of safety for the critical slope of at least 1.5 under dynamic conditions	§ 2547: Class I waste management units shall be designed to withstand the maximum credible earthquake without damage to the foundation or to the structures that control leachate, surface drainage, erosion, or gas	Cal. Code Regs tit 22, § 66264 310(a)(5)
Postclosure care period	§ 66264.117(b)(1) and (2): Postclosure care shall begin after completion of closure and continue for approximately 30 years, based on protectiveness to human health and the environment	§ 258.61(a) and (b): Postclosure care must be conducted for approximately 30 years, based on protection of human health and the environment	§ 20950(a): The postclosure maintenance period shall extend as long as the wastes pose a threat to water quality § 21180(a): The landfill shall be maintained and monitored for a period of not less than 30 years after completion of closure of the entire solid waste landfill.	§ 2580(a): The postclosure maintenance period shall extend as long as the wastes pose a threat to water quality	Cal. Code Regs tit 27, §§ 20950(a) and 21180(a)

(table continues)

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs: Cal. Code Regs. tit. 22, RCRA	POTENTIAL FEDERAL ARARs: 40 C.F.R. pt. 258, subpt. F	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 27	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 23	Controlling[b] ARARs
Postclosure care	§ 66264.310(a)(1): The final cover shall be designed to prevent the downward entry of water into the closed landfill throughout a period of at least 100 years. § 66264.310(b)(1): Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events throughout the postclosure period.	§ 258.61(a)(1): Maintain the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and runoff from eroding or otherwise damaging the final cover during the postclosure care period	§ 21090(c)(1): Maintain the structural integrity and effectiveness of all containment structures and maintain the final cover as necessary to correct the effects of settlement or other adverse factors.	§ 2580(a): Classified waste management units shall be closed according to an approved closure and postclosure maintenance plan which provides for continued compliance with the applicable standards for waste containment and precipitation and drainage controls in art. 4 of this chapter	Cal. Code Regs. tit. 22, § 66264.310(a)(1) and (b)(1)
Erosion control	§ 66264.310(b)(4): Prevent run-on and runoff from eroding or otherwise damaging the final cover throughout the postclosure period	Not specified.	§ 20365(c) and (d): Diversion and drainage facilities shall be designed, constructed, and maintained to accommodate the anticipated volume of precipitation and peak flows. Collection and holding facilities associated with precipitation and drainage control systems shall be emptied immediately or otherwise managed to maintain system design capacity. § 21090(c)(4): Prevent erosion and related damage of the final cover due to drainage throughout the postclosure maintenance period. § 21150: The drainage and erosion control system shall be designed and maintained to assure integrity of postclosure land uses, roads, and structures; to prevent public contact with waste and leachate; to assure integrity of gas monitoring and control systems; to prevent safety hazards; and to prevent exposure of waste.	§ 2546(a): Class I waste management units and containment structures shall be designed and constructed to limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under the precipitation conditions specified in Table 4.1 of this article.	Cal. Code Regs. tit. 27, §§ 20365(c) and (d), 21090(c)(4), and 21150

(table continues)

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs: Cal. Code Regs. tit. 22, RCRA	POTENTIAL FEDERAL ARARs: 40 C.F.R. pt. 258, subpt. F	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 27	POTENTIAL STATE ARARs: Cal. Code Regs. tit. 23	Controlling[b] ARARs
Benchmark maintenance	§ 66264.310(b)(5): Protect and maintain surveyed benchmarks throughout the postclosure period.	Not specified.	§ 21090(c)(5): Throughout the postclosure maintenance period, the discharger shall protect and maintain surveyed monuments (installed under § 20950[d]).	Not specified.	Cal. Code Regs tit. 22, § 66264.310(b)(5)
Engineered alternatives to final cover standard	§ 66264.310(a)(7): At final closure of the landfill or upon closure of any cell, the owner or operator shall cover the landfill or cell with a final cover designed and constructed to conform to the provisions of subsections (e) through (r) of § 66264.228, except that a variance shall be granted from any requirement of subsections (e) through (r) that the owner or operator demonstrates is not necessary to protect public health, water quality, or other environmental quality.	§ 258.60(b)(1) and (2): An alternative final cover design may be approved that includes: (1) an infiltration layer that achieves a reduction in infiltration equivalent to the infiltration layer specified in paragraphs (a)(1) and (a)(2) of this section, and (2) an erosion layer that provides protection from wind and water erosion equivalent to the erosion layer specified in paragraph (a)(3) of this section.	§ 20080(b) and (c): Alternatives to prescriptive standards may be considered provided the prescriptive standard is not feasible and there is a specific engineered alternative that is consistent with the performance goal and affords equivalent protection against water quality impairment. § 21090(a): The RWQCB can allow any alternative final cover that it finds will continue to isolate the waste and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards.	§ 2510(b) and (c): Alternatives to prescriptive standards may be considered provided the prescriptive standard is not feasible and there is a specific engineered alternative that is consistent with the performance goal and affords equivalent protection against water quality impairment.	Cal. Code Regs tit. 27, §§ 20080(b) and (c) and 21090(a)
Vegetation layer	§ 66264.228(e)(12): A layer of topsoil shall be provided thick enough to support vegetation for erosion control and deep enough to prevent root penetration into the filter layer.	§ 258.60(a)(3): Minimize erosion by use of an erosion layer that contains a minimum of 6 inches of earthen material that is capable of sustaining native plant growth.	§ 21090(a)(3): Closed landfills shall be provided with an uppermost cover layer consisting of either a vegetative layer consisting of not less than 1 foot of soil capable of sustaining native or other suitable plant growth or a mechanically erosion-resistant layer.	§ 2580(e): Vegetation for closed waste management units shall be selected to require minimum irrigation and maintenance and shall not impair the integrity of containment structures, including the final cover.	Cal. Code Regs. tit. 27, § 21090(a)(3)

(table continues)

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs		POTENTIAL STATE ARARs		Controlling[b] ARARs
	Cal. Code Regs. tit. 22, RCRA	40 C.F.R. pt. 258, subpt. F	Cal. Code Regs. tit. 27	Cal. Code Regs. tit. 23	
	§ 66264.228(e)(4): A foundation layer shall be provided for the compacted barrier layer of the final cover If needed, the foundation layer shall contain herbicide sufficient to prevent vegetative growth, and shall be free of decomposable organic matter The layer shall be compacted at a moisture content sufficient to achieve the density required to provide adequate support for the nonearthen membrane	Not specified	§ 21090(1): Foundation Layer—Closed landfills shall be provided with not less than 2 feet of appropriate materials as a foundation layer for the final cover These materials may be soil, contaminated soil, incinerator ash, or other waste materials, provided that such materials have appropriate engineering properties to be used for a foundation layer. The foundation layer shall be compacted to the maximum density obtainable at optimum moisture content using methods that are in accordance with accepted civil engineering practice A lesser thickness may be allowed for units if the differential settlement of waste and ultimate land use will not affect the structural integrity of the final cover	Not specified	Cal. Code Regs tit. 27, § 21090(1)
	§ 66264.228(5): A compacted barrier layer of clean earth shall be provided above the foundation layer, and shall be provided around the unit to a depth as low as the level at which the owner or operator has deposited waste, to prevent lateral migration of waste and gas and vapor from the waste The layer of earth shall be wholly below the average depth of frost penetration, and shall be compacted at a moisture content sufficient to achieve a percent	§ 258.60(a): Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion The final cover system must be designed and constructed to: (1) have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less, and (2) minimize infiltration through the closed MSWLF by the use of an infiltration	§ 21090(a)(2): Low-Hydraulic-Conductivity Layer—Closed landfills shall be provided with a low-hydraulic-conductivity (or low through-flow rate) layer, consisting of not less than 1 foot of soil containing no waste or leachate, that is placed on top of the foundation layer and compacted to attain a hydraulic conductivity of either 1×10^{-6} cm/sec (i.e , 1 foot per year) or less, or equal to the hydraulic conductivity of any bottom liner system or underlying natural geologic	Not specified	Cal Code Regs tit. 27, § 21090(a)(2)

(table continues)

Table A4-4 (continued)

Closure Activity	POTENTIAL FEDERAL ARARs		POTENTIAL STATE ARARs		Controlling[b] ARARs
	Cal. Code Regs. tit. 22, RCRA	40 C.F.R. pt. 258, subpt. F	Cal. Code Regs. tit. 27	Cal. Code Regs. tit. 23	
	compaction that has been demonstrated, with the specific cover material to be used, to prevent the downward entry of water into the foundation layer for a period of at least 100 years	layer that contains a minimum 18 inches of earthen material	materials, whichever is less permeable, or another design that provides a correspondingly low through-flow rate throughout the postclosure maintenance period		
	§ 66264.228(7): The owner or operator may use nonearthen materials for the barrier layer provided it is demonstrated to the satisfaction of the department that a barrier layer of alternative composition will equally impede movement of fluid and be as durable as a compacted earthen barrier			Not specified	
	§ 66264.228(10): The owner or operator shall provide a water drainage layer, blanket or channel above the compacted barrier layer of the final cover to provide a path for water to exit rapidly		§ 21090(a)(3): Erosion-Resistant Layer—The low-hydraulic-conductivity layer of § 21090(a)(2) shall be directly overlain by an erosion-resistant layer	Not specified	Cal. Code Regs tit. 27, § 21090(a)(3)
	§ 66264.228(11): The owner or operator shall provide a filter layer above the water drainage layer to prevent soils from clogging the drainage layer			Not specified	

(table continues)

Table A4-4 (continued)

Notes:

[a] landfill closure and postclosure requirements in potential federal ARARs Cal. Code Regs. tit. 22 and 40 C.F.R. § 258 and potential state ARARs Cal Code Regs. tits. 27 and 23 are "relevant and appropriate" rather than "applicable" if the landfills ceased operation prior to the effective date of the regulations

[b] controlling – because 40 C.F.R. § 258, Cal. Code Regs. tits. 22, 27, and 23 contain overlapping requirements, this table was used to compare the four sets of regulations and to select the most stringent as the controlling ARAR; where regulations were judged to be equally stringent, the federal regulations were selected as the controlling ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
app. – appendix
art. – article
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
ch. – chapter
cm/sec – centimeters per second
MSWLF – municipal solid waste landfill
pt. – part
RCRA – Resource Conservation and Recovery Act
RWQCB – Regional Water Quality Control Board
subdiv. – subdivision
subpt. – subpart
tit – title

Appendix B
Summary of Data

Appendix B-1: Data Summary for OU-2 Site 7 Soil Samples

Table A-2
Data Summary for OU-2
Site 7 Soil Samples

Sheet 1 of 2

Sample No.	Date Sampled	Depth Sampled (in.)	4-chloro-3-methyl-phenol (mg/kg)	Chrysene (mg/kg)	Di-n-butyl Phthalate (mg/kg)	Fluoran-thene (mg/kg)	Methylene Chloride (mg/kg)	Toluene (mg/kg)	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)	Total Chromium (Cr) (mg/kg)	Copper (Cu) (mg/kg)	Lead (Pb) (mg/kg)	Mercury (Hg) (mg/kg)	Nickel (Ni) (mg/kg)	Silver (Ag) (mg/kg)	Zinc (Zn) (mg/kg)
W41-7-1	11/04/88	1	ND	ND	ND	ND	0.600	ND	2.6	ND	17.5	26	28	0.15	12	ND	126
W41-7-5	"	5	ND	ND	ND	ND	0.580	ND	4.4	ND	32.3	35.9	21	ND	21	ND	94
W41-7-5D	"	5	ND	ND	ND	ND	0.400	ND	2.9	ND	28.9	64.2	19	0.15	21	ND	92
W41-7-10	"	10	ND	ND	ND	ND	0.510	ND	3.6	ND	24.6	26.7	14	ND	12	ND	65
W42-7-1	"	1	ND	ND	ND	ND	0.360	ND	15.5	0.7	86.6	68.6	2,060	0.91	21	ND	437
W42-7-5	"	5	ND	ND	ND	ND	0.350	ND	1.9	ND	11.8	9.6	10	ND	7	ND	43
W42-7-10	"	10	ND	ND	ND	ND	0.310	ND	1.6	ND	13.6	15.2	9	ND	11	ND	72
W43-7-1	11/07/88	1	ND	0.160	0.170	0.120	ND	0.190	NR	NR	24.3	NR	5.7	0.5	19.1	ND	65.4
W43-7-5	"	5	ND	ND	ND	ND	ND	ND	NR	NR	26	NR	2.6	0.67	19.8	ND	66.6
W43-7-10	"	10	ND	ND	ND	ND	ND	0.093	NR	NR	53.4	NR	6.6	0.58	27.4	ND	112
W43-7-10D	"	10	ND	ND	ND	ND	ND	0.034	NR	NR	37.2	NR	5.2	0.58	16.8	5.6	88.8
W44-7-1	"	1	ND	ND	ND	ND	ND	0.038	NR	NR	28.6	NR	13.1	0.39	15.9	2.6	74.3
W44-7-5	"	5	0.120	ND	ND	ND	ND	0.065	NR	NR	25.8	NR	2.8	0.5	13.7	3.4	114
W44-7-10	"	10	ND	ND	ND	ND	ND	0.017	NR	NR	51.7	NR	9.8	0.59	50.8	3.3	134
W45-7-1	11/10/88	1	ND	ND	ND	ND	ND	0.460	NR	NR	24.1	NR	6.4	0.5	15.6	ND	84.6
W45-7-5	"	5	ND	ND	ND	ND	ND	0.120	NR	NR	33.2	NR	6.1	0.77	20.6	ND	92.4
W45-7-10	"	10	ND	ND	ND	ND	ND	0.260	NR	NR	36.4	NR	9.6	1.5	22.3	ND	110
W45-7-10D	"	10	ND	ND	ND	ND	ND	0.310	NR	NR	31.7	NR	8.2	1.5	19.1	ND	93.9
W46-7-1	"	1	ND	ND	ND	ND	ND	0.038	NR	NR	35.2	NR	4.7	ND	18.5	ND	92.4
W46-7-5	"	5	ND	ND	ND	ND	ND	0.018	NR	NR	26.2	NR	5.1	ND	20.2	ND	86.5
W46-7-10	"	10	ND	ND	ND	ND	ND	0.013	NR	NR	41	NR	6.8	ND	30.7	ND	104
S47-7-6	11/08/88	6	ND	ND	ND	ND	ND	0.550	NR	NR	35.1	NR	75	ND	23.6	ND	115
S47-7-15	"	15	ND	ND	ND	ND	ND	0.041	NR	NR	22	NR	3.1	ND	17.2	ND	77.5
S47-7-27	11/08/88	27	ND	ND	ND	ND	ND	0.140	NR	NR	26.7	NR	3.5	ND	20.9	ND	63.3
S47-7-27D	"	27	ND	ND	ND	ND	ND	0.079	NR	NR	27.9	NR	2.4	ND	27	4.3	76.8
S48-7-6	"	6	ND	ND	ND	ND	ND	0.480	NR	NR	43.4	NR	24.1	ND	33.9	ND	156
S48-7-15	"	15	ND	ND	ND	ND	ND	0.340	NR	NR	27.8	NR	3.7	ND	24.1	ND	78.1

Table A-5
Data Summary for OU-2
Site 7 Surface Water Samples

Sample No.	Date Sampled	Methylene Chloride (ug/L)	Acetone (ug/L)	Carbon disulfide (ug/L)	4-Methyl-2-pentanone (ug/L)	Benzo(a)-anthracene (ug/L)	Bis(2-ethyl-hexyl) phthalate (ug/L)	Di-n-butyl phthalate (ug/L)	Hexa-chloro-benzene (ug/L)	Phenanthrene (ug/L)	Pyrene (ug/L)	N-nitroso-diphenyl-amine (ug/L)	4-bromo-phenyl-phenyl-ether (ug/L)	Chromium (Cr) (ug/L)	Lead (Pb) (ug/L)	Mercury (Hg) (ug/L)	Nickel (Ni) (ug/L)	Silver (Ag) (ug/L)	Zinc (Zn) (ug/L)
S47-7-W	11/21/88	1	6	ND	ND	ND	2	ND	ND	ND	ND	ND	ND	65.3	ND	ND	82	ND	ND
S48-7-W	11/21/88	2	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	47.8	ND	ND	74.2	ND	116
S49-7-W	11/21/88	2	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	69.1	ND	ND	104	ND	ND

Source: SOUTHWESTDIV, 1990.

Detection Limits (µg/l)

Methylene Chloride	2.0
Acetone	10
Carbon Disulfide	5.0
4-Methyl-2-pentanone	10
Benzo(a)anthracene	10
Bis(2-ethylhexyl)phthalate	10
Di-n-butylphthalate	10
Hexachlorobenzene	10
Phenanthrene	10
Pyrene	10
N-nitrosodiphenylamine	10
4-bromophenyl-phenylether	10
Chromium	10
Lead	250
Mercury	0.20
Nickel	40
Silver	10
Zinc	20

ND = not detected
TR = trace detected
ug/L = micrograms per liter

Appendix B-2: Surface Soil Field Screening Results – Site 7 NWS Seal Beach RI Report

Table 4-14
Surface Soil Field Screening Results - Site 7
NWS Seal Beach
RI Report

Station No.	Sample No.	Chromium (mg/kg)	Exceeds Criteria	Lead (mg/kg)	Exceeds Criteria	Zinc (mg/kg)	Exceeds Criteria
Lead "Hot Spot"							
07G09	07G09SA0-1	33.		539.	X	194.	
07G10	07G10SA0-1	60.	X	1,120.	X	366.	
07G11	07G11SA0-1	65.	X	1,540.	X	386.	
07G12	07G12SA0-1	30.		539.	X	194.	
07G13	07G13SA0-1	126.	X	509.	X	297.	
07G14	07G14SA0-1	75.	X	1,110.	X	373.	
07G15	07G15SA0-1	200.	X	4,940.	X	706.	X
07G16	07G16SA0-1	198.	X	4,490.	X	655.	X
07G17	07G17SA0-1	22.		83.		86.	
07G18	07G18SA0-1	18.		22.		70.	
07G19	07G19SA0-1	85.	X	5,180.	X	645.	X
07G20	07G20SA0-1	16.		36.		71.	
07G21	07G21SA0-1	15.		15.		74.	
07G22	07G22SA0-1	37.		1,590.	X	508.	
07G23	07G23SA0-1	21.		191.	X	126.	
07G23	07G23SA1-1	22.		166.	X	119.	
07G24	07G24SA0-1	19.		306.	X	139.	
07G25	07G25SA0-1	28.		96.		106.	
07G26	07G26SA0-1	78.	X	629.	X	112.	
07G27	07G27SA0-1	18.		107.		84.	
07G28	07G28SA0-1	16.		150.	X	76.	
07G29	07G29SA0-1	69.	X	945.	X	302.	
07G30	07G30SA0-1	80.	X	3,020.	X	400.	
07G31	07G31SA0-1	52.	X	268.	X	206.	
07G32	07G32SA0-1	46.	X	444.	X	204.	
07G33	07G33SA0-1	56.	X	363.	X	1,330.	X
07G34	07G34SA0-1	45.	X	465.	X	180.	
07G35	07G35SA0-1	34.		556.	X	193.	

Notes:
X = Exceeds screening criteria (44 mg/kg for chromium, 146 mg/kg for lead or 627 mg/kg for zinc).

Table 4-15
Groundwater Field Screening Results - Site 7
NWS Seal Beach
RI Report

Station No.	Sample No.	Sample Depth (ft)	VOC Detections*			Chromium (ug/L)	Lead (ug/L)	Zinc (ug/L)
			Compound	Conc. (ug/L)	Detected in Blank (Y/N)?			
07P01	07P01GA0-1	36	1,1-DCE	8.8	Y	20 U	70 U	30 U
	07P01GA0-2	12	1,1-DCE	1.3	Y	20 U	70 U	30 U
07P02	07P02GA0-1	10.5	1,1-DCE	1.5	Y	20 U	70 U	132
			Benzene	0.3	N			
07P03	07P03GA0-1	9	1,1-DCE	2.2	Y	20 U	70 U	258
07P04	07P04GA0-1	9	1,1-DCE	2	Y	20 U	70 U	43
			Benzene	0.2	N			
			Toluene	1.4	N			
07P05	07P05GA0-1	11	1,1-DCE	1.7	Y	20 U	70 U	143
07P06	07P06GA0-1	11	1,1-DCE	4.1	Y	20 U	70 U	30 U
			1,3-Dichlorobenzene	3.4	N			
07P07	07P07GA0-1	12	1,1-DCE	10	Y	20 U	70 U	103
07P08	07P08GA0-1	11	1,1-DCE	4.7	Y	20 U	70 U	36
			1,1,1-TCA	2.5	Y			
			1,2-Dichloropropane	2.8	N			
07P09	07P09GA0-1	11	1,1-DCE	3	Y	20 U	70 U	30 U
			Methylene Chloride	1.2	Y			
			1,1,1-TCA	2.9	Y			
07P10	07P10GA0-1	11	1,1-DCE	2.1	Y	20 U	70 U	30 U
			Methylene Chloride	1.8	Y			
			1,1,1-TCA	2.2	Y			
			1,2-Dichloropropane	2.8	N			
07P11	07P11GA0-1	11	1,1-DCE	1.7	Y	20 U	70 U	30 U
			1,1,1-TCA	4.5	Y			
07P12	07P12GA0-1	10	1,1-DCE	2.3	Y	20 U	70 U	117
			1,1,1-TCA	4.1	Y			
07P13	07P13GA0-1	10	1,1-DCE	2.5	Y	20 U	70 U	30 U
			Methylene Chloride	1.3	Y			
			1,1,1-TCA	4.1	Y			
07P14	07P14GA0-1	10	1,1-DCE	3.3	Y	20 U	70 U	178
			Methylene Chloride	3.7	Y			
			1,1,1-TCA	5.1	Y			
	07P14GA7-1	Trip Blank	1,1-DCE	3.8	Y	NA	NA	NA
			Methylene Chloride	3.4	Y			
			1,1,1-TCA	4.5	Y			
	07P14GA2-1	Equipment Rinsate Blank	1,1-DCE	3.1	Y	20 U	70 U	30 U
			Methylene Chloride	2.5	Y			
			1,1,1-TCA	4.6	Y			
07P15	07P15GA0-1	12	1,1-DCE	3.7	Y	20 U	70 U	248
			Methylene Chloride	2.3	Y			
			1,1,1-TCA	5.5	Y			
			1,1-DCA	1.6	N			
			Vinyl Chloride	1.8	N			
			Chloroethane	2.1	N			
			Freon-12	2.9	N			
			Benzene	<1(0.6)	N			

Table 4-15
Groundwater Field Screening Results - Site 7
NWS Seal Beach
RI Report

Station No.	Sample No.	Sample Depth (ft)	VOC Detections[a] Compound	Conc. (ug/L)	Detected in Blank (Y/N)?	Chromium (ug/L)	Lead (ug/L)	Zinc (ug/L)
07P15	07P15GA8-1	Refrigerator Blank	1,1-DCE	4.8	Y	NA	NA	NA
			Methylene Chloride	2.5	Y			
			1,1,1-TCA	7.4	Y			
			Benzene	<1(0.3)	N			
	07P15GA8-2	CPT Ring Blank	1,1-DCE	3.3	Y	NA	NA	NA
			Methylene Chloride	4.6	Y			
			1,1,1-TCA	5.2	Y			
	07P15GA8-3	Ambient Air Blank	1,1-DCE	2.7	Y	NA	NA	NA
			Methylene Chloride	2	Y			
			1,1,1-TCA	4.7	Y			
			Benzene	<1(0.2)	N			
W39	W39GA0-1	20	1,1-DCE	6.9	Y	20 U	70 U	30 U
			1,1,1-TCA	3.3	Y			
W41	W41GAO-1	20	1,1-DCE	2	Y	20 U	70 U	30 U
			Methylene Chloride	1.6	Y			
W42	W42GAO-1	20	1,1-DCE	2.1	Y	20 U	70 U	30 U
			Methylene Chloride	1.9	Y			
			1,1,1-TCA	3.2	Y			
W43	W43GA0-1	20	1,1-DCE	6.7	Y	20 U	70 U	30 U
			1,1,1-TCA	4.4	Y			
W44	W44GAO-1	20	1,1-DCE	2.2	Y	20 U	70 U	30 U
W45	W45GAO-1	20	1,1-DCE	1.8	Y	NA	NA	NA
			Methylene Chloride	1.7	Y			
			1,1,1-TCA	3.3	Y			
W46	W46GAO-1	20	1,1-DCE	2.8	Y	20 U	70 U	30 U
			Methylene Chloride	<1(0.8)	Y			
	Blank 1	Field Blank	1,1-DCE	2.9	Y	NA	NA	NA
			Methylene Chloride	4	Y			
			1,1,1-TCA	2	Y			
	Blank 2	Field Blank	1,1-DCE	3.6	Y	NA	NA	NA
			Methylene Chloride	3.3	Y			
			1,1,1-TCA	2.6	Y			
	Ambient Air	Laboratory Air	1,1-DCE	2.7	Y	NA	NA	NA
			1,1,1-TCA	1.6	Y			

Notes:
[a] EPA Methods 8010/8020
Screening levels: Chromium - 20 ug/L; Lead - 70 ug/L; and Zinc - 30 ug/L.
1,1-DCE = 1,1-Dichloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
U = Not detected Reported value is detection limit.
NA = not analyzed

Table 4-16
Summary of Organic Compounds Detected in Soil - Site 7
NWS Seal Beach
RI Report

Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximum Concentration	Sample with Min Conc.	Minimum Concentration	CRQL	Units
TRENCH 1										
VOCs										
Acetone	1st	6	1	07M03SA0-1	0.	4. J	07M03SA0-1	4. J	10.	µg/kg
Tetrachloroethene	1st	6	3	07G49SA0-1	0.	5. J	07M03SA0-1	3. J	5.	µg/kg
	2nd	1	1	07M03SA0-2	1.	3. J	07M03SA0-2	3. J	5.	µg/kg
Pesticides & PCBs										
4,4-DDD	1st	6	2	07G49SA1-1	0.	9.96 P	07G49SA0-1	5.68 P	3.3	µg/kg
4,4-DDE	1st	6	3	07G49SA1-1	0.	28.3	07G50SA0-1	6.56 P	3.3	µg/kg
4,4-DDT	1st	6	3	07G49SA1-1	0.	21.9 P	07G50SA0-1	7.15 P	1.7	µg/kg
alpha-Chlordane	1st	6	1	07G49SA1-1	0.	5.59	07G49SA1-1	5.59	1.7	µg/kg
Aroclor-1248 (PCB)	1st	6	3	07G49SA1-1	0.	209. P	07G50SA0-1	69.4 P	10.	µg/kg
Aroclor-1254 (PCB)	1st	6	2	07G49SA1-1	0.	225.	07G50SA0-1	40.1	10.	µg/kg
Dieldrin	1st	6	1	07G49SA1-1	0.	11. P	07G49SA1-1	11. P	3.3	µg/kg
gamma-Chlordane	1st	6	1	07G49SA1-1	0.	2.05 P	07G49SA1-1	2.05 P	1.7	µg/kg
TRENCH 2										
VOCs										
Acetone	1st	6	1	07G58SA0-1	0.	18.	07G58SA0-1	18.	10.	µg/kg
Tetrachloroethene	1st	6	2	07G57SA0-1	0.	6.	07G56SA1-1	3. J	5.	µg/kg
SVOCs										
Benzo(b)Fluoranthene	1st	6	1	07G56SA0-1	0.	38. J	07G56SA0-1	38. J	330.	µg/kg
Benzo(k)Fluoranthene	1st	6	1	07G56SA0-1	0.	56. J	07G56SA0-1	56. J	330.	µg/kg
Bis(2-ethylhexyl)phthalate	1st	6	1	07G57SA0-1	0.	180. BJ	07G57SA0-1	180. BJ	330.	µg/kg
Pyrene	1st	6	1	07G56SA0-1	0.	49. J	07G56SA0-1	49. J	290.	µg/kg
Pesticides & PCBs										
4,4-DDE	1st	6	3	07G56SA1-1	0.	55.5 D	07G58SA0-1	8.68	3.3	µg/kg
4,4-DDT	1st	6	4	07G56SA0-1	0.	54.4 P	07G58SA0-1	4.31	1.7	µg/kg
Total Petroleum Hydrocarbons										
TPH-D	1st	6	1	07G56SA0-1	0.	30,400.	07G56SA0-1	30,400.	5,000.	µg/kg
TRENCH 3										
VOCs										
Acetone	2nd	1	1	07M01SA0-2	1.	21.	07M01SA0-2	21.	10.	µg/kg
	3rd	1	1	07M01SA0-3	3.3	23.	07M01SA0-3	23.	10.	µg/kg
Ethylbenzene	1st	7	2	07G62SA1-1	0.	230.	07G61SA1-1	34.	5.	µg/kg
Methylene Chloride	1st	7	1	07M01SA0-1	0.	3. J	07M01SA0-1	3. J	5.	µg/kg
	2nd	1	1	07M01SA0-2	1.	3. J	07M01SA0-2	3. J	5.	µg/kg
Tetrachloroethene	1st	7	1	07G61SA0-1	0.	3. J	07G61SA0-1	3. J	5.	µg/kg
Xylene (total)	1st	7	2	07G62SA1-1	0.	370.	07G61SA1-1	57.	5.	µg/kg
Pesticides & PCBs										
4,4-DDE	1st	7	2	07G65SA0-1	0.	7.49	07G61SA1-1	7.22	3.3	µg/kg
Total Petroleum Hydrocarbons										
TPH-D	1st	7	1	07G62SA0-1	0.	19,600.	07G62SA0-1	19,600.	5,000.	µg/kg
OUTSIDE TRENCHES										
VOCs										
Tetrachloroethene	1st	6	4	07M02SA0-1	0.	12.	07G43SA0-1	5. J	5.	µg/kg
SVOCs										
Bis(2-ethylhexyl)phthalate	1st	6	1	07G45SA0-1	0.	2,800.	07G45SA0-1	2,800.	330.	µg/kg
Pesticides & PCBs										
4,4-DDD	1st	6	1	07M02SA1-1	0.	4.05 J	07M02SA1-1	4.05 J	3.3	µg/kg
4,4-DDE	1st	6	4	07G42SA0-1	0.	16.9	07M02SA1-1	8.11 PJ	3.3	µg/kg
4,4-DDT	1st	6	4	07G44SA0-1	0.	83.3	07G42SA0-1	7.5	1.7	µg/kg
Aroclor-1248 (PCB)	1st	6	1	07G43SA0-1	0.	45.4	07G43SA0-1	45.4	10.	µg/kg
Total Petroleum Hydrocarbons										
TPH-D	1st	6	1	07G44SA0-1	0.	65,700.	07G44SA0-1	65,700.	5,000.	µg/kg
DITCH SEDIMENTS										
VOCs										
Methylene Chloride	1st	6	3	07E04CA0-1	0.	12.	07E03CA0-1	8.	5.	µg/kg
DITCH SEDIMENTS										
SVOCs										
Bis(2-ethylhexyl)phthalate	1st	6	2	07E01CA1-1	0.	410. J	07E01CA0-1	320. J	330.	µg/kg

Table 4-17
Summary of Inorganic and General Chemistry Analytes Detected in Soil - Site 7
NWS Seal Beach
RI Report

Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximuim Concentration	Sample with Min Conc.	Minimum Concentration	CRDL	Background	Number > Background	Units
Trench 3												
Metals												
Copper	3rd	1	1	07M01SA0-3	3.3	7.5	07M01SA0-3	7.5	5.	70.8	0.	MG/KG
Iron	1st	7	7	07G62SA0-1	0.	42,100.	07G65SA0-1	16,100.	20.	76,800.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	15,900.	07M01SA0-2	15,900.	20.	76,800.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	85,800.	07M01SA0-3	85,800.	20.	76,800.	1.	MG/KG
Lead	1st	7	4	07G61SA0-1	0.	81.9	07G62SA0-1	18.9 EN*	0.6	32.5	3.	MG/KG
Magnesium	1st	7	7	07G62SA0-1	0.	14,700. *	07G65SA0-1	6,930. *	1,000.	40,800.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	5,500.	07M01SA0-2	5,500.	1,000.	40,800.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	8,230.	07M01SA0-3	8,230.	1,000.	40,800.	0.	MG/KG
Manganese	1st	7	7	07G61SA0-1	0.	508.	07G65SA0-1	287. N*	3.	1,960.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	205.	07M01SA0-2	205.	3.	1,960.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	541.	07M01SA0-3	541.	3.	1,960.	0.	MG/KG
Nickel	1st	7	7	07G62SA0-1	0.	25.5	07G65SA0-1	10.3	8.	55.9	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	11.1 B	07M01SA0-2	11.1 B	8.	55.9	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	25.6	07M01SA0-3	25.6	8.	55.9	0.	MG/KG
Potassium	1st	7	7	07G62SA0-1	0.	8,160.	07G65SA0-1	2,820.	1,000.	15,100.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	3,450.	07M01SA0-2	3,450.	1,000.	15,100.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	5,060.	07M01SA0-3	5,060.	1,000.	15,100.	0.	MG/KG
Sodium	1st	7	7	07G62SA0-1	0.	8,620. *	07G61SA1-1	2,980.	1,000.	13,300.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	2,990.	07M01SA0-2	2,990.	1,000.	13,300.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	4,420.	07M01SA0-3	4,420.	1,000.	13,300.	0.	MG/KG
Vanadium	1st	7	7	07G62SA0-1	0.	77.2	07G65SA0-1	33.9	10.	148.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	28.5	07M01SA0-2	28.5	10.	148.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	47.1	07M01SA0-3	47.1	10.	148.	0.	MG/KG
Zinc	1st	7	6	07G62SA0-1	0.	113. *	07M01SA0-1	75.9	4.	216.	0.	MG/KG
	2nd	1	1	07M01SA0-2	1.	55.8	07M01SA0-2	55.8	4.	216.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	903.	07M01SA0-3	903.	4.	216.	1.	MG/KG
Nitrogen												
Ammonia N	1st	7	7	07G61SA1-1	0.	150.	07G63SA0-1	8.4	5.	77.	1.	MG/KG
	2nd	1	1	07M01SA0-2	1.	7.1	07M01SA0-2	7.1	5.	77.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	21.	07M01SA0-3	21.	5.	77.	0.	MG/KG
Nitrate/Nitrite N	1st	7	6	07G61SA0-1	0.	140.	07M01SA0-1	3.5	10.	120.	2.	MG/KG
	2nd	1	1	07M01SA0-2	1.	8.5	07M01SA0-2	8.5	10.	120.	0.	MG/KG
	3rd	1	1	07M01SA0-3	3.3	2.3	07M01SA0-3	2.3	10.	120.	0.	MG/KG
Total Kjeldahl Nitrogen	1st	7	3	07G61SA0-1	0.	130.	07G62SA1-1	6.6	5.	1,640.	0.	MG/KG
Asbestos												
Asbestos	1st	7	1	07M01SA0-1	0.	1.	07M01SA0-1	1.	0.1	N/A	N/A	%

Table 4-17
Summary of Inorganic and General Chemistry Analytes Detected in Soil - Site 7
NWS Seal Beach
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Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximum Concentration	Sample with Min Conc.	Minimum Concentration	CRDL	Background	Number > Background	Units
Trench 3												
General Chemistry												
Total Organic Carbon	2nd	1	1	07B01SA0-2	2.5	879.	07B01SA0-2	879.	200.	N/A	N/A	MG/KG
	4th	1	1	07M01SA0-4	17.5	6,080.	07M01SA0-4	6,080.	200.	N/A	N/A	MG/KG
Total Organic Halogens	2nd	1	1	07B01SA0-2	2.5	1,010. J	07B01SA0-2	1,010. J	0.5	N/A	N/A	MG/KG
Total phenols	2nd	1	1	07B01SA0-2	2.5	1.56	07B01SA0-2	1.56	1.	N/A	N/A	MG/KG
Outside Trenches												
Metals												
Aluminum	1st	6	6	07G42SA0-1	0.	22,100. *	07G45SA0-1	10,700. *	40.	65,800.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	13,500.	07M02SA0-2	13,500.	40.	65,800.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	20,100.	07M02SA0-3	20,100.	40.	65,800.	0.	MG/KG
Arsenic	3rd	1	1	07M02SA0-3	4.	4.	07M02SA0-3	4.	2.	13.5	0.	MG/KG
Barium	1st	6	6	07G42SA0-1	0.	128. *	07G45SA0-1	56. *	40.	396.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	77.9	07M02SA0-2	77.9	40.	396.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	124.	07M02SA0-3	124.	40.	396.	0.	MG/KG
Beryllium	1st	6	5	07G42SA0-1	0.	2. *	07M02SA0-1	1.4	1.	5.11	0.	MG/KG
	1st	6	5	07G42SA0-1	0.	2. *	07G44SA0-1	1.4 *	1.	5.11	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	1.4	07M02SA0-2	1.4	1.	5.11	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	1.9	07M02SA0-3	1.9	1.	5.11	0.	MG/KG
Calcium	1st	6	6	07G42SA0-1	0.	16,900. *	07G45SA0-1	4,960. *	1,000.	126,000.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	9,210.	07M02SA0-2	9,210.	1,000.	126,000.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	15,800.	07M02SA0-3	15,800.	1,000.	126,000.	0.	MG/KG
Chromium	1st	6	6	07G42SA0-1	0.	46.4 *	07G45SA0-1	14.4 *	2.	85.4	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	18.6	07M02SA0-2	18.6	2.	85.4	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	26.7	07M02SA0-3	26.7	2.	85.4	0.	MG/KG
Cobalt	1st	6	5	07G43SA0-1	0.	17.9	07M02SA0-1	13.7	10.	16.8	2.	MG/KG
	2nd	1	1	07M02SA0-2	1.	13.3	07M02SA0-2	13.3	10.	16.8	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	18.5	07M02SA0-3	18.5	10.	16.8	1.	MG/KG
Copper	1st	6	6	07G42SA0-1	0.	63.9 *	07G45SA0-1	7.7 *	5.	70.8	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	15.1	07M02SA0-2	15.1	5.	70.8	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	14.9	07M02SA0-3	14.9	5.	70.8	0.	MG/KG
Iron	1st	6	6	07G42SA0-1	0.	30,000. *	07G45SA0-1	15,600. *	20.	76,800.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	20,900.	07M02SA0-2	20,900.	20.	76,800.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	29,800.	07M02SA0-3	29,800.	20.	76,800.	0.	MG/KG
Lead	1st	6	1	07G42SA0-1	0.	8.8 N	07G42SA0-1	8.8 N	0.6	32.5	0.	MG/KG
Magnesium	1st	6	6	07G42SA0-1	0.	11,300. *	07G45SA0-1	5,860. *	1,000.	40,800.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	7,610.	07M02SA0-2	7,610.	1,000.	40,800.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	11,700.	07M02SA0-3	11,700.	1,000.	40,800.	0.	MG/KG

Table 4-17
Summary of Inorganic and General Chemistry Analytes Detected in Soil - Site 7
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Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximum Concentration	Sample with Min Conc.	Minimum Concentration	CRDL	Background	Number > Background	Units
Outside Trenches												
Metals												
Manganese	1st	6	6	07G42SA0-1	0.	541. N*	07G45SA0-1	270. N*	3.	1,960.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	403.	07M02SA0-2	403.	3.	1,960.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	466.	07M02SA0-3	466.	3.	1,960.	0.	MG/KG
Mercury	1st	6	1	07G43SA0-1	0.	0.19	07G43SA0-1	0.19	0.2	N/A [a]	N/A	MG/KG
Nickel	1st	6	6	07G42SA0-1	0.	21.6 *	07G45SA0-1	11.4 *	8.	55.9	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	18.3	07M02SA0-2	18.3	8.	55.9	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	40.8	07M02SA0-3	40.8	8.	55.9	0.	MG/KG
Potassium	1st	6	6	07G42SA0-1	0.	7,000. *	07G45SA0-1	3,990. *	1,000.	15,100.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	4,440.	07M02SA0-2	4,440.	1,000.	15,100.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	6,500.	07M02SA0-3	6,500.	1,000.	15,100.	0.	MG/KG
Selenium	1st	6	1	07G43SA0-1	0.	0.54 BWN	07G43SA0-1	0.54 BWN	1.	N/A [a]	N/A	MG/KG
Sodium	1st	6	6	07M02SA0-1	0.	3,130.	07G45SA0-1	663. B	1,000.	13,300.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	2,500.	07M02SA0-2	2,500.	1,000.	13,300.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	4,300.	07M02SA0-3	4,300.	1,000.	13,300.	0.	MG/KG
Vanadium	1st	6	6	07G42SA0-1	0.	58.2 *	07G45SA0-1	28.1 *	10.	148.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	40.3	07M02SA0-2	40.3	10.	148.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	57.9	07M02SA0-3	57.9	10.	148.	0.	MG/KG
Zinc	1st	6	6	07G42SA0-1	0.	94.3 *	07G45SA0-1	57.7 *	4.	216.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	91.4	07M02SA0-2	91.4	4.	216.	0.	MG/KG
	3rd	1	1	07M02SA0-3	4.	89.3	07M02SA0-3	89.3	4.	216.	0.	MG/KG
Cyanide												
Cyanide	1st	6	1	07M02SA0-1	0.	0.81	07M02SA0-1	0.81	0.5	N/A	N/A	MG/KG
Nitrogen												
Ammonia N	1st	6	5	07G45SA0-1	0.	15.	07G43SA0-1	6.8	5.	77.	0.	MG/KG
Nitrate/Nitrite N	1st	6	6	07G45SA0-1	0.	49.	07G44SA0-1	7.3	10.	120.	0.	MG/KG
	2nd	1	1	07M02SA0-2	1.	4.4	07M02SA0-2	4.4	10.	120.	0.	MG/KG
General Chemistry												
Total Organic Carbon	2nd	1	1	07B02SA0-2	3.	1,010.	07B02SA0-2	1,010.	200.	N/A	N/A	MG/KG
	4th	1	1	07B02SA0-4	7.5	948.	07B02SA0-4	948.	200.	N/A	N/A	MG/KG
Total Organic Halogens	2nd	1	1	07B02SA0-2	3.	742.	07B02SA0-2	742.	0.5	N/A	N/A	MG/KG
	4th	1	1	07B02SA0-4	7.5	464.	07B02SA0-4	464.	0.5	N/A	N/A	MG/KG
Total phenols	2nd	1	1	07B02SA0-2	3.	5.13	07B02SA0-2	5.13	1.	N/A	N/A	MG/KG
	4th	1	1	07B02SA0-4	7.5	2.86	07B02SA0-4	2.86	1.	N/A	N/A	MG/KG
Ditch Sediments												
Metals												
Aluminum	1st	6	6	07E01CA1-1	0.	36,500.	07E02CA0-1	15,000.	40.	65,800.	0.	MG/KG
Arsenic	1st	6	3	07E01CA0-1	0.	8.	07E02CA0-1	2.2 B	2.	13.5	0.	MG/KG
Barium	1st	6	4	07E01CA0-1	0.	118.	07E04CA0-1	82.2	40.	396.	0.	MG/KG

Table 4-17
Summary of Inorganic and General Chemistry Analytes Detected in Soil - Site 7
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Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximum Concentration	Sample with Min Conc.	Minimum Concentration	CRDL	Background	Number > Background	Units
Ditch Sediments												
Metals												
Beryllium	1st	6	6	07E01CA0-1	0.	2.6	07E02CA0-1	1.3	1.	5.11	0.	MG/KG
Calcium	1st	6	6	07E04CA0-1	0.	10,800.	07E02CA0-1	5,500.	1,000.	126,000.	0.	MG/KG
Chromium	1st	6	6	07E01CA1-1	0.	56.	07E02CA0-1	20.2	2.	85.4	0.	MG/KG
Cobalt	1st	6	6	07E01CA0-1	0.	20.4	07E02CA0-1	10.2 B	10.	16.8	2.	MG/KG
Copper	1st	6	6	07E01CA1-1	0.	50.5	07E02CA0-1	13.	5.	70.8	0.	MG/KG
Iron	1st	6	6	07E01CA1-1	0.	43,400.	07E02CA0-1	22,300.	20.	76,800.	0.	MG/KG
Lead	1st	6	6	07E01CA1-1	0.	202.	07E02CA0-1	21.2	0.6	32.5	5.	MG/KG
Magnesium	1st	6	6	07E01CA1-1	0.	17,900.	07E02CA0-1	9,310.	1,000.	40,800.	0.	MG/KG
Manganese	1st	6	6	07E04CA0-1	0.	540.	07E02CA0-1	435.	3.	1,960.	0.	MG/KG
Nickel	1st	6	6	07E01CA0-1	0.	35.6	07E02CA0-1	15.3	8.	55.9	0.	MG/KG
Potassium	1st	6	6	07E01CA1-1	0.	10,300.	07E02CA0-1	5,580.	1,000.	15,100.	0.	MG/KG
Sodium	1st	6	6	07E01CA1-1	0.	10,900.	07E02CA0-1	3,860.	1,000.	13,300.	0.	MG/KG
Vanadium	1st	6	6	07E01CA1-1	0.	84.2	07E02CA0-1	41.7	10.	148.	0.	MG/KG
Zinc	1st	6	6	07E01CA1-1	0.	237.	07E02CA0-1	77.	4.	216.	1.	MG/KG
Nitrogen												
Ammonia N	1st	6	6	07E01CA1-1	0.	40.	07E02CA0-1	14.	5.	77,000.	0.	MG/KG
Nitrate/Nitrite N	1st	6	6	07E05CA0-1	0.	37.	07E01CA0-1	5.6	10.	120,000.	0.	MG/KG
Lead "Hot Spot"												
Metals												
Aluminum	1st	5	5	07G53SA0-1	0.	18,000. *	07G54SA0-1	13,100. *	40.	65,800.	0.	MG/KG
Arsenic	1st	5	2	07G54SA0-1	0.	14.3	07G55SA0-1	12.9	2.	13.5	1.	MG/KG
Barium	1st	5	5	07G54SA0-1	0.	365. *	07G53SA0-1	107. *	40.	396.	0.	MG/KG
Beryllium	1st	5	5	07G53SA0-1	0.	1.7 *	07G54SA0-1	1.1 *	1.	5.11	0.	MG/KG
Cadmium	1st	5	3	07G54SA0-1	0.	0.68 B	07G55SA0-1	0.44 B	1.	N/A [a]	N/A	MG/KG
Calcium	1st	5	5	07G55SA0-1	0.	21,900. *	07G52SA0-1	11,800. *	1,000.	126,000.	0.	MG/KG
Chromium	1st	5	5	07G54SA0-1	0.	62.2 *	07G53SA0-1	24.7 *	2.	85.4	0.	MG/KG
Chromium VI	1st	5	2	07G53SA0-1	0.	0.7 JR	07G52SA0-1	0.69 JR	0.1	N/A [a]	N/A	MG/KG
Cobalt	1st	5	5	07G53SA0-1	0.	14.3	07G55SA0-1	12.5	10.	16.8	0.	MG/KG
Copper	1st	5	5	07G55SA0-1	0.	30.2 *	07G53SA0-1	14.7 *	5.	70.8	0.	MG/KG
Iron	1st	5	5	07G53SA0-1	0.	25,400. *	07G54SA0-1	19,600. *	20.	76,800.	0.	MG/KG
Lead	1st	5	5	07G54SA0-1	0.	740.	07G53SA0-1	18.3 N	0.6	32.5	4.	MG/KG
Magnesium	1st	5	5	07G53SA0-1	0.	12,100. *	07G54SA0-1	7,870. *	1,000.	40,800.	0.	MG/KG
Manganese	1st	5	5	07G53SA0-1	0.	496. N*	07G54SA0-1	424. N*	3.	1,960.	0.	MG/KG
Mercury	1st	5	2	07G55SA0-1	0.	0.38	07G54SA0-1	0.28	0.2	N/A [a]	N/A	MG/KG
Nickel	1st	5	5	07G54SA0-1	0.	27.1 *	07G51SA0-1	18.1 *	8.	55.9	0.	MG/KG
Potassium	1st	5	5	07G53SA0-1	0.	5,960. *	07G54SA0-1	4,510. *	1,000.	15,100.	0.	MG/KG
Sodium	1st	5	5	07G53SA0-1	0.	11,800.	07G54SA0-1	264. B	1,000.	13,300.	0.	MG/KG

Table 4-17
Summary of Inorganic and General Chemistry Analytes Detected in Soil - Site 7
NWS Seal Beach
RI Report

Parameter Name	Depth	Number of Samples	Number of Detects	Sample with Max Conc.	Upper Depth (ft bgs)	Maximuim Concentration	Sample with Min Conc.	Minimum Concentration	CRDL	Background	Number > Background	Units
Lead "Hot Spot"												
Metals												
Vanadium	1st	5	5	07G53SA0-1	0.	48.5 *	07G54SA0-1	40.4 *	10.	148.	0.	MG/KG
Zinc	1st	5	5	07G54SA0-1	0.	262. *	07G53SA0-1	96. *	4.	216.	1.	MG/KG
Cyanide												
Cyanide	1st	5	1	07G53SA0-1	0.	0.71	07G53SA0-1	0.71	0.5	N/A	N/A	MG/KG
Nitrogen												
Ammonia N	1st	5	5	07G51SA0-1	0.	20.	07G53SA0-1	13.	5.	77.	0.	MG/KG
Nitrate/Nitrite N	1st	5	5	07G52SA0-1	0.	140.	07G55SA0-1	30.	10.	120.	1.	MG/KG

Notes:
N/A = Not Applicable

[a] Antimony, cadmium, mercury, hexavalent chromium, selenium, and thallium were detected in less than 50% of the background samples and, therefore, the 99th percentile values for these metals were not calculated. If these metals were detected in the site samples, they were nonetheless considered to be COPCs and were further evaluated in the human health and ecological risk assessments.

Qualifiers:
* = Post digestion spike out of control limits while sample absorbance less than 50% spike absorbance
+ = Correlation coefficient for method of standard additions is less than 0.995
B = Estimated - below the contract required detection limit and above the instrument detection limit
E = Reported value estimated due to interference
M = Duplicate injection precision not met
N = Spiked sample recovery not within control limits
S = Reported value determined by the method of standard additions
U = Not detected - value is detection limit
W = Post digestion spike out of control limits while sample absorbance less than 50% W spike absorbance
X = Surrogate (spiked) compound
J=Estimated value-below CRQL and above MDL
R=Rejected-data unusable

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	Range of	Anaheim Bay	07M01		07M01		07M01		07M02		07M02		07M02		07M03	
	Quarter:	Naturally	Water Sample	1st		2nd		3rd		1st		2nd		3rd		1st	
	Sample ID:	Occurring	3rd Quarter	07M01GA0-1		07M01GB0-1		07M01GE0-1		07M02GA0-1		07M02GB0-1		07M02GE0-1		07M03GA0-1	
Parameter Name	Units	Concentrations[a]	(DOCK 1)														
VOCs																	
1,1-Dichloroethane	ug/l	NA	NA	1.	U	1.	U	1.	U	2.		0.7	J	1.		1.	U
1,2-Dichloroethene (total)	ug/l	NA	NA	1.	U	1.	U	1.	U	0.8	J	0.3	J	0.5	J	1.	U
Acetone	ug/l	NA	NA	2.	U	1.	U	1.	U	0.9	U	1.	U	2.	U	0.8	U
Benzene	ug/l	NA	NA	1.	U	1.	U	1.	U	0.7	J	0.5	J	0.4	J	0.1	J
Carbon Disulfide	ug/l	NA	NA	0.7	J	0.4	J	0.3	J	1.	U	0.08	J	1.	U	1.	U
Ethylbenzene	ug/l	NA	NA	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	0.3	J
Methylene Chloride	ug/l	NA	NA	1.	U	1.	U	1.	U	1.	U	1.	U	0.8	J	0.2	U
Toluene	ug/l	NA	NA	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Trichloroethene	ug/l	NA	NA	1.	U	1.	U	1.	U	0.8	J	1.	U	0.4	J	1.	U
Vinyl Chloride	ug/l	NA	NA	1.	U	1.	U	1.		1.		1.	U	1.		1.	U
Xylene (total)	ug/l	NA	NA	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	0.4	J
SVOCs																	
Acenaphthene	ug/l	NA	NA	4.	J	5.	J	6.	J	10.	U	10.	U	10.	U	2.	J
Anthracene	ug/l	NA	NA	10.	U	10.	U	0.3	J	10.	U	10.	U	10.	U	10.	U
Bis(2-Ethylhexyl)phthalate	ug/l	NA	NA	10.	U	10.	U	10.	U	10.	U	4.	J	1.	J	10.	U
Butylbenzylphthalate	ug/l	NA	NA	10.	U	10.	U	10.	U	10.	U	10.	U	0.4	UJ	10.	U
Di-n-butylphthalate	ug/l	NA	NA	10.	U	10.	U	0.5	J	10.	U	10.	U	10.	U	10.	U
Diethylphthalate	ug/l	NA	NA	10.	U	10.	U	0.4	J	10.	U	10.	U	10.	U	10.	U
Dimethylphthalate	ug/l	NA	NA	10.	U	50.		10.	U	10.	U	40.		10.	U	10.	U
Fluoranthene	ug/l	NA	NA	10.	U	10.	U	0.5	J	10.	U	10.	U	10.	U	10.	U
N-Nitrosodiphenylamine	ug/l	NA	NA	10.	U	2.	J	10.	U	10.	U	10.	U	10.	U	10.	U
Naphthalene	ug/l	NA	NA	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	2.	J
Phenanthrene	ug/l	NA	NA	10.	U	10.	U	0.3	J	10.	U	10.	U	10.	U	10.	U
Phenol	ug/l	NA	NA	3.	J	10.	U	5.	J	10.	U	10.	U	3.	J	10.	U
Pyrene	ug/l	NA	NA	10.	U	10.	U	0.4	J	10.	U	10.	U	10.	U	10.	U
Pesticides/PCBs																	
4,4-DDD	ug/l	NA	NA	0.1	U	0.1	U	1.	U	0.1	U	0.1	U	0.1	U	0.0057	BJ
Aldrin	ug/l	NA	NA	0.05	U	0.05	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-BHC	ug/l	NA	NA	0.05	U	0.05	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-Chlordane	ug/l	NA	NA	0.05	U	0.05	U	5.	U	0.05	U	0.05	U	0.05	U	0.015	U
delta-BHC	ug/l	NA	NA	0.05	U	0.05	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	ug/l	NA	NA	0.0013	JP	0.1	U	1.	U	0.1	U	0.1	U	0.1	U	0.1	U
gamma-BHC (Lindane)	ug/l	NA	NA	0.05	U	0.05	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
Gamma-Chlordane	ug/l	NA	NA	0.05	U	0.05	U	0.5	U	0.05	U	0.05	U	0.05	U	0.016	U
Heptachlor	ug/l	NA	NA	0.05	U	0.05	U	0.15	JP	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	ug/l	NA	NA	0.5	U	0.5	U	0.45	JP	0.5	U	0.5	U	0.5	U	0.5	U
Total Petroleum Hydrocarbons																	
TPH-D	ug/l	NA	NA	50.	U	50.	U	NA		50.	U	50.	U	NA		210.	
Dissolved Metals																	
Dissolved Aluminum	mg/l	<0.005 - 1.0	0.129 BN	0.0678	B	0.0701	U	0.0728	BN	0.0744	B	0.0844	U	0.0667	BN	0.0449	B
Dissolved Antimony	mg/l	NA	NA	0.031	UN	0.031	U	0.0286	UN	0.0564	BN	0.031	U	0.0543	BN	0.031	UN
Dissolved Arsenic	mg/l	<0.001 - 0.03	0.013 N	0.011	MW	0.0059	BW	0.0072	BN	0.0047	BW	0.002	UW	0.0085	BN	0.0836	M
Dissolved Barium	mg/l	0.01 - 0.5	0.0616 BEN	0.708		0.776		0.642	EN	0.158	B	0.086	B	0.0623	BEN	1.03	
Dissolved Beryllium	mg/l	NA	0.0086 N	0.001	U	0.001	U	0.0034	BN	0.001	U	0.001	U	0.0027	BN	0.001	U

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	Range of	Anaheim Bay	07M01		07M01		07M01		07M02		07M02		07M02		07M03	
	Quarter:	Naturally	Water Sample	1st		2nd		3rd		1st		2nd		3rd		1st	
	Sample ID:	Occurring	3rd Quarter	07M01GA0-1		07M01GB0-1		07M01GE0-1		07M02GA0-1		07M02GB0-1		07M02GE0-1		07M03GA0-1	
Parameter Name	Units	Concentrations[a]	(DOCK 1)														
Dissolved Metals																	
Dissolved Cadmium	mg/l	<0.001	0.0017	B	0.004	U	0.004	U	0.03	U	0.004	U	0.004	U	0.0012	B	0.004	U
Dissolved Calcium	mg/l	1.0 - 500	252.		405.		452.		410.		1,730.		1,820.		1,580.		382.	
Dissolved Chromium	mg/l	<0.001 - 0.005	0.0081	B	0.003	U	0.003	U	0.0041	B	0.025		0.0205		0.0023	U	0.003	U
Dissolved Cobalt	mg/l	<0.01	0.0164	BN	0.002	U	0.0034	B	0.0023	UN	0.0202	B	0.008	B	0.011	BN	0.002	U
Dissolved Copper	mg/l	<0.001 - 0.03	0.003	BN	0.002	U	0.002	U	0.0004	UN	0.002	U	0.0022	U	0.0004	UN	0.002	U
Dissolved Iron	mg/l	0.01 - 10	0.977	N	0.175	N	0.0343	B	14.	N	16.8	N	52.3		21.6	N	28.3	N
Dissolved Lead	mg/l	NA	NA		0.01	U	0.01	U	0.04	UN	0.01	U	0.01	U	0.008	UN	0.01	U
Dissolved Magnesium	mg/l	1.0 - 400	897.		1,280.		1,470.		1,460.		1,290.		1,400.		1,280.		1,290.	
Dissolved Manganese	mg/l	<0.001 - 1.0	0.119	N	0.703		0.283		0.323	N	6.98		5.4		5.79	N	1.72	
Dissolved Nickel	mg/l	<0.01 - 0.05	0.011	B	0.007	U	0.007	U	0.0025	U	0.007	U	0.007	U	0.0072	B	0.007	U
Dissolved Potassium	mg/l	1.0 - 10	392.	E	322.		309.		477.	E	79.5		82.8		132.	E	167.	
Dissolved Selenium	mg/l	<0.001 - 0.01	0.0091	N	0.0354	BEN	0.02	UNW	0.115	UN	0.0473	BEN	0.02	UN	0.0023	UN	0.003	UNW
Dissolved Silver	mg/l	NA	NA		0.002	U	0.002	U	0.002	U	0.0104		0.0059	B	0.002	U	0.002	U
Dissolved Sodium	mg/l	0.5 - 1000	8,600.	E	11,300.		11,700.		13,300.	E	4,210.		9,160.		11,000.	E	10,400.	
Dissolved Thallium	mg/l	NA	0.0203		0.03	UNW	0.02	UNW	0.1	U	0.03	UEN	0.02	UNW	0.002	U	0.03	UNW
Dissolved Vanadium	mg/l	<0.001 - 0.01	0.0156	BN	0.0064	B	0.0097	B	0.003	BN	0.002	U	0.002	U	0.0014	UN	0.003	B
Dissolved Zinc	mg/l	<0.01 - 2.0	0.0095	B	0.0024	B	0.0025	B	0.0102	B	0.009	B	0.0083	B	0.0214		0.0033	B
Total Metals																	
Aluminum	mg/l	NA	0.0427	B	0.0678	U	0.582		0.1	B	0.0744	U	0.0906	B	0.0185	U	0.0449	U
Antimony	mg/l	NA	NA		0.031	UN	0.031	U	0.0307	B	0.081	N	0.031	U	0.0286	U	0.031	UN
Arsenic	mg/l	NA	NA		0.0038	BW	0.0085	BS	0.0161		0.0119	M	0.0022	BW	0.0037	B	0.002	U
Barium	mg/l	NA	0.007	BE	0.789		0.884		0.673	E	0.105	B	0.08	B	0.0609	BE	1.3	
Beryllium	mg/l	NA	0.0043	B	0.001	U	0.001	U	0.0042	B	0.001	U	0.001	U	0.0035	U	0.001	U
Cadmium	mg/l	NA	NA		0.004	U	0.004	U	0.03	U	0.004	U	0.004	U	0.0011	B	0.004	U
Calcium	mg/l	NA	301.		468.		462.		401.		1,780.		1,830.		1,660.		416.	
Chromium	mg/l	NA	NA		0.003	U	0.003	U	0.005	B	0.0266		0.0254		0.0023	U	0.003	U
Cobalt	mg/l	NA	NA		0.002	U	0.002	U	0.0023	U	0.0091	B	0.0057	B	0.013	B	0.002	U
Copper	mg/l	NA	NA		0.002	U	0.002	U	0.0004	U	0.002	U	0.002	U	0.0004	U	0.002	U
Iron	mg/l	NA	0.872		1.28	N	0.72		10.4		33.3	N	52.7		15.4		35.6	N
Lead	mg/l	NA	NA		0.01	UW	0.0253	BN*	0.04	U	0.01	U	0.01	UN*	0.016	U	0.001	UM
Magnesium	mg/l	NA	1,230.		1,440.		1,580.		1,560.		1,310.		1,430.		1,320.		1,300.	
Manganese	mg/l	NA	0.013	B	0.819		0.259		0.31		6.4		5.48		5.62		1.75	
Mercury	mg/l	NA	NA		0.0002	UN	0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0001	U	0.00027	N
Nickel	mg/l	NA	NA		0.007	U	0.007	U	0.0025	U	0.007	U	0.007	U	0.0096	B	0.007	U
Potassium	mg/l	NA	626.	E	323.		331.		570.	E	75.9		80.3		139.	E	166.	
Selenium	mg/l	NA	NA		0.03	UNW	0.02	UNW	0.115	U	0.0351	BN	0.02	UEN	0.0023	U	0.03	UN
Silver	mg/l	NA	NA		0.002	U	0.002	U	0.002	U	0.0112		0.0055	B	0.002	U	0.002	U
Sodium	mg/l	NA	13,100.	E	11,500.		12,600.		14,900.	E	8,310.		9,340.		10,900.	E	9,780.	
Thallium	mg/l	NA	0.0046	B	0.03	UNW	0.02	UENW	0.1	U	0.03	UN	0.02	UEN	0.002	U	0.03	UNW
Vanadium	mg/l	NA	NA		0.0109	B	0.0118	B	0.0053	B	0.0032	B	0.002	U	0.0014	U	0.0058	B
Zinc	mg/l	NA	0.0063	B	0.0024	U	0.0057	U	0.015	B	0.0093	U	0.0059	U	0.0497		0.0012	U
Cyanide																	
Cyanide	mg/l	NA	NA		0.0965		0.013		0.501		0.005	U	0.005	U	0.005	U	0.0264	
Asbestos																	
Asbestos	part/l	NA	NA		5.		2.		2.	U	2.	U	2.		2.	U	3.	

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	Range of Naturally Occurring Concentrations*	Anaheim Bay Water Sample 3rd Quarter (DOCK 1)	07M01	07M01	07M01	07M02	07M02	07M02	07M03
	Quarter:			1st	2nd	3rd	1st	2nd	3rd	1st
	Sample ID:			07M01GA0-1	07M01GB0-1	07M01GE0-1	07M02GA0-1	07M02GB0-1	07M02GE0-1	07M03GA0-1
Parameter Name	Units									
Nitrogen										
Ammonia N	mg/l	NA	NA	4.7	3.	3.4	1.7	1.8	1.4	10.
Nitrate/Nitrite N	mg/l	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1	0.2	0.1 U
Total Kjeldahl Nitrogen	mg/l	NA	0.24	4.4	5.5	5.2	2.2	2.4	2.4	13.
General Chemistry										
Bicarbonate Alkalinity	mg/l	NA	100.	NA	900.	1,500.	NA	84.	200.	NA
Carbonate Alkalinity	mg/l	NA	100.	2,200.	2. U	2. U	270.	2. U	2. U	1,400.
Chlorides	mg/l	1.0 - 1000	29,000.	37,000.	38,000.	56,000.	41,000.	33,000.	43,000.	46,000.
pH	pH	NA	8.	7.1	7.1	6.9	6.7	6.5	6.3	7.
Specific Conductance	umhos/cm	NA	41,000.	56,000.	66,000.	56,000.	50,000.	55,000.	49,000.	56,000.
Sulfate	mg/l	3.0 - 150	820.	590.	850.	1,000.	1,900.	2,800.	3,100.	180.
Total Alkalinity as Carbonate	mg/l	NA	NA	2,200.	900.	1,500.	270.	84.	200.	1,400.
Total Dissolved Solids	mg/l	NA	37,000.	39,000.	42,000.	44,000.	38,000.	39,000.	41,000.	37,000.
Feasibility Study Analyses										
Biochemical Oxygen Demand	mg/l	NA	NA	NA	113.	NA	NA	5.3	NA	NA
Chemical Oxygen Demand	mg/l	NA	NA	NA	360.	NA	NA	89.	NA	NA
Color	color	NA	NA	NA	65.	NA	NA	70.	NA	NA
Gross Alpha	pci/l	NA	NA	NA	i. UJ	NA	NA	i. UJ	NA	NA
Gross Beta	pci/l	NA	NA	NA	300. J	NA	NA	4. UJ	NA	NA
Phosphorous-P	mg/l	NA	NA	NA	0.69	0.3	NA	0.1 U	0.1 U	NA
Silica	mg/l	NA	NA	NA	70.7	NA	NA	42.1	NA	NA
Total Organic Halogens	mg/l	NA	NA	NA	0.45	NA	NA	0.55	NA	NA
Total Suspended Solids	mg/l	NA	NA	NA	33.	NA	NA	32.	NA	NA
Turbidity	NTU	NA	NA	NA	120.	NA	NA	51.	NA	NA

Table 4-19
Summary of Analytes Detected In Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	07M03		07M03		07M04		07M04		07M04		W39		W39		W41		W41	
	Quarter:	2nd		3rd		1st		2nd		3rd		1st		2nd		1st		2nd	
	Sample ID:	07M03GB0-1		07M03GE0-1		07M04GA0-1		07M04GB0-1		07M04GE0-1		W39GB0-1		W39GC0-1		W41GB0-1		W41GC0-1	
Parameter Name	Units																		
VOCs																			
1,1-Dichloroethane	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
1,2-Dichloroethene (total)	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Acetone	ug/l	1.	U	1.	U	1.	U	3.		1.	U	1.	U	1.	U	1.	U	1.	U
Benzene	ug/l	0.2	J	1.	U	1.	U	0.1	J	1.	U	1.	U	1.	U	1.	U	1.	U
Carbon Disulfide	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Ethylbenzene	ug/l	0.5	J	0.2	J	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Methylene Chloride	ug/l	0.5	J	0.9	J	0.2	U	1.	U	0.8	J	1.	U	0.3	J	1.	U	1.	U
Toluene	ug/l	1.	U	1.	U	0.5	J	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Trichloroethene	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Vinyl Chloride	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Xylene (total)	ug/l	0.7	J	0.3	J	0.6	J	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
SVOCs																			
Acenaphthene	ug/l	1.	J	2.	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Anthracene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Bis(2-Ethylhexyl)phthalate	ug/l	10.	U	10.	U	10.	U	4.	J	10.	U	10.	U	10.	U	13.		4.	U
Butylbenzylphthalate	ug/l	10.	U	0.5	UJ	10.	U	10.	U	0.3	UJ	10.	U	10.	U	10.	U	10.	U
Di-n-butylphthalate	ug/l	10.	U	0.4	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Diethylphthalate	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Dimethylphthalate	ug/l	74.		10.	U	10.	U	250.		10.	U	10.	U	95.		10.	U	76.	
Fluoranthene	ug/l	10.	U	0.5	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
N-Nitrosodiphenylamine	ug/l	3.	J	3.	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Naphthalene	ug/l	2.	J	1.	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenanthrene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenol	ug/l	10.	U	10.	U	10.	U	10.	U	15.		10.	U	10.	U	10.	U	10.	U
Pyrene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Pesticides/PCBs																			
4,4-DDD	ug/l	0.1	U	0.1	U	0.017	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Aldrin	ug/l	0.008	JP	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-BHC	ug/l	0.0048	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-Chlordane	ug/l	0.05	U	0.05	U	0.13	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
delta-BHC	ug/l	0.05	U	0.05	U	0.0055	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	ug/l	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
gamma-BHC (Lindane)	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Gamma-Chlordane	ug/l	0.05	U	0.05	U	0.13	B	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	ug/l	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Total Petroleum Hydrocarbons																			
TPH-D	ug/l	50.	U	NA		50.	U	50.	U	NA		50.	U	50.	U	50.	U	50.	U
Dissolved Metals																			
Dissolved Aluminum	mg/l	0.111	B	0.0722	UN	0.0597	B	0.0974	B	0.0357	UN	0.0494	B	0.169	B	0.121	B	0.0866	B
Dissolved Antimony	mg/l	0.031	U	0.0286	UN	0.031	UN	0.031	U	0.0388	BN	0.031	UN	0.031	U	0.031	UN	0.031	U
Dissolved Arsenic	mg/l	0.0026	BW	0.0031	UN	0.02	UW	0.02	UW	0.0031	UN	0.002	UW	0.02	U	0.0036	BW	0.02	U
Dissolved Barium	mg/l	1.22		0.902	EN	0.119	B	0.0986	B	0.0902	BEN	0.0854	B	0.0775	B	0.0952	B	0.09	B
Dissolved Beryllium	mg/l	0.001	U	0.0028	UN	0.001	U	0.001	U	0.0034	UN	0.001	U	0.001	U	0.001	U	0.001	U

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	07M03		07M03		07M04		07M04		07M04		W39		W39		W41		W41	
	Quarter:	2nd		3rd		1st		2nd		3rd		1st		2nd		1st		2nd	
	Sample ID:	07M03GB0-1		07M03GE0-1		07M04GA0-1		07M04GB0-1		07M04GE0-1		W39GB0-1		W39GC0-1		W41GB0-1		W41GC0-1	
Parameter Name	Units																		
Dissolved Metals																			
Dissolved Cadmium	mg/l	0.004	U	0.03	U	0.004	U	0.0059	U	0.0006	U	0.004	U	0.0049	U	0.0123		0.0083	U
Dissolved Calcium	mg/l	464.		484.		439.		472.		411.		1,000.		1,080.		1,690.		1,570.	
Dissolved Chromium	mg/l	0.003	U	0.0023	U	0.003	U	0.003	U	0.0023	U	0.003	U	0.003	U	0.0234		0.0148	
Dissolved Cobalt	mg/l	0.003	U	0.0023	UN	0.002	U	0.0044	U	0.0028	BN	0.0043	B	0.0066	U	0.0224	B	0.0191	B
Dissolved Copper	mg/l	0.002	U	0.0004	UN	0.002	U	0.0037	U	0.0017	BN	0.002	U	0.0047	U	0.0036	B	0.002	U
Dissolved Iron	mg/l	31.3		41.2	N	2.8	N	1.93		2.8	N	8.81	N	11.1		10.2	N	10.7	
Dissolved Lead	mg/l	0.01	U	0.04	UN	0.01	U	0.0246	BW	0.0426	BN	0.01	UW	0.01	U	0.0139	BW	0.0112	BW
Dissolved Magnesium	mg/l	1,420.		1,490.		1,260.		1,310.		1,370.		1,470.		1,560.		1,600.		1,470.	
Dissolved Manganese	mg/l	1.96		2.13	N	2.21		2.35		2.07	N	2.3		2.58		6.38		5.65	
Dissolved Nickel	mg/l	0.007	U	0.0025	U	0.007	U	0.007	U	0.0108	B	0.007	U	0.007	U	0.007	U	0.007	U
Dissolved Potassium	mg/l	141.		245.	BE	388.		331.		526.	E	261.		248.		115.		97.	
Dissolved Selenium	mg/l	0.02	UNW	0.115	UN	0.03	UNW	0.02	UEN	0.0023	UN	0.0141	MN	0.0325	BN	0.03	UNW	0.021	BEN
Dissolved Silver	mg/l	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	B	0.0028	B	0.0094	B	0.0052	B
Dissolved Sodium	mg/l	10,700.		13,200.	E	11,000.		11,100.		12,800.	E	11,500.		11,700.		11,800.		11,200.	
Dissolved Thallium	mg/l	0.02	UNW	0.153	B	0.03	UEN	0.02	UNW	0.0023	U	0.03	UEN	0.02	UNW	0.03	UNW	0.02	UNW
Dissolved Vanadium	mg/l	0.0024	B	0.0014	UN	0.002	U	0.0023	B	0.0014	UN	0.0026	B	0.002	U	0.002	U	0.002	U
Dissolved Zinc	mg/l	0.0025	U	0.0089	U	0.0026	B	0.0029	U	0.0105	U	0.0045	B	0.0106	B	0.0043	B	0.0152	B
Total Metals																			
Aluminum	mg/l	0.725		0.0819	U	0.469		0.11	B	0.0691	U	0.935		24.4		35.9		1.13	
Antimony	mg/l	0.031	U	0.0286	U	0.031	UN	0.031	U	0.0286	U	0.031	UN	0.031	U	0.0937	N	0.031	U
Arsenic	mg/l	0.0026	BW	0.0031	U	0.0032	U	0.02	UW	0.0031	U	0.0165	M	0.02	U	0.02	UE	0.02	UW
Barium	mg/l	1.31		0.818	E	0.137	B	0.1	B	0.0931	BE	0.088	B	0.246		0.154	B	0.0936	B
Beryllium	mg/l	0.001	U	0.0035	U	0.001	U	0.001	U	0.0039	U	0.001	U	0.001	U	0.0018	B	0.001	U
Cadmium	mg/l	0.004	U	0.0012	B	0.004	U	0.004	U	0.0006	U	0.004	U	0.004	U	0.0071		0.004	U
Calcium	mg/l	478.		398.		620.		482.		390.		1,030.		1,100.		2,020.		1,550.	
Chromium	mg/l	0.003	U	0.0023	U	0.003	U	0.003	U	0.0023	U	0.0082	B	0.0401		0.0678		0.0232	
Cobalt	mg/l	0.0022	B	0.0023	U	0.002	U	0.002	U	0.0023	U	0.002	U	0.0127	B	0.0326	B	0.0199	B
Copper	mg/l	0.002	U	0.0004	U	0.002	U	0.002	U	0.0004	U	0.002	U	0.0306	U	0.0981		0.0053	U
Iron	mg/l	34.8		20.7		3.36	N	2.07		3.48		10.	N	41.7		42.2	N	10.8	
Lead	mg/l	0.01	UN*	0.018	U	0.01	UW	0.01	UNW*	0.04	U	0.01	UW	0.0201	BN*	0.0484	W	0.0255	BNW*
Magnesium	mg/l	1,420.		1,380.		1,420.		1,360.		1,300.		1,460.		1,620.		1,580.		1,550.	
Manganese	mg/l	2.		1.8		2.55		2.35		1.96		2.48		2.97		8.24		5.58	
Mercury	mg/l	0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0002	UN	0.0001	U
Nickel	mg/l	0.007	U	0.0025	U	0.007	U	0.007	U	0.0085	B	0.007	U	0.007	U	0.0324	B	0.007	U
Potassium	mg/l	150.		281.	E	360.		342.		536.	E	245.		251.		104.		103.	
Selenium	mg/l	0.02	UNW	0.0023	U	0.036	BN	0.032	BEN	0.0023	U	0.03	UNW	0.026	BEN	0.03	UNW	0.02	UEN
Silver	mg/l	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.0031	U	0.002	U	0.0103		0.006	B
Sodium	mg/l	10,700.		13,800.	E	11,300.		11,500.		12,500.	E	11,100.		12,200.		11,300.		11,900.	
Thallium	mg/l	0.02	UNW	0.002	U	0.03	UEN	0.02	UNW	0.002	U	0.03	UNW	0.02	UEN	0.03	UEN	0.02	UEN
Vanadium	mg/l	0.0073	B	0.0014	U	0.0036	U	0.004	B	0.0014	U	0.0031	B	0.057		0.0789		0.002	U
Zinc	mg/l	0.0073	U	0.0085	B	0.0039	U	0.0072	U	0.0067	U	0.0084	U	0.105		0.12		0.0063	U
Cyanide																			
Cyanide	mg/l	0.019		0.0206		0.005	U	0.0051	B	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Asbestos																			
Asbestos	part/l	3.	U	2.	U	5.		2.	U	2.	U	2.	U	3.	U	3.	U	2.	U

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	07M03		07M03		07M04		07M04		07M04		W39		W39		W41		W41	
	Quarter:	2nd		3rd		1st		2nd		3rd		1st		2nd		1st		2nd	
	Sample ID:	07M03GB0-1		07M03GE0-1		07M04GA0-1		07M04GB0-1		07M04GE0-1		W39GB0-1		W39GC0-1		W41GB0-1		W41GC0-1	
Parameter Name	Units																		
Nitrogen																			
Ammonia N	mg/l	9.1		11.		0.89		0.64		0.58		1.		0.74		2.1		1.1	
Nitrate/Nitrite N	mg/l	0.14		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Total Kjeldahl Nitrogen	mg/l	12.		12.		1.4		0.88		1.4		0.98		1.1		6.1		1.7	
General Chemistry																			
Bicarbonate Alkalinity	mg/l	1,200.		1,500.		NA		380.		390.		NA		290.		NA		310.	
Carbonate Alkalinity	mg/l	2.	U	2.	U	420.		2.	U	2.	U	390.		2.	U	400.		2.	U
Chlorides	mg/l	49,000.		48,000.		40,000.		44,000.		48,000.		43,000.		53,000.		40,000.		43,000.	
pH	pH	6.9		7.		7.1		7.1		7.		7.4		6.6		6.3		7.6	
Specific Conductance	umhos/cm	64,000.		53,000.		58,000.		64,000.		52,000.		52,000.		61,000.		60,000.		61,000.	
Sulfate	mg/l	90.		400.		2,000.		3,200.		3,400.		2,900.		3,500.		3,200.		3,400.	
Total Alkalinity as Carbonate	mg/l	1,200.		1,500.		420.		380.		390.		390.		290.		400.		310.	
Total Dissolved Solids	mg/l	38,000.		43,000.		42,000.		43,000.		41,000.		43,000.		43,000.		48,000.		44,000.	
Feasibility Study Analyses																			
Biochemical Oxygen Demand	mg/l	23.2		NA		NA		3.	U	NA		NA		3.	U	NA		3.	U
Chemical Oxygen Demand	mg/l	5,000.	U	NA		NA		140.		NA		NA		180.		NA		89.	
Color	color	20.		NA		NA		10.		NA		NA		15.		NA		10.	
Gross Alpha	pci/l	1.	UJ	NA		NA		1.	UJ	NA		NA		1.	UJ	NA		1.	UJ
Gross Beta	pci/l	4.	UJ	NA		NA		270.	J	NA		NA		280.	J	NA		120.	J
Phosphorous-P	mg/l	NA		0.35		NA		NA		0.1	U	NA		NA		NA		0.1	U
Silica	mg/l	15.7		NA		NA		13.4		NA		NA		19.6		NA		22.5	
Total Organic Halogens	mg/l	0.4		NA		NA		0.21		NA		NA		0.9		NA		0.16	
Total Suspended Solids	mg/l	NA		NA		NA		NA		NA		NA		NA		NA		84.	
Turbidity	NTU	NA		NA		NA		NA		NA		NA		NA		NA		9.6	

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W41		W42		W42		W42		W43		W43		W43		W44		W44	
	Quarter:	3rd		1st		2nd		3rd		1st		2nd		3rd		1st		1st	
	Sample ID:	W41GE0-1		W42GB0-1		W42GC0-1		W42GE0-1		W43GB0-1		W43GC0-1		W43GE0-1		W44GB0-1		W44GB1-1	
Parameter Name	Units																		
VOCs																			
1,1-Dichloroethane	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
1,2-Dichloroethene (total)	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Acetone	ug/l	1.	U	1.	U	4.		3.		1.	U	1.	U	2.	U	1.	U	0.9	U
Benzene	ug/l	1.	U	1.	U	1.	U	0.1	J	1.	U	1.	U	1.	U	0.2	J	1.	U
Carbon Disulfide	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Ethylbenzene	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Methylene Chloride	ug/l	0.8	J	1.	U	1.	U	2.		1.	U	1.	U	1.		1.	U	1.	U
Toluene	ug/l	1.	U	0.2	J	1.	U	1.	U	1.	U	1.	U	1.	U	0.3	J	0.2	J
Trichloroethene	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Vinyl Chloride	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Xylene (total)	ug/l	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
SVOCs																			
Acenaphthene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Anthracene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Bis(2-Ethylhexyl)phthalate	ug/l	10.	U	4.	J	10.	U	10.	U	14.		10.	U	10.	U	10.	U	9.	J
Butylbenzylphthalate	ug/l	10.	U	10.	U	10.	U	1.	J	10.	U	10.	U	10.	U	10.	U	10.	U
Di-n-butylphthalate	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Diethylphthalate	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Dimethylphthalate	ug/l	10.	U	10.	U	370.		10.	U	10.	U	87.		10.	U	10.	U	10.	U
Fluoranthene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
N-Nitrosodiphenylamine	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Naphthalene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenanthrene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenol	ug/l	7.	J	10.	U	10.	U	10.	U	10.	U	10.	U	10.	J	10.	U	10.	U
Pyrene	ug/l	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Pesticides/PCBs																			
4,4-DDD	ug/l	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Aldrin	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-BHC	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-Chlordane	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
delta-BHC	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	ug/l	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
gamma-BHC (Lindane)	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Gamma-Chlordane	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	ug/l	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	ug/l	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Total Petroleum Hydrocarbons																			
TPH-D	ug/l	NA		50.	U	50.	U	NA		50.	U	50.	U	NA		50.	U	50.	U
Dissolved Metals																			
Dissolved Aluminum	mg/l	0.0565	UN	0.0667	B	0.0741	U	0.0589	BN	0.063	B	0.151	B	0.0571	BN	NA		NA	
Dissolved Antimony	mg/l	0.0286	UN	0.031	UN	0.031	U	0.0338	BN	0.031	UN	0.031	U	0.0286	UN	NA		NA	
Dissolved Arsenic	mg/l	0.0031	UN	0.0044	BW	0.02	U	0.0078	BN	0.002	UW	0.02	UW	0.0031	UN	NA		NA	
Dissolved Barium	mg/l	0.0779	BEN	0.103	B	0.0824	B	0.104	BEN	0.0514	B	0.0617	B	0.0441	BEN	NA		NA	
Dissolved Beryllium	mg/l	0.004	UN	0.001	U	0.001	U	0.0042	BN	0.001	U	0.001	U	0.0043	BN	NA		NA	

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W41		W42		W42		W42		W43		W43		W43		W44		W44	
	Quarter:	3rd		1st		2nd		3rd		1st		2nd		3rd		1st		1st	
	Sample ID:	W41GE0-1		W42GB0-1		W42GC0-1		W42GE0-1		W43GB0-1		W43GC0-1		W43GE0-1		W44GB0-1		W44GB1-1	
Parameter Name	Units																		
Dissolved Metals																			
Dissolved Cadmium	mg/l	0.03	U	0.004	U	0.004	U	0.03	U	0.004	U	0.0081	U	0.012	U	NA		NA	
Dissolved Calcium	mg/l	1,750.		438.		289.		421.		672.		778.		505.		NA		NA	
Dissolved Chromium	mg/l	0.0023	U	0.003	U	0.003	U	0.0023	U	0.003	U	0.003	U	0.0023	U	NA		NA	
Dissolved Cobalt	mg/l	0.0207	BN	0.002	U	0.002	B	0.0034	BN	0.002	U	0.0024	B	0.0027	BN	NA		NA	
Dissolved Copper	mg/l	0.0004	UN	0.0023	B	0.01	U	0.0014	BN	0.002	U	0.002	U	0.0004	UN	NA		NA	
Dissolved Iron	mg/l	24.7	N	0.0476	BN	0.0661	B	15.3	N	0.592	N	1.55		9.61	N	NA		NA	
Dissolved Lead	mg/l	0.04	UN	0.016	B	0.01	U	0.04	UN	0.01	U	0.0252	BW	0.016	UN	NA		NA	
Dissolved Magnesium	mg/l	1,550.		1,430.		722.		1,500.		1,690.		1,800.		1,870.		NA		NA	
Dissolved Manganese	mg/l	5.74	N	1.53		0.571		1.33	N	1.15		1.35		1.15	N	NA		NA	
Dissolved Nickel	mg/l	0.0098	B	0.007	U	0.007	U	0.0039	B	0.007	U	0.007	U	0.0041	B	NA		NA	
Dissolved Potassium	mg/l	156.	BE	372.		200.		523.	E	310.		275.		584.	E	NA		NA	
Dissolved Selenium	mg/l	0.115	UN	0.0305	BEN	0.02	UEN	0.115	UN	0.03	UNW	0.02	UEN	0.046	UN	NA		NA	
Dissolved Silver	mg/l	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	NA		NA	
Dissolved Sodium	mg/l	12,900.	E	12,000.		6,630.		14,000.	E	13,500.		14,300.		20,100.	E	NA		NA	
Dissolved Thallium	mg/l	0.179	B	0.003	UEN	0.02	UNW	0.342	B	0.03	UEN	0.02	UNW	0.04	U	NA		NA	
Dissolved Vanadium	mg/l	0.0014	UN	0.0041	B	0.005	B	0.0034	BN	0.003	B	0.0025	B	0.0014	UN	NA		NA	
Dissolved Zinc	mg/l	0.0105	U	0.0041	B	0.0047	B	0.0124	B	0.0022	B	0.0024	B	0.0101	B	NA		NA	
Total Metals																			
Aluminum	mg/l	56.9		0.194	B	5.18		0.0831	U	0.238		17.4		0.367		0.121	B	0.318	
Antimony	mg/l	0.0438	B	0.031	UN	0.031	U	0.0286	U	0.031	UN	0.031	U	0.0286	U	0.031	UN	0.031	UN
Arsenic	mg/l	0.0128		0.02	UW	0.02	UW	0.0087	B	0.02	UW	0.02	UW	0.005	B	0.0056	U	0.0064	U
Barium	mg/l	0.356	E	0.109	B	0.105	B	0.104	BE	0.0527	B	0.156	B	0.0425	BE	0.339		0.351	
Beryllium	mg/l	0.0047	B	0.001	U	0.001	U	0.0044	B	0.001	U	0.001	U	0.0057		0.001	U	0.001	U
Cadmium	mg/l	0.012	U	0.004	U	0.004	U	0.03	U	0.004	U	0.004	U	0.0006	U	0.004	U	0.004	U
Calcium	mg/l	2,010.		466.		310.		392.		683.		837.		445.		1,240.		1,270.	
Chromium	mg/l	0.288		0.003	U	0.003	U	0.0023	U	0.003	U	0.0197		0.0023	U	0.0131		0.0164	
Cobalt	mg/l	0.0494	B	0.002	U	0.002	U	0.0036	B	0.002	U	0.0079	B	0.0023	B	0.002	U	0.002	U
Copper	mg/l	0.101		0.002	U	0.0136	U	0.00096	B	0.0024	U	0.0164	U	0.0004	U	0.002	U	0.0026	U
Iron	mg/l	95.7		2.45	N	8.1		13.1		0.929	N	21.1		1.53		0.556	N	0.963	N
Lead	mg/l	0.016	U	0.01	UW	0.0014	BNW*	0.04	U	0.01	UW	0.0182	BN*	0.04	U	0.001	UW	0.0029	BW
Magnesium	mg/l	1,480.		729.		803.		1,510.		1,670.		1,930.		1,850.		1,090.		1,080.	
Manganese	mg/l	7.17		1.56		0.861		1.28		1.18		1.72		1.1		1.84		1.93	
Mercury	mg/l	0.0001	U	0.0002	UN	0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0001	U	0.0002	UN	0.0002	UN
Nickel	mg/l	0.18		0.007	U	0.007	U	0.0047	B	0.007	U	0.007	U	0.0025	U	0.007	U	0.007	U
Potassium	mg/l	207.	E	389.		198.		549.	E	302.		290.		545.	E	42.5		42.3	
Selenium	mg/l	0.046	U	0.0553	N+	0.02	UEN	0.115	U	0.03	UEN	0.02	UEN	0.0023	U	0.03	UNW	0.03	UEN
Silver	mg/l	0.002	U	0.0021	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.008	B	0.0088	B
Sodium	mg/l	14,200.	E	5,950.		7,070.		14,400.	E	13,200.		15,100.		18,000.	E	5,330.		5,270.	
Thallium	mg/l	0.04	U	0.03	UEN	0.02	UEN	0.1	U	0.03	UEN	0.02	UEN	0.0073	U	0.03	UNW	0.003	UN
Vanadium	mg/l	0.123		0.0062	B	0.0169	B	0.004	B	0.0029	B	0.0409	B	0.0014	U	0.002	U	0.0022	U
Zinc	mg/l	0.253		0.001	U	0.0242	U	0.01	B	0.001	U	0.0565		0.0098	U	0.001	U	0.001	U
Cyanide																			
Cyanide	mg/l	0.005	U	0.011		0.0059	B	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Asbestos																			
Asbestos	part/l	2.	U	2.	U	17.	U	2.	U	2.	U	2.		2.	U	2.	U	2.	U

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W41	W42	W42	W42	W43	W43	W43	W44	W44
	Quarter:	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	1st
	Sample ID:	W41GE0-1	W42GB0-1	W42GC0-1	W42GE0-1	W43GB0-1	W43GC0-1	W43GE0-1	W44GB0-1	W44GB1-1
Parameter Name	Units									
Nitrogen										
Ammonia N	mg/l	1.5	3.2	1.6	2.9	0.66	0.31	0.68	0.05 U	1.9
Nitrate/Nitrite N	mg/l	0.1 U	0.1 U	0.25	0.1 U	0.1 U	0.1 U	0.1 U	0.84	0.27
Total Kjeldahl Nitrogen	mg/l	2.2	4.1	2.8	4.4	0.93	1.4	1.6	0.52	0.51
General Chemistry										
Bicarbonate Alkalinity	mg/l	370.	NA	810.	910.	NA	300.	3,000.	NA	NA
Carbonate Alkalinity	mg/l	2. U	1,100.	2. U	2. U	370.	2. U	2. U	800.	810.
Chlorides	mg/l	59,000.	50,000.	21,000.	32,000.	22,000.	58,000.	62,000.	15,000.	27,000.
pH	pH	6.4	7.3	7.6	7.1	7.	7.4	6.8	6.7	7.
Specific Conductance	umhos/cm	58,000.	61,000.	35,000.	53,000.	65,000.	83,000.	64,000.	36,000.	35,000.
Sulfate	mg/l	5,100.	1,300.	1,300.	2,500.	2,700.	3,500.	4,800.	730.	510.
Total Alkalinity as Carbonate	mg/l	370.	1,100.	810.	910.	370.	300.	3,000.	800.	810.
Total Dissolved Solids	mg/l	53,000.	44,000.	24,000.	44,000.	50,000.	53,000.	53,000.	27,000.	28,000.
Feasibility Study Analyses										
Biochemical Oxygen Demand	mg/l	NA	NA	3. U	NA	NA	3. U	NA	NA	NA
Chemical Oxygen Demand	mg/l	NA	NA	230.	NA	NA	230.	NA	NA	NA
Color	color	NA	NA	55.	NA	NA	20.	NA	NA	NA
Gross Alpha	pci/l	NA	NA	1. UJ	NA	NA	1. UJ	NA	NA	NA
Gross Beta	pci/l	NA	NA	290. J	NA	NA	280. J	NA	NA	NA
Phosphorous-P	mg/l	0.32	NA	NA	0.23	NA	NA	0.17	NA	NA
Silica	mg/l	NA	NA	17.9	NA	NA	16.5	NA	NA	NA
Total Organic Halogens	mg/l	NA	NA	0.26	NA	NA	0.19	NA	NA	NA
Total Suspended Solids	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turbidity	NTU	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W44		W44		W44		W45		W45		W45		W46		W46		W46	
	Quarter:	1st		2nd		3rd		1st		2nd		3rd		1st		2nd		3rd	
	Sample ID:	W44GC0-1		W44GD0-1		W44GE0-1		W45GB0-1		W45GC0-1		W45GE0-1		W46GB0-1		W46GC0-1		W46GE0-1	
Parameter Name	Units																		
VOCs																			
1,1-Dichloroethane	ug/l	NA		1.	U	1.	U	1.	U	1.	U	i.	U	1.	U	1.	U	1.	U
1,2-Dichloroethene (total)	ug/l	NA		1.	U	1.	U	1.	U	1.	U	i.	U	1.	U	1.	U	1.	U
Acetone	ug/l	NA		1.	U	2.	U	0.7	U	i.	U	0.8	UJ	0.9	U	1.	U	1.	U
Benzene	ug/l	NA		1.	U	1.	U	i.	U	i.	U	1.	U	1.	U	1.	U	1.	U
Carbon Disulfide	ug/l	NA		1.	U	i.	U	i.	U	0.2	BJ	1.	U	1.	U	1.	U	i.	U
Ethylbenzene	ug/l	NA		1.	U	i.	U	i.	U	i.	U	1.	U	1.	U	i.	U	i.	U
Methylene Chloride	ug/l	NA		1.	U	0.8	J	i.	U	0.4	J	0.4	J	1.	U	1.	U	1.	U
Toluene	ug/l	NA		1.	U	i.	U	i.	U	i.	U	1.	U	1.	U	1.	U	1.	U
Trichloroethene	ug/l	NA		1.	U	i.	U	i.	U	i.	U	1.	U	i.	U	i.	U	1.	U
Vinyl Chloride	ug/l	NA		1.	U	i.	U	i.	U	1.	U	1.	U	1.	U	1.	U	1.	U
Xylene (total)	ug/l	NA		1.	U	1.	U	i.	U	1.	U	1.	U	1.	U	1.	U	1.	U
SVOCs																			
Acenaphthene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Anthracene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Bis(2-Ethylhexyl)phthalate	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Butylbenzylphthalate	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Di-n-butylphthalate	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Diethylphthalate	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Dimethylphthalate	ug/l	NA		190.		10.	U	10.	U	180.		10.	U	10.	U	100.		10.	U
Fluoranthene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
N-Nitrosodiphenylamine	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Naphthalene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenanthrene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Phenol	ug/l	NA		10.	U	9.	J	10.	U	10.	U	10.	U	10.	U	10.	U	8.	J
Pyrene	ug/l	NA		10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U	10.	U
Pesticides/PCBs																			
4,4-DDD	ug/l	NA		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.0098	JP	0.1	U	0.1	U
Aldrin	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-BHC	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-Chlordane	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.066	P	0.05	U	0.05	U
delta-BHC	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.0058	JP	0.05	U	0.05	U
Dieldrin	ug/l	NA		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
gamma-BHC (Lindane)	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.021	J	0.05	U	0.05	U
Gamma-Chlordane	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.063		0.05	U	0.05	U
Heptachlor	ug/l	NA		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	ug/l	NA		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Total Petroleum Hydrocarbons																			
TPH-D	ug/l	NA		50.	U	NA		50.	U	50.	U	NA		50.	U	50.	U	NA	
Dissolved Metals																			
Dissolved Aluminum	mg/l	0.0967	B	0.187	B	0.0522	BN	0.0183	B	0.108	B	0.0558	UN	0.0495	B	0.064	U	0.0609	BN
Dissolved Antimony	mg/l	0.031	UN	0.031	U	0.0286	UN	0.031	UN	0.042	B	0.0351	BN	0.031	UN	0.031	U	0.0286	UN
Dissolved Arsenic	mg/l	0.0024	U	0.0034	B	0.0031	UN	0.011		0.002	UW	0.0031	UN	0.02	UW	0.02	UW	0.0031	UN
Dissolved Barium	mg/l	0.376		0.325		0.234	EN	0.0029	B	0.0503	B	0.0374	BEN	0.086	B	0.0685	B	0.0713	BEN
Dissolved Beryllium	mg/l	0.001	U	0.001	U	0.0019	BN	0.001	U	0.001	U	0.0044	UN	0.001	U	0.001	U	0.0035	UN

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W44		W44		W44		W45		W45		W45		W46		W46		W46	
	Quarter:	1st		2nd		3rd		1st		2nd		3rd		1st		2nd		3rd	
	Sample ID:	W44GC0-1		W44GD0-1		W44GE0-1		W45GB0-1		W45GC0-1		W45GE0-1		W46GB0-1		W46GC0-1		W46GE0-1	
Parameter Name	Units																		
Dissolved Metals																			
Dissolved Cadmium	mg/l	0.004	U	0.0082	U	0.012	U	0.004	U	0.0065	U	0.006	U	0.004	U	0.004	U	0.0006	U
Dissolved Calcium	mg/l	1,190.		1,210.		2,430.		73.3		1,840.		904.		413.		488.		405.	
Dissolved Chromium	mg/l	0.0038	B	0.0108		0.0023	U	0.003	U	0.0174		0.0023	U	0.003	U	0.003	U	0.0023	U
Dissolved Cobalt	mg/l	0.002	U	0.0059	U	0.0024	BN	0.002	U	0.0035	U	0.0024	BN	0.002	U	0.002	U	0.0023	UN
Dissolved Copper	mg/l	0.002	U	0.0037	U	0.0027	BN	0.002	U	0.0044	U	0.0004	UN	0.002	U	0.002	U	0.0004	UN
Dissolved Iron	mg/l	0.0584	BN	0.34		9.26	N	0.0291	BN	0.419		4.33	N	2.05	N	1.83		3.32	N
Dissolved Lead	mg/l	0.01	U	0.01	U	0.016	UN	0.01	U	0.01	U	0.006	UN	0.01	U	0.01	U	0.008	UN
Dissolved Magnesium	mg/l	903.		1,040.		2,150.		64.8		1,440.		741.		1,170.		1,280.		1,160.	
Dissolved Manganese	mg/l	1.62		1.75		1.63	N	0.0858		1.08		1.06	N	2.23		1.87		2.24	N
Dissolved Nickel	mg/l	0.007	U	0.007	U	0.0107	B	0.007	U	0.007	U	0.0056	B	0.007	U	0.007	U	0.0025	U
Dissolved Potassium	mg/l	38.9		40.4		79.6	E	3.89	B	65.3		65.8	E	318.		307.		480.	E
Dissolved Selenium	mg/l	0.03	UEN	0.0377	BN	0.046	UN	0.0412	BEN	0.02	UN	0.023	UN	0.0368	BEN	0.02	UEN	0.0023	UN
Dissolved Silver	mg/l	0.0043	B	0.0054	B	0.002	U	0.002	U	0.0063	B	0.002	U	0.002	U	0.002	U	0.002	U
Dissolved Sodium	mg/l	4,500.		5,170.		13,800.	E	505.		10,800.		7,040.	E	9,450.		10,400.		10,300.	E
Dissolved Thallium	mg/l	0.03	UNW	0.02	UNW	0.0504	B	0.03	UEN	0.02	UNW	0.0204	B	0.03	UEN	0.02	UNW	0.0071	B
Dissolved Vanadium	mg/l	0.002	U	0.002	U	0.0014	UN	0.002	U	0.002	U	0.0014	UN	0.0023	B	0.0029	B	0.0014	UN
Dissolved Zinc	mg/l	0.0032	B	0.0135	B	0.0049	B	0.001	U	0.0032	U	0.0076	U	0.001	U	0.001	U	0.0047	U
Total Metals																			
Aluminum	mg/l	NA		1.46		1.86		0.12	B	4.94		2.68		1.19		1.15		0.2	
Antimony	mg/l	NA		0.031	U	0.0286	U	0.031	UN	0.031	U	0.0286	U	0.031	UN	0.031	U	0.0286	U
Arsenic	mg/l	NA		0.02	U	0.0031	U	0.002	UW	0.02	UW	0.0031	U	0.02	U	0.002	UW	0.0031	U
Barium	mg/l	NA		0.336		0.252	E	0.0435	B	0.0713	B	0.0511	BE	0.0916	B	0.0763	B	0.0735	BE
Beryllium	mg/l	NA		0.001	U	0.0027	B	0.001	U	0.001	U	0.0047	B	0.001	U	0.001	U	0.0038	U
Cadmium	mg/l	NA		0.004	U	0.0041	B	0.004	U	0.004	U	0.03	U	0.004	U	0.004	U	0.0006	U
Calcium	mg/l	NA		1,250.		1,280.		1,610.		1,920.		1,840.		439.		486.		379.	
Chromium	mg/l	NA		0.0211		0.0119		0.0197		0.0314		0.0053	B	0.003	U	0.003	U	0.0023	U
Cobalt	mg/l	NA		0.002	U	0.0038	B	0.002	U	0.0025	B	0.0038	B	0.002	U	0.002	U	0.0023	U
Copper	mg/l	NA		0.005	U	0.0012	B	0.002	U	0.006	U	0.0026	B	0.0034	U	0.002	U	0.0004	U
Iron	mg/l	NA		2.11		2.95		0.633	N	6.84		18.3		6.03	N	4.03		3.55	
Lead	mg/l	NA		0.001	UNW*	0.0008	U	0.01	UW	0.01	UN*	0.04	U	0.01	UW	0.01	UN*	0.008	U
Magnesium	mg/l	NA		1,100.		1,100.		1,370.		1,510.		1,490.		1,240.		1,370.		1,120.	
Manganese	mg/l	NA		1.77		1.71		1.39		1.14		0.98		2.38		1.96		2.23	
Mercury	mg/l	NA		0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0001	U	0.0002	UN	0.0001	U	0.0001	U
Nickel	mg/l	NA		0.007	U	0.0148	B	0.007	U	0.007	U	0.0073	B	0.007	U	0.007	U	0.0025	U
Potassium	mg/l	NA		39.4		90.8	E	69.9		86.5		122.	BE	322.		319.		520.	E
Selenium	mg/l	NA		0.02	UNW	0.0023	U	0.03	UNS	0.02	UNW	0.115	U	0.03	UN+	0.0276	BEN	0.0023	U
Silver	mg/l	NA		0.0064	B	0.002	U	0.0109		0.0102		0.002	U	0.002	U	0.002	U	0.002	U
Sodium	mg/l	NA		5,450.		7,430.	E	10,300.		11,200.		12,500.	E	9,780.		11,000.		12,400.	E
Thallium	mg/l	NA		0.02	UEN	0.006	U	0.03	UNW	0.02	UNW	0.1	U	0.03	UNW	0.02	UEN	0.002	U
Vanadium	mg/l	NA		0.004	B	0.005	B	0.002	U	0.0132	B	0.0069	B	0.0159	B	0.0089	B	0.0014	U
Zinc	mg/l	NA		0.0151	U	0.01	U	0.0022	U	0.0245	U	0.0201		0.0046	U	0.0031	U	0.0046	U
Cyanide																			
Cyanide	mg/l	NA		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Asbestos																			
Asbestos	part/l	NA		2.	U	2.	U	2.	U	3.		NA		2.	U	1.	U	2.	U

Table 4-19
Summary of Analytes Detected in Groundwater - Site 7 - Quarters 1, 2, and 3
NWS Seal Beach
RI Report

	Station ID:	W44	W44	W44	W45	W45	W45	W46	W46	W46
	Quarter:	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
	Sample ID:	W44GC0-1	W44GD0-1	W44GE0-1	W45GB0-1	W45GC0-1	W45GE0-1	W46GB0-1	W46GC0-1	W46GE0-1
Parameter Name	Units									
Cyanide										
Cyanide	mg/l	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Asbestos										
Asbestos	part/l	NA	2. U	2. U	2. U	3.	NA	2. U	1. U	2. U
Nitrogen										
Ammonia N	mg/l	NA	0.1 U	0.05 U	0.28	0.16	0.05 U	0.83	0.52	0.94
Nitrate/Nitrite N	mg/l	NA	2.9	1.6	0.1 U	3.1	4.6	0.1 U	0.1 U	0.1 U
Total Kjeldahl Nitrogen	mg/l	NA	0.43	0.6	0.39	0.41	0.43	1.1	0.05 U	1.5
General Chemistry										
Bicarbonate Alkalinity	mg/l	NA	750.	900.	NA	88.	170.	NA	250.	330.
Carbonate Alkalinity	mg/l	NA	2. U	2. U	150.	2. U	2. U	310.	2. U	2. U
Chlorides	mg/l	NA	24,000.	29,000.	23,000.	38,000.	31,000.	56,000.	46,000.	42,000.
pH	pH	NA	7.1	6.6	5.8	6.2	6.2	7.1	7.1	7.1
Specific Conductance	umhos/cm	NA	33,000.	33,000.	53,000.	72,000.	57,000.	47,000.	56,000.	46,000.
Sulfate	mg/l	NA	420.	540.	2,900.	2,900.	3,200.	2,600.	3,000.	2,900.
Total Alkalinity as Carbonate	mg/l	NA	750.	900.	150.	88.	170.	310.	250.	330.
Total Dissolved Solids	mg/l	NA	25,000.	32,000.	41,000.	47,000.	52,000.	37,000.	43,000.	37,000.
Feasibility Study Analyses										
Biochemical Oxygen Demand	mg/l	NA	3. U	NA	NA	3. U	NA	NA	3. U	NA
Chemical Oxygen Demand	mg/l	NA	120.	NA	NA	5,000. U	NA	NA	120.	NA
Color	color	NA	5. U	NA	NA	10.	NA	NA	25.	NA
Gross Alpha	pci/l	NA	200. J	NA	NA	1. UJ	NA	NA	1. UJ	NA
Gross Beta	pci/l	NA	4. UJ	NA	NA	4. UJ	NA	NA	340. J	NA
Phosphorous-P	mg/l	NA	NA	0.1 U	NA	NA	0.1 U	NA	NA	0.19
Silica	mg/l	NA	22.9	NA	NA	11.6	NA	NA	12.8	NA
Total Organic Halogens	mg/l	NA	0.16	NA	NA	0.26	NA	NA	0.22	NA
Total Suspended Solids	mg/l	NA*	NA	NA	NA	NA	NA	NA	NA	NA
Turbidity	NTU	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

* Naturally occurring concentrations are values from literature (Dragun, 1988).

NA = Not analyzed for that sample.

Qualifiers:

Organic Compounds

B = Analyte found in laboratory blank

J = Estimated value - below the contract required quantitation limit and above the method detection limit.

P = Quantitative value from the two analytical columns differs by greater than 25 percent (potential false positive)

U = Not detected

Inorganic Compounds

* = Duplicate analysis not within control limits

+ = Correlation coefficient for Method of Standard Addition less than 0.995

B = Estimated - below the contract required detection limit and above the instrument detection limit

E = Reported value estimated due to interference

N = Spiked sample recovery not within control limits

S = Reported value determined by the Method of Standard Addition

U = Not detected

W = Post digestion spike out of control limits while sample absorbance less than 50 percent spike absorbance

Complete laboratory analytical data are provided in Appendix F.

Appendix B-3: Analytical Results for Metals, Phase II Sampling

Table B-1
Analytical Results for Metals, Phase II Sampling
(µg/kg)

SAMPLE_ID	SAMPLE_COMMENT	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	COBALT	COPPER	LEAD	MANGANESE	MERCURY	NICKEL	POTASSIUM	SELENIUM	SILVER	ZINC
BIOLOGICAL																	
01E01MA0M	HOUSE MOUSE	2.1 UJ	1.1 U	2 B	0.1 U	0.16 U	0.38 U	0.54 U	2.7 B	0.5 U	1.3 B	0.06 U	0.56 U	2190	0.26 UJ	0.4 U	22.7
01E01MA0R	WESTERN HARVEST MOUSE	2.1 UJ	1.1 U	3.4 B	0.08 U	0.16 U	1.1 B	0.54 U	4.8 B	0.5 U	2.3 B	0.28 U	0.56 U	2670	0.26 UJ	0.4 U	31.9
01E01PA0L	RADISH LEAVES	2.1 UJ	1.1 U	6.1 B	0.06 U	0.16 U	0.38 U	0.54 U	3.3 B	0.5 U	12	0.05 U	0.56 U	2300	0.26 UJ	0.4 U	5.3
01E01PA0R	RADISH PODS	2.1 UJ	1.1 U	0.66 B	0.06 U	0.16 U	0.38 U	0.54 U	6.1	0.5 U	2 B	0.05 U	0.56 U	1500	0.26 UJ	0.4 U	6.1
01E02MA0M	HOUSE MOUSE	2.1 UJ	1.1 U	1.7 B	0.11 U	0.16 U	0.38 U	0.54 U	3 B	1.6	1.8 B	0.09 U	0.56 U	2320	0.28 BWJ	0.4 U	21.9
01E02MA0R	WESTERN HARVEST MOUSE	2.1 UJ	1.1 U	2 B	0.12 U	0.16 U	0.38 U	0.54 U	3.9 B	0.5 U	2 B	0.07 U	0.56 U	2230	0.26 UWJ	0.4 U	28.9
01E02PA0L	RADISH LEAVES	2.1 UJ	1.1 U	4.8 B	0.06 U	0.16 U	0.38 U	0.54 U	4.3 B	0.52 U	11.7	0.05 U	0.56 U	2690	0.26 UJ	0.4 U	11.3
01E02PA0R	RADISH PODS	2.1 UJ	1.1 U	2.2 B	0.09 B	0.16 U	0.38 U	0.54 U	18.5	0.5 U	4.6	0.05 U	0.56 U	2950	0.26 UJ	0.4 U	6.4
01E03MA0M	HOUSE MOUSE	2.1 UJ	1.1 U	1.5 B	0.12 B	0.16 U	0.38 U	0.54 U	2.9 B	0.5 U	0.78 B	0.06 U	0.61 B	1990	0.26 UWJ	0.4 U	30.1
01E03MA0R	WESTERN HARVEST MOUSE	2.1 UJ	1.1 U	2.5 B	0.1 U	0.16 U	1.2 B	0.54 U	5.4	0.5 U	2 B	0.08 U	0.56 U	2870	0.7 UWJ	0.4 U	54.7
01E03PA0L	RADISH LEAVES	2.1 UJ	1.1 U	3 B	0.06 U	0.16 U	0.38 U	0.54 U	4 B	0.5 U	8.9	0.05 U	0.56 U	2600	0.26 UJ	0.4 U	16.6
01E03PA1L DUP	RADISH LEAVES	2.1 UJ	1.1 U	4.4 B	0.06 U	0.16 U	0.47 B	0.54 U	11.3	0.5 U	8.8	0.05 U	0.91 B	2260	0.39 BJ	0.4 U	27.3
01E03PA0R	RADISH PODS	2.1 UJ	1.1 U	2.9 B	0.07 B	0.16 U	0.42 B	0.54 U	1.6 B	0.5 U	6	0.05 U	0.56 U	3690	0.26 UJ	0.4 U	12.7
01E04IA0I	MIXED	2.1 UJ	1.1 U	1.5 B	0.06 U	0.16 U	0.38 U	0.54 U	10.9	0.93 U	9.4	0.05 U	0.56 U	3070	0.26 UJ	0.4 U	56.9
01E04IA0S	SOWBUGS	2.1 UJ	1.1 U	74.7	0.06 U	0.2 U	0.93 B	0.54 U	171	0.5 U	11.3	0.05 U	0.56 U	2430	0.26 UJ	0.4 U	61.6
01E04PA0O	OAT SEED	2.1 UJ	1.1 U	1.7 B	0.06 U	0.16 U	0.38 U	0.54 U	189	7.2	38.3	0.05 U	2.7 B	3330	0.26 UWJ	0.4 U	124
01E04PA0S	RYE SEED	2.1 UJ	1.1 U	10.4 B	0.06 U	0.16 U	0.38 U	0.54 U	3.1 B	0.5 U	30.7	0.05 U	0.56 U	2590	0.26 UWJ	0.4 U	17.2
07E01MA0M	HOUSE MOUSE	2.1 UJ	1.1 U	1.3 B	0.1 U	0.16 U	0.38 U	0.54 U	2.6 B	0.5 U	0.92 B	0.06 U	0.6 B	2290	0.26 BJ	0.4 U	41.3
07E01MA1M DUP	DUP OF 07E01MA0R	2.1 UJ	1.1 U	1.2 B	0.07 U	0.16 U	0.38 U	0.54 U	2.4 B	0.5 U	1.2 B	0.08 U	0.56 U	2290	0.26 BJ	0.4 U	40.6
07E01MA0R	WESTERN HARVEST MOUSE	2.1 UJ	1.1 U	1 B	0.09 U	0.16 U	0.38 U	0.54 U	3.1 B	0.5 U	1.9 B	0.12 U	0.56 U	2210	0.32 BWJ	0.4 U	51.3
07E01PA0C	CLOVER	2.1 UJ	1.1 U	2 B	0.06 U	0.16 U	0.38 U	0.54 U	5.8	0.5 U	5.4	0.05 U	0.56 U	3810	0.26 UJ	0.4 U	9.5
07E01PA0D	DOCK	2.1 UJ	1.1 U	9.4 B	0.06 U	0.16 U	0.38 U	0.54 U	12.7	0.5 U	60.5	0.05 U	0.56 U	2620	0.26 UJ	0.4 U	21
07E01PA0S	CLOVER SEED	2.1 UJ	1.1 U	1.3 B	0.06 U	0.16 U	0.38 U	0.54 U	5.9	0.5 U	4.9	0.05 U	0.56 U	3390	0.26 UJ	0.4 U	10.5
07E02MA0M	HOUSE MOUSE	2.1 UJ	1.1 U	1.8 B	0.12 U	0.16 U	0.38 U	0.54 U	5 B	1.2	1.2 B	0.06 U	0.56 U	2640	0.4 BWJ	0.4 U	60.5
07E02MA0R	WESTERN HARVEST MOUSE	2.1 UJ	1.1 U	1.3 B	0.16 U	0.16 U	0.38 U	0.54 U	45.2	1.4	1.9 B	0.08 U	0.73 B	2080	0.26 UWJ	0.4 U	77.3
07E02PA0C	CLOVER	2.1 UJ	1.1 U	1.6 B	0.06 U	0.16 U	0.38 U	0.54 U	4.7 B	0.5 U	6.6	0.05 U	0.56 U	3930	0.26 UJ	0.4 U	8.2
07E02PA0D	DOCK	2.1 UJ	1.1 U	5.7 B	0.06 U	0.16 U	0.38 U	0.54 U	5.7	0.5 U	31.4	0.05 U	0.56 U	2650	0.26 UJ	0.4 U	10
07E02PA0S	CLOVER SEED	2.1 UJ	1.1 U	0.83 B	0.06 U	0.16 U	0.38 U	0.54 U	27.7	0.65 U	7	0.05 U	2.1 B	3210	0.26 UJ	0.4 U	28.3
07E04IA0I	MIXED	2.1 UJ	1.1 U	4.1 B	0.06 U	0.55 U	0.38 U	0.54 U	30.9	0.54 U	17.3	0.08 U	0.56 U	2980	0.26 UJ	0.43 B	68
SURFACE SOIL																	
01E01SA0.1		6.2 UN	4.8	156	0.73	0.5 U	27 *	10.7	36.1 *	17.7	561 E	0.1 U	19.2	6090	0.96 N	1.2 U	93.2 E
01E02SA0.1		6.2 UN	4	144	0.72	0.5 U	117 *	10.9	167 *	26.7	537 E	0.1 U	19.2	5830	0.62 UN	1.2 U	170 E
01E03SA0.1		5.9 UN	32.5	166	0.63	0.98	710 *	24.6	592 *	122	555 E	0.15	110	5480	0.61 N	1.2 U	843 E
01E03SA1.1		5.9 UN	29.8	160	0.65	1.3	962 *	21.1	768 *	146	569 E	0.16	120	5690	0.9 N	1.2 U	917 E
07E01SA0.1		6.3 UN	2.7 U	79.4	0.46 B	0.51 U	21.5 *	8.5	24.1 *	18.4	386 E	0.11 U	12.5	4930	0.63 UN	2.3	79 E
07E01SA3.1		6.4 UN	2.9 U	87.1	0.45 B	0.51 U	18.2 *	7.4	19.7 *	17.9	396 E	0.11 U	11.9	4990	1.1 N	1.3 U	78.7 E
07E01SA3.1_MS		12.63 N	6.74	311.89	6.01	5.16	41.38	63.57	50.03	21.82	427.21	0.61	67.61	10296.22	1.88 N	5.72	131.34
07E02SA0.1		6.5 UN	2.1 U	75.2	0.42 B	0.52 U	16.1 *	7.2	16.2 *	31	346 E	0.11 U	11.9	5030	0.65 UN	1.3 U	69.9 E
07E03SA0.1		6.6 UN	8.5	123	0.76	0.53 U	59.3 *	12	54.7 *	72.4	549 E	0.11 U	20.2	7060	0.66 UN	2.9	295 E

Note: SAMPLE_ID code indicates Site Number in first 2 characters, environmental (E) in third character and Area Number in fourth through fifth character.
For example, 07E03 is a Site 7 ecological sample taken from area 3.

Table B-2
Analytical Results for Organics, Phase II Sampling
(µg/kg)

SAMPLE_ID	SAMPLE_COMMENT	1-METHYLNAPHTHALENE	2,4'-DDD (O,P'-DDD)	2,4'-DDE (O,P'-DDE)	2,4'-DDT (O,P'-DDT)	2-METHYLNAPHTHALENE	4,4'-DDD	4,4'-DDE	4,4'-DDT	ACENAPHTHENE
BIOTOLOGICAL										
01E01MA0M	HOUSE MOUSE	13 U	1.6 U	5.7 U	2.5 U	13 U	0.72 U	1 U	1.3 U	34 U
01E01MA0R	WESTERN HARVEST MOUSE	130 U	4.1 U	14 U	6.1 U	130 U	1.8 U	2.5 U	3.3 U	340 U
01E01PA0L	RADISH LEAVES	13 U	1.6 U	5.7 U	2.5 UJ	13 U	0.72 U	1 U	1.3 U	34 U
01E01PA0R	RADISH PODS	13 U	1.6 U	5.7 U	4.3 PJ	13 U	0.72 U	1 U	1.3 U	34 U
01E02MA0M	HOUSE MOUSE	52 U	1.6 U	5.7 U	2.5 U	54 U	0.72 U	1 U	3 P	130 U
01E02MA0R	WESTERN HARVEST MOUSE	52 U	2 U	6.9 U	3 U	54 U	0.88 U	2.8 P	1.6 U	130 U
01E02PA0L	RADISH LEAVES	13 U	1.6 U	5.7 U	2.5 UJ	13 U	0.72 U	3.6	1.3 U	34 U
01E02PA0R	RADISH PODS	13 U	1.6 U	5.7 U	2.5 UJ	13 U	0.72 U	1 U	1.3 U	34 U
01E03MA0M	HOUSE MOUSE	52 U	1.6 U	5.7 U	2.5 U	54 U	0.72 U	1.9 P	1.6	130 U
01E03MA0R	WESTERN HARVEST MOUSE	130 U	31 U	110 U	47 U	130 U	14 U	19 U	25 U	340 U
01E03PA0L	RADISH LEAVES	52 U	1.6 U	5.7 U	2.5 UJ	54 U	0.72 U	2.7	1.3 U	130 U
01E03PA1L DUP	RADISH LEAVES	13 U	1.6 U	5.7 U	2.5 U	13 U	0.72 U	7.2	1.3 UJ	34 U
01E03PA0R	RADISH PODS	13 U	1.6 U	5.7 U	2.5 UJ	13 U	0.72 U	15 P	1.3 U	34 U
01E04IA0I	MIXED	130 U	5.4 U	18 U	10	130 U	2.4 U	31 P	4.3 U	340 U
01E04IA0S	SOWBUGS	52 U	3.3 U	11 U	5 U	54 U	1.4 U	35	2.7 UJ	130 U
01E04PA0O	OAT SEED	130 U	6.6 U	23 U	10 U	130 U	2.9 U	4 U	5.3 UJ	340 U
01E04PA0S	RYE SEED	13 U	1.6 U	5.7 U	2.5 U	13 U	0.72 U	2.3	1.3 U	34 U
07E01MA0M	HOUSE MOUSE	52 U	1.6 U	5.7 U	2.5 U	54 U	0.72 U	1 U	1.3 U	130 U
07E01MA1M DUP	DUP OF 07E01MA0R	13 U	1.6 U	5.7 U	2.5 U	13 U	0.72 U	1 P	1.3 U	34 U
07E01MA0R	WESTERN HARVEST MOUSE	52 U	1.6 U	5.7 U	2.5 U	54 U	0.72 U	1.1	1.3 U	130 U
07E01PA0C	CLOVER	13 U	1.6 U	5.7 U	2.5 UJ	13 U	0.72 U	1 U	1.3 U	34 U
07E01PA0D	DOCK	13 U	1.6 U	5.7 U	2.5 U	20 Q	0.72 U	4.4	3.1	34 U
07E01PA0S	CLOVER SEED	52 U	1.6 U	5.7 U	2.5 UJ	54 U	0.72 U	1 U	1.3 U	130 U
07E02MA0M	HOUSE MOUSE	26 U	1.6 U	5.7 U	2.5 U	27 U	0.72 U	1 U	1.3 U	67 U
07E02MA0R	WESTERN HARVEST MOUSE	13 U	1.7 U	5.9 U	2.6 U	13 U	0.75 U	10	1.4 U	34 U
07E02PA0C	CLOVER	52 U	6.6 U	23 U	10 UJ	54 U	2.9 U	4 U	5.3 U	130 U
07E02PA0D	DOCK	13 U	1.6 U	5.7 U	2.5 U	13 U	0.72 U	2.4	1.3 U	34 U
07E02PA0S	CLOVER SEED	52 U	6.6 U	23 U	10 UJ	54 U	2.9 U	4 U	5.3 U	130 U
07E04IA0I	MIXED	130 U	7 U	24 U	10 U	130 U	3 U	4.2 U	5.6 U	340 U
SURFACE SOIL										
01E01SA0.1							4.15 U	10.2	10.5	104 U
01E02SA0.1							4.14 U	7.81	3.29 J	104 U
01E03SA0.1							31.5	302 D	234 D	97.8 U
01E03SA1.1							30	342 D	265 D	98.2 U
07E01SA0.1							4.22 U	2.79 J	4.22 U	105 U
07E01SA3.1							4.25 U	2.87 J	4.25 U	106 U
07E01SA3.1_MS MS									48.5	
07E01SA3.1_MSD MSD									41.8	
07E02SA0.1							4.35 U	3.61 J	4.35 U	109 U
07E03SA0.1							2.19 J	7.34	4.28 J	110 U

Note: SAMPLE_ID code indicates Site Number in first 2 characters, environmental (E) in third character and Area Number in fourth through fifth character.
For example, 07E03 is a Site 7 ecological sample taken from area 3.

ACENAPHTHYLENE	ALDRIN	ALPHA-CHLORDANE	ANTHRACENE	BENZO(A)ANTHRACENE	BENZO(A)PYRENE	BENZO(B)FLUORANTHENE	BENZO(GHI)PERYLENE	BENZO(K)FLUORANTHENE	BHC-ALPHA	BHC-BETA
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
710 U	1.8 P	2 U	30 U	31 U	33 U	63 U	63 U	32 U	5 U	6.4 P
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
72 U	7.8 P	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
290 U	0.38 U	0.84 U	12 U	12 U	13 U	25 U	25 U	13 U	2 U	0.88 U
290 U	0.46 U	1 U	12 U	12 U	13 U	25 U	25 U	13 U	2.5 U	1.1 U
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
290 U	0.38 U	0.84 U	12 U	12 U	13 U	25 U	25 U	13 U	2 U	0.88 U
710 U	7.1 U	16 U	30 U	31 U	33 U	63 U	63 U	32 U	39 U	16 U
290 U	0.38 U	0.84 U	12 U	39	45	38 Q	29 Q	20 Q	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	5 Q	6.9 Q	6.3 U	6.3 U	3.2 U	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
710 U	1.2 U	2.7 U	30 U	31 U	33 U	63 U	63 U	32 U	6.7 U	2.8 U
290 U	0.75 U	1.7 U	12 U	12 U	13 U	25 U	25 U	13 U	4.1 U	1.8 U
710 U	1.5 U	3.3 U	30 U	56 Q	59 Q	63 U	63 U	32 U	8.2 U	3.5 U
72 U	0.38 U	0.84 U	3 U	7.4 Q	7.8 Q	7.1 Q	6.3 U	3.6 Q	2 U	0.88 U
290 U	0.38 U	0.84 U	12 U	12 U	13 U	25 U	25 U	13 U	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
290 U	0.38 U	0.84 U	12 U	12 U	13 U	25 U	25 U	13 U	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	9.4 Q	8.2 Q	8.5 Q	6.6 Q	4.2 Q	2 U	0.88 U
72 U	0.38 U	0.84 U	3 U	3.1 U	4.3 Q	6.3 U	6.3 U	3.2 U	2 U	0.88 U
290 U	0.38 U	0.84 U	12 U	12 U	13 U	25 U	25 U	13 U	2 U	0.88 U
140 U	0.38 U	0.84 U	6.1 U	6.1 U	6.6 U	13 U	13 U	6.4 U	2 U	0.88 U
72 U	0.39 U	0.87 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2.1 U	0.91 U
290 U	1.5 U	3.3 U	12 U	14 Q	13 U	25 U	25 U	13 U	8.2 U	3.5 U
72 U	0.38 U	0.84 U	3 U	3.1 U	3.3 U	6.3 U	6.3 U	3.2 U	2 U	0.88 U
290 U	1.5 U	3.3 U	12 U	12 U	13 U	25 U	25 U	13 U	8.2 U	3.5 U
710 U	1.6 U	3.5 U	30 U	31 U	33 U	63 U	63 U	32 U	8.6 U	3.7 U
208 U	2.08 U	2.08 U	10.4 U	10.4 U	10.4 U	20.8 U	20.8 U	10.4 U	2.08 U	2.08 U
208 U	2.08 U	2.08 U	10.4 U	10.4 U	5.81 J	8.34 J	20.8 U	4.14 J	2.08 U	2.08 U
196 U	1.96 U	2.17	9.78 U	9.78 U	83.7	49.6	19.6 U	20.8	1.96 U	1.96 U
197 U	1.97 U	1.62 J	9.82 U	11.5	63.8	45.3	19.7 U	27.8	1.97 U	1.97 U
211 U	2.11 U	2.11 U	10.5 U	10.5 U	10.5 U	21.1 U	21.1 U	10.5 U	2.11 U	2.11 U
213 U	2.13 U	2.13 U	10.6 U	10.6 U	10.6 UJ	21.3 U	21.3 UJ	10.6 U	2.13 U	2.13 U
	19.2		21.4	26	22.7			25.3		
	16.4		26.8	29.3	25.6			28.4		
218 U	2.18 U	2.18 U	10.9 U	10.9 U	10.9 U	21.8 U	21.8 U	10.9 U	2.18 U	2.18 U
220 U	2.2 U	13.7	17.7	44.8	49.1	32	22 U	20.1	2.2 U	2.2 U

BHC-DELTA	BHC-GAMMA(LINDANE)	CHRYSENE	CIS-NONCHLOR	DIBENZO(A,H)ANTHRACENE	DIELDRIN	ENDOSULFAN I	ENDOSULFAN II	ENDOSULFAN SULFATE	ENDRIN	ENDRIN ALDEHYDE	ENDRIN KETONE
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
2.6 U	1 U	32 U	17 U	60 U	2 U	1 U	2.5 U	2.2 U	1.9 U	11 U	3.8 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	8.8 P	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	13 U	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.3 U	0.49 U	13 U	8.3 U	24 U	1 U	0.5 U	1.2 U	1.1 U	0.96 U	5.6 U	1.9 U
1.1 U	3.4 P	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	13 U	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
20 U	7.6 U	32 U	130 U	60 U	16 U	7.8 U	19 U	17 U	15 U	86 U	29 U
1.1 U	0.4 U	59	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	12	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 UJ	1.5 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
3.5 U	1.3 U	32 U	22 U	60 U	2.7 U	14 P	3.3 U	2.9 U	2.6 U	15 U	5 U
2.1 U	0.81 U	13 U	14 U	24 U	1.6 U	0.83 U	2 U	1.8 U	1.6 U	9.2 U	3.1 U
4.3 U	1.6 U	83 Q	27 U	60 U	3.3 U	1.7 U	4.1 U	3.6 U	3.2 U	18 UJ	6.1 U
1.1 U	0.4 U	11	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 UJ	1.5 U
1.1 U	0.4 U	13 U	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	1.4 P	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	13 U	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	11	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	3.6 Q	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	13 U	6.8 U	24 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.4 U	6.3 U	6.8 U	12 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
1.1 U	0.42 U	3.2 U	7.1 U	6 U	0.86 U	0.43 U	1.1 U	0.93 U	0.82 U	4.8 U	1.6 U
4.3 U	1.6 U	20 Q	27 U	24 U	3.3 U	1.7 U	4.1 U	3.6 U	3.2 U	18 U	6.1 U
1.1 U	0.4 U	3.2 U	6.8 U	6 U	0.82 U	0.42 U	1 U	0.89 U	0.79 U	4.6 U	1.5 U
4.3 U	1.6 U	13 U	27 U	24 U	3.3 U	1.7 U	4.1 U	3.6 U	3.2 U	18 U	6.1 U
4.5 U	1.7 U	32 U	29 U	60 U	3.5 U	1.7 U	4.3 U	3.7 U	3.3 U	19 U	6.4 U
2.08 U	2.08 U	3.06 J		20.8 U	4.15 U	2.08 U	4.15 U	4.15 U	4.15 U	4.15 U	4.15 U
2.08 U	2.08 U	9.28 J		20.8 U	4.14 U	2.08 U	4.14 U	4.14 U	4.14 U	4.14 U	4.14 U
1.96 U	1.96 U	40.1		19.6 U	6.23	1.96 U	2.51 JN	3.91 U	3.91 U	7.17	3.91 U
1.97 U	1.97 U	61.9		6.44 J	4.67	1.97 U	1.94 JN	3.93 U	2.12 J	6.42	3.93 U
2.11 U	2.11 U	10.5 U		21.1 U	4.22 U	2.11 U	4.22 U	4.22 U	4.22 U	4.22 U	4.22 U
2.13 U	2.13 U	10.6 U		21.3 U	4.25 U	2.13 U	4.25 U	4.25 U	4.25 U	4.25 U	4.25 U
	15.9	25.9			39.3				40.5		
	15.3	29.5			35.1				37		
2.18 U	2.18 U	10.9 U		21.8 U	4.35 U	2.18 U	4.35 U	4.35 U	4.35 U	4.35 U	4.35 U
2.2 U	2.2 U	134		22 U	2.83 J	2.2 U	4.39 U	4.39 U	4.39 U	1.73 J	4.39 U

FLUORANTHENE	FLUORENE	GAMMA-CHLORDANE	HEPTACHLOR	HEPTACHLOR EPOXIDE	HEXACHLOROBENZENE	INDENO(1,2,3-C,D)PYRENE	METHOXYCHLOR	MIREX	NAPHTHALENE	OXYCHLORDANE	PCB-1016
6 U	11 U	0.37 P	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 UJ	27 U	4.8 U	8.7 U
60 U	110 U	0.75 U	1.5 U	0.68 U	2.6 U	41 U	13 U	4 UJ	270 U	12 U	21 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	3.2 P	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	0.3 U	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 UJ	110 U	4.8 U	8.7 U
24 U	44 U	0.37 U	0.75 U	0.33 U	1.3 U	16 U	6.2 U	2 UJ	110 U	5.9 U	10 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	3.5	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	0.3 U	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 UJ	110 U	4.8 U	8.7 U
60 U	110 U	5.8 U	12 U	5.2 U	20 U	41 U	97 U	31 UJ	270 U	92 U	160 U
96	44 U	0.3 U	0.62 U	0.28 U	1.1 U	30 Q	5.1 U	1.6 U	110 U	4.8 U	8.7 U
15 Q	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.5 Q	5.1 U	1.6 U	27 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
60 U	110 U	1 U	2 U	0.9 U	3.4 U	41 U	17 U	5.3 U	270 U	16 U	28 U
24 U	44 U	0.61 U	1.2 U	0.55 U	2.1 U	16 U	10 U	3.3 U	110 U	9.7 U	17 U
110 Q	110 U	1.2 U	2.5 U	1.1 U	4.2 U	47 Q	20 U	6.5 U	270 U	19 U	35 U
15 Q	11 U	0.3 U	0.62 U	0.28 U	1.1 U	6.2 Q	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	0.3 U	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 UJ	110 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 UJ	27 U	4.8 U	8.7 U
24 U	44 U	2	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 UJ	110 U	4.8 U	8.7 U
19	11 U	0.3 U	0.62 U	0.28 U	1.1 U	6.8 Q	5.1 U	1.6 U	27 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	0.3 U	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 U	110 U	4.8 U	8.7 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	0.3 U	0.62 U	0.28 U	1.1 U	16 U	5.1 U	1.6 U	110 U	4.8 U	8.7 U
12 U	22 U	0.3 U	0.62 U	0.28 U	1.1 U	8.2 U	5.1 U	1.6 UJ	54 U	4.8 U	8.7 U
6 U	11 U	0.32 U	2.3	0.29 U	1.1 U	4.1 U	5.3 U	1.7 UJ	27 U	5 U	9 U
28 Q	44 U	1.2 U	2.5 U	1.1 U	4.2 U	16 U	20 U	6.5 U	110 U	19 U	35 U
6 U	11 U	0.3 U	0.62 U	0.28 U	1.1 U	4.1 U	5.1 U	1.6 U	27 U	4.8 U	8.7 U
24 U	44 U	1.2 U	2.5 U	1.1 U	4.2 U	16 U	20 U	6.5 U	110 U	19 U	35 U
60 U	110 U	1.3 U	2.6 U	1.2 U	4.4 U	41 U	22 U	6.9 U	270 U	20 U	36 U
20.8 U	20.8 U	2.08 U	2.08 U	2.08 U		10.4 U	20.8 U		104 U		41.1 U
13.3 J	20.8 U	2.08 U	2.08 U	2.08 U		7.71 J	20.8 U		104 U		41 U
8.86 J	19.6 U	4.87	1.96 U	4.67		9.78 U	19.6 U		97.8 U		38.7 U
29.7	19.7 U	3.2	1.97 U	2.99		44	19.7 U		98.2 U		38.9 U
21.1 U	21.1 U	0.732 J	2.11 U	0.921 J		10.5 U	21.1 U		105 U		41.8 U
21.3 U	21.3 U	2.13 U	2.13 U	0.991 J		10.6 U	21.3 U		106 U		42.1 U
			16 J								
			13.9 J								
21.8 U	21.8 U	2.18 U	2.18 U	2.18 U		10.9 U	21.8 U		109 U		43.1 U
29.3	22 U	12.2	2.2 U	1.56 J		25.2	22 U		110 U		43.5 U

PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PENTACHLOROANISOLE	PHENANTHRENE	PYRENE	TOXAPHENE	TRANS NONACHLOR
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	3.7 U	2 U	41 U	1.8 U
26 U	26 U	26 U	26 U	26 U	26 U	2.7 U	37 U	20 U	100 U	4.3 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	7.8 Q	2 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	3.7 U	2 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	15 U	7.9 U	41 U	1.8 U
13 U	13 U	13 U	13 U	13 U	13 U	1.3 U	15 U	7.9 U	50 U	2.2 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	7.7 Q	2 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	4.3 Q	2 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	15 U	7.9 U	41 U	1.8 U
200 U	200 U	200 U	200 U	200 U	200 U	20 U	37 U	20 U	770 U	33 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	17 Q	72	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	11 Q	9.7	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	3.9 Q	2 U	41 U	1.8 U
35 U	35 U	35 U	35 U	35 U	35 U	3.5 U	37 U	20 U	130 U	5.8 U
22 U	22 U	22 U	22 U	22 U	22 U	2.2 U	15 U	7.9 U	82 U	3.5 U
43 U	43 U	43 U	43 U	43 U	43 U	4.3 U	37 U	92	160 U	7.1 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	3.7 U	11	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	15 U	7.9 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	3.7 U	2 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	15 U	7.9 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	4.6 Q	13	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	13	4 Q	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	15 U	7.9 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	7.4 U	3.9 U	41 U	1.8 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	4.3 Q	2 U	43 U	1.8 U
43 U	43 U	43 U	43 U	43 U	43 U	4.3 U	15 U	21 Q	160 U	7.1 U
11 U	11 U	11 U	11 U	11 U	11 U	1.1 U	4.7 Q	2 U	41 U	1.8 U
43 U	43 U	43 U	43 U	43 U	43 U	4.3 U	15 U	7.9 U	160 U	7.1 U
45 U	45 U	45 U	45 U	45 U	45 U	4.6 U	37 Q	20 U	170 U	7.4 U
41.1 U	41.1 U	41.1 U	41.1 U	41.1 U	41.1 U		10.4 U	10.4 U	41.1 U	
41 U	41 U	41 U	41 U	41 U	41 U		5.27 J	11.2	41 U	
38.7 U	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U		123	114	38.7 U	
38.9 U	38.9 U	38.9 U	38.9 U	38.9 U	38.9 U		65.5	84.9	38.9 U	
41.8 U	41.8 U	41.8 U	41.8 U	41.8 U	41.8 U		10.5 U	10.5 U	41.8 U	
42.1 U	42.1 U	42.1 U	42.1 U	42.1 U	42.1 U		10.6 U	10.6 U	42.1 U	
							23.4			
							30.6			
43.1 U	43.1 U	43.1 U	43.1 U	43.1 U	43.1 U		10.9 U	10.9 U	43.1 U	
43.5 U	43.5 U	43.5 U	43.5 U	43.5 U	43.5 U		17.1	55.4	43.5 U	

Appendix B-4: Analytical Results for Site 7 Wells, 1998 Sampling Events
WPNSTA Seal Beach Groundwater Monitoring Study

Table 4-3
Analytical Results for Site 7 Wells, 1998 Sampling Events
WPNSTA Seal Beach
Groundwater Monitoring Study

CHEMICAL NAME	CONCENTRATION UNITS	WELL NUMBER DATE SAMPLE ID							
		07M01 06/29/98 07M01GG0-1	07M01 09/22/98 07M01GH0-1	07M02 06/29/98 07M02GG0-1	07M02 09/23/98 07M02GH0-1	07M03 06/29/98 07M03GG0-1	07M03 09/22/98 07M03GH0-1	07M04 06/30/98 07M04GG0-1	07M04 09/23/98 07M04GH0-1
DISSOVED METALS									
ALUMINUM	UG/L	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U
ANTIMONY	UG/L	50 U	50 UJ	50 U	50 UJ	50 U	50 UJ	50 U	50 UJ
ARSENIC	UG/L	6.5 B	5.9 BN	11.7	9.5 BN	5 U	5 UN	5 U	5 UN
BARIUM	UG/L	884	895	67.2 B	75.8 B	1230	1400	100 B	118 B
BERYLLIUM	UG/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CADMIUM	UG/L	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
CALCIUM	UG/L	522000 E	595000	1770000 E	2060000	450000 E	525000	568000 E	589000
CHROMIUM	UG/L	10 U	47.5 N*	10 U	207 N*	10 U	154 N*	10 U	73.8 N*
COBALT	UG/L	10 U	10 U	18.7 B	27 B	10 U	10 U	10 U	10 U
COPPER	UG/L	6.9 B	18.4 B*	6 U	103 *	6 U	59.7 *	6 U	98.4 *
IRON	UG/L	20 U	34.6 BN*	21500	18700 N*	20600	22100 N*	1760	1520 N*
LEAD	UG/L	2.9 U	3 UN*	2.9 U	19.5 N*	2.9 U	40.2 N*	2.9 U	4.3 N*
MAGNESIUM	UG/L	1500000 E	1680000 E	1630000 E	1880000 E	1530000 E	1690000 E	1380000 E	1380000 E
MANGANESE	UG/L	480	1030	6020	7840	1720	2120	2570	2950
MERCURY	UG/L	0.2 UN	0.2 U	0.2 UN	0.2 U	0.2 UN	0.2 U	0.2 UN	0.2 U
NICKEL	UG/L	20 U	20 U	20 U	33.8 B	20 U	20 U	20 U	20 U
POTASSIUM	UG/L	366000	441000	79600	95300	185000	223000	368000	403000
SELENIUM	UG/L	4 U	4 U	4.8 UB	4 U	4 U	4 U	4 U	4 U
SILVER	UG/L	9 U	9 U	10.3 U	9 U	9 U	9 U	12.4 U	9 U
SODIUM	UG/L	12100000 E	13100000	9640000 E	12000000	11800000 E	12700000	10700000 E	10500000
THALLIUM	UG/L	10.5 U	7 U	7.2 UB	10	14 U	7 U	9.6 UB	8 B
VANADIUM	UG/L	24.8 B	17.6 B	13.9 B	25.7 B	10 U	12.4 B	13.7 B	13.6 B
ZINC	UG/L	10 U	18 B	10.8 B	13.6 B	10 U	14.3 B	10 U	10 U
TOTAL METALS									
ALUMINUM	UG/L	60 U	60 U	60 U	60 U	60 U	60 U	122 B	203
ANTIMONY	UG/L	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
ARSENIC	UG/L	9.2 B	9.6 B	6.6 B	7.5 B	5 U	5.4 B	5 U	5 U
BARIUM	UG/L	877	938	67.6 B	73 B	1230	1460	92.3 B	125 B
BERYLLIUM	UG/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CADMIUM	UG/L	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
CALCIUM	UG/L	513000 E	599000	1770000 E	1930000	446000 E	519000	529000 E	600000
CHROMIUM	UG/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
COBALT	UG/L	10 U	10 U	21.4 B	11.5 B	10 U	10 U	10 U	10 U
COPPER	UG/L	6 U	6 U	7.3 B	45.9	6 U	9.2 B	6 U	69
IRON	UG/L	20 U	20 U	22700	16800	21500	23100	861	2060
LEAD	UG/L	2.9 UN	3 UN	2.9 UN	3 UN	2.9 UN	3 UN	2.9 UN	3 UN
MAGNESIUM	UG/L	1480000 E	1700000 E	1630000 E	1830000 E	1510000 E	1650000 E	1290000 E	1460000 E
MANGANESE	UG/L	474	1030	6420	7380	1800	2130	2420	3060
MERCURY	UG/L	0.2 UN	0.2 U	0.2 UN	0.2 U	0.24 NJ	0.2 U	0.2 UN	0.2 U
NICKEL	UG/L	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
POTASSIUM	UG/L	355000	466000	82400	93600	182000	231000	317000	431000
SELENIUM	UG/L	4 UN	4 U	4 UN	4 U	4 UN	4 U	4 UN	4 U
SILVER	UG/L	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
SODIUM	UG/L	12700000 E	13100000	10200000 E	11100000	11500000 E	12200000	9810000 E	11000000
THALLIUM	UG/L	7.2 B	7 U	7 U	9.1 B	7 U	7.9 B	7 U	10.8
VANADIUM	UG/L	16.5 B	11.1 B	17.4 B	13.4 B	10.1 B	11 B	15.6 B	11.8 B
ZINC	UG/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
TDS AND CYANIDE									
TOTAL DISSOLVED SOLIDS	MG/L	39600	44000	43300	47700	42000	44400	37600	39800
CYANIDE	UG/L	5U	10 U	NA	NA	17	10 U	5U	10 U

Table 4-3
Analytical Results for Site 7 Wells, 1998 Sampling Events
WPNSTA Seal Beach
Groundwater Monitoring Study

CHEMICAL NAME	CONCENTRATION UNITS	WELL NUMBER DATE SAMPLE ID							
		07M01 06/29/98 07M01GG0-1	07M01 09/22/98 07M01GH0-1	07M02 06/29/98 07M02GG0-1	07M02 09/23/98 07M02GH0-1	07M03 06/29/98 07M03GG0-1	07M03 09/22/98 07M03GH0-1	07M04 06/30/98 07M04GG0-1	07M04 09/23/98 07M04GH0-1
RADIOLOGICAL PARAMETERS									
GROSS ALPHA	pCi/L	106 U	NA	NA	NA	NA	NA	119 U	NA
GROSS ALPHA COPRECIPITATION	pCi/L	15.8	NA	NA	NA	NA	NA	9.6	NA
GROSS BETA	pCi/L	293	NA	NA	NA	NA	NA	317	NA
RADIUM-226	pCi/L	2.5	NA	NA	NA	NA	NA	0.84	NA
RADIUM-228	pCi/L	5.5	NA	NA	NA	NA	NA	6.5	NA
GAMMA SPECTROSCOPY:									
ACTINIUM-228	pCi/L	36 U	NA	NA	NA	NA	NA	34 U	NA
AMERICIUM	pCi/L	49 U	NA	NA	NA	NA	NA	41 U	NA
ANTIMONY-124	pCi/L	11 U	NA	NA	NA	NA	NA	13 U	NA
ANTIMONY-125	pCi/L	22 U	NA	NA	NA	NA	NA	20 U	NA
BERRYLLIUM-7	pCi/L	74 U	NA	NA	NA	NA	NA	79 U	NA
BISMUTH-212	pCi/L	130 U	NA	NA	NA	NA	NA	130 U	NA
BISMUTH-214	pCi/L	15 U	NA	NA	NA	NA	NA	19 U	NA
CERIUM-139	pCi/L	5.4 U	NA	NA	NA	NA	NA	5.2 U	NA
CERIUM-144	pCi/L	35 U	NA	NA	NA	NA	NA	36 U	NA
CESIUM-134	pCi/L	8.7 U	NA	NA	NA	NA	NA	9.7 U	NA
CESIUM-137	pCi/L	9.3 U	NA	NA	NA	NA	NA	7.9 U	NA
CHROMIUM-51	pCi/L	72 U	NA	NA	NA	NA	NA	86 U	NA
COBALT-56	pCi/L	21 U	NA	NA	NA	NA	NA	24 U	NA
COBALT-57	pCi/L	4.4 U	NA	NA	NA	NA	NA	4.5 U	NA
COBALT-58	pCi/L	11 U	NA	NA	NA	NA	NA	11 U	NA
COBALT-60	pCi/L	7.8 U	NA	NA	NA	NA	NA	12 U	NA
EUROPIUM-152	pCi/L	45 U	NA	NA	NA	NA	NA	69 U	NA
EUROPIUM-154	pCi/L	35 U	NA	NA	NA	NA	NA	40 U	NA
EUROPIUM-155	pCi/L	19 U	NA	NA	NA	NA	NA	19 U	NA
IODINE-131	pCi/L	30 U	NA	NA	NA	NA	NA	28 U	NA
IRON-59	pCi/L	20 U	NA	NA	NA	NA	NA	29 U	NA
LEAD-210	pCi/L	1200 U	NA	NA	NA	NA	NA	860 U	NA
LEAD-212	pCi/L	12 U	NA	NA	NA	NA	NA	11 U	NA
LEAD-214	pCi/L	14 U	NA	NA	NA	NA	NA	14 U	NA
MANGANESE-54	pCi/L	9.6 U	NA	NA	NA	NA	NA	11 U	NA
NIOBIUM-95	pCi/L	8.9 U	NA	NA	NA	NA	NA	11 U	NA
POTASSIUM-40	pCi/L	350	NA	NA	NA	NA	NA	340	NA
PROTACTINIUM	pCi/L	1500 U	NA	NA	NA	NA	NA	1700 U	NA
RUTHENIUM-106	pCi/L	82 U	NA	NA	NA	NA	NA	89 U	NA
SCANDIUM-46	pCi/L	12 U	NA	NA	NA	NA	NA	10 U	NA
SILVER-110M	pCi/L	9.4 U	NA	NA	NA	NA	NA	7.3 U	NA
SODIUM-22	pCi/L	13 U	NA	NA	NA	NA	NA	14 U	NA
STRONTIUM-85	pCi/L	13 U	NA	NA	NA	NA	NA	18 U	NA
THALLIUM-208	pCi/L	7.5 U	NA	NA	NA	NA	NA	9.1 U	NA
THORIUM-227	pCi/L	42 U	NA	NA	NA	NA	NA	37 U	NA
THORIUM-234	pCi/L	97 U	NA	NA	NA	NA	NA	100 U	NA
URANIUM-235	pCi/L	32 U	NA	NA	NA	NA	NA	37 U	NA
ZINC-65	pCi/L	22 U	NA	NA	NA	NA	NA	24 U	NA

Notes:

NA = Not analyzed

Sample qualifiers:

*: duplicate analysis not within control limits

B: estimated - below Contract Required Detection Limit and above Instrument Detection Limi

E: reported value estimated due to interference

J: estimated - below Contract Required Quantitation Limit and above Method Detection Limi

N: spiked sample recovery not within control limits

U: not detected

Table 4-3
Analytical Results for Site 7 Wells, 1998 Sampling Events
WPNSTA Seal Beach
Groundwater Monitoring Study

CHEMICAL NAME	CONCENTRATION UNITS	WELL NUMBER DATE SAMPLE ID						
		W39 07/02/98 W39GG0-1	W41 07/02/98 W41GG0-1	W41 09/22/98 W41GH0-1	W42 07/02/98 W42GG0-1	W42 07/02/98 W42GG1-1	W42 09/22/98 W42GH0-1	W42 09/22/98 W42GH1-1
DISSOVED METALS								
ALUMINUM	UG/L	NA	60 UJ	60 U	60 UJ	60 UJ	60 U	60 U
ANTIMONY	UG/L	NA	50 U	50 U	50 UJ	50 U	50 UJ	50 UJ
ARSENIC	UG/L	NA	5 U	5 UN	11.7	5 U	6.3 BN	5.2 BN
BARIUM	UG/L	NA	112 B	114 B	287	292	181 B	182 B
BERYLLIUM	UG/L	NA	2 U	2 U	2 U	2 U	2 U	2 U
CADMIUM	UG/L	NA	4 U	5	4 U	4 U	4 U	4 U
CALCIUM	UG/L	NA	962000	1570000	414000	420000	588000	595000
CHROMIUM	UG/L	NA	10 U	10 UN*	10 U	10 U	168 N*	10 UN*
COBALT	UG/L	NA	10.2 B	12 B	13.3 B	10 U	10 U	10 U
COPPER	UG/L	NA	6 U	6 B*	8.6 B	14 B	76.1 *	8.2 B*
IRON	UG/L	NA	10600	17200 N*	389	626	722 N*	20 UN*
LEAD	UG/L	NA	2.9 UN	3 UN*	2.9 UN	2.9 UN	34.7 N*	3 UN*
MAGNESIUM	UG/L	NA	1060000	1570000 E	882000	826000	1560000 E	1600000 E
MANGANESE	UG/L	NA	5090	7370	860	912	2050	2110
MERCURY	UG/L	NA	0.2 UN	0.2 U	0.2 UN	0.33 N	0.2 U	0.2 U
NICKEL	UG/L	NA	20 U	20 U	20 U	20 U	22.6 B	20 U
POTASSIUM	UG/L	NA	113000	120000	221000	228000	411000	417000
SELENIUM	UG/L	NA	4 U	4 U	4 U	4 U	4 U	4 U
SILVER	UG/L	NA	9 U	9 U	9 U	9 U	9 U	9 U
SODIUM	UG/L	NA	9020000 E	11900000	7320000 E	6980000 E	12400000	12700000
THALLIUM	UG/L	NA	7 U	10.6	10.9 U	7 U	7 U	7 U
VANADIUM	UG/L	NA	12.6 B	10 U	20.5 B	20.1 B	24.1 B	26.6 B
ZINC	UG/L	NA	10 U	10 U	10 U	10 U	10 U	10 U
TOTAL METALS								
ALUMINUM	UG/L	NA	1240	25700	60 UJ	60 UJ	536	434
ANTIMONY	UG/L	NA	50 U	50 U	50 U	50 U	50 U	50 U
ARSENIC	UG/L	NA	5 U	5 U	5 U	5 U	5.7 B	6.9 B
BARIUM	UG/L	NA	115 B	168 B	354	357	171 B	172 B
BERYLLIUM	UG/L	NA	2 U	2 U	2 U	2 U	2 U	2 U
CADMIUM	UG/L	NA	4.8 B	15.4	4 U	4 U	4 U	4 U
CALCIUM	UG/L	NA	1010000	1740000	485000	490000	564000	567000
CHROMIUM	UG/L	NA	13.2	10 U	10 U	10 U	10.6	10 U
COBALT	UG/L	NA	19.2 B	24.9 B	10 U	16.6 B	10 U	10 U
COPPER	UG/L	NA	6 U	68.1	6 U	11.7 B	8.3 B	6.4 B
IRON	UG/L	NA	13300	37500	20 U	20 U	1690	1220
LEAD	UG/L	NA	3.2	10.5 N	2.9 U	2.9 U	3 UN	3 UN
MAGNESIUM	UG/L	NA	1070000	1650000 E	1090000	1090000	1450000 E	1540000 E
MANGANESE	UG/L	NA	5330	8710	1310	1320	1970	2010
MERCURY	UG/L	NA	0.2 UN	0.2 U	0.2 UN	0.41 N	0.2 U	0.2 U
NICKEL	UG/L	NA	20 U	28.6 B	20 U	20 U	23.6 B	20 U
POTASSIUM	UG/L	NA	105000	140000	292000	293000	395000	402000
SELENIUM	UG/L	NA	4 U	4 U	4 U	6.4 U	4 U	4 U
SILVER	UG/L	NA	9 U	9 U	9 U	9 U	9 U	9 U
SODIUM	UG/L	NA	9180000 E	12600000	8630000 E	8850000 E	11600000	12300000
THALLIUM	UG/L	NA	7 U	9.9 B	7 U	7 U	7.2 B	7 U
VANADIUM	UG/L	NA	15.8 B	64.1	24.1 B	21.3 B	21.4 B	20.8 B
ZINC	UG/L	NA	10 U	78.7	10 U	10 U	10 U	19.2 B
TDS AND CYANIDE								
TOTAL DISSOLVED SOLIDS	MG/L	48600	40400	46300	28600	28100	41200	41700
CYANIDE	UG/L	NA	NA	NA	5 U	5 U	10 U	10 U

Table 4-3
Analytical Results for Site 7 Wells, 1998 Sampling Events
WPNSTA Seal Beach
Groundwater Monitoring Study

CHEMICAL NAME	CONCENTRATION UNITS	WELL NUMBER DATE SAMPLE ID							
		W43 07/06/98 W43GG0-1	W43 09/22/98 W43GH0-1	W44 06/30/98 W44GG0-1	W44 09/21/98 W44GH0-1	W45 07/02/98 W45GG0-1	W45 09/23/98 W45GH0-1	W46 07/06/98 W46GG0-1_9807	W46 09/23/98 W46GH0-1
RADIOLOGICAL PARAMETERS									
GROSS ALPHA	pCi/L	161 U	NA	77 U	NA	NA	NA	93 U	NA
GROSS ALPHA COPRECIPITATION	pCi/L	36.6	NA	66.6	NA	NA	NA	6.2	NA
GROSS BETA	pCi/L	320	NA	97	NA	NA	NA	256	NA
RADIUM-226	pCi/L	0.66 U	NA	1.87	NA	NA	NA	0.69	NA
RADIUM-228	pCi/L	5.2	NA	5.9	NA	NA	NA	3.9	NA
GAMMA SPECTROSCOPY:									
ACTINIUM-228	pCi/L	38 U	NA	15 U	NA	NA	NA	45 U	NA
AMERICIUM	pCi/L	36 U	NA	19 U	NA	NA	NA	47 U	NA
ANTIMONY-124	pCi/L	9.3 U	NA	6.3 U	NA	NA	NA	12 U	NA
ANTIMONY-125	pCi/L	23 U	NA	12 U	NA	NA	NA	25 U	NA
BERRYLLIUM-7	pCi/L	73 U	NA	46 U	NA	NA	NA	79 U	NA
BISMUTH-212	pCi/L	120 U	NA	70 U	NA	NA	NA	120 U	NA
BISMUTH-214	pCi/L	25	NA	10 U	NA	NA	NA	20 U	NA
CERIUM-139	pCi/L	5.5 U	NA	4.2 U	NA	NA	NA	5.9 U	NA
CERIUM-144	pCi/L	31 U	NA	24 U	NA	NA	NA	41 U	NA
CESIUM-134	pCi/L	8.6 U	NA	5.4 U	NA	NA	NA	11 U	NA
CESIUM-137	pCi/L	9.7 U	NA	5.4 U	NA	NA	NA	9.4 U	NA
CHROMIUM-51	pCi/L	69 U	NA	49 U	NA	NA	NA	76 U	NA
COBALT-56	pCi/L	24 U	NA	11 U	NA	NA	NA	14 U	NA
COBALT-57	pCi/L	3.9 U	NA	2.9 U	NA	NA	NA	5.7 U	NA
COBALT-58	pCi/L	11 U	NA	5.9 U	NA	NA	NA	13 U	NA
COBALT-60	pCi/L	10 U	NA	5.3 U	NA	NA	NA	14 U	NA
EUROPIUM-152	pCi/L	66 U	NA	26 U	NA	NA	NA	59 U	NA
EUROPIUM-154	pCi/L	37 U	NA	17 U	NA	NA	NA	30 U	NA
EUROPIUM-155	pCi/L	17 U	NA	12 U	NA	NA	NA	21 U	NA
IODINE-131	pCi/L	17 U	NA	16 U	NA	NA	NA	17 U	NA
IRON-59	pCi/L	23 U	NA	13 U	NA	NA	NA	26 U	NA
LEAD-210	pCi/L	430 U	NA	270 U	NA	NA	NA	380 U	NA
LEAD-212	pCi/L	10 U	NA	7.1 U	NA	NA	NA	12 U	NA
LEAD-214	pCi/L	35	NA	8.9 U	NA	NA	NA	16 U	NA
MANGANESE-54	pCi/L	10 U	NA	5.4 U	NA	NA	NA	12 U	NA
NIOBIUM-95	pCi/L	11 U	NA	6.2 U	NA	NA	NA	11 U	NA
POTASSIUM-40	pCi/L	260 U	NA	143 U	NA	NA	NA	200 U	NA
PROTACTINIUM	pCi/L	1900 U	NA	930 U	NA	NA	NA	2000 U	NA
RUTHENIUM-106	pCi/L	77 U	NA	46 U	NA	NA	NA	83 U	NA
SCANDIUM-46	pCi/L	9.8 U	NA	5.3 U	NA	NA	NA	9.8 U	NA
SILVER-110M	pCi/L	7.7 U	NA	5.1 U	NA	NA	NA	9 U	NA
SODIUM-22	pCi/L	13 U	NA	6.1 U	NA	NA	NA	11 U	NA
STRONTIUM-85	pCi/L	13 U	NA	9.1 U	NA	NA	NA	15 U	NA
THALLIUM-208	pCi/L	8.3 U	NA	5.2 U	NA	NA	NA	9.3 U	NA
THORIUM-227	pCi/L	44 U	NA	30 U	NA	NA	NA	45 U	NA
THORIUM-234	pCi/L	88 U	NA	67 U	NA	NA	NA	120 U	NA
URANIUM-235	pCi/L	31 U	NA	23 U	NA	NA	NA	44 U	NA
ZINC-65	pCi/L	25 U	NA	13 U	NA	NA	NA	22 U	NA

Notes:

NA - Not analyzed

Sample qualifiers:

*: duplicate analysis not within control limits

B: estimated - below Contract Required Detection Limit and above Instrument Detection Limi

E: reported value estimated due to interference

J: estimated - below Contract Required Quantitation Limit and above Method Detection Limi

N: spiked sample recovery not within control limits

U: not detected

Appendix B-5: Summary of Analytical Results Exceeding Background Levels Inorganic Constituents Supplemental Characterization of Site 7

TA- E 1

SUMMARY OF ANALYTICAL RESULTS EXCEEDING BACKGROUND LEVELS
INORGANIC CONSTITUENTS (MG/KG)
SUPPLEMENTAL CHARACTERIZATION OF SITE 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA

Boring No.	Depth	Arsenic	Barium*	Cadmium	Chromium	Cobalt*	Copper	Cyanide*	Lead	Mercury	Molybdenum*	Nickel	Selenium	Silver*	Thallium*	Zinc
HA3	0.5	--	140	6.8	--	14	120	--	240	--	7.6	34	1.5	4.4	--	1100
HA4	0.5	--	70	--	--	9.8	--	--	--	--	--	--	1.3	--	--	--
HA4	4	--	140	--	--	13	--	0.3	--	--	--	--	1.1	--	--	--
SB01	0.5	--	86.0	--	--	10.0	--	--	--	--	--	--	--	--	--	--
SB01	5	--	100	--	--	12	43	--	--	--	--	--	--	--	--	--
SB01	7.5	--	59	--	--	7.5	--	--	--	--	--	--	--	--	--	--
SB02	0.5	--	110	--	--	11	--	--	44	--	--	--	--	2.4	--	--
SB02	12.5	--	36	--	--	5.7	--	--	--	--	--	--	--	--	--	--
SB02	4.5	--	87	--	--	12	--	--	--	--	--	--	--	--	--	470
SB03	0.5	--	100	--	--	9.6	--	--	--	--	--	--	--	1.7	1	--
SB03	1	--	98	--	--	12	--	--	--	--	--	--	--	1.9	0.69	--
SB03	10	--	62	--	--	10	--	--	--	--	--	--	--	--	--	--
SB03	4.5	--	45	--	--	7.4	--	--	--	--	--	--	--	--	--	--
SB04	0.5	--	83	--	--	10	--	--	--	--	--	--	--	--	--	--
SB04	1	--	89	--	52	10	--	--	--	--	--	--	--	4	--	--
SB04	10	--	63	--	--	12	--	--	--	--	6.4	--	--	--	--	--
SB04	5	--	44	--	--	5.8	--	--	--	--	--	--	--	--	--	--
SB05	0.5	--	110	2.3	--	12	40	--	56	--	--	--	--	--	--	270
SB05	12.5	--	35.0	--	--	6.6	--	--	--	--	--	--	--	--	--	--
SB05	6.5	--	57.0	--	--	4.3	--	--	--	--	--	--	--	--	--	--
SB06	0.5	--	92.0	--	--	10.0	--	--	--	--	--	--	--	--	--	--
SB06	4.5	--	110.0	--	--	15.0	--	--	--	--	--	--	--	--	--	--
SB06	9	--	61.0	--	--	12.0	--	--	--	--	6.4	--	--	--	--	--
SB07	0.5	--	100.0	--	--	11.0	--	--	42.0	--	--	--	--	--	--	--
SB07	3	--	73.0	--	--	9.2	--	--	--	--	--	--	--	--	--	--
SB07	8	--	82.0	--	--	9.6	--	--	--	--	--	--	--	--	--	--
SB07	9	--	63.0	--	--	8.4	--	--	--	--	9.3	--	--	--	--	--
SB08	0.5	--	77.0	--	--	9.4	--	--	--	--	--	--	--	--	--	--
SB08	13	--	52.0	--	--	10.0	--	--	--	--	--	--	--	--	--	--
SB08	6	--	21.0	--	--	3.4	--	--	73.0	--	5.5	--	--	--	--	230.0
SB08	7	--	51.0	2.7	72.0	11.0	66.0	--	290.0	--	7.1	33.0	0.79	--	--	370.0
SB09	0.5	--	79.0	--	--	9.6	--	--	--	--	--	--	0.62	--	--	--
SB09	11	--	90.0	--	--	14.0	--	--	--	--	7.0	--	1.6	--	--	--
SB09	7.5	--	41.0	--	--	7.9	--	0.2	--	--	--	--	--	--	--	--

TABLE 1

SUMMARY OF ANALYTICAL RESULTS EXCEEDING BACKGROUND LEVELS
INORGANIC CONSTITUENTS (MG/KG)
SUPPLEMENTAL CHARACTERIZATION OF SITE 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA

Boring No.	Depth	Arsenic	Barium*	Cadmium	Chromium	Cobalt*	Copper	Cyanide*	Lead	Mercury	Molybdenum*	Nickel	Selenium	Silver*	Thallium*	Zinc
SB10	0.5	40.0	63.0	--	--	7.3	49.0	--	160.0	--	--	--	--	--	--	--
SB10	5	--	140.0	--	--	12.0	--	--	--	--	--	--	--	--	--	--
SB10	9	--	88.0	--	--	14.0	--	--	--	--	--	--	--	--	--	--
SB11	0.5	23.0	67.0	17.0	49.0	18.0	2200.0	1.3	190.0	--	26.0	66.00	3.40	5.10	--	1000
SB11	4.5	--	480.0	10.0	56.0	6.6	77.0	--	310.0	1.2	--	--	--	17.00	--	--
SB11	8.5	--	62	--	--	9.4	--	--	--	--	5.1	--	--	--	--	--
SB12	0.5	--	69	--	--	8.4	--	--	--	0.3	--	--	--	--	--	--
SB12	11	--	82	--	--	12	--	--	--	--	--	--	--	--	--	--
SB12	4.5	--	110.0	4.2	54.0	15.0	130.0	0.31	150.0	--	10.0	43.0	1.40	--	--	270
SB13	0.5	--	46	--	--	6.7	--	--	69	--	--	--	--	--	--	--
SB13	4.5	--	120	--	--	14	--	--	--	--	6.6	--	--	--	0.61	--
SB13	9	17	73	--	--	12	--	--	--	--	10	--	1.30	--	--	--
SB14	0.5	--	79	--	--	9.6	--	--	--	--	--	--	--	--	--	--
SB14	12	--	36	--	--	5.2	100	--	--	--	--	--	--	3.60	--	--
SB14	3	--	72	3	--	8.6	60	2.6	63	--	6.5	--	0.84	--	--	1100
SB15	0.5	--	54	--	--	7.9	--	--	--	--	--	--	--	--	0.98	--
SB15	4.5	--	120	3.1	--	13	45	--	44	--	7.3	--	--	--	--	220
SB15	8.5	--	58	--	--	14	--	--	--	--	5.9	--	--	--	--	--
SB16	0.5	--	87	2.9	60	9.6	170	--	100	--	--	--	--	--	0.84	180
SB16	5	--	100	--	--	13	--	--	--	--	--	--	--	--	--	--
SB16	9	--	45	--	--	8.8	--	--	--	--	6.4	--	0.84	--	--	--
SB17	0.5	--	49	--	--	7.3	--	--	--	--	--	--	--	--	--	--
SB17	1	--	59	--	--	8.1	--	--	--	0.37	--	--	0.68	--	--	--
SB17	4.5	--	50	3	--	6	--	--	--	--	--	--	--	--	--	2300
SB17	5	--	26.0	2.7	--	3.3	--	1.6	--	--	--	--	--	--	--	1100
SB17	9	47	72	3.3	--	12	--	--	--	--	13	--	1.8	--	--	--

NOTES:

* No background levels established.

-- Non-detect or does not exceed background levels.

Beryllium and Vanadium were not detected in any sample above background levels.

Antimony was detected in one sample (SB14-3) at 8.7 mg/kg.

TABLE 2
SUMMARY OF ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
SUPPLEMENTAL CHARACTERIZATION OF SITE 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA

Boring Number	Sample Depth (ft bgs)	Constituent Name (EPA Method 8260)	Result ug/kg
SB01	5	Naphthalene	150
SB05	0.5	Naphthalene	19
SB05	0.5	p-Isopropyltoluene	37
SB05	6.5	p-Isopropyltoluene	18.0
SB06	4.5	1,2,4-Trimethylbenzene	4.6
SB06	4.5	Naphthalene	6.1
SB08	6	1,2,4-Trimethylbenzene	66
SB08	6	1,3,5-Trimethylbenzene	29
SB08	6	1,4-Dichlorobenzene	89
SB08	6	2-Chlorotoluene	15
SB08	6	4-Chlorotoluene	14
SB08	6	Ethyl Benzene	39
SB08	6	Isopropylbenzene	13
SB08	6	n-Propylbenzene	19
SB08	6	Naphthalene	130,000
SB08	6	Ortho Xylene	19
SB08	6	p-Isopropyltoluene	120
SB08	6	Para and Meta Xylenes	27
SB08	7	1,2,4-Trimethylbenzene	8.3
SB08	7	1,4-Dichlorobenzene	5.6
SB08	7	2-Chlorotoluene	6.1
SB08	7	Naphthalene	7,600
SB08	7	p-Isopropyltoluene	8.7
SB08	13	Naphthalene	81.0
SB11	4.5	1,2,4-Trimethylbenzene	6,000
SB11	4.5	1,3,5-Trimethylbenzene	1,600
SB11	4.5	1,4-Dichlorobenzene	130
SB11	4.5	Cis-1,3-Dichloropropene	8.7
SB11	4.5	Ethyl Benzene	6,700
SB11	4.5	Isopropylbenzene	250
SB11	4.5	n-Propylbenzene	330
SB11	4.5	Naphthalene	34
SB11	4.5	Ortho Xylene	1,600
SB11	4.5	Para and Meta Xylenes	20,000
SB11	4.5	Toluene	64
SB12	4.5	1,2,4-Trimethylbenzene	1,000
SB12	4.5	1,3,5-Trimethylbenzene	910
SB12	4.5	Ethyl Benzene	1,500
SB12	4.5	n-Propylbenzene	83
SB12	4.5	Ortho Xylene	3,600
SB12	4.5	p-Isopropyltoluene	30
SB12	4.5	Para and Meta Xylenes	5,900
SB12	4.5	Toluene	28
SB12	4.5	Benzene	10
SB14	3	Para and Meta Xylenes	4.60
SB15	4.5	Naphthalene	150
SB15	8.5	Naphthalene	14
SB16	9	Naphthalene	5.3
SB17	5	1,4-Dichlorobenzene	5.5
SB17	5	Isopropylbenzene	7.4
SB17	5	n-Butylbenzene	11
SB17	5	Naphthalene	11
SB17	5	n-Propylbenzene	12
SB17	5	n-Butylbenzene	4.1

NOTE: SOIL BORINGS NOT LISTED WERE NON-DETECT

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
SEMI-VOLATILE ORGANIC COMPOUNDS
SUPPLEMENTAL CHARACTERIZATION OF SITE 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA

Boring Number	Sample Depth (ft bgs)	Constituent Name (EPA Method 8270)	Result (ug/kg)
SB01	5	Naphthalene	2,600
SB01	5	Acenaphthylene	1,500
SB01	5	Fluorene	1,800
SB01	5	Anthracene	630
SB01	5	Pyrene	2,100
SB01	5	Chrysene	380
SB01	5	2-Methylnapthalene	1,300
SB01	5	Dibenzofuran	1,300
SB01	5	Phenanthrene	6,500
SB01	5	Flouranthene	2,100
SB01	5	Benzo(A)Anthracene	390
SB08	6	Naphthalene	13,000
SB08	6	Acenaphthylene	7,300
SB08	6	2-Methylnapthalene	4,600
SB08	6	Dibenzofuran	5,900
SB08	6	Fluorene	8,400
SB08	6	Phenanthrene	30,000
SB08	6	Anthracene	6,800
SB08	6	Fluoranthene	17,000
SB08	6	Pyrene	4,400
SB08	6	Benzo(A)Anthracene	5,100
SB08	6	Chrysene	5,400
SB08	6	Benzo(A)Pyrene	1,300
SB08	7	Phenanthrene	420
SB11	0.5	Phenanthrene	2,200
SB11	0.5	Anthracene	2,000
SB11	0.5	Flouranthrene	12,000
SB11	0.5	Pyrene	6,300
SB11	0.5	Benzo(A)Anthracene	11,000
SB11	0.5	Chrysene	15,000
SB11	0.5	Benzo(B)Fluoranthene	12,000
SB11	0.5	Benzo(K)Fluoranthene	10,000
SB11	0.5	Benzo(A)Pyrene	8,800
SB11	0.5	Indeno(1,2,3-CD)Pyrene	5,800
SB11	0.5	Benzo(GHI)Perylene	3,900
SB11	4.5	Anthracene	310
SB11	4.5	Fluoranthene	640
SB11	4.5	Phenanthrene	500

NOTE: SOIL BORINGS NOT LISTED WERE NON-DETECT

TABLE 4
SUMMARY OF ANALYTICAL RESULTS
PESTICIDES / PCBs
SUPPLEMENTAL CHARACTERIZATION OF SITE 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA

Boring Number	Sample Depth (fbgs)	Constituent Name (EPA Method 8080)	Result (ug/kg)
SB02	0.5	Aroclor 1254	69
SB10	0.5	4,4' DDD	30
SB10	0.5	4,4' DDT	40
SB11	0.5	4,4' DDD	340
SB11	0.5	4,4' DDT	780
SB11	4.5	Aroclor 1254	430
SB13	4.5	Aroclor 1248	130
SB14	12	Aroclor 1248	120
SB15	0.5	Aroclor 1248	210
SB15	4.5	Aroclor 1248	310
SB16	0.5	Aroclor 1248	78
SB17	1	Aroclor 1248	61

NOTE: SOIL BORINGS NOT LISTED WERE NON-DETECT

Appendix B-6: Concentration of Metals in Sediment

Table 5. Concentrations of Metals in Sediment

Chemical	Sample Location					
	07E01CA0-1	07E01CA0-2	07E01CA0-3	07E01CA0-4	07E01CA0-5	07E01CA0-6
Antimony	0.73 UN	0.68 UN	0.66 UN	0.75 BN	0.71 UN	0.73 UN
Arsenic	4.70 N	4.50 N	3.40 N	4.80 N	8.30[4] N	5.40 N
Cadmium	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.29 B
Chromium	22.00	38.00	27.00	35.00	24.00	43.00
Cobalt	8.00 B	7.20 B	7.70 B	8.90 B	7.80 B	9.20 B
Copper	21.00[3]	18.00	18.00	19.00[3]	15.00	26.00[3]
Lead	13.00 N	15.00 N	17.00 N	11.00 N	8.00 N	23.00 N
Mercury	0.07 N	0.07 N	0.02 N	0.02 BN	0.02 BN	0.05 N
Nickel	13.00	12.00	13.00	15.00	13.00	16.00
Selenium	1.00 UN	0.98 UN	0.95 UN	0.94 UN	1.00 UN	1.00 UN
Silver	0.16 U	2.10[4] B	0.63 B	0.89 B	0.73 B	2.20[4] B
Zinc	89.00	71.00	78.00	75.00	67.00	94.00

Chemical	Sample Location					
				Duplicate Samples		
	07E01CA0-7	07E01CA0-8	07E01CA0-9	07E02CA0-1[1]	07E02Ca1-1[1]	07E05CA0-1[2]
Antimony	0.66 UN	0.67 UN	0.63 J	0.71 UN	0.75 UN	1.40 BN
Arsenic	3.60 N	4.20 N	3.70 J	5.10 N	6.10 N	7.80 N
Cadmium	0.07 U	0.07 U	0.06 U	0.07 U	0.07 U	0.08 U
Chromium	20.00	17.00	15.00	30.00	25.00	42.00
Cobalt	7.50 B	6.40 B	5.30 B	11.20 B	10.50 B	8.80 B
Copper	17.00	13.00	16.00	27.00[3]	23.00[3]	37.00[4]
Lead	13.00 N	15.00 N	9.60 J	26.00 N	21.00 N	27.00 N
Mercury	0.03 N	0.01 B	0.03 J	0.05 N	0.05 N	0.04 N
Nickel	12.00	11.00 B	8.90 B	20.00	18.00	14.00
Selenium	0.95 UN	0.96 UN	0.91 J	1.00 UN	1.10 UN	1.10 UN
Silver	0.23 U	0.11 U	0.39 U	0.09 U	0.09 U	2.20 B
Zinc	100.00	53.00	50.00	120.00	110.00	130.00[3]

[1]"White Stained" Area
[2]"Blue Stained" Area
[3]Exceeds TEL
[4]Exceeds TEL and ER-L

Table 6. Polynuclear Aromatic Hydrocarbons in Sediment µg/kg dry weight)

Chemical	Sample Location					
	07E01CA0-1	07E01CA0-2	07E01CA0-3	07E01CA0-4	07E01CA0-5	07E01CA0-6
1-Methylnaphthalene	4.9 U	4.5 U	4.4 U	4.4 U	4.8 U	4.9 U
2-Methylnaphthalene	5.0 U	4.7 U	4.6 U	4.5 U	4.9 U	5.0 U
Acenaphthene	5.2 U	4.8 U	4.7 U	4.6 U	5.0 U	5.2 U
Acenaphthylene	5.4 U	5.0 U	4.9 U	4.8 U	5.2 U	5.4 U
Anthracene	5.6 U	5.3 U	5.1 U	5.1 U	5.5 U	16.0
Benzo(a)anthracene	9.2 U	19.0	8.4 U	8.3 U	9.0 U	140.0[3]
Benzo(a)pyrene	7.5	22.0	9.7	6.6	5.7 u	120.0[3]
Benzo(b)fluoranthene	8.3	25.0	11.0	7.4 U	8.1 U	68.0
Benzo(g,h,i)perylene	7.1 U	13.0	7.9	6.4 U	7.0 U	58.0
Benzo(k)fluoranthene	8.6 U	20.0	7.8 U	7.7 U	8.4 U	74.0
Chrysene	9.6 U	30.0	10.0	8.6 U	9.4 U	150.0[3]
Dibenzo(a,h)anthracene	6.8 U	8.1[3]	6.2 U	6.1 U	6.7 U	18.0[3]
Fluoranthene	8.2 U	40.0	12.0	7.4 U	8.0 U	280.0[3]
Fluorene	6.4 U	6.0 U	5.9 U	5.8 U	6.3 U	6.4 U
Indeno(1,2,3-cd)pyrene	13.0 J	13.0 J	12.0 U	12.0 J	13.0 J	76.0 J
Naphthalene	5.0 U	4.6 U	4.5 J	4.5 U	4.8 U	5.3
Phenanthrene	7.8 U	7.3 U	7.1 U	7.0 U	7.6 U	45.0
Pyrene	9.3	40.0	37.0	8.1 U	8.8 U	380.0[3]

Chemical	Sample Location					
	07E01CA0-7	07E01CA0-8	07E01CA0-9	07E02CA0-1[1]	07E02CA0-1[1]	07E05CA0-1[2]
1-Methylnaphthalene	4.4 U	4.5 U	4.2 U	4.7 U	5.0 U	5.1 U
2-Methylnaphthalene	4.6 U	4.6 U	4.4 U	4.9 U	5.2 U	5.3 U
Acenaphthene	4.7 U	4.7 U	4.5 U	5.0 U	5.3 U	5.4 U
Acenaphthylene	4.9 U	4.9 U	4.7 U	5.2 U	5.5 U	5.6 U
Anthracene	5.1 U	5.2 U	4.9 U	5.5 U	5.8 U	5.9 U
Benzo(a)anthracene	8.4 J	26.0	8.0 U	9.0 U	9.5 U	10.0
Benzo(a)pyrene	7.7	14.0	7.2	12.0	10.0	14.0
Benzo(b)fluoranthene	8.2	16.0	7.4	11.0	10.0	13.0
Benzo(g.h.i)perylene	6.5 U	7.7 U	6.2 U	32.0	38.0	9.3
Benzo(k)fluoranthene	7.8 U	11.0	7.5 U	8.4 U	8.8 U	9.1 U
Chrysene	8.7 J	23.0	8.3 U	10.0	9.8 U	12.0
Dibenzo(a,h)anthracene	6.2 U	6.3 U	6.0 U	11.0[3]	8.1[3]	7.2 U
Fluoranthene	9.4	8.2	8.1	8.0 U	8.4 U	17.0
Fluorene	5.8 U	5.9 U	5.6 U	6.3 U	6.6 U	6.8 U
Indeno(1,2,3-cd)pyrene	12.0 J	12.0 J	12.0 J	13.0 J	14.0 J	14.0 J
Naphthalene	4.5 U	4.6 U	4.3 U	4.8 U	5.1 U	5.2 U
Phenanthrene	7.1 U	7.2 U	6.8	7.6 U	8.0 U	12.0
Pyrene	16.0 J	12.0	11.0	8.8 U	9.3 U	21.0

[1] "White Stained Area"
[2] "Blue Stained Area"
[3] Exceeds TEL

Table 7. Concentrations of Pesticides in Sediment µg/kg dry weight)

Chemical	Sample Location					
	07E01CA0-1	07E01CA0-2	07E01CA0-3	07E01CA0-4	07E01CA0-5	07E01CA0-6
2,4'-DDD	6.70[6]	1.20	1.30	1.60	0.65 U	2.20[6]
2,4'-DDE	0.94 U	0.88 U	0.85 U	0.84 U	0.92 U	0.94 U
2,4'-DDT	0.73 U	0.68 U	0.66 U	0.65 U	0.71 U	0.73 U
4,4'-DDD	43.00[5]	3.10[3]	3.50[3]	4.70[3]	1.20	8.30[5]
4,4'-DDE	2.70[4]	3.90[4]	3.10[4]	3.20[4]	1.70	6.70[4]
4,4'-DDT	57.00[5]	4.10[4]	1.00 U	1.00 U	1.10 U	1.20 U
Aldrin	0.48 U	0.45 U	0.44 U	0.43 U	0.47 U	0.48 U
Alpha-BHC	0.57 U	0.53 U	0.52 U	0.51 U	0.55 U	0.57 U
Alpha-Chlordane	0.47 U	0.43 U	0.42 U	0.42 U	0.46 U	0.47 U
Aroclor 1016	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1221	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1232	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1242	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1248	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1254	15.00 U	63.00[4] P	13.00 U	13.00 U	14.00 U	160.00[5] P
Aroclor 1260	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Beta-BHC	0.57 U	0.53 U	0.52 U	0.51 U	0.55 U	0.57 U
cis-Nonachlor	0.58 U	1.90	0.53 U	0.52 U	0.57 U	3.40 P
Delta-BHC	0.50 U	0.46 U	0.45 U	0.45 U	0.49 U	0.50 U
Dieldrin	0.99 U	0.92 U	0.90 U	0.89 U	0.98 U	0.99 U
Endosulfan I	0.44 U	0.41 U	0.40 U	0.39 U	0.43 U	0.44 U
Endosulfan II	1.50 U	1.40 U	1.30 U	1.30 U	1.40 U	1.50 U
Endosulfan Sulfate	0.79 U	0.74 U	0.72 U	0.71 U	0.78 U	0.79 U
Endrin	1.10 U	1.00 U	1.00 U	1.00 U	1.10 U	1.10 U
Endrin Aldehyde	6.80 U	6.40 U	6.20 U	6.10 U	6.70 U	6.80 U
Endrin Ketone	1.10 U	1.00 U	0.97 U	0.96 U	1.00 U	1.10 U
Gamma-BHC (Lindane)	0.49 U	0.46 U	0.44 U	0.44 U	0.48 U	0.49 U
Gamma-Chlordane	2.10[6]	0.43 U	1.40[6]	0.41 U	0.45 U	0.46 U
Heptachlor	0.51 U	0.48 U	0.46 U	0.46 U	0.50 U	0.51 U
Heptachlor Epoxide	0.47 U	0.56 P	0.43 U	0.42 U	0.46 U	1.50 P
Hexachlorobenzene	1.70 U	1.60 U	1.50 U	1.50 U	1.60 U	1.70 U
Methoxychlor	6.30 U	5.80 U	5.70 U	5.60 U	6.10 U	6.30 U
Mirex	1.10 U	1.00 U	0.98 U	0.97 U	1.00 U	1.50[3] P
Oxychlordane	0.76 U	0.71 U	0.69 U	0.68 U	0.68 U	0.74 U
Pentachloroanisole	0.74 U	0.69 U	0.68 U	0.67 U	0.72 U	0.74 U
Toxaphene	140.00 U	130.00 U	120.00 U	120.00 U	130.00 U	140.00 U
trans-Nonachlor	1.80 J	2.00	1.10	0.66 P	0.55 U	1.10

Chemical	Sample Location					
	07E01CA0-7	07E01CA0-8	07E01CA0-9	07E02CA0-1[1]	07E02CA0-1[1]	07E05CA0-1[2]
2,4'-DDD	1.00 J	0.61 U	0.58 U	0.64 U	0.68 U	2.30[6]
2,4'-DDE	0.85 U	0.86 U	0.82 U	0.91 U	0.96 U	0.99 U
2,4'-DDT	0.66 U	0.67 U	0.63 U	0.71 U	0.75 U	0.76 U
4,4'-DDD	3.60[3]	0.95 U	0.90 U	1.00 U	2.80[3]	3.60[3]
4,4'-DDE	2.20	1.20	1.60	3.20	3.40[3]	4.40[3]
4,4'-DDT	1.00 U	1.10 U	1.00 U	2.10[3]	6.00[4]	1.20 U

Table 7. Concentrations of Pesticides in Sediment µg/kg dry weight)

Aldrin	0.44 U	0.44 U	0.42 U	0.47 U	0.49 U	0.50 U
	Sample Location					
Chemical	**07E01CA0-7**	**07E01CA0-8**	**07E01CA0-9**	**07E02CA0-1[1]**	**07E02CA0-1[1]**	**07E05CA0-1[2]**
Alpha-BHC	0.52 U	0.52 U	0.49 U	0.55 U	0.58 U	0.60 U
Alpha-Chlordane	0.42 U	0.43 U	0.41 U	0.45 U	0.48 U	0.49 U
Aroclor 1016	13.00 U	14.00 U	13.00 U	14.00 U	145.00 U	16.00 U
Aroclor 1221	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1232	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1242	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1248	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1254	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	100.00[4] P
Aroclor 1260	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Beta-BHC	0.52 U	0.52 U	0.49 U	0.55 U	0.58 U	0.60 U
cis-Nonachlor	0.53 U	0.53 U	0.51 U	0.57 U	0.60 U	1.80 P
Delta-BHC	0.45 U	0.46 U	0.43 U	0.48 U	0.51 U	0.52 U
Dieldrin	0.90 U	0.91 U	0.86 U	0.96 U	1.00 U	1.00 U
Endosulfan I	0.40 U	0.40 U	0.38 U	0.42 U	0.45 U	0.46 U
Endosulfan II	1.30 U	1.30 U	1.30 U	1.40 U	1.50 U	1.50 U
Endosulfan Sulfate	0.72 U	0.73 U	0.69 U	0.77 U	0.81 U	0.83 U
Endrin	1.00 U	1.00 U	0.97 U	1.10 U	1.10 U	1.20 U
Endrin Aldehyde	6.20 U	6.30 U	6.00 U	6.70 U	7.00 U	7.20 U
Endrin Ketone	0.97 U	0.98 U	0.93 U	1.00 U	1.10 U	1.10 U
Gamma-BHC (Lindane)	0.44 U	0.45 U	0.42 U	0.48 U	0.50 U	0.51 U
Gamma-Chlordane	0.42 U	0.42 U	0.40 U	0.45 U	0.47 U	0.48 U
Heptachlor	0.46 U	0.47 U	0.44 U	0.50 U	0.52 U	0.54 U
Heptachlor Epoxide	0.43 U	0.43 U	0.41 U	0.46 U	0.48 U	0.77 P
Hexachlorobenzene	1.50 U	1.50 U	1.50 U	1.60 U	1.70 U	1.80 U
Methoxychlor	5.70 U	5.70 U	5.40 U	6.10 U	6.40 U	6.60 U
Mirex	0.98 U	0.99 U	0.94 U	1.00 U	1.10 U	1.10 U
Oxychlordane	0.69 U	0.70 U	0.66 U	0.74 U	0.78 U	0.80 U
Pentachloroanisole	0.67 U	0.68 U	0.65 U	0.72 U	0.76 U	0.78 U
Toxaphene	120.00 U	130.00 U	120.00 U	130.00 U	140.00 U	140.00 U
trans-Nonachlor	0.51 U	0.51 U	0.49 U	0.55 U	0.58 U	0.59 U

[1] "White Stained Area"
[2] "Blue Stained Area"
[3] Exceeds TEL
[4] Exceeds TEL and ER-L
[5] Exceeds PEL
[6] Exceeds ER-L

Table 8. Volatile Organic Chemicals in Surface Water (µg/L)

Chemical	White Area		Seep
	07E02RA0-1[1]	07E02RA-1-1[1]	07E03GA0-1
1,1,1-Trichloroethane	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U
1,2-Dichloroethene, Total	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U
Acetone	10 U	10 U	10 U
Benzene	10 U	10 U	10 U
Bormodichloromethane	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U
Chlorodibromomethane	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U
Chloromethane	10 U	10 U	10 U
cis-1,3-dichloropropene	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U
Styrene	0.03 J	0.02 J	0.02 J
Tetrachloroethene	10 U	10 U	10 U
Toluene	10 U	10 U	10 U
trans-1,3-dichloropropene	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U
Xylene, Total	10 U	10 U	10 U

[1]Duplicate samples from White Area

Table 9. Concentrations of Metals in Water (µg/L)

Chemical	Sample Location		
	07E02RA0-1[1]	07E02RA1-1[1]	07E03GA0-1[2]
Antimony	2.50 U	2.50 U	19.20 U
Arsenic	4.40 U	4.40 U	8.20 B
Cadmium	0.25 UN	0.25 UN	1.10 J
Chromium	2.60 B	2.10 U	41.00[5,6]
Cobalt	1.10 U	0.60 U	11.00 UJ
Copper	4.90[3] B	3.50[3] B	50.00[5]
Lead	1.60 U	1.60 U	12.00[4]
Mercury	0.03 U	0.03 U	0.03 U
Nickel	1.40 U	2.00 U	20.20 [4]J
Selenium	3.60 UN	3.60 UN	3.60 R
Silver	0.31 UN	0.37 U	2.30 UJ
Zinc	11.20 BN	6.50 BN	170.00[4] J

[1]White Area
[2]Seep
[3]Exceeds Ocean Plan 6-Month Median
[4]Exceeds Ocean Plan Daily Maximum
[5]Exceeds Ocean Plan Instantaneous Maximum
[6]Assumed Hexavalent. If Trivalent, No Exceedance

Table 10. Polynuclear Aromatic Hydrocarbons in Water (µg/L)

Chemical	Sample Location		
	07E02RA0-1[1]	07E02RA1-1[1]	07E03GA0-1[2]
1-Methylnaphthalene	0.081 U	0.081 U	0.081 U
2-Methylnaphthalene	0.084 U	0.084 U	0.084 U
Acenaphthene	0.087 U	0.087 U	0.087 U
Acenaphthylene	0.081 U	0.081 U	0.081 U
Anthracene	0.068 U	0.068 U	0.068 U
Benzo(a)anthracene	0.093 U	0.093 U	0.093 U
Benzo(a)pyrene	0.099 U	0.099 U	0.099 U
Benzo(b)fluoranthene	0.110 U	0.110 U	0.110 U
Benzo(g,h,i)perylene	0.110 U	0.110 U	0.110 U
Benzo(k)fluoranthene	0.110 U	0.110 U	0.110 U
Chrysene	0.110 U	0.110 U	0.110 U
Dibenzo(a,h)anthracene	0.086 U	0.086 U	0.086 U
Fluoranthene	0.051 U	0.051 U	0.051 J
Fluorene	0.085U	0.085 U	0.085 U
Indeno(1,2,3-cd)pyrene	0.170 U	0.170 U	0.170 U
Naphthalene	0.086 U	0.086 U	0.086 U
Phenanthrene	0.066 U	0.066 U	0.066 U
Pyrene	0.056 U	0.056 U	0.056 U

[1]White Area
[2]Seep

Table 11. Pesticides in Water (µg/L)

Chemical	Sample Location		
	07E02RA0-1[1]	07E02RA1-1[1]	07E03GA0-1[2]
2,4'-DDD	0.0500 U	0.0500 U	0.0500 U
2,4'-DDE	0.0550 U	0.0550 U	0.0550 U
2,4'-DDT	0.0410 U	0.0410 U	0.0410 U
4,4'-DDD	0.0120 U	0.0120 U	0.0120 U
4,4'-DDE	0.0110 U	0.0110 U	0.0110 U
4,4'-DDT	0.0130 U	0.0130 U	0.0130 U
Aldrin	0.0041 U	0.0041 U	0.0041 U
Alpha-BHC	0.0066 U	0.0066 U	0.0066 U
Alpha-Chlordane	0.0045 U	0.0045 U	0.0045 U
Aroclor 1016	0.3300 U	0.3300 U	0.3300 U
Aroclor 1221	0.3300 U	0.3300 U	0.3300 U
Aroclor 1232	0.3300 U	0.3300 U	0.3300 U
Aroclor 1242	0.3300 U	0.3300 U	0.3300 U
Aroclor 1248	0.3300 U	0.3300 U	0.3300 U
Aroclor 1254	0.3300 U	0.3300 U	0.3300 U
Aroclor 1260	0.3300 U	0.3300 U	0.3300 U
Beta-BHC	0.0041 U	0.0041 U	0.0041 U
cis-Nonachlor	0.0540 U	0.0540 U	0.0540 U
Delta-BHC	0.0220 U	0.0220 U	0.0220 U
Dieldrin	0.0110 U	0.0110 U	0.0110 U
Endosulfan I	0.0053 U	0.0053 U	0.0053 U
Endosulfan II	0.0130 U	0.0130 U	0.013[3] J
Endosulfan Sulfate	0.0220 U	0.0220 U	0.0220 U
Endrin	0.0100 U	0.0100 U	0.010[3] J
Endrin Aldehyde	0.0510 U	0.0510 U	0.0510 J
Endrin Ketone	0.0150 U	0.0150 U	0.0150 J
Gamma-BHC (Lindane)	0.0064 U	0.0064 U	0.0064 U
Gamma-Chlordane	0.0055 U	0.0055 U	0.0055 U
Heptachlor	0.0052 U	0.0052 U	0.0052 U
Heptachlor Epoxide	0.0073 U	0.0073 U	0.0073 U
Hexachlorobenzene	0.0250 U	0.0250 U	0.0250 U
Methoxychlor	0.0640 U	0.0640 U	0.0640 U
Mirex	0.0530 U	0.0530 U	0.0530 U
Oxychlordane	0.0510 U	0.0510 U	0.0510 U
Pentachloroanisole	0.0260 U	0.0260 U	0.0260 U
Toxaphene	1.1000 U	1.1000 U	1.1000 U
trans-Nonachlor	0.0490 U	0.0490 U	0.0490 U

[1]White Area Duplicate Samples
[2]Seep
[3]Exceeds Ocean Plan Instantaneous Maximum

Table 12. Metals in Mussel Tissue (mg/kg wet weight)

Analyte	Sample Location		
	07E01UA0-1	07E01UA0-2	07E01UA0-4
Antimony	0.50 U	0.50 U	0.50 U
Arsenic	1.00 B	0.88 U	0.88 U
Cadmium	0.25 U	0.27 U	0.30 B
Chromium	0.21 U	0.31 U	0.25 U
Cobalt	0.09 U	0.09 U	0.10 B
Copper	1.20 B	1.30 B	1.20 B
Lead	0.57 B	0.32 U	0.32 U
Mercury	0.01 U	0.01 U	0.01 U
Nickel	0.26 U	0.26 U	0.26 U
Selenium	0.73[1] BN	0.88[1] BN	0.72[1] UN
Silver	0.06 U	0.061 U	0.06 U
Zinc	15.00 E	13.00 J	11.00 E

[1]Exceeds EDL 85

Table 13. Polynuclear Aromatic Hydrocarbons in Mussel Tissue (µg/kg wet weight)

Chemical	Sample Location		
	07E01UA0-1	07E01UA0-2	07E01UA0-3
1-Methylnaphthalene	6.0 U	6.0 U	6.0 U
2-Methylnaphthalene	6.5 U	6.5 U	6.5 U
Acenaphthene	5.5 U	5.5 U	5.5 U
Acenaphthylene	5.1 U	5.1 U	5.1 U
Anthracene	5.2 U	5.2 U	5.2 U
Benzo(a)anthracene	5.1 U	5.1 U	5.1 U
Benzo(a)pyrene	5.6 U	5.6 U	5.6 U
Benzo(b)fluoranthene	6.8 U	6.8 U	6.8 U
Benzo(g,h,i)perylene	11.0 U	11.0 U	11.0 U
Benzo(k)fluoranthene	5.5 U	5.5 U	5.5 U
Chrysene	4.8 U	4.8 U	4.8 U
Dibenzo(a,h)anthracene	5.5 U	5.5 U	5.5 U
Fluoranthene	5.5 J	8.9	5.7 J
Fluorene	6.0 U	.60 U	6.0 U
Indeno(1,2,3-cd)pyrene	6.0 U	6.0 U	6.0 U
Naphthalene	5.8 U	5.8 U	5.8 U
Phenanthrene	7.0 U	6.0 U	7.0 U
Pyrene	4.5 J	7.8	5.0 J

Table 14. Pesticides in Mussel Tissue (µg/kg wet weight)

Chemical	Sample Location		
	07 E01UA0-1	07E01UA0-2	07E01UA0-3
2,4'-DDD	2.60[2]	2.60[2]	2.20[2]
2,4'-DDE	1.20 U	1.20 U	1.20 U
2,4'-DDT	1.10 U	1.10 U	1.10 U
4,4'-DDD	9.10[2]	9.30[2]	7.30[1]
4,4'-DDE	52.00[1]	42.00[1]	38.00[1]
4,4'-DDT	1.10	1.10 U	1.10 U
Aldrin	0.42 U	0.42 U	0.42 U
Alpha-BHC	0.86 U	0.86 U	0.86 U
Alpha-Chlordane	2.30	0.42 U	0.42 U
Aroclor 1016	12.00 U	12.00 U	12.00 U
Aroclor 1221	12.00 U	12.00 U	12.00 U
Aroclor 1232	12.00 U	12.00 U	12.00 U
Aroclor 1242	12.00 U	12.00 U	12.00 U
Aroclor 1248	12.00 J	12.00 J	12.00 J
Aroclor 1254	85.00[2]	87.00[2]	79.002
Aroclor 1260	12.00 U	12.00 U	12.00 U
Beta-BHC	1.10 U	1.10 U	1.10 U
cis-Nonachlor	1.50[2]	1.40[2]	1.20
Delta-BHC	0.67 U	0.67 U	0.67 U
Dieldrin	1.10 U	1.10 U	1.10 U
Endosulfan I	0.43 U	0.43 U	0.43 U
Endosulfan II	0.80 U	0.80 U	0.80 U
Endosulfan Sulfate	2.00 U	2.00 U	2.00 U
Endrin	0.83 U	0.83 U	0.83 U
Endrin Aldehyde	1.00 U	1.00 U	1.00 U
Endrin Ketone	0.90 U	0.90 U	0.90 U
Gamma-BHC (Lindane)	0.48 U	0.48 U	0.48 U
Gamma-Chlordane	1.90 P	1.80 P	1.60 U
Heptachlor	0.72 U	0.72 U	0.72 U
Heptachlor Epoxide	0.66 U	0.66 U	0.66 U
Hexachlorobenzene	0.45 U	0.45 U	0.45 U
Methoxychlor	2.80 U	2.80 U	2.80 U
Mirex	0.99 U	0.99 U	0.99 U
Oxychlordane	0.72 U	0.72 U	0.72 U
Pentachloroanisole	0.37 U	0.37 U	0.37 U
Toxaphene	46.00 U	46.00 U	46.00 U
trans-Nonachlor	0.81	1.90[1]	1.40

[1]Exceeds EDL 85
[2]Exceeds EDL 95

Appendix C
Aquatic and Wetland Plant Species That Inhabit Perimeter Pond

AQUATIC AND WETLAND PLANT SPECIES THAT INHABIT PERIMETER POND AREA

[Compiled by John Bradley. Sources: The Marine Resources of Anaheim Bay edited by E. David Lane and Cliff W. Hill (CDFG Fish Bulletin 165, 1975); Seal Beach National Wildlife Refuge Mitigation Monitoring Project (Port of Long Beach, 1991)]

Crustaceans
Accedomoera vagor
Ampithoe spp.
Callianassa californiensis
Copepoda calinoida
Copepoda cyclopoida
Copepoda harpacticoida
Corophium sp.
Dexamine sp.
Grandidierella japonica
Hemigrapsus oregonensis
Hippolyte californiensis
Hyale frequens
Mayerella banksias
Megalopa
Mysid sp.
Leptochelia dubia
Palaemon macrodactylus
Parasterope barnesi
Peracarida mysidacea mysida
Pinnotheridae
Rudilemboides stenopropodus
Scleroplax granulata
Upogebia sp.

Echinoderms
Leptosynapta sp.

Insecta
Collembola
Clunioninae sp.
Dolichopodidae sp.
Heleidae sp.
Muscidae sp.

Molluscs
Alderia modesta
Cerithidea californica
Cryptomya californica

Cylichnella harpa
Cylichnella sp.
Geukensia demissa
Haminoea vescula
Lyonsia californica
Mactra californica
Olivella baetica
Protothaca staminea
Tagelus subteres
Tagelus sp.

Nematodes
Nematoda sp.

Miscellaneous
Arachnida
Gobiidae
Kalyptorhynchia
Lineidae
Micrura sp.
Nemertea
Notoplana sp.
Paranemertes spp.
Stylochus exiguous
Tubulanus pellucidus

Polychaetes
Apoprionospio pygmaea
Armandia bioculata
Boccardiella hamata
Capitella capitata
Caulleriella spp.
Capitita ambiseta
Chaetozone corona
Cossura candida
Eteone dilatae
Etione pacifica
Euchone limnicola
Exogone lourei
Exogone sp.

Goniada littorea
Haplpscoloplos elongatus
Leitoscoloplos pugettensis
Lumbrinerus minima
Lumbrineris spp.
Mediomastus spp.
Megalomma pigmentum
Neanthes acuminata
Neanthes arenaceodentata
Neanthes succinea
Nephtys caecoides
Nephytes c. franciscana
Nerinides acuta
Oligochaeta
Ophiodromus pugettensis
Paleonotus bellis
Pista alata
Polydora ligni
Polydora nuchalis
Prionospio cirrifera
Prionospio heterobranchia
Prionospio lighti
Prionospio pygmaeus
Pseudopolydora kempi
Pseudopolydora paucibranchiata
Rhynchospio arenincola
Rhynchospio glutaea
Sabellidae
Scolelepis tridentata
Spio filicornis
Spionidae
Spiophanes missionensis
Stauronereis rudolphi
Streblosoma benedicti
Stroblospio benedicti
Terebellidae
Tharyx parvus
Tharyx spp.

Horn snail (*Cerithidea californica*)

<u>Fish</u>

Gray smoothhound shark	*Mustelus californicus*
Brown smoothound shark	*Mustelus henlei*

Leopard shark		*Mustelus semifasciata*
Pacific angel shark		*Squatina californica*
Thornback		*Platyrhinoidis triseriata*
Shovelnose guitarfish		*Rhinobatos productos*
Round stingray		*Urolophus halleri*
Threadfin shad		*Dorosoma petenense*
Pacific sardine		*Sardinops sagax*
Silversides spp.		*Atherinidae* spp.
Northern anchovy		*Engraulis mordax*
Slough anchovy		*Anchoa delicatissima*
Deepwater anchovy		*Anchoa compressa*
California killifish		*Fundulus parvipinnis*
Topsmelt		*Atherinops affinis*
California grunion		*Leuresthes tenuis*
Spotted sand bass		*Paralabrax maculatofasciatus*
Barred sand bass		*Paralabrax nebulifer*
White seabass		*Atractoscion nobilis*
White croaker		*Genyonemus lineatus*
California corbina		*Menticirrhus undulates*
Queenfish		*Seriphus politus*
Spotfin croaker		*Roncador stearnsi*
Yellowfin croaker		*Umbrina roncador*
Shiner surfperch		*Cymatogaster aggregata*
Walleye surfperch		*Hyperprosopon argenteum*
Pile surfperch		*Damalichthys vacca*
Striped mullet		*Mugil cephalus*
Specklefin midshipman		*Porichthys myriaster*
Barred pipefish		*Syngnathus auliscus*
Bay pipefish		*Syngnathus griseolineatus*
California barracuda	?	*Sphyraena argentea*
Arrow goby		*Clevelandia ios*
Cheekspot goby		*Ilypnus gilberti*
Shadow goby		*Quietula ycauda*
Longjaw mudsucker		*Gillichthys mirabilis*
Pacific butterfish		*Peprilus simillimus*
Pacific staghorn sculpin		*Leptocottus armatus*
Speckled sanddab		*Citharichthys stigmaeus*
California halibut		*Paralichthys californicus*
Diamond turbot		*Hypsopsetta guttulata*

<u>Algae</u>

Filamentous green alga	*Enteromorpha crinita*
	Enteromorpha spp.
	Gracilaria spp.

	Ulva lactuca
<u>Grass</u>	
Eel grass	*Zostera marina*
Cordgrass	*Spartina foliosa*
Arrow-grass	*Triglochin concinnum*
Saltgrass	*Distichlis spicata*
Shore grass	*Monanthochloe littoralis*
<u>Selected Plants</u>	
Marsh fleabane	*Pluchea purpurascens*
Heliotrope	*Heliotropium curassavicum* var. *oculatum*
	Jaumea carnosa
Sea-Lavender	*Limonium californicum*
	Frankenia grandifolia
Sea-Blite	*Suaeda californica*
Saltwort	*Batis maritime*
Pickleweed	*Salicornia bigelovii*
	Salicornia subterminalis
	Salicornia virginica
Dodder	*Cucusta salina* var. *major*

Appendix D
ARARs Identification Letters

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • http://www.aqmd.gov

December15, 2000

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, Ca 90630

Attn: Katherine K. Leibel
Remedial Project Manager

The AQMD appreciates your request for input into compiling Applicable or Relevant and Appropriate Requirements (ARAR's) for the proposed non-time critical removal action at Installation Restoration (IR) Program Site 7, the station landfill, located at the Seal Beach Naval Weapons Station (NWS), Seal Beach, California as stated in your letter dated December 13, 2000.

The following AQMD Rules and Regulations should be incorporated in the ARAR's.

Regulation IV - Prohibitions

Rule 401 - Visible Emissions
This rule limits any visible emissions from any single source to less than Ringlemann No. 1 or 20 percent opacity for 3 minutes in any hour (Ref. Health and Safety Code 41701).

Rule 402 - Nuisance
This rule prohibits the discharge of any air contaminant or other material (including odorous compounds) that causes injury or annoyance to the public, endangers the comfort, repose, health or safety of the public or causes damage to business or property. In general, a notice of violation may be issued upon receipt of six verified complaints or for any property damage or personal injury (Ref. Health and Safety Code 41700).

Rule 403 - Fugitive Dust
This rule limits on site activities so that the concentrations of fugitive dust at the property line shall not be visible. In addition, PM10 levels shall not exceed 50 micrograms per cubic meter as determined by the difference between upwind and downwind samples collected on high volume particulate matter samplers. These requirements do not apply if the wind gusts exceed 25 miles per hour. The rule also requires every reasonable precaution to minimize fugitive dust and the prevention and cleanup of any material accidentally deposited on paved streets. This rule shall not apply during life-threatening situations or during a declared disaster or state of emergency.

Rule 404 - Particulate Matter
This rule limits equipment from discharging particulate emissions in excess of 0.01 to 0.196 grain per cubic foot based on a given volumetric (dry standard cubic feet per minute) exhaust gas flow rate averaged over one hour or one cycle of operation. It excludes steam generators or gas turbines.

Rule 405 - Solid Particulate Matter
This rule limits equipment from discharging particulate emissions in excess of 0.99 to 30 pounds per hour based on a given process weight.

Rule 407 - Liquid and Gaseous Air Contaminants
This rule limits equipment from discharging carbon monoxide emissions in excess of 2000 ppm and sulfur dioxide emissions of 500 ppm or greater averaged over 15 minutes. It excludes stationary internal combustion engines, propulsion of mobile equipment or emergency venting.

Rule 408 - Circumvention
This rule prohibits a person from building, erecting, installing or using any equipment, the use of which reduces or conceals an emission which would otherwise constitute a violation of these rules or Chapter 3 (starting with 41700) of Part 4, of Division 26 of the Health and Safety Code.

Rule 409 - Fuel Combustion Contaminants
This rule limits the emissions of particulate matter from the exhaust of a combustion source (such as a gas turbine) to 0.23 grams per cubic meter (0.1 grains per standard cubic foot) at 12 percent CO2 averaged over 15 minutes. It excludes internal combustion engines.

Rules 431.1, 431.2, 431.3 - Sulfur Content of Gaseous, Liquid or Fossil Fuels
These rules limit sulfur compounds from combustion of gaseous fuels not to exceed 40 ppm, 0.05 percent by weight for liquid fuels and 0.56 pounds of sulfur per million BTU for solid fossil fuels.

Rule 474 - Fuel Burning Equipment-Oxides of Nitrogen
This rule limits the concentration of oxides of nitrogen (as NO2) averaged over 15 minutes, from any non-mobile fuel burning equipment, to a range of 125 to 300 ppm for gaseous fuels and 225 to 400 ppm for solid and liquid fuels depending on equipment size.

Regulation X - National Emission Standards for Hazardous Air Pollutants

This regulation implements the provisions of Part 61, Chapter I, Title 40 of the Code of Federal Regulations (CFR) under the supervision of the AQMD Executive Officer. It specifies emissions testing, monitoring procedures or handling of hazardous pollutants such as beryllium, benzene, mercury, vinyl chloride and asbestos.

Regulation XI - Source Specific Standards

Rule 1150 - Excavation of Landfill Sites
This rule states that no person shall initiate excavation of an active or inactive landfill without an Excavation Management Plan approved by the Executive Officer of AQMD. The Plan shall provide information regarding the quantity and characteristics of the material to be excavated and transported and shall identify mitigation measures including gas collection and disposal, baling, encapsulating, covering the material and chemical neutralizing.

Rule 1166 - Volatile Organic Compound Emissions from Decontamination of Soil
This rule limits the emissions of volatile organic compounds (VOCs) from contaminated soil to less than 50 ppm. For contaminated soil with 50 ppm or greater, an approved mitigation plan, describing removal methods and mitigation measures, must obtained from the District prior to proceeding with the excavation. Uncontrolled spreading of contaminated soil is not permitted.

Regulation XIII - New Source Review

This regulation applies to any new or modified equipment which may cause the issuance of any non-attainment air contaminant, ozone depleting compound or ammonia. It requires all equipment to be constructed with BACT (Best Available Control Technology). For non-attainment emission increases, it requires the emission increases to be offset and substantiated with modeling that the equipment will not cause a significant increase in concentrations of non-attainment contaminants.

Regulation XIV - Toxics

Rule 1401 - New Source Review of Carcinogenic Air Contaminants
This rule specifies limits for cancer risk and excess cancer cases from new stationary sources and modifications to existing stationary sources that emit carcinogenic air contaminants. The rule establishes allowable emission impacts for all such stationary sources requiring new permits pursuant to AQMD Rules 201 or 203. Best Available Control Technology for Toxics (T-BACT) will be required for any system where a lifetime (70 years) maximum individual cancer risk of one in one million or greater is estimated to occur. Limits are calculated using risk factors for specific contaminants.

Best Available Control Technology (BACT) Guidelines document

This document was compiled by SCAQMD. Although a guideline, it set up BACT requirements for various types of equipment or process. BACT is determined on a permit-by-permit basis based on the definition of BACT. In essence, BACT is the most stringent emission limit or control technology that is:

- found in a state implementation plan (SIP), or
- achieved in practice, or
- is technologically feasible and cost effective.

For practical purposes, at this time, nearly all AQMD BACT determinations will be based on achieved in practice BACT because it is generally more stringent than BACT based on SIP, and because state law constrains AQMD from using the third approach.

If you have any questions regarding these regulations, please call Mr. Ted Kowalczyk at (909) 396-2592.

Very truly yours

Ed Mueller for

Larry Bowen
Senior Manager
Toxic and Waste Management Team

LB:EM:TK

ARAR2000B.doc

California Integrated Waste Management Board

Daniel G. Pennington, Chairman
8800 Cal Center Drive • Sacramento California 95826 • (916) 255-2200
www.ciwmb.ca.gov

Peter M. Rooney
Secretary for Environmental Protection

Pete Wilson
Governor

January 3, 2001

Ms. Katherine K. Leibel
Remedial Project Manager
Federal Facilities Unit "B"
Southern California Operations
Office of Military Facilities
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

SOLICITATION FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR SITE 7, STATION LANDFILL, SEAL BEACH NAVAL WEAPONS STATION, SEAL BEACH, CALIFORNIA

Dear Ms. Leibel:

The Integrated Waste Management Board (IWMB) would like to thank-you for the opportunity to provide you with input for IWMB ARARs pertaining to landfill closure and postclosure maintenance activities. Based on the description of Site 7, Station Landfill, IWMB ARARs would be applicable and/or relevant and appropriate. Please find attached ARARs pertaining to landfill closure and postclosure maintenance and excavation and consolidation activities. We look forward to reviewing the reports to be prepared for this site and to working with you on the remedial action for the Station Landfill.

Should you have any questions or comments concerning the above matter, please contact me at (916) 341-6318.

Sincerely,

Michael B. Wochnick, P.E.
Senior Waste Management Engineer
Closure & Technical Services Section
Permitting and Enforcement Division

Cc: Mr. John Broderick, Santa Ana Regional Water Quality Control Board
Mr. Dean Clarke, Orange County Health Care Agency

State ARARs for Solid Waste Disposal Site Excavation and Consolidation

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20510(a) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20510(a), Disposal Site Operating Records	Applicable	Weight/Volume Records: the weight or volume of waste accepted must be determined to an accuracy of ±10%	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20510(b) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20510(b), Disposal Site Operating Records	Applicable	Excavation Records: records shall be maintained for excavations which may affect the safe and proper operation of the site or cause damage to adjoining properties.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20530 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20530, Site Security	Applicable	Site Security: the site shall be designed to discourage unauthorized access by persons or vehicles by using a perimeter barrier or topographic constraints. Areas within the site where open storage or ponding of hazardous materials occurs shall be separately fenced.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20540 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20540, Roads	Applicable	Roads: landfill roads must minimize dust and tracking of materials onto public roads. Such roads shall be kept in safe condition and maintained such that vehicle access and unloading can be conducted during inclement weather.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites.
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20630 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20630, Confined Unloading	Applicable	Confined Unloading: unloading of solid wastes shall be confined to as small an area as possible without resulting in traffic, personnel or public safety hazards. Requires normal deposition of waste at toe of fill.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20640 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20640, Spreading and Compacting	Applicable	Spreading and Compacting: Requires spreading and compacting of refuse in layers.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20650 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20650, Grading of Fill Surface	Applicable	Grading of Fill Surface: Covered surfaces of the disposal area shall be graded to promote run-off and prevent ponding, accounting for future settlement.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20660 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20660, Stockpiling	Applicable	Stockpiling: Requires stockpiled cover material and unsuitable native materials to be placed so as not to cause problems or interference with site operations.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated	27 CCR 20700	Applicable	Intermediate Cover: Requires compacted earthen material of at least	Applies to solid waste disposal sites as	For consolidation and

State ARARs for Solid Waste Disposal Site Excavation and Consolidation

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20700, Intermediate Cover		12 inches on all surfaces of the fill where no additional solid waste will be deposited within 180 days.	defined by Public Resources Code Section 40122.	excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20710(a) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(a), Scavenging, Salvaging and Storage	Applicable	Scavenging: Scavenging is prohibited.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20710(b) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(b), Scavenging, Salvaging and Storage	Applicable	Salvaging Permitted: Salvaging is permitted in a planned and controlled manner.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20710(c) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(c), Scavenging, Salvaging and Storage	Applicable	Storage of Salvage: Salvage material must be safely isolated for storage.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20710(c) Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20710(c), Scavenging, Salvaging and Storage	Applicable	Removal: Storage time for salvage materials shall be limited to a duration specified by the enforcement agency.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20720 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20720, Non-Salvageable Items	Applicable	Non-Salvageable Items: Items capable of impairing public health shall not be salvaged without approval by the agencies.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20730 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20730, Volume Reduction & Energy Recovery	Applicable	Volume Reduction and Energy Recovery: Volume reduction and energy recovery are permitted in planned and controlled manners. Processing area shall be confined to specified, clearly identifiable areas of the site.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20760 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec: 20710(c), Nuisance Control	Applicable	Nuisance Control: Each site shall be operated and maintained so as not to create a public nuisance.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989	27 CCR 20780(b) Div: 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec.	Applicable	Burning Wastes: Burning wastes shall be extinguished.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites

State ARARs for Solid Waste Disposal Site Closure and Postclosure Maintenance

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21130 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Emergency Response: potential emergency conditions that may exceed the design of the site and could endanger the public health or environment must be anticipated. Response procedures for these conditions must be addressed in the RD/RA plans.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21135 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Site Security: all points of access to the site must be restricted, except permitted entry points. All monitoring, control, and recovery systems shall be protected from unauthorized access.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21137 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Structure Removal: site structures and leachate and gas control systems not intended for reuse will be dismantled and removed at the time of closure to protect public health and safety.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21140 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Final Cover: the final cover shall function with minimum maintenance and provide waste containment to protect public health and safety by controlling at a minimum, vectors, fire, odor, litter and landfill gas migration. The final cover shall also be compatible with postclosure land use.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21142 Ch. 3, Sub. 5, Article 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Final Grading: final grades must be designed and maintained to reduce impacts to health and safety and take into consideration any postclosure land use.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21145 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Slope Stability: the operator shall ensure the integrity of final slopes under both static and dynamic conditions to protect public health & safety and prevent damage to postclosure land uses, roads, structures, utilities, gas monitoring and control systems, leachate collection and control systems to prevent public contact with leachate, and prevent exposure of waste.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2. Scope & Applicability pursuant 27 CCR 21100.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21150 Ch. 3, Subch. 5, Art. 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Drainage and Erosion Control: the drainage and erosion control system shall be designed and maintained to ensure integrity of postclosure land uses, roads, and structures; to prevent public contact with waste and leachate; to ensure integrity of gas monitoring and control systems; to prevent safety hazards; and to prevent exposure of waste.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Sub. 5, Art. 2. Scope & Applicability pursuant to 27 CCR 21100	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	27 CCR 21160 Ch. 3, Sub. 5, Article 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Landfill Gas Control and Leachate Contact: landfill gas control shall be implemented and maintained; leachate must be collected and controlled in a manner which prevents public contact and controls vectors, nuisance and odor.	Closure or Postclosure Maintenance Standards for Disposal Sites and Landfills of 27 CCR, Ch. 3, Subch. 5, Art. 2, Scope & Applicability pursuant 27 CCR 21100. The state does not intend that subsurface leachate monitoring and collecting systems need to be added to existing landfills unless leachate production and/or accumulation is evident.	For closing sites

State ARARs for Solid Waste Disposal Site Excavation and Consolidation

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
PRC 40502, 43020, 43021 and 43030	20780(b), Open Burning & Burning Wastes				
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20790 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 1, Sec. 20790, Nuisance Control	Applicable	Leachate Control: The operator shall ensure that leachate is controlled to prevent contact with the public.	The state does not intend that subsurface leachate monitoring and collection systems need to be installed at existing sites unless there is evidence of leachate production and/or accumulation. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20800 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20800, Dust Control	Applicable	Dust Control: The operator shall take adequate measures to minimize the creation of dust and prevent safety hazards due to obscured visibility.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20810 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20810,. Dust Control	Applicable	Vector and Bird Control: The operator shall take adequate measures to control or prevent the propagation, harborage, or attraction of flies, rodents, or other vectors, and to minimize bird problems.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20820 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20820, Drainage and Erosion Control	Applicable	Drainage And Erosion Control: The drainage system shall be designed and maintained to: ensure integrity of roads, structures, and gas monitoring and control systems; prevent safety hazards; and prevent exposure of waste.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20830 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 4, Sec. 20830, Grading of Fill Surface	Applicable	Litter Control: Litter and loose materials shall be routinely collected and disposed of properly.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 20919 Div. 2, Subdiv. 1, Ch. 3, Subch. 4, Art. 6, Sec. 20919, Gas Control	Applicable	Gas Control: The operator shall cause the site to be monitored for the presence and movement of landfill gas and take any necessary action to control such gases in the event that the gas causes a hazard or nuisance.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation and excavation sites
California Integrated Waste Management Act of 1989 PRC 40502, 43020, 43021 and 43030	27 CCR 21600 Div. 2, Subdiv. 1, Ch. 4, Subch. 3, Art. 2, Sec. 21600, Report of Disposal Site Info	Relevant and Appropriate	Report of Disposal Site Information: The planning and procedural requirements necessary to ensure that solid waste is handled and disposed in manners that protect public health and safety and the environment must be conducted.	Applies to operating solid waste disposal sites as defined by Public Resources Code Section 40122.	For consolidation sites

14 CCR - California Code of Regulations, Title 14 ARAR - applicable or relevant and appropriate requirement ROD - Record of Decision RD/RA - remedial design/remedial action

Winston H. Hickox
Agency Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

MEMORANDUM

TO: Katherine Leibel
Remedial Project Manager
Federal Facilities Unit "B"
Southern California Operations
Office of Military Facilities
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

FROM: Lynton Baker Lynn Baker
Staff Air Pollution Specialist
Substance Evaluation Section
Stationary Source Division

DATE: January 5, 2001

SUBJECT: APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR INSTALLATION RESTORATION OF SITE 7, STATION LANDFILL - SEAL BEACH NAVAL WEAPONS STATION

This memorandum is in response to your request for potential California "Applicable or Relevant and Appropriate Requirements" (ARARs) for the installation restoration of the Site 7, Station Landfill, at the Seal Beach Naval Weapons Station. State law as codified in Health and Safety Code (Division 26, section 40000) provides to local and regional authorities the primary responsibility for control of air pollution from sources other than emissions from motor vehicles. Air pollution control districts and air quality management districts are required to adopt and enforce rules and regulations to achieve and maintain the state and federal ambient air quality standards in all areas affected by emission sources under their jurisdiction, and to enforce all applicable provisions of state and federal law (Health and Safety Code section 40001).

Rules and regulations of the South Coast Air Quality Management District (SCAQMD) should be included in the consideration of action specific ARARs for Site 7. If you have not contacted the SCAQMD, we recommend that you contact Mr. Larry Bowen, Manager of the Toxics Section, at (909) 396-2575. SCAQMD rules that may apply include:

201 Permit to Construct
203 Permit to Operate
402 Nuisance
403 Fugitive Dust
1150 Excavation of Landfill Sites
1166 Volatile Organic Compound Emissions from Decontamination of Soil
1401 New Source Review of Carcinogenic Air Contaminants

In addition, the California Ambient Air Quality Standards (CAAQS, list enclosed) may apply as chemical specific ARARs. This is to ensure that activities undertaken to remediate Site 7 do not cause ambient air concentrations above the health protection levels of the CAAQS. In soil removal is necessary, the CAAQS for particulate matter (PM10) and lead should be considered.

If you have questions, please call me at (916) 324-6997.

Enclosure

cc: Mr. Larry Bowen (w/o Enclosure)
Manager, Toxics Section
South Coast Air Quality Management District
21865 E. Copley Dr.
Diamond Bar, CA 91765

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	0.12 ppm (235 µg/m³)[8]	Same as Primary Standard	Ethylene Chemiluminescence
	8 Hour	—		0.08 ppm (157 µg/m³)		
Respirable Particulate Matter (PM_{10})	Annual Geometric Mean	30 µg/m³	Size Selective Inlet Sampler ARB Method P (8/22/85)	—	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	24 Hour	50 µg/m³		150 µg/m³		
	Annual Arithmetic Mean	—		50 µg/m³		
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		65 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	Annual Arithmetic Mean			15 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m³)	Non-dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	—	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m³)		—		
Lead	30 days average	1.5 µg/m³	AIHL Method 54 (12/74) Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Fluorescence	0.030 ppm (80 µg/m³)	—	Pararosoaniline
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		—	—	
Visibility Reducing Particles	8 Hour (10 am to 6 pm, PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer—visibility of ten miles or more (0.07—30 miles or more for Lake Tahoe) due to particles when the relative humidity is less than 70 percent. Method: ARB Method V (8/18/89).		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Turbidimetric Barium Sulfate-AIHL Method 61 (2/76)			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Cadmium Hydroxide STRactan			

See footnotes on next page....

January 10, 2001

Department of Toxic Substances Control
Attn: Katherine K. Leibel
Remedial Project Manager
Federal Facilities Unit "B"
Southern California Operations
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

Dear Ms. Leibel:

SUBJECT: ***"Request for Applicable or Relevant and Appropriate Requirements"*** **(ARARs) for Non-Time Critical Removal Action - Site 7, Station Landfill, Seal Beach Naval Weapons Station**

The City of Seal Beach has reviewed your request of December 13, 2000 relative to "*Request for Applicable or Relevant and Appropriate Requirements*" (ARARs) for Naval Weapons Station, Seal Beach, Site 7. Upon a review of your letter, the information provided in Attachment A, and the attached EPA Fact Sheet "*Overview of ARARs*" (provided as Attachment 2), the City of Seal Beach has no input on potential ARARs regarding chemical-specific ARARs. The City does have a "***relevant and appropriate requirement***" in relation to Site 7, Station Landfill. The City requests that all requirements of South Coast Air Quality Management District Rule 402, Nuisances, and Rule 403, Fugitive Dust, be incorporated into the remediation program for this site, due to the close distance to existing residential areas.

In addition, since there are agreements between the Navy and the State of California which require the Installation Restoration Program to comply with State requirements and regulations, all project activities would be determined a project pursuant to California Public Resources Code Section 21065, and therefor would require an environmental analysis to be performed in accordance with the provisions of the California Environmental Quality Act, Section 21000 et. seq., and the "Guidelines for the Implementation of the California Environmental Quality Act with Discussions", prepared by the Governors Office of Planning and Research.

These comments are the same as previously made on January 1997 to an earlier request by your agency regarding identification of ARARs relating to IR Sites 7, 8, and 19 at the Seal Beach Naval Weapons Station. Thank you for allowing us to again comment on the proposed ARARs for Naval Weapons Station, Seal Beach, Site 7. If you have any questions or require further information, please contact my office, (562) 431-2527, extension 313, at your earliest convenience. I will be most anxious to respond to any additional questions that you may have regarding this matter.

Sincerely,

Lee Whittenberg
Director of Development Services

cc: City Council
Environmental Quality Control Board
Archaeological Advisory Committee

City Manager

COUNTY OF ORANGE
HEALTH CARE AGENCY

REGULATORY HEALTH SERVICES
ENVIRONMENTAL HEALTH

JULIETTE A. POULSON, RN, MN
INTERIM DIRECTOR

MIKE SPURGEON
DEPUTY AGENCY DIRECTOR
REGULATORY HEALTH SERVICES

JACK MILLER, REHS
DIRECTOR
ENVIRONMENTAL HEALTH

MAILING ADDRESS:
2009 EAST EDINGER AVENUE
SANTA ANA, CA 92705-4720

TELEPHONE: (714) 667-3600
FAX: (714) 972-0749
E-MAIL: environhealth@hca.co.orange.ca.us

January 12, 2001

Katherine K. Leibel
Remedial Project Manager
Federal Facilities Unit "B"
Southern California Operations
Office of Military Operations
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: **Request for Applicable or Relevant and Appropriate Requirements (ARARS) for Site 7, Station Landfill, Seal Beach Naval Weapons Station, Seal Beach File No. 30-CR-0162**

Dear Ms. Leibel:

The Orange County Solid Waste Local Enforcement Agency (LEA) has received your request for input for Applicable and Relevant and Appropriate Requirements (ARARs) pertaining to the subject site. The LEA is working in conjunction with the California Integrated Waste Management Board on all solid waste related issues and would like to reference the January 3, 2001 letter from the CIWMB (Michael Wochnick) for this facility. This letter provides a general list of solid waste ARARs pertaining to Site 7. The LEA would also like to add the CIWMB LEA Advisory #16, "Clean Closure " guidelines (September 26, 1994) to the list of solid waste ARARs. The Clean Closure guidelines pertain to excavation of disposal sites and are relevant to the subject site.

Thank you for the opportunity of working together on this project. If you have any additional questions, please call Dean Clarke at (714) 667-2023.

Sincerely,

Patricia Henshaw, REHS
Supervising Hazardous Waste Specialist
Solid Waste Local Enforcement Agency
Environmental Health

cc: John Broderick, RWQCB-Santa Ana
Michael Wochnick, CIWMB

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

GRAY DAVIS, Govern

DEPARTMENT OF TRANSPORTATION

DISTRICT 12
3337 Michelson Drive Suite CN 380
Irvine, CA 92612-1699

FAX AND MAIL

January 23, 2001

Ms. Katherine K. Leibel
Remedial Project Manager
Department of Toxic Substances Control
Federal Facilities Unit "B"
5796 Corporate Avenue
Cypress, CA 92628-1200

File: IGR/CEQA
SCH#: n/a
Log #: 845, 845a

Post-it® Fax Note 7671 | Date 1/23/01 | # of pages ▶ 2
To KATHARINE LEIBEL | From MANUEL EL NADAF
Co./Dept. DEPT. OF TOXIC SUBSTANCES | Co. CALTRANS D12
Phone # (714) 484-5446 | Phone # (949) 724-2085
Fax # (714) 484-5437 | Fax #

Subject: Department of Navy Request for Potential State-Action Specific, Chemical-Specific and Location Specific Applicable or Relevant and Appropriate Requirements (ARARS) for IR **Site 7and Site 5** at NWS, Seal Beach

Dear Ms. Leibel,

Thank you for the opportunity to review and comment on the above project. The project location for **IR Site 5 is a 4.1 acre** area situated in the southwest quadrant of the facility, near the southeast corner of Kitts Highway and Bolsa Avenue. The site is within Section 13 of Township 5 South, Range 12 West, of San Bernardino Meridian. The longitude and latitude of IR Site 5 are 118 05'0" west and 33 44'30" north respectively. The project location for **IR Site 7 is a 33 acre area** situated also on the southern boundary of the Naval Weapons Station, Seal Beach and adjacent to Perimeter Road and the Orange County (Bolsa Chica) Flood Control Channel. This site is also within Sections 17 and 18 of Township 5 South, Range 11 West, of the San Bernardino Meridian. The longitude and latitude are also the same as that given for Site 5. The State routes closest to the two projects are the I-405 and the SR-1 (Pacific Coast Highway).

The Projects for both sites involve assessing the alternatives for removal of a possible wide variety of construction debris, oil and petroleum products, domestic refuse, and earthen fill. It is also stated that IR Site 5 may contain ordinance items and scrap metal. IR Site 7 is characterized as being tested positively for mainly domestic refuse, construction debris and earthen fill. (1995 & 1996). Each site lists three alternatives for action and a fourth alternative for no action.

Caltrans District 12 status is a reviewing agency on this project and has reviewed both Requests for Identification of Applicable or Relevant and Appropriate Requirements for IR Site 5 *and* IR Site 7 under CERCLA dated November 21 and December 13, 2000, respectively, and has the following comments:

- If there is any impact to Caltrans Right of Way, an Encroachment Permit will be required.

- In Alternatives 4.3 and 4.4 of IR Site 5 and Alternative 4.2, 4.3 and 4.4 of IR Site 7, construction debris and inert material would be sent to appropriate recycling and disposal facilities. If these materials are transported via Caltrans Right of Way (e.g. I-405, SR-1 Pacific Coast Highway), measures must be taken during excavation and removal to contain all vehicle loads and avoid any tracking of materials, which may fall or blow onto Caltrans roadways or facilities.

- As noted in a telephone conversation with Ms. Leibel on January 23, 2001, the cover letter for IR Site 5 was attached to the data for IR Site 7 and vice versa, resulting in an initial comment for clarification by Ms. Leibel. She provided this information and this letter was amended to reflect the changes on this date.

Caltrans is always available to provide assistance and information on transportation issues to our communities as they continue to grow and prosper. Please continue to keep us informed of this project and other future developments, which could potentially impact our transportation facilities. If you have any questions or need to contact us, please do not hesitate to call Carolynn Gear at (949) 724-2241.

Sincerely,

Maureen El Harake for Robert Joseph

Robert F. Joseph, Chief
Transportation Planning Branch B

Cc: Ron Helgeson, HDQRTRS Planning
Leslie Manderscheid, Environmental Planning Branch B

Winston H. Hickox
Secretary for
Environmental
Protection

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Gray Davis
Governor

January 24, 2000

Mr. K. E. Reynolds
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

Dear Mr. Reynolds:

RESPONSE TO REQUEST FOR IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs): PROPOSED NON-TIME CRITICAL REMOVAL ACTION AT INSTALLATION RESTORATION (IR) PROGRAM SITE 7, STATION LANDFILL, NAVAL WEAPONS STATION (NWS), SEAL BEACH.

The California Department of Toxic Substances Control (DTSC) received your letter dated November 9, 2000 requesting state action-specific, chemical specific and location specific ARARs for IR Site 7 at NWS Seal Beach. According to Federal Facility Site Remediation Agreement (FFSRA) section 7.7 (c), the Navy is required to contact the agencies that failed to respond and again solicit their inputs. Please note that ARARs analysis is an iterative process. At the time of developing Remedial Action Plan (RAP)/ Removal Action Work plan (RAW), additional ARARs may be apparent.

In response to your request, we solicited action-specific, chemical specific and location specific ARARs from the following state and local agencies:

California Department of Health Services;
California Coastal Commission;
California Integrated Waste Management Board;
California Regional Water Quality Control Board, Santa Ana Region;
California Department of Fish and Game;
Orange County Public Facilities & Resources Department (Environmental Management Agency);
California Department of Transportation (District 12);
South Coast Air Quality Management District;
California Air Resources Board;
California State Lands Commission;
Orange County Sanitation District;

Orange County Water District;
Orange County Health Care Agency;
City of Seal Beach Environmental Quality Control Board; and
City of Seal Beach Planning Department.

We received responses from South Coast Air Quality Management District, California Air Resources Board, California Department of Transportation, California Integrated Waste Management Board, County of Orange Health Care Agency and City of Seal Beach Planning Department. The responses are enclosed as Attachment A.

If you have any questions, please call me at (714) 484-5446.

Sincerely,

Katherine K. Leibel
Remedial Project Manager
Federal Facilities Unit "B"
Southern California Branch
Office of Military Facilities

Enclosure

cc: Commanding Officer (w/o enclosures)
Naval Weapon Station, Seal Beach
Mail Code 045
800 Seal Beach Boulevard
Seal Beach, California 90740-5050

Ms. Pei- Fen Tamashiro, Environmental Engineer
Naval Weapons Station, Seal Beach
Public Works Code 099
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

Mr. Andrew Dick
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

cc: Mr. D. Baillie, Environmental Director (w/o enclosures)
The Department of the Navy
Naval Weapons Station, Seal Beach
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

Mr. John Boderick
California Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, California 92501-3339

Ms. Laurie Sullivan (w/o enclosures)
Coastal Resources Coordinator (H-1-2)
National Oceanic and Atmospheric Administration
c/o United States Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105

Ms. Lindi Wilhite
17340 Santa Maria Street
Fountain Valley, California 92708

Mr. Byrant Wong
CH2M Hill
3 Hutton Center Drive, Suite 200
Santa Ana, California 92707

California Regional Water Quality Control Board
Santa Ana Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb8
3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (909) 782-4130 - FAX (909) 781-6288

Gray Davis
Governor

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.swrcb.ca.gov/rwqcb8.

March 15, 2001

Ms. Pei-Fen Tamashiro
Installation Restoration Coordinator
Nanal Weapons Station, Seal Beach
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

REQUESTS FOR REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) APPLICABLE RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR SITES 7 AND 5, NAVAL WEAPONS STATION, SEAL BEACH

Dear Ms. Tamashiro:

On December 14, 2000, we received your requests for ARARs for a proposed non-time critical removal action at Site 7 at NWS Seal Beach, in compliance with Section 121(d) (2) (A) of CERCLA and the National Contingency Plan 40 CFR SS300.400 (g) and 300.515(d) and (h). The following is a list of our ARARs:

- **Water Quality Control Plan Santa Ana River Basin 1995 (Basin Plan)**

Citation: Chapter 3, Beneficial Uses

Description: Defines beneficial uses for groundwater beneath NWS Seal Beach as municipal, agricultural, industrial service and industrial process supply.

Comments: The identification of the groundwater as a potential drinking water source forms a basis for selection of concentration limits, cleanup levels and treatment levels.

ARAR Status: Applicable, Action

Citation: Chapter 4, Water Quality Objectives

Description: Defines the groundwater quality objectives for non-degradation, taste and odor, bacteria, chemical constituents, toxic substances, radioactivity, and minerals.

Comments: Concentration limits, cleanup levels, and treatment levels established for Site 7 must conform to the Basin Plan objectives.

ARAR Status: Applicable, Action, Chemical

Citation: Chapter 5, Implementation, Salt Balance and Assimilative Capacity – Lower Santa Ana Basin

Description: Describes the actions that are necessary to achieve the water quality objectives and protect beneficial uses of the Region's surface water and groundwater.

Comments: Applies to control, removal or remedial actions associated with groundwater remediation.

ARAR Status: Applicable, Action, Chemical

- **Statement of Policy with Respect to Maintaining High Quality of Waters in California**

Citation: State Water Resources Control Board Resolution No. 68-16

Description: Establishes policy on maintaining the high quality of California's surface waters and groundwater.

Comments: Affects discharges from treatment systems and migration of contaminated or polluted water into high quality waters.

ARAR Status: Applicable, Action, Chemical, Location

- **Sources of Drinking Water Policy**

Citation: State Water Resources Control Board Resolution No. 88-63 and Regional Board Resolution No. 89-42

Description: Defines all groundwater and surface waters as existing or potential sources of drinking water with a few specified exceptions. These exceptions are specified in Chapter 3, Beneficial Uses of the Basin Plan.

Comments: The identification of the groundwater beneath Site 7 as a potential drinking water source provides information for determining concentration limits, cleanup levels, or treatment levels.

ARAR Status: Applicable, Location

- **Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under the Water Code Section 13304**

Citation: State Water Resources Control Board Resolution No. 92-49 (as amended on April 21, 1994 and October 2, 1996)

Description: Requires the investigation, cleanup and abatement to extend to any location affected by a discharge or threatened discharge and sets policies and procedures for all investigations and cleanup and abatement activities.

Comments: This is applicable to investigations and remedial activities at Site 7.

ARAR Status: Applicable, Action, Chemical, Location

- **Porter-Cologne Water Quality Control Act 1998**

Citation: California Water Code SS13000

Description: Defines the legislative intent to attain the highest water quality reasonable, considering all demands being made.

Comments: Basis for selection of background levels as the goal for cleanup criteria.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 20090(d)

Description: Actions taken by public agencies to cleanup unauthorized releases are exempt from Title 27, except wastes removed from immediate place of release and discharged to land

must be managed in accordance with classification (Title 27 CCR, Section 20200) and wastes contained or left in place must comply with Title 27 to the extent feasible.

Comments: Applies to remediation, operation, maintenance, and monitoring of sites.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 20410

Description: Requires monitoring for compliance with remedial action objectives for three years from the date of achieving cleanup levels.

Comments: Applies to all soil cleanup activities.

ARAR Status: Relevant and Appropriate, Action

Citation: California Code of Regulations, Title 27, Section 20430

Description: Requires implementation of corrective action measures that ensure that cleanup levels are achieved throughout the zone affected by the release by removing the waste constituents or treating them in place. Source control may be required. Also requires monitoring to determine the effectiveness of the corrective actions.

Comments: If water quality is threatened or adversely impacted, this section applies to all soil cleanup activities.

ARAR Status: Relevant and Appropriate, Action

Citation: California Water Code SS13176

Description: Requires the analysis of material be performed in a state-certified laboratory.

Comments: Applies to all investigations and remedial actions.

ARAR Status: Applicable, Action

Citation: California Water Code Chapter 4, Article 4

Description: Requires submission of information regarding waste discharges and states that requirements shall be placed to implement water quality control plans. Technical or monitoring reports may be required for investigation of water quality. Provides for penalties for non-compliance.

Comments: Removal and remedial actions must comply with substantive requirements.

ARAR Status: Applicable, Action, Chemical, Location

Citation: California Code of Regulations, Title 27, Section 20950, 22207(a), 22212(a), and 22222

Description: General closure requirements, including continued maintenance of waste containment, drainage controls, and groundwater monitoring throughout the closure and post-closure maintenance periods.

Comments: Applies to partial or final closure of waste management units.

ARAR Status: Applicable, Action, Location

Citation: California Water Code Chapter 5, Article 1

Description: Requires cleanup and abatement of conditions of pollution or nuisance or threatened pollution or nuisance.

Comments: Applies to all investigation and remedial actions.

ARAR Status: Applicable, Action

Citation: California Water Code, Chapter 10, Article 3

Description: Specifies requirements for water wells, monitoring wells, and cathodic protection wells.

Comments: Applies to all well installations.

ARAR Status: Applicable, Action

Citation: California Water Code SS13240, 13241, 13242, 13243

Description: Establishes water quality objectives, including narrative and numerical standards, that protect the beneficial uses of surface waters and groundwater in the Region. Describes control measures designed to ensure compliance with state plans and policies and provide comprehensive water quality planning. Includes implementation actions for setting soil cleanup levels for soils that threaten water quality.

Comments: Any activity, including a new discharge of contaminated soils or containment of contaminated soils, that may affect water quality must not result in exceeding water quality objectives. Implementation plans and other policies and requirements may apply.

ARAR Status: Applicable, Action

- **Discharges of Waste to Land**

Citation: California Code of Regulations, Title 27, Division 2, Chapter 3

Description: Specifies water quality monitoring and response programs for waste management units. Requires establishment of concentration limits for groundwater, surface water, and the unsaturated zone. Monitoring points and Points of Compliance shall be specified in the requirements.

Comments: Applies to Site 7 due to waste discharged during past operations.

ARAR Status: Relevant and Appropriate, Action, Chemical, Location

Citation: California Code of Regulations, Title 27, Section 20200(c), 20210

Description: Requires that designated waste be discharged to Class I or Class II waste management units.

Comments: Applies to discharges of designated waste (non-hazardous waste that could cause degradation of surface or ground waters) to land for treatment, storage, or disposal.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 20230

Description: Requires that inert waste does not need to be discharged at classified units.

Comments: Applies to discharges of inert waste to land for treatment, storage, or disposal.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 20200(c), 20220

Description: Requires that non-hazardous solid waste be discharged to a classified waste management unit.

Comments: Applies to discharges of non-hazardous solid waste to land for treatment, storage, or disposal.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 21090

Description: Requires a final cover constructed in accordance with specific prescriptive standards, to be maintained as long as wastes pose a threat to water quality.

Comments: Relevant and appropriate for closed, abandoned, or inactive landfills and other areas where wastes have been discharged to land and water quality is threatened.

ARAR Status: Relevant and Appropriate, Action, Location

Citation: California Code of Regulations, Title 27, Division 2, Subdivision 1

Description: Establishes waste and siting classification systems and minimum waste management standards for discharges of waste to land for treatment, storage, and disposal. Engineered alternatives that are consistent with Title 27 performance goals may be considered. Establishes corrective action requirements for responding to leaks and other unauthorized discharges.

Comments: Applies to all discharges of waste to land for treatment, storage, or disposal that may affect water quality.

ARAR Status: Applicable, Action, Chemical, Location

Citation: California Code of Regulations, Title 27, Section 20080(g)

Description: Requires monitoring. If water quality is threatened, corrective action consistent with Title 27 is required

Comments: Applies to areas of land where discharges had ceased as of November 27, 1984 (the effective date of the revised Title 27 regulations).

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Article 1, Sections 20385-20435

Description: Where groundwater monitoring is required under 2510 or 2511 of Chapter 15 (and equivalent for Title 27), Article 5 applies to authorized waste management units as well as unauthorized discharges of waste to land and to closed abandoned or inactive units.

Comments: Applies to all areas in which waste has been discharged to land to determine the threat to water quality.

ARAR Status: Applicable, Action, Location

Citation: California Code of Regulations, Title 27, Section 20385

Description: Requires detection monitoring. Once a significant release has occurred, site investigation and remediation, with evaluation or corrective action monitoring, are required.

Comments: Applies to all areas in which waste has been discharged to land where groundwater is threatened or adversely impacted.

ARAR Status: Applicable, Action, Location

Citation: California Code of Regulations, Title 27, Section 20390

Description: Requires establishment of a water quality protection standard consisting of a list of constituents of concern, concentration limits, compliance monitoring points, and all monitoring points. This section further specifies the time period during which the standard shall apply.

Comments: Applies to all areas in which waste has been discharged to land where groundwater is threatened or adversely impacted.

ARAR Status: Applicable, Action, Location

Citation: California Code of Regulations, Title 27, Section 20395

Description: Requires development of a list of constituents of concern which include all waste constituents, that are reasonably expected to be present in the soil from discharges to land, and could adversely affect water quality.

Comments: Applies to all areas in which waste has been discharged to land where groundwater is threatened.

ARAR Status: Applicable, Action, Location

Citation: California Code of Regulations, Title 27, Section 20400

Description: Cleanup levels must be set at background concentration levels, or, if background levels are not technologically and economically feasible, then at the lowest levels that are economically and technologically feasible. Specific factors must be considered in setting cleanup levels above background levels. Cleanup levels above background levels shall be evaluated every five years. If the actual concentration of a constituent is lower than its associated cleanup level, the cleanup level shall be lowered to reflect existing water quality.

Comments: If water quality is threatened, this section applies in setting soil cleanup levels for all cleanups of discharges of waste to land.

ARAR Status: Relevant and Appropriate, Action

Citation: California Code of Regulations, Title 27, Section 20405

Description: Requires identification of the point of compliance, hydraulically down gradient from the area where waste was discharged to the land.

Comments: Applies to all areas in which waste has been discharged to land where groundwater is threatened.

ARAR Status: Applicable, Action

Citation: California Code of Regulations, Title 27, Section 20415

Description: Requires general soil surface water, and groundwater monitoring.

Comments: Applies to all areas in which waste has been discharged to land.

ARAR Status: Relevant and Appropriate, Action

Citation: California Code of Regulations, Title 27, Section 20420

Description: Requires detection monitoring to determine if a release has occurred.

Comments: Applies to all areas where waste has been discharged to land and groundwater is threatened.

ARAR Status: Applicable, Action

- **Storm Water Activities**

Citation: 40 CFR Parts 122, 123, 124, National Pollution Discharge Elimination System, implemented by California Storm Water Permit for Industrial Activities, State Water Resources Control Board Order #97-03-DWQ

Description: Regulates pollutants in discharge of storm water associated with hazardous waste treatment, storage, and disposal facilities, wastewater treatment plants, landfills, land application sites, and open dumps. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards. Regulates pollutants in discharge of storm water associated with construction activity (clearing, grading, or excavation) involving the disturbance of 5 acres or more. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.

Comments: Applies to storm water discharges from industrial areas. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance. Applies to construction areas over 5 acres in size. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance.

ARAR Status: Applicable, Action

For any questions on this list or related matters, please call me at (909) 782-4494.

Sincerely,

John Broderick
SLC/DoD/AGT Section

cc: Ms. Katherine Leibel, Department of Toxic Substances, OMF
Mr. John Bradley, Seal Beach National Wildlife Refuge
Mr. Si Le, Naval Facilities Engineering Command, SWDIV

Vicki L. Wilson, Director

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

Environmental Resources
1750 S. Douglass Road
Anaheim, CA 92806

Telephone: (714) 567-6363
Fax: (714) 567-6220

April 24, 2001

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 1

To BOB & BRYANT	From Si Le
Dept./Agency	Phone # (619) 532-1235
Fax #	Fax # -3546
NSN 7540-01-317-7368 5099-101	GENERAL SERVICES ADMINISTRATION

M. R. Good
Department of the Navy
Southwest Division
1220 Pacific Highway
San Diego, CA 92132-5190

Subject: **Applicable or Relevant and Appropriate Requirements (ARARs) for Installation Restoration (IR) Sites 5 and 7, Naval Weapons Station (NWS), Seal Beach, California**

Dear Mr. Good:

In response to your letter dated March 23, 2001, the following ARARs should be considered for the Seal Beach NWS non-time critical removal actions:

- Action-specific--Applicable or relevant to: Excavations, soil removal, grading

  California Regional Water Quality Control Board, Santa Ana Region, Order No 96-31, NPDES Permit No CAS618030, issued to the County of Orange, the Orange County Flood Control District and the City of Seal Beach (March 8, 1996), and the State General Permit for Stormwater Discharges Associated with Construction Activity, requires the implementation of structural and non-structural Best Management Practices (BMPs) to control erosion/siltation and contaminated run-off from construction sites.

- Chemical-specific--Applicable or relevant to: Disposal of groundwater to stormdrain

  Order No. 96-31 of NPDES Permit No. CAS618030, page 7 item 23, states that entities discharging to the stormdrain systems or any surface water bodies may be required to participate in this area-wide permit (have appropriate controls for the proper management of stormwater runoff and also, to work cooperatively with the County of Orange to manage urban stormwater runoff) or obtain individual storm water discharge permits, pursuant to 40CFR 122.26(a).

- Location-specific--Applicable or relevant to: Construction or access to County right-of-ways

  County of Orange Ordinance (OCC Sections 6-1-13, 6-1-122, 6-3-41 and 6-4-377) requires that a Public Property Encroachment Permit be obtained for any work conducted in the right-of-ways and facilities administered by the County's Public Facilities and Resources Department

Thank you for the opportunity to comment on ARARs for the Seal Beach NWS non-time critical removal project. Please direct any questions regarding this letter to Duc Nguyen at (714) 567-6339.

Very truly yours,

Chris Crompton
Manager, Environmental Resources

CC: dn\D:\Nguyend\Rem\ARAR\Seal Beach NWS ARAR 0104

TOTAL P.01

State of California

Memorandum

To : Mr. Rafat Abassi
Department of Toxic Substances Control
Office of Military Facilities, Region 4
245 West Broadway, Suite 350
Long Beach, California 90802

Date : February 25, 1997

From : **Department of Fish and Game**

Subject : Applicable or Relevant and Appropriate Requirements (ARARs), Seal Beach Naval Weapons Station (NWS), Installation Restoration Sites 7, 8, and 19

This memorandum is in response to your December 24, 1996 letter to interested parties requesting potential State ARARs for selected Installation Restoration Sites at Seal Beach NWS. The Department of Fish and Game (DFG) appreciates this opportunity to provide State laws and regulations to guide the planned cleanup at Seal Beach NWS. As the State lead agency for toxic cleanup, you are making an inquiry to DFG for purposes of coordination and to request that DFG define appropriate State cleanup requirements under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as a portion of the RI/FS process. This letter will also serve to advise you of the Department's continuing interest in coordinating any natural resource issues, as one of the designated State natural resource trustees, which may be necessary should release(s) of any hazardous materials at the subject site affect State natural resources, pursuant to CERCLA.

We have not had the opportunity to do a site inspection at Seal Beach NWS. However, based upon the proximity of the sites to the National Wildlife Refuge, we feel that the potential for impacting valuable fish and wildlife resources exists. Listed on the enclosed table is a complete list of Fish and Game Code Sections that are possible State location-specific ARARs or TBCs (to be considered). The specific citation and explanation for each listed ARAR and TBC are included.

Thank you for the opportunity to comment upon the ARARs request. If you have any questions regarding this or other issues at Seal Beach NWS contact me at (916) 327-3196. Please be advised that all future correspondence regarding Seal Beach NWS should be directed to the following address: Ms. Susan Ellis, OSPR Headquarters, P.O. Box 944209, Sacramento, California 94244-2090.

Susan R. Ellis

Susan R. Ellis, Senior Biologist
Military Facilities Program

cc: Mr. Jonathan Clark, OSPR-Legal
Department of Fish and Game
Sacramento

INSTALLATION RESTORATION SITES 7, 8, AND 19 ARARs AND TBCs, SEAL BEACH NWS

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Wildlife species/habitats	Action must be taken for the general protection and conservation of fish and wildlife resources.	Fish & Game Code Section 1600	This code section declares the protection and conservation of fish and wildlife to be an important public interest. This section is a general statement of policy that does not impose a substantive requirement. This section should be included as a TBC.
Streambed	The Department must propose reasonable modifications to public construction projects that would alter the bed, channel or bank of any river, stream or lake and may substantially adversely affect an existing fish or wildlife resource.	Fish and Game Code Section 1601	This section requires notification to and action by the Department. It also imposes a substantive requirement to the extent it requires streambed alteration to not substantially adversely affect an existing fish or wildlife resource. Section 1601 complements the operation of federal ARAR 40CFR Section 231.1, which authorizes the USEPA Administrator to prohibit activity whenever he determines that the discharge of dredge or fill material may have an "unacceptable adverse affect" on fish and wildlife. Section 1601 also complements the operation of federal ARAR 16 USC Section 662, which requires the determination of possible damage to wildlife resources and the means and measures that should be adopted to prevent the loss of or damage to such resources caused by proposed streambed alterations. This section should be included as an ARAR.
Streambed	Any streambed may not be altered without first notifying the Department	Fish and Game Code Section 1603	This section requires notification to and action by the Department. It also imposes a substantive requirement to the extent it requires streambed alteration to not substantially adversely affect an existing fish or wildlife resource. This section should be included as an ARAR.

INSTALLATION RESTORATION SITES 7, 8, AND 19 ARARs AND TBCs, SEAL BEACH NWS

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Aquatic and wildlife species/habitats	Action may be taken to collect damages for the taking of birds, mammals, fish, reptiles or amphibia	Fish and Game Code Section 2014	This code section declares that it is the policy of the state to conserve its natural resources. It allows the state to recover damages in a civil action against any person or local agency which unlawfully or negligently takes or destroys a bird, mammal, fish, reptile or amphibian protected by the laws of the state. This section should be included as an ARAR.
Endangered Species	Action must be taken to conserve endangered species, there can be no releases and/or actions that would have a deleterious effect on species or habitat.	Fish & Game Code Section 2080	This section prohibits the taking, importation or sale of any species, or any part thereof, of an endangered species or a threatened species. This section should be included as an ARAR.
Endangered Species	Action must be taken to conserve endangered species, there can be no releases and/or actions that would have a deleterious effect on species or habitat.	Fish & Game Code Sections 2090-2096	These code sections comprise Article 4 of Chapter 1.5 of the California Endangered Species Act. These sections make provisions concerning Department coordination and consultation with state and federal agencies and with project applicants. These sections do not impose substantive requirements. These sections should be included as TBCs.

INSTALLATION RESTORATION SITES 7, 8, AND 19 ARARS AND TBCs, SEAL BEACH NWS

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Wildlife species	Action must be taken to prohibit the taking of birds and mammals, including taking by poison.	Fish & Game Code Section 3005	This code section prohibits the taking of birds and mammals, including taking by poison. "Taking" is defined by Fish and Game Code section 86 to include killing. "Poison" is not defined in the code but contaminants of concern (heavy metals, herbicides and pesticides) are all poisons by definition. Federal law recognizes that poison may effect an incidental taking. (Defenders of Wildlife v. Administrator, Environmental Protection Agency (1989) 882 F.2d 1295.) This code section imposes a substantive, promulgated environmental protection requirement. This section should be included as an ARAR.
Aquatic and Wildlife specis/habitats	Action may be taken if toxic materials area placed where they can enter waters of the State. There can be no releases that would have a deleterious effect on species or habitat.	Fish & Game Code sections 5650(a),(b) & (f)	These code sections prohibit the deposition into State waters of inter alia, petroleum products [Section 5650(a)], factory refuse [Section 5650(b)], and any substance deleterious to fish, plants or birds [Section 5650(f)]. These are substantive promulgated environmental protection requirements. These requirements impose strict criminal liability on violators. [People v Chevron Chemical Company (1983) 143 CAl.App.3d 50.]. This imposition of strict criminal liability imposes a standard that is more stringent than Federal law. The extent to which each subdivision of Section 5650 is relevant and appropriate depends on site specific conditions or details. There is also a scientific/technical reason for inclusion of Section 5650 as a potential location specific ARAR. State and Federal water quality control standards are generally developed utilizing data, information and guidance from numerous sources. Federal water quality criteria may allow higher concentrations of chemicals for limited periods, which can result in conditions which are deleterious to State fish, plants or birds.

INSTALLATION RESTORATION SITES 7, 8, AND 19 ARARs AND TBCs, SEAL BEACH NWS

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Wetlands	Actions must be taken to assure that there is "no net loss" of wetlands acreage or habitat value. Action must be taken to preserve, protect, restore and enhance California's wetland acreage and habitat values.	Fish and Game Commission Wetlands Policy (adopted 1987) included in Fish and Game Code Addenda	This policy seeks to provide for the protection, preservation, restoration, enhancement and expansion of wetland habitat in California. Further, it opposes any development or conversion of wetland which would result in a reduction of wetland acreage or habitat value. It adopts the USFWS definition of a wetland which utilizes hydric soils, saturation or inundation, and vegetable criteria and requires the presence of at least one of these criteria (rather than all three) in order to classify an area a wetland. This policy is not a regulatory program and should be included as a TBC.

Appendix E
Comment Letters

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

OPTIONAL FORM 99 (7-90)

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To Bryant Wong	From Si Le
Dept./Agency	Phone # (714) 424-2065
Fax #	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

December 21, 2001

Ms. Pei-Fen Tamashiro
Naval Weapons Station, Sea
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

REVIEW OF THE ENGINEERING EVALUATION/COST ANALYSIS, NON-TIME CRITICAL REMOVAL ACTION FOR IR SITE 7, STATION LANDFILL, NAVAL WEAPONS STATION, SEAL BEACH, OCTOBER 29, 2001

Dear Ms. Tamashiro:

The Department of Toxic Substances Control has reviewed the subject document, prepared by CH2MHILL, for the Department of Navy, Southwest Division, Naval Facilities Engineering Command. Upon review, the Department of Toxic Substances Control has the enclosed comments. If you have any questions, please call me at (714) 484-5446.

Sincerely,

Katherine Leibel
Remedial Project Manager
Office of Military Facilities

Enclosure:

cc: Mr. Si Le
Remedial Project Manager
SWDIV Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

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cc: Ms. Patricia Hannon
Santa Ana Region
California Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, California 92501-3339

Mr. John Bradley
United States Fish and Wildlife Service
P.O. Box 815
Seal Beach, California 90803

Ms. Lindi Wilhite
17340 Santa Maria Street
Fountain Valley, California 92708

Department of Toxic Substances Control

Edwin F. Lowry, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

TO: Katherine Leibel, Project Manager
Office of Military Facilities
5796 Corporate Avenue
Cypress, California 90630

FROM: Marie T. McCrink, RG, CH
Site Mitigation Branch
Geologic Services Unit
8800 Cal Center Drive
Sacramento, California 95826-3200

Reviewed by:
Mike Finch, RG
Geologic Services Unit

DATE: December 13, 2001

SUBJECT: **Review of the Engineering Evaluation/Cost Analysis, Non-Time Critical Removal Action for IR Site 7, Station Landfill, Naval Weapons Station Seal Beach, Dated October 29, 2001** (log # 011119)

ACTIVITY REQUESTED

Per your request, the Geologic Services Unit (GSU) has reviewed the **Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for IR Site 7, Station Landfill, Naval Weapons Station, Seal Beach**. The report was prepared by CH2MHill, for the Department of the Navy, Southwest Division, Naval Facilities Engineering Command, San Diego. The document is dated October 29, 2001, and was received by GSU on November 1, 2001. As per our agreement, the GSU committed to a completed review of the subject document by December 13, 2001.

The GSU was requested to review the subject EE/CA, evaluate the proposed removal action alternatives, evaluate the recommended removal action, and provide comments and recommendations, if necessary.

PROJECT SUMMARY

The objective of this EE/CA is to summarize the site characteristics, identify removal action objectives, describe the selected removal action alternatives, analyze the alternatives, and describe the recommended removal action alternative for buried refuse, waste, debris, and contaminated soil and groundwater at IR Site 7, the former Station Landfill.

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Chemical analyses of soil samples from Site 7 have detected remnants of past waste disposal operations. Low levels of volatile organic contaminants (VOCs), semi-volatile organic contaminants (SVOCs), polychlorinated biphenyls (PCBs), and cyanide have been detected in soils, but with no consistent pattern. Metals have been detected, generally within background levels. Also, migration gas sampling indicates no significant migration of landfill gas. In shallow groundwater, low levels of VOCs, SVOCs, pesticides, metals, asbestos, and cyanide have been detected infrequently. In ten quarters of groundwater monitoring, well defined plumes of contaminants of potential concern (COPCs) have not been identified. Shallow groundwater occurs between 3 and 5 feet below ground surface, and is tidally influenced. It appears that during the dry season, groundwater flow is towards the east and away from the National Wildlife Refuge (NWR). During the wet season, groundwater flow is generally towards the NWR in a southwesterly direction.

COMMENTS AND RECOMMENDATIONS

1. Executive Summary, page ES-2. It is stated that areas of known debris associated with past landfill operations have been designated as Areas 1 to 6. Descriptions of each area are provided.

   The GSU recommends that Figure 2-9, Disposal Areas, be referenced at the beginning of the area descriptions.

2. Section 6 - Recommended Removal Action Alternative. Based on the comparative analyses of the removal action alternatives, the recommended removal action is Alternative No. 3. This alternative consists of four parts: Area 1 - Repair existing soil cover and groundwater monitoring; Area 2 - Groundwater monitoring; Areas 3, 4, and 6 - Removal of surface debris; and Area 5 - Excavation followed by offsite disposal and backfilling with clean imported fill.

   The GSU concurs with the recommended removal action alternative. However, we recommend the GSU be involved in future discussions about the proposed monitoring activities for Areas 1 and 2 before preparing the action memorandum and the associated remedial action plan. In addition, we recommend groundwater monitoring be conducted in the vicinity of Area 5 due to its sensitive location in the NWR between the Perimeter Pond and the East Pond. Finally, we recommend any furture monitoring include limited groundwater and surface water monitoring in the NWR to confirm that surface debris removal from Areas 3, 4, and 6 does not mobilize any COPCs.

If you have any questions, please call me at (916) 255-3691.

cc: Stewart Black, GSU Supervisor, DTSC, Sacramento

Page 4-10 Section 4.5 Alternative 3 - Existing Soil Cover Repair and Groundwater Monitoring
Please expand the discussion of this alternative. The soil cover must be discussed as an engineered alternative to the prescriptive cover design, taking into consideration the high water table under the site.

Page 6-1 Section 6. Recommended Removal Action Alternative
This section does not present an adequate argument for selection of Alternative 3. This section should summarize the recommended alternative, and include details which support selection of this alternative, taking into consideration the protection of human health and the environment, conditions at the site, and comparative costs of the various alternatives. See CCR, Title 27, Section 20080 (b) and (c).

Page A2-4 Section A2.2.1.1 Federal, last paragraph
The following statement is incorrect as written: "*The aquifer underlying Site 7 at NAVWPNSTA Seal Beach (Santa Ana Pressure Subbasin) is classified as a Class III aquifer and is designated by RWQCB Santa Ana Region as water that cannot be used for drinking water due to the underlying shallow groundwater is saline- to hypersaline and yield is less than 150 gallons per day.*"

According to the Water Quality Control Plan for the Santa Ana River Basin, the Santa Ana Pressure Subbasin is designated as having the following beneficial uses: municipal and domestic supply, agricultural supply, industrial service and industrial process supply. These beneficial use designations are assigned to all areas of the subbasin. We do recognize, however, that the uppermost groundwater zone in this area is unlikely to be used as a source of drinking water, because of its poor mineral quality and low yield. We have taken such site-specific factors into consideration in our cleanup requirements.

If you should have any questions, please call me at (909) 782-4498 or send e-mail to phannon@rb8.swrcb.ca.gov.

Sincerely,

Patricia A. Hannon

Patricia A. Hannon
SLIC/DoD/AGT Section

cc: Ms. Katherine Leibel, Dept of Toxic Substances Control
Mr. Si Le, Naval Facilities Engineering Command, SWDIV
Mr. John Bradley, Seal Beach National Wildlife Refuge

California Integrated Waste Management Board

Linda Moulton-Patterson, Chair
1001 I Street • Sacramento, California 95814 • (916) 341-6000
Mailing Address: P. O. Box 4025, Sacramento, CA 95812-4025
www.ciwmb.ca.gov

Gray Davis

Winston H. Hickox
Secretary for Environmental Protection

Post-it® Fax Note 7671	Date 2/15	# of pages ▶ 1
To Byrant Wong	From R LEEBEL	
Co./Dept. CH2M HILL	Co. DTSC	
Phone #	Phone # (714) 484-5446	
Fax # (714) 424-2065	Fax #	

February 6, 2002

Ms. Pei-Fen Tamashiro, Installation Resto
Environmental Office, Code N45S
Naval Weapons Station Seal Beach
800 Seal Beach Blvd., Bldg. 110
Seal Beach, CA 90740-5000

CIWMB REVIEW OF DRAFT ENGINEERING EVALUATION/COST ANALYSIS NON-TIME CRITICAL REMOVAL ACTION FOR SITE 7 SEAL BEACH NAVAL WEAPONS STATION SITE 7 (SWIS #36-CR-0162) SEAL BEACH, CALIFORNIA

Dear Ms. Tamashiro:

The California Integrated Waste Management Board (CIWMB) staff has completed its review of the draft Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7, Seal Beach Naval Weapons Station. The Naval Facilities Engineering Command in partnership with CH2MHILL prepared the EE/CA on October 29, 2001. CIWMB staff finally received a copy the draft EE/CA on January 29, 2002. CIWMB staff has no comments on the draft EE/CA at this time.

Should you have any questions please call me at (916) 341-6352.

Sincerely,

Christopher Fong

Christopher Fong
Waste Management Engineer
Permitting and Enforcement Division
California Integrated Waste Management Board

cc: See Next Page

Project Note

Date issued:	21 May 2002
Recorded by:	Marielle Coquia/CH2M HILL
Project Number:	141948.02.40
Subject:	Responses to the 13 December 2001 Marie T. McCrink, RG, CH Site Mitigation Branch, Geologic Services Unit, Comments Re: Review of the *Engineering Evaluation/Cost Analysis, Non-Time Critical Removal Action for IR Site 7, Station Landfill, Naval Weapons Station Seal Beach,* Dated October 29, 2001
	Responses to the 19 December 2001 Joseph Porter III, Chairman, Environmental Quality Control Board, City of Seal Beach Comments Re: *Draft Engineering Evaluation/Cost Analysis (EE/QA), Non-Time Critical Removal Action for Site 7 Station Landfill, Naval Weapons Support Facility Seal Beach*
	Responses to the 15 January 2002 Patricia A. Hannon, California Regional Water Quality Control Board, Santa Ana Region Comments Re: *Draft Engineering Evaluation/Cost Analysis (EE/CA), Site 7 Station Landfill, U. S Naval Weapons Station, Seal Beach*
	Responses to the 6 February 2002 Christopher Fong, California Integrated Waste Management Board Comments Re: *Draft Engineering Evaluation/Cost Analysis, Non-Time Critical Removal Action for Site 7 Seal Beach Naval Weapons Station Site 7 (SWIS #36-CR-0162), Seal Beach, California*

The purpose of this project note is to provide written responses to comments made by the regulatory agencies that reviewed the *Draft Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7 Station Landfill, Naval Weapons Station, Seal Beach, Orange County, California* dated 29 October 29, 2001. The reviewers are listed below:

- Marie T. McCrink, RG, CH, Site Mitigation Branch, Geologic Services Unit, Department of Toxic Substances Control
- Joseph Porter III, Chairman, Environmental Quality Control Board, City of Seal Beach
- Patricia A. Hannon, California Regional Water Quality Control Board, Santa Ana Region
- Christopher Fong, Waste Management Engineer, Permitting and Enforcement Division, California Integrated Waste Management Board

Responses will follow comments, which appear in the order they were presented.

Response to Comments Made 13 December 2001 by Marie T. McCrink, RG, CH, Department of Toxic Substances Control

General Comments

1. *Executive Summary, page ES-2. It is stated that areas of known debris associated with past landfill operations have been designated as Areas 1 to 6. Descriptions of each area are provided.*

   The GSU recommends that Figure 2-9, Disposal Areas, be referenced at the beginning of the area descriptions.

Response

Figure 2-9, Disposal Areas will be referenced as recommended. This will be stated in the Final EE/CA.

Comment

2. *Section 6 -- Recommended Removal Action Alternative. Based on the comparative analyses of the removal action alternative consists of four parts: Area 1 – Repair existing soil cover and groundwater monitoring; Area 2 -- Groundwater monitoring; Areas 3, 4, and 6 – Removal of surface debris; and Area 5 – Excavation followed by offsite disposal and backfilling with clean imported fill*

   The GSU concurs with the recommended removal action alternative. However, we recommend the GSU be involved in future discussions about the proposed monitoring activities for Areas 1 and 2 before preparing the action memorandum and the associated remedial action plan. In addition, we recommend groundwater monitoring be conducted in the vicinity of Area 5 due to its sensitive location in the NWR between the Perimeter Pond and the East Pond. Finally, we recommend any future monitoring include limited groundwater and surface water monitoring in the NWR to confirm that surface debris removal from Areas 3, 4, and 6 does not mobilize any COPCs.

Response

The Navy concurs and will include the GSU in future discussions about the proposed monitoring activities for Areas 1 and 2.

Responses to Comments Made 19 December 2001 by Joseph Porter III, Chairman, Environmental Quality Control Board, City of Seal Beach

Comment

The City is concerned and would like some clarification regarding the recommended alternative, however. Specifically, the City is concerned that all lands being remediated outside the boundaries of the Wildlife Refuge be cleaned to a residential standard. The City acknowledges that given current information, the level of contamination and contact with receptors will be reduced to a level of insignificance under the recommended alternative, and that groundwater monitoring wells be installed within Areas 1 & 2. Should any contaminated groundwater migrate or be found to be at a level of significance through the monitoring process, the City requests that a new study and corresponding action plan be undertaken so as to remediate those areas to a residential standard. Additionally, should the geophysical study undertaken after the surface level debris is removed at

Areas 3, 4, and 6 show any further contamination, the City requests that further study be undertaken to identify the appropriate cleanup method and schedule. In reference to Area 5, the City fully concurs with the Navy recommendation to excavate and remove contaminated soil and dispose of it off site. The City is very interested in preserving the viability and natural harmony of the Seal Beach Wildlife Refuge.

Response

Past investigations have shown no contaminated groundwater plume to be present. However, periodic groundwater monitoring is proposed to monitor the status and conditions of the groundwater. If the status changes, appropriate actions will be taken at that time. Additionally, the 1995 Remedial Investigation Report found that for both the average and reasonable maximum exposure (RME) residential land use scenarios, the estimated non-cancer hazard index (HI) is less than 1 (i.e., acceptable) for chemicals of potential concern (COPCs).

The total estimated excess lifetime cancer risk for the average exposure residential land use scenario is less than 1×10^{-6} for the entire site. For the RME residential land use scenario, the estimated excess lifetime cancer risk is less than 1×10^{-5} for the site as a whole.

It should be noted that even though the Navy evaluated the risks at Site 7 assuming the conservative, residential land use scenario, residential land use of a former landfill is not a practical future use of the site.

In Areas 3, 4, and 5, if unexpected contamination is observed that cannot be simply excavated and transported offsite for proper disposal, then the Navy will re-group to evaluate the appropriate cleanup method and schedule given the new findings.

The details for implementing the recommended alternative will be developed by the removal action contractor and will be discussed in the removal action work plan.

Response to Comments 15 January 2002 by Patricia A. Hannon, California Regional Water Quality Control Board

Comment

Page 2 of 30
Please include a description of the methods that were used to measure the landfill gas, and the results you obtained during gas monitoring.

Response

Section 2.3 (Final EE/CA) will include the following description:

The Navy's primary contractor, CH2M HILL, retained Aero Vironment to conduct a landfill assessment for Site 7 Station Landfill. Detailed descriptions of the assessment are provided in *Ambient Air and Integrated Surface Sampling at Sites 7 and 19 for Seal Beach Naval Weapon Station* (Aero Vironment, Inc. November 1993) and *Soil Gas Sampling at Sites 7 and 19 for Seal Beach Weapon Station* (Aero Vironment, Inc. November 1993). The assessment and field procedures were performed in accordance with the State of California Air Resources Board (CARB) Testing Guidelines for Active Solid Waste Disposal Sites, as required by California

Health and Safety Code Section (HSC) 41805.5, which requires all active disposal sites to conduct tests and measurements to determine the composition of landfill gases, the presence of specified air contaminants in the ambient air, and whether offsite subsurface migration of landfill gas is occurring.

Specific monitoring requirements included the following:

- Landfill gas testing
- Gas migration probe sampling
- Integrated surface sampling
- Ambient air sampling
- Weather reporting data

Landfill gas probes were installed within the boundaries of the landfill to depths ranging from 4 to 6 feet. The landfill gas probes were constructed of a ½-inch galvanized steel pipe. Several small holes were drilled in the bottom foot of the pipe to enable gas collection, and a probe point was connected to the probe to prevent soil from entering the probe as it was installed. All samples collected during assessment were analyzed for Attachment 1 compounds in accordance with HSC 41805.5 (See Table 1). The analytical method United States Environmental Protection Agency (USEPA) TO-14 meets the requirements established by HSC 41805.5 and includes all Attachment 1 compounds.

Landfill gas probes were also sampled on 17 September 1993. These samples were analyzed for fixed and permanent gases using American Society for Testing and Materials (ASTM) 1945.

Table 1
Specified Compounds for Landfill Assessment

Compound		Detection Limits (ppb)	
		Air	Disposal Site
Chloroethene (vinyl chloride)	CH_2CHCl	2	500
Benzene	C_6H_6	2	500
1,2-Dibromoethane (ethylene dibromide)	$BrCH_2CH_2Br$	0.5	1
1,2-Dichloroethane (ethylene dichloride)	ClCH2CH2Cl	0.2	20
Dichloromethane (ethylene chloride)	CH_2Cl_2	1	60
Tetrachloroethene (perchloroethylene)	$Cl_2C:CCl_2$	0.2	10
Tetrachloromethane (carbon tetrachloride)	CCl_4	0.2	5
1,1,1-Trichloroethane (methyl chloroform)	CH_3CCl_3	0.5	10
Trichloroethylene	$HClC:CCl_2$	0.6	10
Trichloromethane (chloroform)	$CHCl_3$	0.8	2

ppb = parts per billion
Source: "Testing Guidelines for Active Solid Waste Disposal Sites," California Air Resources Board, 1986

Results of the monitoring are included in the *Ambient Air and Integrated Surface Sampling at Sites 7 and 19 for Seal Beach Naval Weapon Station* (Aero Vironment, Inc. November 1993) and *Soil Gas Sampling at Sites 7 and 19 for Seal Beach Weapon Station* (Aero Vironment, Inc. November 1993). A figure with the sample locations and tables summarizing the results are provided in the Attachment 1.

Comment

Section 2.3 Source, Nature and Extent of Contamination
Please include a map showing the location of the trenches in Area 1, and provide cross-sectional diagrams, oriented perpendicular to the trend of the trenches.

Response

Map and cross-section of the trenches will be provided in Section 2.3.

Comment

Page 2-33 first paragraph
Please provide a list of the pesticides that were found, and provide numerical values for the "elevated concentrations" of these pesticides.

Response

Sentence in Section 2.4.1 (Final EE/CA) will be revised as follows: "Aquatic organisms in the immediate vicinity of water seep(s) could intermittently be exposed to elevated concentrations, of copper, silver, zinc, and some pesticides (DDT and its metabolites DDD and DDE). The elevated concentrations of these pesticides are provided in Table 7 and Table 11 of Appendix B-6."

The results are currently included in Table 7 and Table 11 of Appendix B-6 of the Draft EE/CA and for convenience, a copy is included in Attachment 2 of this letter.

Comment

Page 4-5, Section 4.2.2 Implementability
Please revise the following statement as indicated in bold type: "The removal actions would require close coordination with ***the RWQCB****, CIWMB and the County of Orange to comply with California Code of Regulations (CCR) Title 27, as well as comply with health and safety requirements pertinent to excavation and offsite disposal of excavated waste materials."*

Response

Page 4-5, Section 4.2.2 Implementability: Statement will be revised to include **the RWQCB** as requested.

Comment

Page 4-7 Section 4.4 Alternative 2 – Capping
Modeling of moisture infiltration in unsaturated conditions will be required, in order for you to determine the appropriate thickness of the proposed engineered alternative cover, and meet the performance standards for minimizing the infiltration of precipitation into refuse.

Response

The following sentence will be added to Section 4.4.1, last bullet on page 4-7: "Modeling of the proposed engineered alternative cover would be performed to evaluate if the proposed engineered alternative cover thickness is appropriate and adequate to meet the performance standards for minimizing the infiltration of precipitation into refuse under unsaturated conditions."

Comment

Page 4-10 Section 4.5 Alternative 3 – Existing Soil Cover Repair and Groundwater Monitoring
Please expand the discussion of this alternative. The soil cover must be discussed as an engineered alternative to the prescriptive cover design, taking into consideration the high water table under the site.

Response

Section 4.5.2 will be expanded to describe Alternative 3 as an engineered alternative cover design to the prescriptive cover design, as described in CCR Title 27, Section 20080 (b) and (c). Although the regulations require measures to protect groundwater quality, the intent of Alternative 3 is not to protect water quality by minimizing infiltration through the cover. The site conditions prohibit an effective cover system for this measure. The intent of Alternative 3 is rather to protect humans and habitat from contact or exposure of surface trash and debris.

Comment

Page 6-1 Section 6. Recommended Removal Action Alternative
This section does not present an adequate argument for selection of Alternative 3. This section should summarize the recommended alternative, and include details which support selection of this alternative, taking into consideration the protection of human health and the environment, conditions at the site, and comparative costs of the various alternatives. See CCR, Title 27, Section 20080 (b) and (c).

Response

Page 6-1, Section 6: The following statement will be added.

"Additional soils would be placed on areas with deficient soil cover to provide for an effective cap thickness that would reduce direct contact with buried onsite waste, but avoid destruction of wetlands and sensitive habitat. Areas deficient in soil cover will be confirmed by pot-holing the landfill cap to verify the soil cover thickness. The objective of this cover design is not to minimize precipitation from infiltrating the cap but to prevent direct contact with receptors, as well as, eliminate the migration of potential surface contamination through windblown dust or surface runoff, and/or prevent ponding of surface water runoff. The existing site conditions preclude measures to significantly reduce infiltration of precipitation at the site because of the following factors:

- Shallow groundwater depth at the site is less than 5 feet bgs.
- The base of the buried refuse was determined to vary between 5 and 12 feet bgs and therefore the majority of the waste is below the water table.

- Groundwater quality at the site is generally poor due to natural conditions.
- Natural attenuation by tidal fluctuations appear to have been active over time, therefore no well defined plumes have been identified"

Comment

Page A2-4 Section A2.2.1.1 Federal, last paragraph
The following statement is incorrect as written: "The aquifer underlying Site 7 at NAVWPNSTA Seal Beach (Santa Ana Pressure Subbasin) is classified as a Class III aquifer and is designated by RWQCB Santa Ana Region as water that cannot be used for drinking water due to the underlying shallow groundwater is saline- to hypersaline and yield is less than 150 gallons per day."

According to the Water Quality Control Plan for the Santa Ana River Basin, the Santa Ana Pressure Subbasin is designated as having the following beneficial uses: municipal and domestic supply, agricultural supply, industrial service and industrial process supply. These beneficial use designations are assigned to all areas of the subbasin. We do recognize, however, that the uppermost groundwater zone in this area is unlikely to be used as a source of drinking water, because of its poor mineral quality and low yield.

Response

Page A2-4, Section A2.2.1.1 Federal, last paragraph will be revised as requested.

Response to Comments 6 February 2002 by Christopher Fong, California Integrated Waste Management Board

Comment

CIWMB staff has no comments on the draft EE/CA at this time.

Response

Noted.

Attachment 1

TABLE 2-1. Landfill Gas Sample Results (Continued)
Site 7

Sample Type/Location		Sample Concentration						
Date Sampled		Landfill Gas 1		Landfill Gas 2	Landfill Gas 3		Landfill Gas 4	Landfill Gas 5
Date Analyzed		9/1/93		9/1/93	9/1/93		9/1/93	8/27/93
Sample ID		9/13/93		9/13/93	9/13/93		9/13/93	9/13/93
		7-LG-1		7-LG-2	7-LG-3		7-LG-4	7-LG-5
Compound	Detection Limits $(ppb)_v$		Detection Limits $(ppb)_b$			Detection Limits $(ppb)_b$		
Vinyl Chloride	3.4	ND	0.34	ND	ND	3.4	ND	ND
Dichloromethane	5.3	ND	0.53	ND	4.5	5.3	ND	ND
Chloroform	3.8	ND	0.38	ND	ND	3.8	ND	ND
1,1,1-Trichloroethane	3.4	ND	0.34	ND	0.52	3.4	ND	ND
1,2-Dichloroethane	3.8	ND	0.38	ND	ND	3.8	ND	ND
Benzene	1.9	24	0.19	ND	0.38	1.9	7.2	4.3
Carbon Tetrachloride	3.8	ND	0.38	ND	ND	3.8	ND	ND
Trichloroethene	4.1	ND	0.41	ND	ND	4.1	ND	ND
1,2-Dibromoethane	3.0	ND	0.30	ND	ND	3.0	ND	ND
Tetrachloroethene	2.6	ND	0.26	ND	ND	2.6	ND	ND

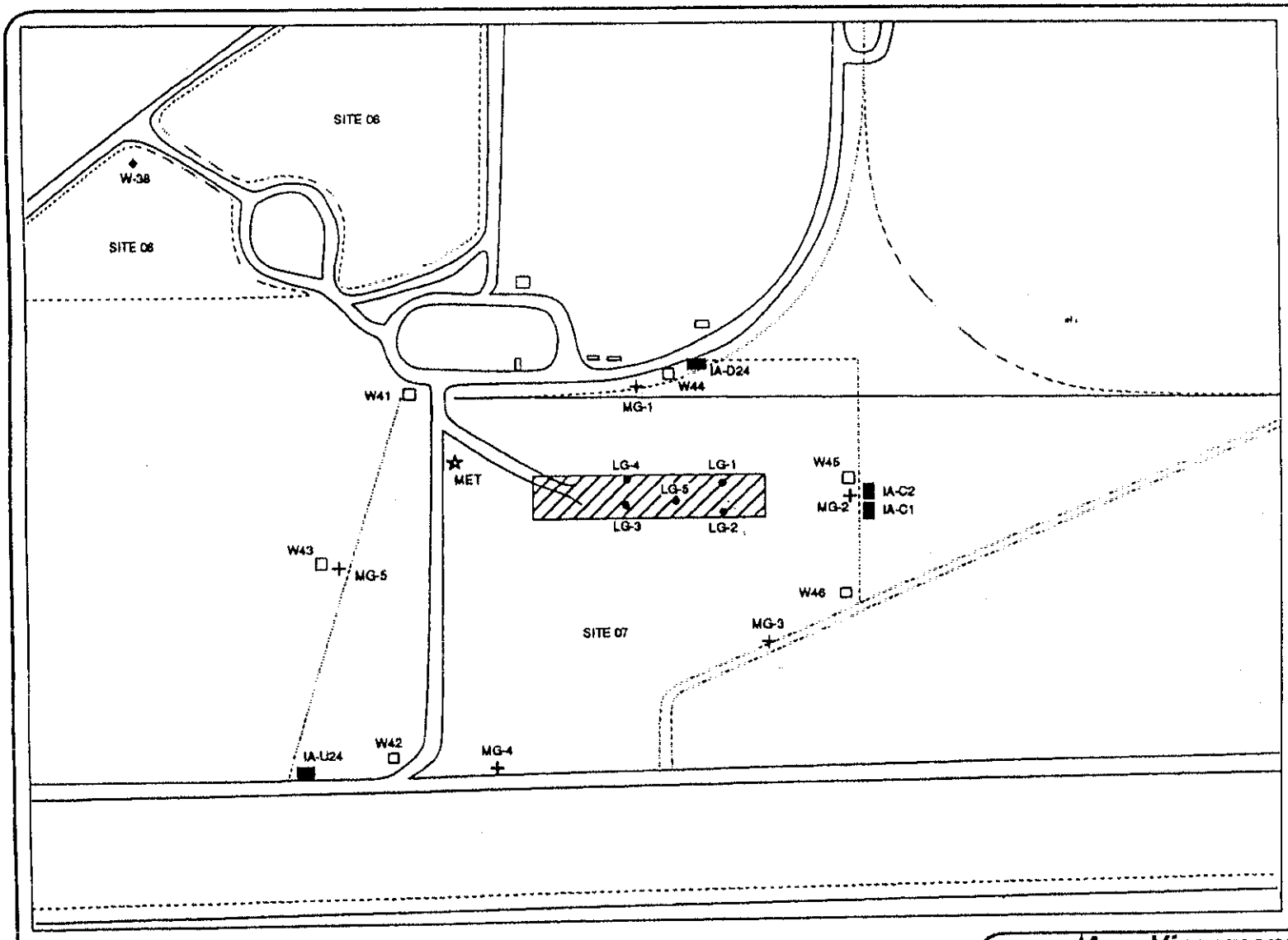
$(ppb)_v$ Parts Per Billion by Volume
ND Not Measured Above the Minumum Detection Limits Determined by Environmental Analytical Services. These detection limits meet or exceed the California Air Resources Board's requirements

TABLE 2-1. Landfill Gas Sample Results (Continued)
Site 7 – Permanent/Fixed Gases

Sample Type/Location	Landfill Gas 1	Landfill Gas 2	Landfill Gas 3	Landfill Gas 4	Landfill Gas 5
Date Sampled	9/17/93	9/17/93	9/17/93	9/17/93	8/27/93
Date Analyzed	9/19/93	9/19/93	9/19/93	9/19/93	9/19/93
Sample ID	7-LG-1	7-LG-2	7-LG-3	7-LG-4	7-LG-5
Component	Sample Concentration Percent by Volume				
Hydrogen	<0.2	<0.2	<0.2	<0.2	<0.2
Oxygen	0.99	18.97	19.21	1.70	2.37
Nitrogen	80.78	80.89	80.76	84.99	88.58
Methane	7.54	<0.1	<0.1	1.37	0.45
Carbon Monoxide	<0.1	<0.1	<0.1	<0.1	<0.1
Carbon Dioxide	10.69	0.14	<0.1	11.95	8.60
	100.0*	100.0*	100.0*	100.0*	100.0*

* As per the method, these values have been normalized to 100 percent

93-494



Features

- Integrated Surface sample grid
- Site
- Trenches
- Fence
- Railroad
- Street

Type

- Ambient air sampler
- Landfill gas probe
- Migration gas probe
- Meteorological weather station
- Monitoring well

FEET
0 100 200 300

N

AeroVironment Inc.
222 East Huntington Drive
Monrovia, California 91016

NWS SEAL BEACH
SITE 7

Project No. 300272B

APPENDIX

A

Attachment 2

Table 7. Concentrations of Pesticides in Sediment µg/kg dry weight)

Chemical	Sample Location					
	07E01CA0-1	07E01CA0-2	07E01CA0-3	07E01CA0-4	07E01CA0-5	07E01CA0-6
2,4'-DDD	6.70[6]	1.20	1.30	1.60	0.65 U	2.20[6]
2,4'-DDE	0.94 U	0.88 U	0.85 U	0.84 U	0.92 U	0.94 U
2,4'-DDT	0.73 U	0.68 U	0.66 U	0.65 U	0.71 U	0.73 U
4,4'-DDD	43.00[5]	3.10[3]	3.50[3]	4.70[3]	1.20	8.30[5]
4,4'-DDE	2.70[4]	3.90[4]	3.10[4]	3.20[4]	1.70	6.70[4]
4,4'-DDT	57.00[5]	4.10[4]	1.00 U	1.00 U	1.10 U	1.20 U
Aldrin	0.48 U	0.45 U	0.44 U	0.43 U	0.47 U	0.48 U
Alpha-BHC	0.57 U	0.53 U	0.52 U	0.51 U	0.55 U	0.57 U
Alpha-Chlordane	0.47 U	0.43 U	0.42 U	0.42 U	0.46 U	0.47 U
Aroclor 1016	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1221	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1232	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1242	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1248	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Aroclor 1254	15.00 U	63.00[4] P	13.00 U	13.00 U	14.00 U	160.00[5] P
Aroclor 1260	15.00 U	14.00 U	13.00 U	13.00 U	14.00 U	15.00 U
Beta-BHC	0.57 U	0.53 U	0.52 U	0.51 U	0.55 U	0.57 U
cis-Nonachlor	0.58 U	1.90	0.53 U	0.52 U	0.57 U	3.40 P
Delta-BHC	0.50 U	0.46 U	0.45 U	0.45 U	0.49 U	0.50 U
Dieldrin	0.99 U	0.92 U	0.90 U	0.89 U	0.98 U	0.99 U
Endosulfan I	0.44 U	0.41 U	0.40 U	0.39 U	0.43 U	0.44 U
Endosulfan II	1.50 U	1.40 U	1.30 U	1.30 U	1.40 U	1.50 U
Endosulfan Sulfate	0.79 U	0.74 U	0.72 U	0.71 U	0.78 U	0.79 U
Endrin	1.10 U	1.00 U	1.00 U	1.00 U	1.10 U	1.10 U
Endrin Aldehyde	6.80 U	6.40 U	6.20 U	6.10 U	6.70 U	6.80 U
Endrin Ketone	1.10 U	1.00 U	0.97 U	0.96 U	1.00 U	1.10 U
Gamma-BHC (Lindane)	0.49 U	0.46 U	0.44 U	0.44 U	0.48 U	0.49 U
Gamma-Chlordane	2.10[6]	0.43 U	1.40[6]	0.41 U	0.45 U	0.46 U
Heptachlor	0.51 U	0.48 U	0.46 U	0.46 U	0.50 U	0.51 U
Heptachlor Epoxide	0.47 U	0.56 P	0.43 U	0.42 U	0.46 U	1.50 P
Hexachlorobenzene	1.70 U	1.60 U	1.50 U	1.50 U	1.60 U	1.70 U
Methoxychlor	6.30 U	5.80 U	5.70 U	5.60 U	6.10 U	6.30 U
Mirex	1.10 U	1.00 U	0.98 U	0.97 U	1.00 U	1.50[3] P
Oxychlordane	0.76 U	0.71 U	0.69 U	0.68 U	0.68 U	0.74 U
Pentachloroanisole	0.74 U	0.69 U	0.68 U	0.67 U	0.72 U	0.74 U
Toxaphene	140.00 U	130.00 U	120.00 U	120.00 U	130.00 U	140.00 U
trans-Nonachlor	1.80 J	2.00	1.10	0.66 P	0.55 U	1.10

Chemical	Sample Location					
	07E01CA0-7	07E01CA0-8	07E01CA0-9	07E02CA0-1[1]	07E02CA0-1[1]	07E05CA0-1[2]
2,4'-DDD	1.00 J	0.61 U	0.58 U	0.64 U	0.68 U	2.30[6]
2,4'-DDE	0.85 U	0.86 U	0.82 U	0.91 U	0.96 U	0.99 U
2,4'-DDT	0.66 U	0.67 U	0.63 U	0.71 U	0.75 U	0.76 U
4,4'-DDD	3.60[3]	0.95 U	0.90 U	1.00 U	2.80[3]	3.60[3]
4,4'-DDE	2.20	1.20	1.60	3.20	3.40[3]	4.40[3]
4,4'-DDT	1.00 U	1.10 U	1.00 U	2.10[3]	6.00[4]	1.20 U

Table 7.. Concentrations of Pesticides in Sediment µg/kg dry weight)

Aldrin	0.44 U	0.44 U	0.42 U	0.47 U	0.49 U	0.50 U
	Sample Location					
Chemical	07E01CA0-7	07E01CA0-8	07E01CA0-9	07E02CA0-1[1]	07E02CA0-1[1]	07E05CA0-1[2]
Alpha-BHC	0.52 U	0.52 U	0.49 U	0.55 U	0.58 U	0.60 U
Alpha-Chlordane	0.42 U	0.43 U	0.41 U	0.45 U	0.48 U	0.49 U
Aroclor 1016	13.00 U	14.00 U	13.00 U	14.00 U	145.00 U	16.00 U
Aroclor 1221	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1232	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1242	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1248	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Aroclor 1254	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	100.00[4] P
Aroclor 1260	13.00 U	14.00 U	13.00 U	14.00 U	15.00 U	16.00 U
Beta-BHC	0.52 U	0.52 U	0.49 U	0.55 U	0.58 U	0.60 U
cis-Nonachlor	0.53 U	0.53 U	0.51 U	0.57 U	0.60 U	1.80 P
Delta-BHC	0.45 U	0.46 U	0.43 U	0.48 U	0.51 U	0.52 U
Dieldrin	0.90 U	0.91 U	0.86 U	0.96 U	1.00 U	1.00 U
Endosulfan I	0.40 U	0.40 U	0.38 U	0.42 U	0.45 U	0.46 U
Endosulfan II	1.30 U	1.30 U	1.30 U	1.40 U	1.50 U	1.50 U
Endosulfan Sulfate	0.72 U	0.73 U	0.69 U	0.77 U	0.81 U	0.83 U
Endrin	1.00 U	1.00 U	0.97 U	1.10 U	1.10 U	1.20 U
Endrin Aldehyde	6.20 U	6.30 U	6.00 U	6.70 U	7.00 U	7.20 U
Endrin Ketone	0.97 U	0.98 U	0.93 U	1.00 U	1.10 U	1.10 U
Gamma-BHC (Lindane)	0.44 U	0.45 U	0.42 U	0.48 U	0.50 U	0.51 U
Gamma-Chlordane	0.42 U	0.42 U	0.40 U	0.45 U	0.47 U	0.48 U
Heptachlor	0.46 U	0.47 U	0.44 U	0.50 U	0.52 U	0.54 U
Heptachlor Epoxide	0.43 U	0.43 U	0.41 U	0.46 U	0.48 U	0.77 P
Hexachlorobenzene	1.50 U	1.50 U	1.50 U	1.60 U	1.70 U	1.80 U
Methoxychlor	5.70 U	5.70 U	5.40 U	6.10 U	6.40 U	6.60 U
Mirex	0.98 U	0.99 U	0.94 U	1.00 U	1.10 U	1.10 U
Oxychlordane	0.69 U	0.70 U	0.66 U	0.74 U	0.78 U	0.80 U
Pentachloroanisole	0.67 U	0.68 U	0.65 U	0.72 U	0.76 U	0.78 U
Toxaphene	120.00 U	130.00 U	120.00 U	130.00 U	140.00 U	140.00 U
trans-Nonachlor	0.51 U	0.51 U	0.49 U	0.55 U	0.58 U	0.59 U

[1]"White Stained Area"
[2] "Blue Stained Area"
[3]Exceeds TEL
[4]Exceeds TEL and ER-L
[5]Exceeds PEL
[6]Exceeds ER-L

Table 11. Pesticides in Water (µg/L)

Chemical	Sample Location		
	07E02RA0-1[1]	07E02RA1-1[1]	07E03GA0-1[2]
2,4'-DDD	0.0500 U	0.0500 U	0.0500 U
2,4'-DDE	0.0550 U	0.0550 U	0.0550 U
2,4'-DDT	0.0410 U	0.0410 U	0.0410 U
4,4'-DDD	0.0120 U	0.0120 U	0.0120 U
4,4'-DDE	0.0110 U	0.0110 U	0.0110 U
4,4'-DDT	0.0130 U	0.0130 U	0.0130 U
Aldrin	0.0041 U	0.0041 U	0.0041 U
Alpha-BHC	0.0066 U	0.0066 U	0.0066 U
Alpha-Chlordane	0.0045 U	0.0045 U	0.0045 U
Aroclor 1016	0.3300 U	0.3300 U	0.3300 U
Aroclor 1221	0.3300 U	0.3300 U	0.3300 U
Aroclor 1232	0.3300 U	0.3300 U	0.3300 U
Aroclor 1242	0.3300 U	0.3300 U	0.3300 U
Aroclor 1248	0.3300 U	0.3300 U	0.3300 U
Aroclor 1254	0.3300 U	0.3300 U	0.3300 U
Aroclor 1260	0.3300 U	0.3300 U	0.3300 U
Beta-BHC	0.0041 U	0.0041 U	0.0041 U
cis-Nonachlor	0.0540 U	0.0540 U	0.0540 U
Delta-BHC	0.0220 U	0.0220 U	0.0220 U
Dieldrin	0.0110 U	0.0110 U	0.0110 U
Endosulfan I	0.0053 U	0.0053 U	0.0053 U
Endosulfan II	0.0130 U	0.0130 U	0.013[3] J
Endosulfan Sulfate	0.0220 U	0.0220 U	0.0220 U
Endrin	0.0100 U	0.0100 U	0.010[3] J
Endrin Aldehyde	0.0510 U	0.0510 U	0.0510 J
Endrin Ketone	0.0150 U	0.0150 U	0.0150 J
Gamma-BHC (Lindane)	0.0064 U	0.0064 U	0.0064 U
Gamma-Chlordane	0.0055 U	0.0055 U	0.0055 U
Heptachlor	0.0052 U	0.0052 U	0.0052 U
Heptachlor Epoxide	0.0073 U	0.0073 U	0.0073 U
Hexachlorobenzene	0.0250 U	0.0250 U	0.0250 U
Methoxychlor	0.0640 U	0.0640 U	0.0640 U
Mirex	0.0530 U	0.0530 U	0.0530 U
Oxychlordane	0.0510 U	0.0510 U	0.0510 U
Pentachloroanisole	0.0260 U	0.0260 U	0.0260 U
Toxaphene	1.1000 U	1.1000 U	1.1000 U
trans-Nonachlor	0.0490 U	0.0490 U	0.0490 U

[1]White Area Duplicate Samples
[2]Seep
[3]Exceeds Ocean Plan Instantaneous Maximum

Appendix F
Final Addendum to the Engineering Evaluation/Cost Analysis (EE/CA) Non-Time Critical Removal Action for Site 7, Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, Naval Weapons Station Seal Beach, Seal Beach, California

July 31, 2003

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A Applicable or Relevant and Appropriate Requirements Evaluation and DTSC Concurrence Letter for ARARs

B Summary of Data for Site 4 AOPCs 1A and 2A

- B1 Final Site Inspection Report (SWDIV, 1990b)
- B2 Surface Soil Screening Locations and Results (SWDIV, 1995a)
- B3 Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4 AOPCs 1A and 2A (BNI, 2001a)

C Review Comments by Department of Toxic Substances Control (27 June 03), Regional Water Quality Control Board, Santa Ana Region (17 June 03), and the City of Seal Beach (16 June 03); and Response to Comments

Acronyms

μg/L	micrograms per liter
AM	Action Memorandum
AOC	area of concern
AOPC	Area of Potential Concern
APR	annual percentage rate
ARAR	Applicable or Relevant and Appropriate Requirements
AUF	Area use factor
BCF	bioconcentration factor
bgs	below ground surface
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
COPC	chemical of potential concern
cy	cubic yards
DDT	dichlorodiphenyl-trichloroethane
DHS	Department of Health Services
DON	Department of the Navy
DTSC	Department of Toxic Substances Control
EE/CA	Engineering Evaluation/Cost Analysis
EIA	Environmental Impact Assessment
EO	Executive Order
EPA	Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessment

FIR	food ingestion rate
GSU	Geologic Services Unit
HERD	Human and Ecological Risk Division
HHRA	human health risk assessment
HI	hazard index
IAS	Initial Assessment Study
IR	Installation Restoration
LOAEL	lowest observed adverse effect level
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
NACIP	Navy Assessment and Control of Installation Pollutants
NAVWPNSTA	Naval Weapons Station
NAWQC	national ambient water quality criteria
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NFA	no further action
NFESC	Naval Facilities Engineering Services Center
NWR	National Wildlife Refuge
O&M	operation and maintenance
OCDD	octachlorodibenzo-p-dioxin
OCFCC	Orange County Flood Control Channel
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
PEL	probable effects level
ppb	parts per billion
ppm	parts per million

PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
RAB	Restoration Advisory Board
RAC	Remedial Action Contractor
RAO	removal action objective
RAP	Remedial Action Plan
RAW	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
RFA	Resource Conservation and Recovery Act Facility Assessment
rPRG	residential preliminary remediation goal
RSE	Removal Site Evaluation
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SI	Site Inspection
SVOC	semivolatile organic compound
SWDIV	Southwest Division, Naval Facilities Engineering Command
SWMU	solid waste management unit
TAL	target analyte list
TBC	to be considered
TCDD	tetrachlorodibenzo-p-dioxin
TCG	target cleanup goal
TDS	total dissolved solids
TEF	toxicity equivalency factor
TEL	threshold effects level
TPHd	total petroleum hydrocarbons as diesel
TRPH	total recoverable petroleum hydrocarbons
TRV	toxicity reference valve
TTLC	toxic threshold limit concentration
U.S.	United States

U.S.C.	United States Code
ULBV	upper-limit background value
USFWS	United States Fish and Wildlife Service
XRF	x-ray fluorescence

F1. Introduction

This Appendix is an addendum to the *Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7* (Southwest Division, Naval Facilities Engineering Command [SWDIV], 2002) (hereafter, referred to as the *Site 7 EE/CA*), identifies and evaluates proposed removal action alternatives to mitigate or prevent damage to public health or welfare or to protect the environment from lead-contaminated soil at Installation Restoration (IR) Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, of the Naval Weapons Station (NAVWPNSTA), Seal Beach. This addendum was prepared to extend the removal actions of Site 7 to include the adjacent areas of Site 4 AOPCs 1A and 2A.

Site 4 AOPCs 1A and 2A are a 5,400-foot by 100-foot-wide unpaved shoulder adjacent to Perimeter Road and Site 7 Station Landfill and along the southern boundary of NAVWPNSTA Seal Beach. Site 4 AOPCs 1A and 2A were identified as containing several potential locations where elevated lead was detected.

Site 4, Oil on Roads, consists of Perimeter Road and adjacent areas that extend around NAVWPNSTA Seal Beach for a total length of about 12 miles. It encompasses segments of road adjacent to the Orange County Flood Control Channel north of Edinger Avenue and west of Bolsa Chica Street, two segments of road parallel to and directly north and south of Westminster Avenue, a segment of road south of U. S. Interstate 405, and a segment of road east of Seal Beach Boulevard. The southwesternmost portion of the segment, along Edinger Avenue, is located adjacent to the National Wildlife Refuge (NWR) and the Site 7 Station Landfill. From the mid-1960s to 1973, about one to three times per year, the perimeter roads of the facility were sprayed with unknown quantities of waste oil for dust control. From 1972 through 1973, the waste oils were sprayed by a contractor and were generated by off-facility crude oil operations, petroleum refineries, and oil spills. This EE/CA addresses the implementability, effectiveness, and cost of mitigating potential impacts emanating from Site 4 AOPCs 1A and 2A and addresses applicable regulatory requirements. The Department of the Navy (DON), with state regulatory oversight, is the lead agency for the mitigation of environmental impacts from Site 4 AOPCs 1A and 2A. As the lead agency, DON has final approval authority of the recommended alternative selected and overall public participation activities with state concurrence. DON is working in cooperation with DTSC, California Regional Water Quality Control Board (RWQCB) Santa Ana Region, and U.S. Fish and Wildlife Service (USFWS) in the implementation of this removal action.

A removal action for Site 4 AOPCs 1A and 2A is being conducted because lead "hot spots" were detected in soil with concentrations that are an ecological concern (BNI, 2001b). The Navy decided that the removal action for Site 4 AOPCs 1A and 2A would be included with the Site 7 removal action because the lead-contaminated soil hot spots are adjacent to Site 7 Station Landfill.

This Addendum along with the *Site 7 EE/CA* will be used as the basis for a future CERCLA removal action and is issued in accordance with the Community Relations Plan prepared for NAVWPNSTA Seal Beach to facilitate public involvement in the decisionmaking process.

However, there are some aspects of Site 4 AOPCs 1A and 2A that are similar to Site 7 and overlap, such as the facility location and background, physical characteristics and regulatory requirements, therefore only information and background related to Site 4 are discussed in this Appendix.

A joint Site 4 AOPCs 1A and 2A and Site 7 Action Memorandum (AM) on the selected removal actions will be prepared based on this Addendum, incorporating regulatory and public comments. The AM would provide a written record of the decision to select the appropriate removal actions at Sites 4 and 7. As the primary decision document, the AM substantiates the need for a removal action, identifies the proposed action, and explains the rationale for the removal action selection. A RAP or RAW will be incorporated into the AM.

F2. Site Characterization

This section includes descriptions of the Site 4 Area and background, previous investigations, nature and extent of contamination, analytical data, and risk-screening evaluation for Site 4. The information for this site characterization was taken from various sources as listed in Section F2.2. General background information for the NAVWPNSTA Seal Beach and Site 7 Station Landfill is discussed in the *Site 7 EE/CA*.

F2.1 Facility Description and Background

Site 4 is within the boundaries of NAVWPNSTA Seal Beach (Figure F2-1), located about 30 miles south of the Los Angeles urban center, consists of about 5,000 acres of land located on the Pacific Coast within the City of Seal Beach in Orange County, California.

F2.1.1 Site Location

Site 4 consists of the Perimeter Road and adjacent areas that extend around NAVWPNSTA Seal Beach for a total length of about 12 miles. It encompasses segments of road adjacent to the Orange County Flood Control Channel north of Edinger Avenue and west of Bolsa Chica Street, two segments of road parallel to and directly north and south of Westminster Avenue, a segment of road south of U. S. Interstate 405, and a segment of road east of Seal Beach Boulevard. The southwesternmost portion of the segment, along Edinger Avenue, is located adjacent to the Seal Beach National Wildlife Refuge (NWR) and the Site 7 Station Landfill and is designated as an AOPC (Figure F2-1). This Addendum specifically addresses Site 4 AOPCs 1A and 2A that extend northward about 100 feet from Perimeter Road (Figure F2-2).

F2.1.2 Type of Facility and Operational Status

From the mid-1960s to 1973, about one to three times per year, the perimeter roads of the facility were sprayed with unknown quantities of waste oil for dust control. Weeds on the unpaved roads and nearby fields were cropped and disked for fire control (NEESA, 1985). The oil was then sprayed over the area and disked into the soils for dust control. The waste oil used was generated by the facility and included Bunker C fuel oil. From 1972 through 1973, an estimated 40,000 gallons of waste oil, generated by off-facility crude oil operations and petroleum refineries and from oil spills, were sprayed by a contractor in two or three applications on approximately 12 miles of roadway. The oil was applied in dry weather to minimize the possibility of transport in surface runoff (SWDIV, 1990b). Offsite contracting of waste oil was discontinued when elevated lead content and trace amounts of other metals were found in the oils (Kearney, 1989). Since early 1974, the perimeter roads have been sprayed with quality-controlled penetrating oil consisting of 70 percent water and 30 percent emulsified agent (NEESA, 1985).

F2.1.3 Topography/Structures

Site 4 AOPCs 1A and 2A are a relatively narrow, linear area (approximately 5,400 feet of a 100-foot wide area). Site 4 AOPC 1A is located within the NWR and AOPC 2A is located east of the NWR. The overall topography of Site 4 mimics that of the station. The road is situated on a gently inclined topographic surface that drains to the southwest (toward the salt marsh). However, locally, the road surface is graded to drain onto NAVWPNSTA Seal Beach. The southern portion of the site has been raised slightly to prevent tidal inundation. Field observations of the tidal flooding of the AOPCs suggest that groundwater in this area is shallow (generally assumed to be less than 10 feet below ground surface [bgs]) (BNI, 2001a). A grade difference of about 2 to 4 feet exists between the lower accumulation areas north of the road portions of Site 4 AOPCs 1A and 2A and the road itself.

F2.1.4 Geology/Soil Information

A description of the geology of NAVWPNSTA Seal Beach and Site 7, including soil, groundwater, and surface water, is provided in the *Site 7 EE/CA* and descriptions related to Site 4 are provided below.

Site 4 is situated in an area that is reportedly underlain by Recent alluvial and coastal deposits (Morton and Miller, 1981). Additionally, lesser amounts of fill are present on some areas of Site 4 (BNI, 2001a). Based on soil borings collected for the RSE, there is indication of possible fill materials beneath portions of AOPCs 1A and 2A.

The depth of groundwater at Site 4 AOPCs 1A and 2A is estimated to range from less than 1 foot to 3 feet bgs. The specific depth to groundwater depends on a number of fluctuating conditions such as tides, seasons, and the specific location within Site 4 AOPCs 1A and 2A.

F2.1.5 Surrounding Land Use and Populations

The surrounding land use and populations at Site 4 AOPCs 1A and 2A are similar to that of Site 7 and are described in the *Site 7 EE/CA*.

Similar to Site 7, water is supplied to NAVWPNSTA Seal Beach by the city of Seal Beach by a gravity-fed distribution system. Groundwater under NAVWPNSTA Seal Beach currently is not used for drinking purposes on-station. Nonpotable water used for agricultural purposes is supplied by on-station agricultural wells with screened intervals between 140 and 600 feet bgs. Because of the distance of these wells from the site (with the closest well nearly 5,000 feet north of Site 4) and the depths of their screen intervals, Site 4 is not expected to impact the water quality in these wells.

No regular NAVWPSTA Seal Beach activities take place at Site 4, except intermittent use of Perimeter Road by security military personnel or to access the NWR. There are no buildings or structures present.

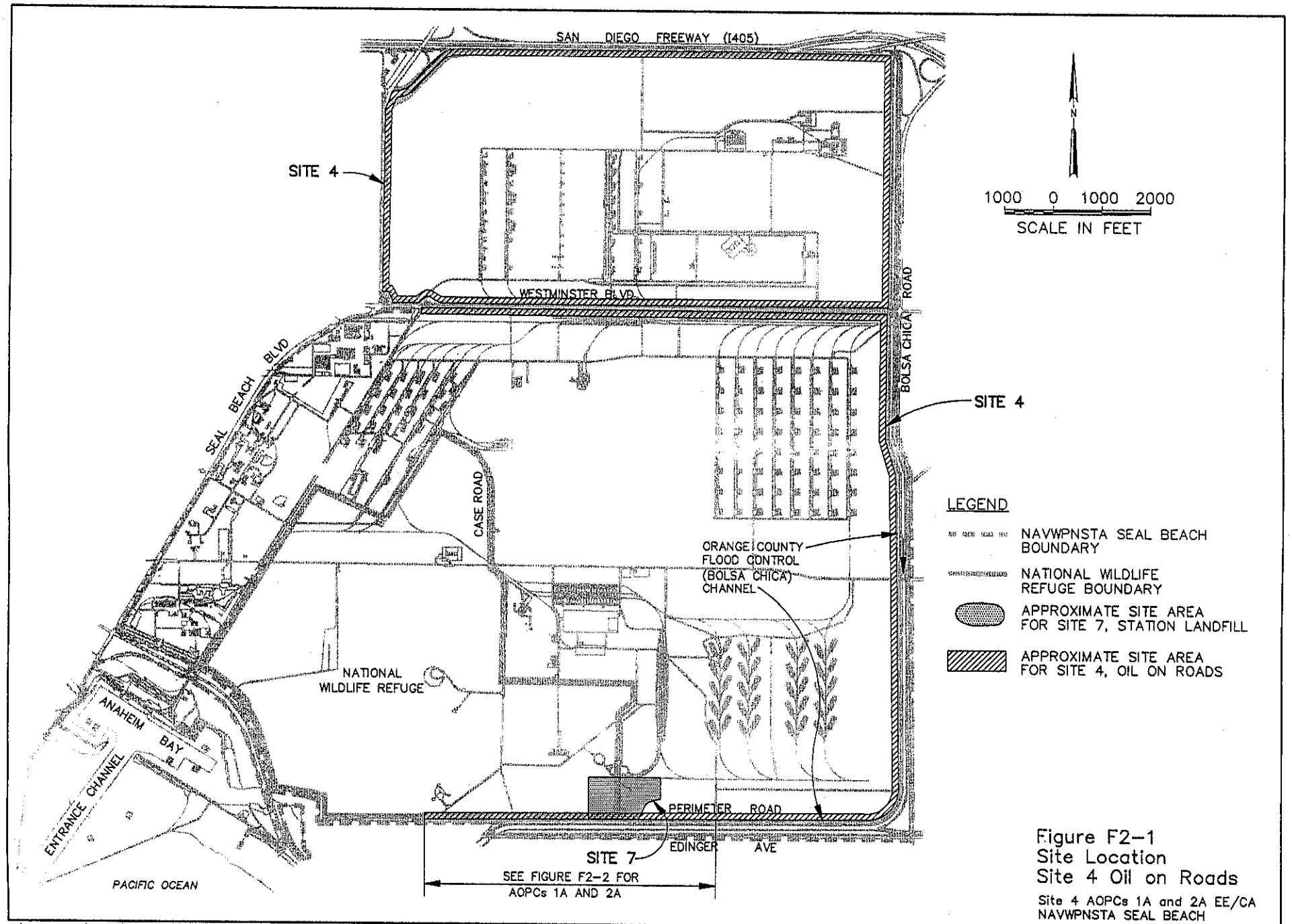

Figure F2-1
Site Location
Site 4 Oil on Roads

Site 4 AOPCs 1A and 2A EE/CA
NAVWPNSTA SEAL BEACH

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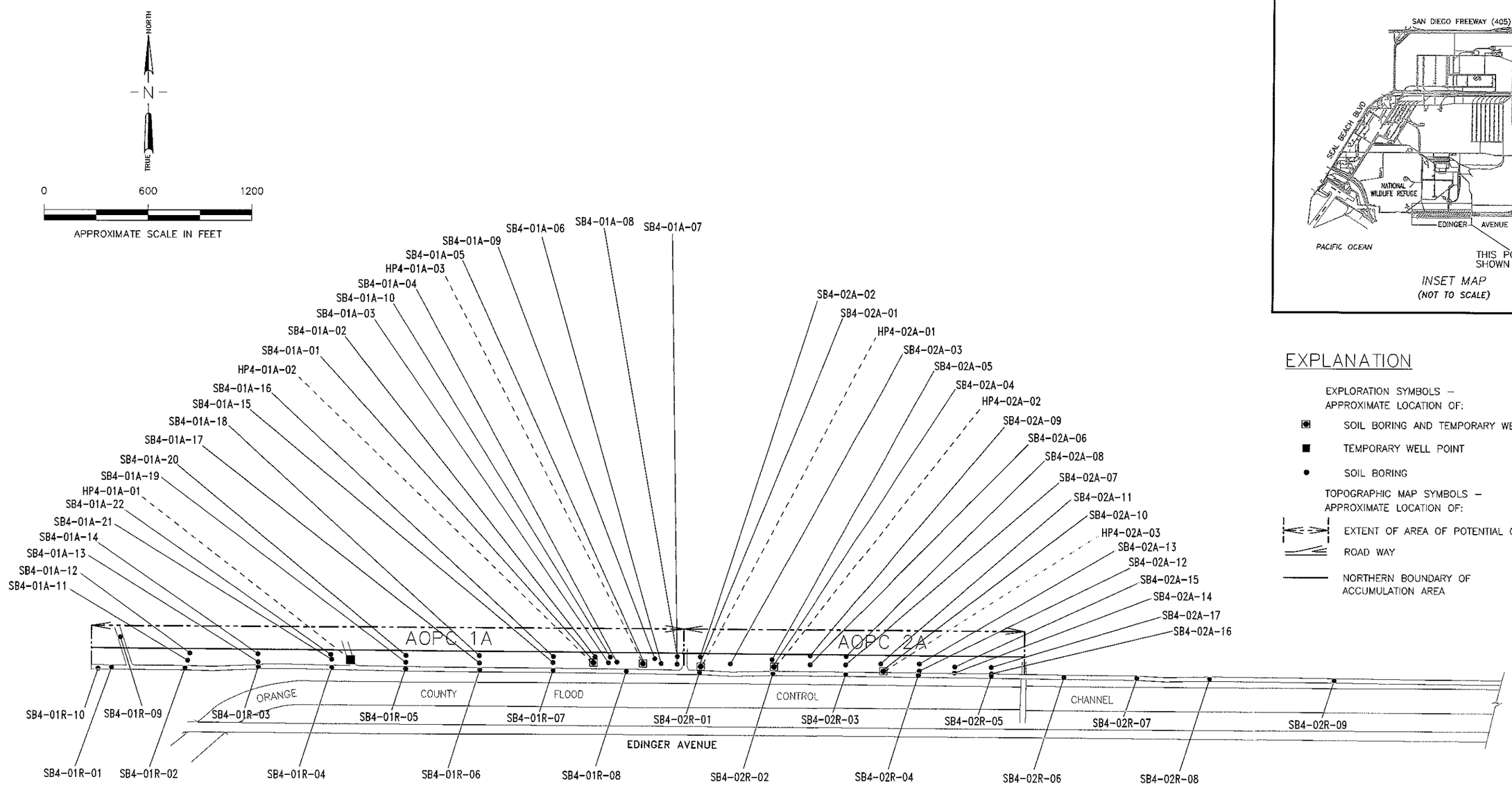

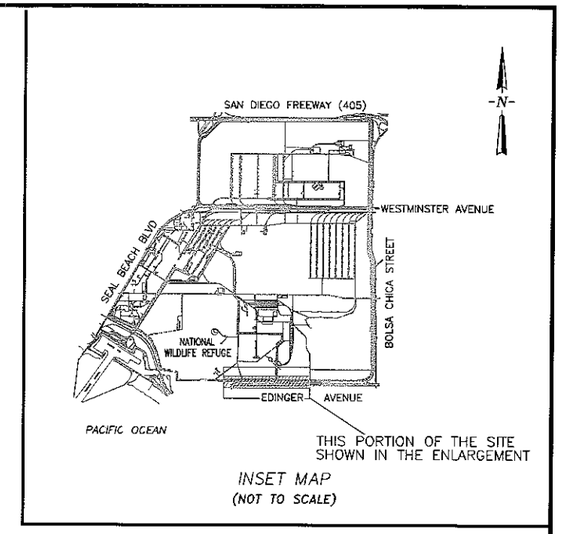

EXPLANATION

EXPLORATION SYMBOLS – APPROXIMATE LOCATION OF:

- SOIL BORING AND TEMPORARY WELL POINT
- TEMPORARY WELL POINT
- SOIL BORING

TOPOGRAPHIC MAP SYMBOLS – APPROXIMATE LOCATION OF:

- EXTENT OF AREA OF POTENTIAL CONCERN (AOPC)
- ROAD WAY
- NORTHERN BOUNDARY OF ACCUMULATION AREA

Source: Final Removal Site Evaluation Report, Installation Restoration Program Sites 4, 5, and 6. Bechtel National, Inc., 2001

Figure F2-2
Sampling Locations at Site 4 Oil on Roads
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

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F2.1.6 Sensitive Ecosystems

Approximately 911 acres of NAVWPNSTA Seal Beach, including almost all of the saltwater marsh, is included in the NWR. The ecological habitats at the station include open water, tidal channels, mud flats, and salt marshes of Anaheim Bay. The main purpose of the NWR is to preserve and enhance the area's living resources. Scientific investigations have been and are being conducted on the NWR. Limited recreational activities are authorized for military and civilian personnel (retired military). Because Site 4 AOPCs 1A and 2A are adjacent to Site 7, the sensitive ecosystem at Site 4 is similar to that of Site 7. The sensitive ecosystem consists of sensitive species of organisms, plants, birds, and mammals. Descriptions of the sensitive ecosystem are provided in the *Site 7 EE/CA*.

The vegetative community at Site 4 AOPC 1A has been characterized as predominantly coastal salt marsh/mudflat and AOPC 2A has been characterized as predominantly annual grassland (Recon, 1997). The following sensitive plant species have been observed at Site 4: Southern tarplan (*Hemizonia parryi* ssp. *Australis*) and Seaside calandrinia (*Calandrinia maritima*) (Recon, 1997).

Mammals observed at Site 7, which is directly north of Site 4, include the house mouse and western harvest mouse, the blacktail hare, cottontail, and California vole (SWDIV, 1999). Birds sighted at Site 7 include the mourning dove, barn owl, California least tern, Forster's tern, rock dove, Cooper's hawk, red-tailed hawk, turkey vulture, northern mockingbird, western meadowlark, and the Belding's Savannah sparrow, which nests throughout Site 7. Two species of federally listed endangered birds, the California least tern and the light-footed clapper rail, rely on the Seal Beach NWR tidal salt marsh habitat for their nesting grounds.

F2.2 Previous Actions and Investigations

NAVWPNSTA Seal Beach and the DON have been actively engaged in the IR Program since 1980.

Since 1973, Site 4 has been the subject of 10 environmental investigations/reports. Not all of the following investigations/reports dealt directly with AOPCs 1A and 2A of Site 4. It was not until the Removal Site Evaluation (RSE) that AOPCs 1A and 2A were separately designated within Site 4.

- *Environmental Impact Assessment (EIA) – Weed and Dust Control* (NAVWPNSTA, 1973)
- *Initial Assessment Study (IAS) of NWS Seal Beach* (NEESA, 1985)
- *Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)* (A.T. Kearney, 1989)
- *Seal Beach Laboratory Testing* (SWDIV, 1990a)
- *Addendum to the Preliminary Assessment* (IAS) (NEESA, 1990)
- *Initial Site Inspection (SI)* (SWDIV, 1990b)
- *Remedial Investigation of Site 7* (SWDIV, 1995a)

- *Confirmation Testing for Operable Unit (OU)-6 and OU-7, Technical Memorandum* (SWDIV, 1995b)
- *Analytical Results for Soil Samples Collected in 1995 from IR Site 4* (AccuTek, 1995)
- *Removal Site Evaluation (RSE) Report for Installation Restoration Program Sites 4, 5, and 6* (BNI, 2001a)

The following discussion briefly summarizes the results of previous environmental investigations conducted at Site 4.

F2.2.1 Environmental Impact Assessment

In 1973, a plan was proposed to control weed growth on NAVWPNSTA Seal Beach property and fugitive dust emissions from base roads by applying an oil/water mixture in accordance with RWQCB waste discharge requirements. This oil/water application on Perimeter Road was later identified as Site 4 and investigated under the IR Program (NAVWPNSTA Seal Beach, 1973).

F2.2.2 Initial Assessment Study

In 1985, the Navy conducted an IAS to investigate potentially contaminated sites at NAVWPNSTA Seal Beach (NEESA, 1985). The IAS was conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) Program by the Naval Energy and Environmental Support Activity (NEESA). NACIP was the predecessor program to the Navy's IR Program. NEESA was later renamed Naval Facilities Engineering Services Center (NFESC). The IAS concluded that 9 of the 25 impacted sites identified at NAVWPNSTA Seal Beach posed a potential threat to human health or the environment and were sufficient to warrant further investigation. Site 4 was identified as one of the nine sites, and a confirmation study was recommended because it was not known if the oil sprayed on the perimeter roads contained polychlorinated biphenyls (PCBs) or pesticides. It was recommended that soil samples be collected at a depth of 12 inches bgs (NEESA, 1985).

F2.2.3 RCRA Facility Assessment

In 1989, A.T. Kearney, Inc., performed an RFA of NAVWPNSTA Seal Beach for EPA. The purpose of the RFA was to assess whether there had been, or were likely to be, releases of hazardous substances from locations where hazardous wastes or materials were or had been used, treated, stored, or disposed. The assessment was based on historical information, interviews with NAVWPNSTA Seal Beach personnel, visual inspections of the sites, and preliminary review of data available from the ongoing SI of the nine sites. The RFA identified 69 solid waste management units (SWMUs) and Areas of Concern (AOC). Many of these SWMUs and AOCs were the same as IR Program sites identified by the 1985 IAS. The RFA concluded that Site 4 has a high current and ongoing potential for the release of hazardous wastes or constituents to the soil or groundwater and for the generation of subsurface gases (Kearney, 1989).

F2.2.4 Seal Beach Laboratory Testing

In January 1990, soils in agricultural outlease area where there was concern that PCB-contaminated oil may have been used for weed suppression were sampled for priority

pollutants. No priority pollutants were detected at levels exceeding toxic threshold limit concentrations (TTLCs) in soils or water sampled (SWDIV, 1990a).

F2.2.5 Addendum to the Preliminary Assessment

In August 1990, California DTSC (Department of Health Services [DHS] at that time) requested that the findings of the IAS be verified and that all 25 initial sites be considered for further investigation, plus other potential sites identified at NAVWPNSTA Seal Beach. Study was undertaken, again without sample collection, but with additional information provided by the RFA report, RI Verification Step Data, and other information found in Navy files. In addition to the original 25 sites identified in the IAS (Sites 1 through 25), 17 new sites were identified (Sites 35 through 51). Several sites recommended for no further action (NFA) in the IAS also were recommended for further study in the Addendum to the Preliminary Assessment (NEESA, 1990).

F2.2.6 Initial Site Inspection

In 1990, as part of the initial SI, a total of 21 (20 samples collected along the road/road shoulder and 1 background sample) soil samples were collected at a depth of 12 inches and analyzed for metals, semivolatile organic compounds (SVOCs), pesticides, PCBs, and polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDDs/PCDFs). Field-screening for gamma radiation and organic vapors was also conducted. Radiation levels ranged between 10 and 16 microroentgen. The organic vapor analyzers detected no organic vapors (SWDIV, 1990b).

Analytical results of soil samples collected during the SI indicated the presence of arsenic; lead; 4,4'-dichlorodiphenyltrichloroethane (DDT); and octachlorodibenzo-p-dioxin (OCDD) at slightly elevated levels in most samples. The SI report recommended no further investigation for Site 4 based on the absence of heavy metals, PCBs, and PCDDs/PCDFs at levels considered to be hazardous to the environment and the fact that oil biodegrades naturally (SWDIV, 1990b). A review of the SI soil data indicated two samples exceeding the preliminary remediation goal (PRG) (EPA, 1996) value for 4,4'-DDT, and five samples with PCDDs/PCDFs toxicity equivalency factor (TEF) values exceeding the residential PRG value for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Arsenic concentrations were above the estimated NAVWPNSTA Seal Beach upper-limit background value (ULBV) for arsenic of 15.38 mg/kg in soil (BNI, 2001a).

F2.2.7 Remedial Investigation

As part of the investigations for the initial SI at Site 7 (Station Landfill), the presence of elevated lead concentrations (2,080 mg/kg) was detected in soil at a depth of 1 foot bgs at the location of well W-42, near the segment of Site 4 that is adjacent to the NWR. Additional investigation was conducted in this area (designated as the "lead hot spot") as part of the Remedial Investigation for OUs 1, 2, and 3. Thirty-five surface-soil samples were field-analyzed for chromium, lead, and zinc. In 1993, results for 23 of these soil samples indicated the presence of lead concentrations in excess of the California-modified residential PRG for lead (130 mg/kg) with a maximum concentration of 5,180 mg/kg. These samples were located in a strip of land approximately 100 by 1,400 feet along Perimeter Road in the southern part of Site 7. For confirmation purposes, five surface-soil samples were collected from the

lead hot spot and analyzed at an offsite fixed, commercial laboratory. Analytical results indicated the presence of elevated lead concentrations with a maximum concentration of 740 mg/kg. Tetrachloroethene, benzo(a)pyrene, and 4,4'-DDT were each reported in one sample. Total petroleum hydrocarbons as diesel (TPHd) concentrations of 40.9 and 19.8 mg/kg were also reported in two sample locations. No chemicals of potential concern (COPCs) were identified in the groundwater samples collected from well W-42 located within the lead hot spot. The RI report concluded that the elevated lead concentrations reported in the lead hot spot were probably associated with oiling of Perimeter Road rather than Site 7 operations; therefore, the lead hot spot would be further addressed as part of Site 4 (SWDIV, 1995a).

F2.2.8 Confirmation Testing for OU-6 and OU-7, Technical Memorandum

In February 1995, out of 35 locations included in OU 6 and OU 7, 29 locations were recommended for NFA, and 6 locations were recommended for further investigation during the SI. The six locations recommended for the SI were AOC 4, Oil on Roads (Site 4); AOC 6, External Paint Area (Building 246); AOC 7, Railroad Supply Yard (Building 438); SWMU 11, Quenching Water Disposal Area (Building 307); SWMU 56, Hazardous Waste Drum Storage (Building 246); and SWMU 57, Paint Locker Area (Building 59). Site 4 was not sampled during this study because it was, "too large for confirmation testing and potential exists for release harmful to human health and the environment." Therefore, Site 4 was recommended for the SI (SWDIV, 1995a).

F2.2.9 Analytical Results for Soil Samples Collected in 1995 from IR Site 4

In 1995, the DON contracted AccuTek to collect soil samples every 250 feet (426 samples) along Perimeter Road at depths of 6 and 24 inches bgs and analyze them for lead. Soil samples collected every 500 feet (212 samples) were analyzed for total recoverable petroleum hydrocarbons (TRPHs) and SVOCs. Soil samples collected every 1,000 feet (106 samples) were analyzed for PCDDs/PCDFs. Analytical results indicated that 36 out of 426 samples at the 6-inch depth had lead concentrations above the residential PRG (rPRGs) value of 130 mg/kg. The analytical results also indicate 25 samples had PCDD/PCDF toxicity equivalency factor values above the PRG value for TCDD of 0.0038 mg/kg, 17 of which were from a depth of 6 inches bgs and 8 of which were from a depth of 24 inches bgs. The only SVOC reported above the rPRG was benz(a)anthracene, in one sample at the 6-inch depth (AccuTek, 1995).

F2.2.10 Removal Site Evaluation for IRP Sites 4, 5, and 6

In 2001, an RSE was conducted to evaluate supplemental data obtained during previous site investigations at Sites 4, 5, and 6. It is in this RSE that Site 4 was separated into 12 AOPCs including AOPCs 1A and 2A. The COPCs were identified for soil and groundwater, and the concentrations above the screening criteria were assessed. The COPCs for soil were evaluated for fate and transport to reach the groundwater. A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were conducted.

Based on the findings and conclusions for soil at AOPCs 1A and 2A, further evaluation is recommended for lead in soil. Based on the findings and conclusions for groundwater at AOPCs 1A and 2A, groundwater is recommended for further evaluation in the form of

confirmatory groundwater monitoring for arsenic, antimony, and hexavalent chromium (BNI, 2001a). Groundwater monitoring for Site 4 AOPCs 1A and 2A is included in the Groundwater Monitoring Program at Installation Restoration Sites 4, 5, 6, and 7 (BNI, 2002).

F2.3 Source, Nature, and Extent of Contamination

The source, nature, and extent of contamination at Site 4 AOPCs 1A and 2A are discussed in this section. The information presented summarizes the results of the previous investigations.

Site 4 consists of Perimeter Road and adjacent areas that extend around NAVWPNSTA Seal Beach for a total length of about 12 miles. From the mid-1960s to 1973, about one to three times per year, the perimeter roads of the facility were sprayed with unknown quantities of waste oil for dust control. Offsite contracting of waste oil was discontinued when elevated lead content and trace amounts of other metals were found in the oils (Kearney, 1989). Site 4 is situated in an area that is reportedly underlain by recent alluvial and coastal deposits (Morton and Miller, 1981). Additionally, lesser amounts of fill are present on some areas of Site 4 (SWDIV, 2001a). Based on soil borings collected for the RSE, there is indication of possible fill materials beneath portions of AOPCs 1A and 2A.

Figure F2-2 shows the locations that were sampled for the RSE investigation. Soil samples were collected and analyzed to characterize and delineate the lateral and vertical extent of the COPCs. Eight soil borings were hand-augered at each AOPC at depths from 0 to 1 foot bgs and 2 to 2.5 feet bgs. Step-out soil samples also were collected as necessary to define the lateral and vertical extent of COPCs. Three groundwater samples were analyzed for the COPCs from AOPCs 1A and 2A.

Soil samples were analyzed for target analyte list (TAL) metals, polynuclear aromatic hydrocarbons (PAHs), PCBs, and PCDDs/PCDFs. The groundwater samples and some soil samples were also analyzed for hexavalent chromium. Results are presented in Section 2.4.

At Site 4 AOPCs 1A and 2A, shallow groundwater is estimated to range from less than 1 foot to 3 feet bgs. The specific depth to groundwater depends on a number of fluctuating conditions such as tides, seasons, and specific location within Site 4 AOPCs 1A and 2A. The underlying shallow groundwater is saline to hypersaline (TDS ranging from 29,600 to 57,800 mg/L) and reasonably cannot be regarded as a potential drinking water source. A connection between the shallow groundwater and the lower aquifer system (deeper main drinking water source) appears to be unlikely as presented in the site discussion above (BNI, 2001a).

F2.4 Analytical Data

This section discusses the analytical results of COPCs detected at Site 4 AOPCs 1A and 2A and summarizes the data quality.

F2.4.1 Presentation of Analytical Data

Analytical data associated with Site 4 AOPCs 1A and 2A include:

- *Initial SI* (SWDIV, 1990b)
- *Remedial Investigation* (SWDIV, 1995a)
- *Final Removal Site Evaluation Report for Installation Restoration Program Sites 4, 5, and 6, Naval Weapons Station Seal Beach, California, October* (BNI, 2001a)

Site 4 AOPCs 1A and 2A analytical data summaries from these reports are presented in Attachment B.

F2.4.2 Data Quality

A description of the quality assurance/quality control (QA/QC) procedures and specific discussion of data quality are included in each document, which contain analytical results from previous investigations. In general, the information contained in these documents was found to be of acceptable quality to adequately describe site conditions. All data collected were validated by an outside, independent validator in accordance with NEESA (now known as NFESC) guidelines.

F2.5 Risk Evaluation

This section summarizes the potential risk to human health or the environment from lead-contaminated soil at Site 4 AOPCs 1A and 2A.

F2.5.1 Risk Evaluation Findings

Two risk assessments have been performed using data collected from Site 4 AOPCs 1A and 2A. They include a human health and ecological risk assessments as part of the RSE (BNI, 2001a), and a proposed site-specific target cleanup goal for lead assessment (CH2M HILL, 2003b).

F2.5.1.1 RSE Human Health and Ecological Risk Assessment

<u>Site 4 AOPC 1A</u>

For AOPC 1A, there were several metals reported at concentrations above statistical background in soil adjacent to the road. There were also elevated dioxin/furan concentrations reported in soil adjacent to the road. No human health risk assessment was performed for AOPC 1A because it is located within the NWR. Additionally, there would not be any development on AOPC 1A due to its location next to a former landfill, location in the NWR, and its location within the explosive arc at NAVWPNSTA Seal Beach.

Further evaluation was recommended for AOPC 1A for soil and confirmatory groundwater monitoring for antimony and hexavalent chromium. The ERA in the RSE suggested that the concentrations of the COPCs in soil were not ecologically significant when compared to background conditions and the range of TRVs. However, DTSC would not concur with NFA for the soil due to the presence of elevated lead concentrations at a few locations. Groundwater chemical concentrations are not expected to adversely affect marine life, so only confirmatory monitoring was recommended.

Site 4 AOPC 2A

For AOPC 2A, there were metals, dioxin/furan, and Aroclor 1254 concentrations reported in soil adjacent to the road. A human health risk assessment was performed for AOPC 2A. The incremental cancer risk was estimated at 3.7×10^{-5}, which is within the NCP generally acceptable range of 10^{-6} to 10^{-4} for risk management. The systemic toxicity was evaluated to be unlikely due to a hazard index (HI) less than 1.0. There are potential adverse health effects from exposure to lead; however, this is not of a concern since residential use of AOPC 2A is unlikely due to its location next to a former landfill, its proximity to the NWR, and its location within the explosive arc at NAVWPNSTA Seal Beach. Additionally, human presence is usually limited to brief visits by USFWS personnel and Navy security personnel due to its location next to the NWR.

Further evaluation was recommended for AOPC 2A for soil and confirmatory groundwater monitoring for antimony, arsenic, and hexavalent chromium. The ERA in the RSE suggested that the dioxin/furan concentrations in soil were of minor ecological significance and the COPC concentrations in soil were not ecologically significant when compared to background conditions and the range of TRVs. However, DTSC would not concur with NFA for the soil due to the presence of elevated lead concentrations at a few locations. Groundwater chemical concentrations are not expected to adversely affect marine life, so only confirmatory monitoring was recommended.

F2.5.1.2 Proposed Site-Specific Target Cleanup Goal for Lead at Site 4 AOPCs 1A and 2A

To guide soil removal action activities at Site 4 AOPCs 1A and 2A, a site-specific target cleanup goal (TCG) for lead was developed. The site-specific TCG is a level specific to Site 4 AOPCs 1A and 2A that represents concentrations of lead that will preserve the desired attributes of the assessment endpoints, and below which, adverse effects levels are expected either to be absent or to be within the limits of effects levels for the wildlife populations (i.e., less than a 20 percent effect). The site-specific TCG was derived based on a comparison of the back-calculated lowest observed adverse effect level (LOAEL)-equivalent soil concentrations for each of four bird and mammal receptors (harvest mouse, ground squirrel, skunk, and robin) against the distribution of lead in the soil at Site 4 AOPCs 1A and 2A.

LOAEL-equivalent soil concentrations for the four bird and mammal receptors were determined by the back-calculation of the following exposure model:

$$E_j = [Soil_j * P_s * FIR] + [\sum_{i=1}^{N} B_{ij} * P_i * FIR] * AUF$$

Where:

E_j	=	total exposure (mg/kg/day)
$Soil_j$	=	concentration of chemical in soil (mg/kg)
P_s	=	soil ingestion rate as a proportion of diet
FIR	=	total food ingestion rate for the representative species (kg food/kg body weight/day)

B_{ij}	=	concentration of chemical (j) in biota type (i) (mg/kg)
P_i	=	proportion of biota type (i) in diet
AUF	=	area use factor

LOAEL-equivalent soil concentrations and information used in the calculations are presented in Table F2-1. The LOAEL toxicity reference valves (TRVs) were developed from Kimmel et al. (1980), Grant et al. (1980), and Fowler et al. (1980) for mammals, and from EFA-West (1998) for birds. Lead concentrations in foods consumed by receptors were estimated using bioaccumulation models from Efroymson et al. (2001) and Sample et al. (1999) for plants and soil invertebrates, respectively. Receptor-specific life-history parameters (e.g., diet, soil and food ingestion, area use factors) were either site-specific or derived from the literature (see Table F2-1). LOAEL-equivalent soil concentrations ranged from 459 mg/kg for the harvest mouse to 5,270 mg/kg for the skunk.

To determine the site-specific TCG, the range of LOAEL-equivalent soil concentrations was compared to the full distribution of lead measured in soils in Site 4 AOPCs 1A and 2A (Figure F2-3). Evaluation of the distribution of lead concentrations in Site 4 AOPCs 1A and 2A indicates they are highly skewed and dominated by relatively few samples with high concentrations (i.e., hot spots). These hot spots were identified in a narrow strip along Perimeter Road and had lead concentrations that ranged from about 900 mg/kg to over 7500 mg/kg in soils. Despite these high concentrations, these values represent only 11 of 64 samples collected from these two AOPCs combined. Moreover, the median lead concentrations were 42 and 61 mg/kg for Site 4 AOPCs 1A and 2A, respectively (Figure F2-3) indicating that these few high concentrations were heavily influencing the mean.

Based on a visual evaluation of the observed lead distribution in Site 4 AOPCs 1A and 2A and in light of the calculated LOAEL-equivalent soil concentrations, a site-specific TCG of 600 mg/kg for lead is proposed. This is in addition to an area-wide arithmetic average TCG of less than 100 mg/kg for lead in soils for Site 4 AOPCs 1A and 2A. This level represents a clear break point in the distribution of lead concentrations at the two AOPCs (Figure F2-3) and represents a concentration that would eliminate the majority of risk to wildlife receptors. The highest and next highest lead concentrations remaining in AOPC 1A following remediation will be 554 and 398 mg/kg, respectively, the highest concentration remaining in AOPC 2A will be 391 mg/kg. Only the 554 mg/kg concentration exceeds the lowest LOAEL-equivalent soil concentration. Lead concentrations in all other samples that will remain following remediation will be below the lowest LOAEL-equivalent soil concentration. Thus, remediation to a maximum TCG of 600 mg/kg for lead with an area-wide arithmetic average TCG of less than 100 mg/kg for lead is expected to virtually eliminate risks from lead to wildlife in Site 4. This TCG was not developed to be protective of human health because human access to Site 4 AOPCs 1A and 2A is limited. Because of the NWR, human presence is usually limited to brief visits by USFWS personnel and Navy security personnel. Additionally, there would not be any development on Site 4 AOPCs 1A and 2A due to its location next to a former landfill, proximity to the NWR, and its location within the explosive arc at NAVWPNSTA Seal Beach. This site-specific TCG is below the industrial PRG (EPA, 2002) for lead, which is 750 mg/kg.

TABLE F2-1. Calculation Site-Specific Lead Target Cleanup Goals for Site 4 AOPCs 1A and 2A

Species	FIR	SIR	Pplant	Pinvert	Pmam	Area Use Factor (AUF)		NOAEL TRV	LOAEL TRV	Estimated concentrations in site biota (mg/kg dry weight)				Estimated Exposure (mg/kg/d)				Total Exposure adjusted for Site Use	NOAEL HQ	LOAEL HQ	TCGs
	kg/kg/d	prop. FIR	prop. FIR	prop. FIR	prop. FIR	Area	Time			Small Mammals	Plants	Soil Invertebrates	Soil	Small Mammals	Plants	Soil Invertebrates	Total				
Harvest Mouse	0.169	0.02	0.9	0.1	0	1	1	0.92	4.7	12.988	8.251	113.077	1.547	0.000	1.251	1.905	4.703	4.703	5.11	1.00	459.0
Ground Squirrel	0.041	0.05	0.6	0.35	0	1	1	0.92	4.7	17.880	11.664	186.049	1.743	0.000	0.287	2.669	4.698	4.698	5.11	1.00	850.6
Skunk	0.053	0.05	0.35	0.4	0.2	0.147	1	0.92	4.7	45.998	32.448	810.630	13.848	0.483	0.597	17.041	31.970	4.700	5.11	1.00	5270.0
Robin	0.206	0.02	0.44	0.54	0	0.286	0.5	0.014	8.75	31.082	21.226	440.212	10.197	0.000	1.926	49.010	61.133	8.742	624.43	1.00	2473.0

TCGs - target cleanup goals
FIR - food ingestion rate
SIR - soil ingestion rate
Pplant - proportion of plant material in the diet
Pinvert - proportion of invertebrates in the diet
Pmam - proportion of vertebrates or small mammals in the diet
prop. FIR - proportion of food ingestion rate
TRV - toxicity reference value
NOAEL - no observed adverse effect level
LOAEL - lowest observed adverse effect level
HQ - hazard quotient

Notes:
1) Food ingestion rates (FIR) from BNI (2001)
2) Soil ingestion from BNI (2001) except for robin which was from Sample and Suter (1994)
3) Diet composition from BNI (2001) for ground squirrel and skunk. Diet for harvest mouse based on Webster and Jones (1982). Diet for robin based on annual mean from EPA (1993).
4) AUF based on area was the sum of area of Site 4 AOPCs 1A and 2A divided by home range reported in BNI (2001) for skunk and robin.
5) AUF- time: Mouse, squirrel and skunk assumed to be resident. Individual robins assumed to be migratory - although birds may be found at site year-round, individuals only spend 1/2 of year on site
6) Mammal TRVs from Kimmel et al. (1980), Grant et al. (1980), and Fowler et al. (1980). Avian TRVs from EFA-West (1998).
7) Small mammal bioaccumulation estimated using herbivore model from Sample et al. (1998).
8) Plant bioaccumulation estimated using model from Efroymson et al. (2002).
9) Soil invertebrate bioaccumulation estimated using earthworm model from Sample et al. (1999)
10) Species-specific PRG calculated based on LOAEL

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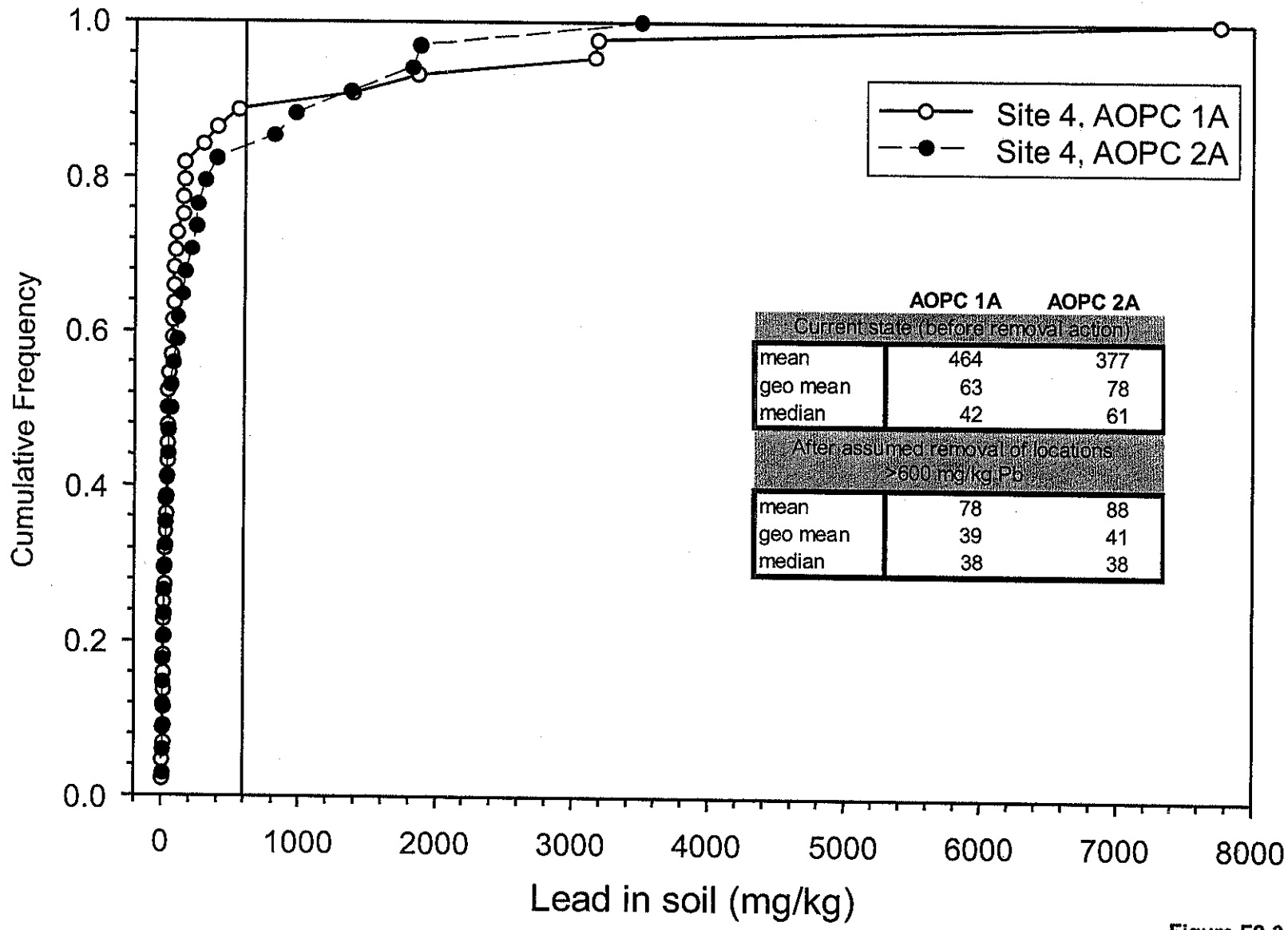

	AOPC 1A	AOPC 2A
Current state (before removal action)		
mean	464	377
geo mean	63	78
median	42	61
After assumed removal of locations >600 mg/kg Pb		
mean	78	88
geo mean	39	41
median	38	38

Figure F2-3
Distribution of Lead in Soil at Site 4 Oil on Roads
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

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A site-specific TCG of 600 mg/kg for lead is less than the LOAEL-equivalent soil concentrations calculated for ground squirrels, skunks, and robins and only somewhat greater than the LOAEL-equivalent soil concentration for harvest mice (459 mg/kg). Additionally, removal of locations with 600 mg/kg or more of lead at the two AOPCs would decrease the arithmetic mean lead concentrations from 464 to 78 mg/kg at AOPC 1A and from 377 to 88 mg/kg at AOPC 2A (Figure F2-3). The resulting mean lead concentrations are far below the LOAEL-equivalent soil concentrations for all four species and indicate that the site-specific TCG will provide an effective removal of localized risk from lead. The approach and methods used for the development of the site-specific TCG for lead in Site 4 AOPCs 1A and 2A, plus the final site-specific maximum TCG of 600 mg/kg for lead were presented to and discussed with Human and Ecological Risk Division (HERD) of the California DTSC. The methods, approach, and final site-specific TCG were found to be acceptable to DTSC (DTSC, 2003b).

According to the NCP, eight factors must be considered to determine the appropriateness of a removal action (40 Code of Federal Regulations [CFR] 300.415[b][2]). Of the eight NCP criteria for determining the appropriateness of a removal action, those identified as being applicable for this removal action are:

- Actual or potential exposure to nearby animals or the food chain from hazardous substances or pollutants or contaminants (40 CFR 300.415[b][2][i])
- Actual or potential contamination of sensitive ecosystems (40 CFR 300.415[b][2][ii])

F2.5.2 Health and Environmental Effects Associated with Chemicals of Concern and Threat to Nearby Human Populations and Environment

Based on the RSE findings and conclusions for soil at Site 4 AOPCs 1A and 2A, further evaluation is recommended for lead in soil (BNI, 2001a). General effects to ecological receptors are described below as well as in the *Site 7 EE/CA*.

F2.5.2.1 Lead

Lead can be extremely toxic to a wide variety of organisms. Plants exposed to high concentrations of lead in soils usually exhibit decreases in transpiration rate, weight (e.g., leaves, root, and shoot), and growth (e.g., elongation and biomass). Similarly, lead concentrations in soil can reduce the rate of decomposition by microflora, inhibit soil respiration and other biochemical processes, and reduce nitrogen and carbon mineralization efficiency. In general, invertebrates are more sensitive to lead than fish, but the severity of toxicity is species dependent. For terrestrial invertebrates, such as earthworms, significant amounts of lead exposure may cause impairment to cocoon production, reduced reproductive success (e.g., reduced hatches/cocoon or percent hatches), and decreases in overall growth. For aquatic invertebrates and fish, acute and chronic lead toxicity increases as hardness decreases and can readily cause mortality. The effects of lead on amphibians and reptiles are not very well known, due to lack of research to date. However, it is believed that elevated body burdens of lead in amphibians and reptiles may result in physiological and reproductive effects. Research with mice in the laboratory has implicated lead as a potential carcinogen and an agent for adverse reproductive effects (e.g., reduced offspring weight).

Fish and Aquatic Invertebrates. Eisler (1988) conducted a review and found that several trends are evident concerning lead toxicity in aquatic organisms.

- Dissolved waterborne lead was more toxic than total lead.
- Organic lead compounds were more toxic than inorganic forms.
- Effects were most pronounced at elevated water temperatures and reduced pH after long exposures.
- Younger life stages had more pronounced effects.

Within invertebrates, crustaceans appear to be the most sensitive to lead (Mance, 1990). The LC50/EC50 for various lead compounds to Daphnia magna ranged from 450 to 1,910 parts per million (ppm) and increased with water hardness (EPA, 1980). Reproductive impairment in daphnids was significant with exposure to 10 parts per billion (ppb) lead (Eisler, 1988). Rotifers exposed to lead chloride in relatively soft water had an LC50/EC50 value of 40,800 ppb (EPA, 1980). Snails exhibit significant mortality rates when exposed to lead at 19 ppb over their lifetime (Eisler, 1988).

Chronic lead exposure to fishes can lead to spinal curvature, anemia, darkening of the tail, caudal fin degeneration, reduced swimming ability, enzyme inhibition in various organs, muscular atrophy, paralysis, reduced growth, delay in maturation, and death (Eisler, 1988). One sign of acute toxicity in fishes is increased mucous formation. The excess coagulates over the entire body, particularly the gills, and can result in death from suffocation (Aronson, 1971; NRCC, 1973). Rand and Petrocelli (1985) found that toxic effect levels (48- to 96-hour LC50 or EC50) ranged from 1,000 to 500,000; 20,000 to 400,000; and 2,000 to 500,000 ppb for species of Salmonidae, Centrarchidae, and Cyprinidae, respectively. An LC50 value of 40 mg/L lead was reported for a 96-hour static toxicity test with goldfish (*Carassius auratus*) (Bolognani et al., 1992). LC50 values for rainbow trout (*Oncorhynchus mykiss*) exposed to lead under the static conditions were 471 and 542 mg/L (total) and 1.47 and 1.32 mg/L (dissolved), while the LC50 under flow-through conditions was only 1.17 mg/L (Goettl and Davies, 1976).

In California, the acute ambient water quality values for lead, based on the dissolved fraction, are 65 micrograms per liter (µg/L) at a water hardness of 100 mg/L calcium carbonate ($CaCO_3$) in fresh water and 210 µg/L in saltwater (EPA, 2000). The chronic criteria are 2.5 µg/L and 8.1 µg/L, respectively. For screening purposes, the threshold effects level (TEL) for lead in freshwater sediments is 35.0 mg/kg, and the TEL in marine sediments is 30.2 mg/kg (Buchman, 1999). The probable effects levels (PELs) are 91.3 mg/kg and 112.2 mg/kg for freshwater and marine sediments, respectively. The acute and chronic national ambient water quality criteria (NAWQC) for lead are 0.082 and 0.0032 mg/L at a hardness of 100 mg/L $CaCO_3$ (EPA, 1985).

Bioavailability and Bioaccumulation. Due to strong absorption of lead to soil organic matter, the bioavailability of the lead is limited. Organic compounds of lead are more bioavailable than inorganic lead. Compared to lead carbonate, lead sulfate is relatively soluble and likely to be more bioavailable.

Lead can be bioaccumulated by plants and animals. The primary route of lead exposure to plants is through root uptake; however, translocation to shoots is limited (Wallace, et al., 1977). In aquatic organisms, the highest lead concentrations are usually seen in benthic organisms and algae, whereas the lowest concentrations tend to be evident in upper trophic level predators like carnivorous fish (ATSDR, 1993). Lead is known to bioconcentrate in aquatic biota. Invertebrates exposed to 32 ppb lead had bioconcentration factors (BCFs) of 1,000 to 9,000 over a 28-day period. Median BCF values in aquatic biota exposed to various concentrations of lead varied from about 42 in fish to 2,570 in mussels (EPA, 1985); however, available evidence does not support the occurrence of lead biomagnification through the aquatic food chain (Eisler, 1988). In vertebrates, lead tends to concentrate in bone matter instead of soft tissue, minimizing movement to higher trophic levels and uptake of lead by predators, especially raptors that regurgitate indigestible material (Stansley and Roscoe, 1996).

F2.5.3 Documented Exposure Pathways

There are no documented impacts due to exposure to chemicals in soil at Site 4 AOPCs 1A and 2A. The primary receptors that are most likely to be impacted by Site 4 AOPCs 1A and 2A under existing conditions are ecological receptors that nest in Site 7, which is located directly north of Site 4 AOPCs 1A and 2A.

Site 4 AOPCs 1A and 2A have vegetative and wildlife receptors. If Site 4 COPCs have migrated to the adjacent habitat, potentially complete pathways are present for exposure of representative organisms to COPCs in the soil in the cropland, non-native grassland, southern willow scrub, and coastal salt marsh (BNI, 2001a).

Another possible exposure pathway, though less likely, for chemicals from Site 4 AOPCs 1A and 2A to impact the environment is through groundwater. Groundwater appears to flow predominantly away from the NWR and the coast towards the north and northeast (SWDIV, 1995a). However, during periods of significant rainfall (wet weather conditions), the groundwater at Site 4 may flow towards the NWR. The exact groundwater flow direction is determined by the interaction among hydrologic features at or adjacent to Site 4, including the NWR tidal marsh and the Orange County Flood Control Channel (OCFCC) (SWDIV, 1999b).

Human exposure to Site 4 AOPCs 1A and 2A (especially the areas within the Seal Beach NWR) would be limited. Because wildlife refuges are established to protect wildlife, human presence is usually limited to brief visits by USFWS personnel and Navy security personnel. Additionally, there would not be any development on Site 4 AOPCs 1A and 2A due to its location next to a former landfill, proximity to the NWR, and its location within the explosive arc at NAVWPNSTA Seal Beach.

F2.5.4 Sensitive Populations

Of the eight species of birds that are listed as endangered by either federal or state agencies and are known to occur at NAVWPNSTA Seal Beach and the associated wetlands, the state-listed Belding's Savannah sparrow nests in the upland areas of Site 7 that are about 500 feet directly north of Site 4 AOPCs 1A and 2A. Other species (including the California

least tern and Aleutian Canada goose) have been observed and periodically may visit the site.

The western portion of Site 4, AOPC 1A, lies in the Seal Beach NWR. In general, the NWR should be considered a sensitive ecological habitat because it provides essential habitat for a variety of avian species. Site 4 AOPCs 1A and 2A are only intermittently used for human activities; therefore, humans would not be a sensitive receptor.

F3. Identification of Removal Action Objectives

F3.1 Determination of Removal Scope

The scope of this removal action is to reduce risk to the environment associated with lead-contaminated soil at Site 4 AOPCs 1A and 2A to the extent practicable and reasonable. Because these areas are adjacent to Site 7 and have some similar characteristics and removal actions, this addendum to the *Site 7 EE/CA* is intended to expand the removal actions of Site 7 to include the removal actions for Site 4. This addendum to the *Site 7 EE/CA* identifies and evaluates two alternatives and then recommends one of the alternatives for effectively reducing the risk to the environment.

A removal action for Site 4 AOPCs 1A and 2A was deemed necessary because lead concentrations in soil are an ecological concern. DTSC stated that, although human health risk did not appear to be an issue, it is concerned about a few sample locations where higher lead concentrations were found (BNI, 2001b).

DTSC stated that they were unable to concur with the RSE's recommendations of NFA for soil at Site 4 AOPCs 1A and 2A because of ecological concerns. DTSC stated that the human health risk did not appear to be an issue, particularly due to the low exposure related to intermittent travel on Perimeter Road. DTSC did not comment on the specifics of the ecological risk assessment, except to say that they did not disagree with the ecological risk assessment results (BNI, 2001b).

A general discussion reviewed the RSE's analytical data and calculations on the exposure point concentrations (EPCs). DTSC did not disagree with the EPC calculation or use of the EPCs in the human health or ecological risk assessments. However, they were concerned about how to adequately address the few sample locations where higher lead concentrations were reported. DTSC suggested that additional sampling be performed at Site 4 AOPCs 1A and 2A in the vicinity of the previous locations where elevated lead concentrations were reported. These locations occur on the east end of AOPC 1A (sample locations SB4-01A-01, -03, -05, -15, and -18) where lead concentrations range from 1,390 to 7,760 mg/kg, and on the west and east ends of AOPC 2A (sample locations SB4-02A-04, -06, -15, and -17) where lead concentrations range from 1,370 to 3,500 mg/kg.

F3.2 Determination of Removal Schedule

Once the draft EE/CA Addendum is completed and approved by DON it would be available for public review and comment for 30 days. NAVWPNSTA Seal Beach would review the comments and direct the incorporation of public comments into the final EE/CA Addendum. The schedule for this removal action would be based on timely regulatory approval of the EE/CA Addendum, public acceptance of the Site 4 removal action, and adequate funding and contracting availability. Table F3-1 shows the projected schedule, assuming timely approval and selection of the preferred alternative.

The removal action to address the elevated lead detections found in Site 4 AOPCs 1A and 2A will be timed to coincide with the implementation of the removal action at the adjacent Site 7. Scheduling constraints associated with the Site 7 removal action are described in Section 3.3 of the 23 May 2002 Final *Site 7 EE/CA* (SWDIV, 2002). As discussed, this removal action will coincide with the Site 7 removal action.

The removal action and site restoration activities are expected to be completed in 2003. The schedule for Site 4 removal action activities for AOPCs 1A and 2A is presented in Table F3-1.

TABLE F3-1
Projected Removal Action Schedule for Site 4 NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A (Oil on Roads) EE/CA

Activity	Start Date	Completion Date
Complete Draft EE/CA	April 2003	June 2003
Applicable or Relevant and Appropriate Requirements (ARAR) Analysis and Concurrence	January 2003	March 2003
EE/CA Public Comment Period (RAB review)	June 2003	July 2003
Prepare Final EE/CA and Response to Public Comments (RAB comments)	July 2003	August 2003
Prepare Draft AM/RAP, California Environmental Quality Act (CEQA) Documentation, Fact Sheet, and Public Notice	July 2003	August 2003
RAB/Public Meeting	September 2003	September 2003
Prepare Final AM/RAP, CEQA Documentation, Fact Sheet, and Public Notice	September 2003	October 2003
Removal Action Planning and Review	October 2003	October 2003
Implement Site 4 Removal Action	November 2003	December 2003

To expedite the schedule the following activities will occur:

- A 30-day regulatory agency and RAB review will be requested.
- Preparation of the draft Action Memorandum/Remedial Action Plan (AM/RAP), CEQA documentation, Fact Sheet, and Public Notice will be prepared, submitted, and reviewed concurrently. These documents will include both Site 4 AOPCs A1 and A2 and Site 7 removal actions.

F3.3 Applicable or Relevant and Appropriate Requirements

The evaluation of applicable or relevant and appropriate requirements (ARARs) for Site 4 AOPCs 1A and 2A can be found in Attachment A. The following sections provide an overview of the ARARs process and a summary of those ARARs that potentially affect the development of removal action objectives (RAOs).

F3.3.1 ARARs Overview

As the lead federal agency, DON has the primary responsibility for the identification of federal ARARs at Site 4 AOPCs 1A and 2A. As the lead state agency, DTSC has the responsibility for identifying state ARARs (Attachment A). Requirements of ARARs and TBCs are generally divided into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific and location-specific ARARs affecting the development of RAOs are discussed in the following section. Other chemical-specific, location-specific, and action-specific ARARs are presented in Section 4 for each of the alternatives considered. An evaluation of the ARARs considered for this EE/CA Addendum can be found in Attachment A.

DON has evaluated and concluded that no ARARs were identified for Site 4 AOPCs 1A and 2A beyond those ARARs already identified in the *Site 7 EE/CA* (SWDIV, 2002). The development and evaluation of the Site 7 ARARs are described in Section 3.4 of the 23 May 2002 *Site 7 EE/CA* (SWDIV, 2002). DTSC reviewed the DON's ARAR evaluation and concurred with its conclusions; the concurrence letter can be found in Attachment A (DTSC, 2003a). ARARs previously were requested from the state for Site 7. Because the Site 4 removal action for AOPCs 1A and 2A is being conducted concurrently with the Site 7 removal action, these same ARARs will be used for Site 4 AOPCs 1A and 2A as appropriate.

F3.3.2 ARARs Affecting RAOs

The substantive provisions of the following requirements also have been identified as location- and chemical-specific ARARs that affect the development of RAOs for Site 4 AOPCs 1A and 2A.

- National Wildlife Refuge System Administration Act of 1996, 16 U.S.C. § 668dd-668ee and 50 CFR § 27.11-27.97
- Protection of Wetlands, EO 11990
- Floodplain Management, EO 11988
- Endangered Species Act of 1973
- Migratory Bird Treaty Act
- California Fish and Game Code §§ 2080, 2014, 3005, and 5650(a), (b), and (f)
- State Water Resource Control Board Resolutions 68-16, 88-63, and 89-42
- California Code of Regulations, Title 27, §§ 20210, 20220, 20230, 20390, 20395, 20400, 20410, 20950, 22207(a), 22212(a), 22222
- California Water Code, Division 7, §§ 13241, 13243, 13263(a), 13269, and 13360
- Comprehensive Water Quality Control Plan for the Santa Ana Region Basin Plan (California Water Code § 13240), Chapters 4 and 5
- RCRA: California CFR Title 22 §§ 66261.21; 66261.22(a)(1); 66261.23; 66261.24(a)(1); 66261.100; 66261.24(a)(1)(B); 40 CFR § 261.24(a)

In general, these requirements prohibit the taking or harassing of wildlife from hazardous waste sites. These requirements are ARARs because the evaluation of ecological risk indicated that Site 4 AOPCs 1A and 2A posed a risk to wildlife (Section F2.5).

F3.4 Removal Action Objectives

Based on CERCLA, the NCP, the ARARs evaluation, and the human health and ecological risk assessments, the RAOs for Site 4 AOPCs 1A and 2A are as follows:

- Minimize further migration of lead in surface soil.
- Reduce risk to ecological receptors from lead-contaminated soil to acceptable levels.

To help achieve these RAOs, target cleanup goals (TCGs) were established for the areas where excavations would occur requiring confirmation sampling. Ecological risk-based TCGs were developed following the DTSC ecological risk assessment guidance (DTSC, 1996) and identifying the primary risks. For Site 4 AOPCs 1A and 2A, a site-specific maximum TCG of 600 mg/kg for lead coupled with an area-wide arithmetic average TCG of less than 100 mg/kg for lead were developed based on the risks to representative site-specific terrestrial receptors, which include ground squirrel, harvest mouse, skunk, and robin. The development of this site-specific TCG is described in Section F2.5.1.2.

Another primary risk identified at Site 4 AOPCs 1A and 2A involves the potential risks to aquatic ecological species due to the exposure of lead contamination during tidal water inundation that occurs at AOPCs 1A and 2A. These aquatic ecological risks are described in the RSE Report (BNI, 2001a).

Human exposure to Site 4 AOPCs 1A and 2A (especially the areas within the Seal Beach NWR) would be limited. Because wildlife refuges are established to protect wildlife, human presence is usually limited to brief visits by USFWS personnel and Navy security personnel. Additionally, there would not be any development on Site 4 AOPCs 1A and 2A due to its location next to a former landfill, proximity to the NWR, and its location within the explosive arc at NAVWPNSTA Seal Beach. Additionally, DTSC stated that the human health risk did not appear to be an issue, particularly due to the low exposure related to intermittent travel on Perimeter Road (BNI, 2001a).

F4. Identification and Analysis of Removal Action Alternatives

Based on the RAOs presented in the previous section, two alternatives have been developed for the removal action at Site 4 for AOPCs 1A and 2A. A brief summary of the alternatives evaluated in this EE/CA is:

- Alternative 1: No Action.
- Alternative 2: Excavation and Offsite Disposal. Primary removal action activities involve excavation and offsite disposal of lead contaminated soil for Site 4 AOPCs 1A and 2A.

F4.1 Evaluation Criteria

These alternatives were evaluated based on effectiveness, implementability, and cost. Brief descriptions of the evaluation criteria are provided below.

F4.1.1 Effectiveness

To evaluate effectiveness, consideration was given to the overall protection of public health and safety and the environment, and compliance with ARARs and other guidance. In addition, the removal action alternatives evaluation considered the following.

- Ability of the alternative to achieve RAOs
- Reduction of toxicity, mobility, or volume through treatment
- Long-term effectiveness and reliability in reducing long-term risks
- Short-term effectiveness

F4.1.2 Implementability

Evaluation of the implementability of each alternative included consideration of the technical feasibility, commercial availability, and administrative feasibility. Anticipated state and community acceptance also would be evaluated. The latter acceptance evaluation would be updated based on receipt of comments from the state and the community.

F4.1.3 Cost

The cost evaluation is based upon estimates for capital costs, annual operation and maintenance (O&M) costs, duration of removal action, and present worth. Capital costs would include the costs for design, materials, construction, equipment, mobilization, and decommissioning.

Annual O&M costs include monitoring, minor repair, and replacement costs. The present worth for each alternative is the sum of capital cost and O&M cost based on a 5-year present worth analysis. A present worth analysis is used to evaluate expenditures that occur over

different time periods by discounting all future costs to a common base year. The present worth was calculated using the following equation.

$$P = A \frac{(1 + i)^n - 1}{i(1 + i)^n}$$

where,

P = present worth
A = monthly costs (annual costs/12)
i = interest rate of 7 percent (annual percentage rate [APR]), compounded monthly
n = 60 months (5 years)

The present worth allows the cost of removal action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. Inflation was not considered in this cost evaluation.

Brief descriptions of the removal action alternatives and the alternative evaluation discussions are presented in Subsections F4.2 to F4.4.

F4.2 Alternative 1—No Action

The following subsections provide a description and discussion of the effectiveness, implementability, and cost for Alternative 1.

F4.2.1 Description

Alternative 1 does not include additional characterization of the site or further action to remove waste materials or reduce risk posed by wastes at the site. A "no-action" alternative is required by the NCP to be evaluated in detail as an alternative. This removal action alternative was retained as a baseline against which other response actions could be compared and allows evaluation of the effect of responses that directly address the mitigation of impacted media. Under this alternative, the lead-contaminated soil at Site 4 AOPCs 1A and 2A is left in place.

The following subsections discuss the effectiveness, implementability, and cost for Alternative 1.

F4.2.2 Effectiveness

The No Action Alternative would not meet the RAOs stated in Section 3. Because no response actions would be implemented, long-term ecological risks for the site would be the same as the baseline risks described in the RSE for Site 4 (BNI, 2001a). At certain areas of Site 4 AOPCs 1A and 2A, contaminants would remain in the soil at concentrations exceeding ecological screening criteria for wildlife protection. Because the site currently poses a threat to ecological receptors, this alternative would not meet minimum standards established by the Endangered Species Act, the Migratory Bird Treaty Act, and California Department of Fish and Game (CDFG) Code 2080 and 3005, all of which prohibit the taking

or harassing of wildlife. Further, there would be no groundwater monitoring to determine whether potential contaminants detected in the groundwater could be migrating to aquatic receptors.

This alternative includes no controls to reduce the probability of exposure and no long-term management measures other than those that currently exist (i.e., because Site 4 lies within a naval facility, it benefits from the presence of military security and security fencing). All current and future risks would remain. This alternative would provide no reduction in toxicity, mobility, or volume through treatment.

F4.2.3 Implementability

There would be no implementability concerns posed by this alternative because no action would be taken. Since there would be no construction or implementation phase for this alternative, there would be no additional short-term risks posed to the community, workers, or the environment as a result of excavation of lead-contaminated soil. However, it is anticipated that the Alternative 1 would be unacceptable to the community and the state regulators.

F4.2.4 Costs

No costs would be incurred under the Alternative 1 for Site 4 AOPCs 1A and 2A.

F4.3 Alternative 2—Excavation of Contaminated Soil and Offsite Disposal with Monitoring

The following subsections provide a description and discussion of the effectiveness, implementability, and cost for Alternative 2.

F4.3.1 Description

Alternative 2 consists of excavation followed by offsite disposal and clean backfill.

It is estimated that approximately 600 cubic yards (cy) each of lead contaminated soil exists in Site 4 AOPCs 1A and 2A, respectively. The excavation volume, however, may vary significantly based on conditions encountered during x-ray fluorescence (XRF), excavation, and analytical sample confirmation. It is anticipated that in-place excavation volumes (excavated soils) in AOPC 1A could range from as low as 600 cy to as high as 2,200 cy. Similarly, in AOPC 2A, the in-place excavation volumes could range from as low as 600 cy to as high as 2,800 cy.

The excavation removal action at Site 4 AOPCs 1A and 2A comprises the following activities.

- Re-establish locations of elevated lead in soils
- Use XRF to identify lateral extent of lead-contaminated soil excavation
- Excavation of lead-contaminated soil within AOPCs 1A and 2A
- Confirmation sampling to verify successful attainment of RAOs
- Offsite disposal of excavated soil

- Backfill with clean fill
- Revegetating the clean fill

Because of the proximity of Site 4 AOPCs 1A and 2A to the Seal Beach NWR, all field activities would be coordinated with the USFWS refuge manager to minimize the potential for disturbing or harming nearby sensitive habitat.

F4.3.2 Effectiveness

Alternative 2 would meet the RAOs stated in Subsection 3.5 and would provide protection to public health and safety and the environment. Long-term risks to ecological receptors at Site 4 AOPCs 1A and 2A would be eliminated because the contaminated soils would be excavated and disposed offsite. Clean material would be used to backfill the excavation. Magnitude of residual risks would be minimal because the excavation alternative would remove lead-contaminated soil at concentrations higher than the target cleanup goal. No additional controls, such as access restrictions or land use restrictions, would be required.

Alternative 2 would meet ARARs by complying with guidelines of the Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, and the Resource Conservation and Recovery Act, listed in Section 3.4.2. Removal of lead contaminated soil from Site 4 AOPCs 1A and 2A would reduce exposure to wildlife. It would meet requirements of the Endangered Species Act, the Migratory Bird Treaty Act, and CDFG Code 2080, 2014, and 3005, all of which prohibit the taking or harassing of wildlife. DON would coordinate with USFWS, U.S. Army Corps of Engineers (USACE), and CDFG during the removal action in this portion of the site to comply with the National Wildlife Refuge System Administration Act. This alternative would also be expected to meet the South Coast Air Quality Management District (SCAQMD) requirements because dust generated during implementation of the alternative would be controlled with dust-suppression technologies.

Alternative 2 would be highly reliable because the wastes would be excavated and then disposed offsite and, therefore, would not pose a risk in the future. Alternative 2 would not reduce toxicity, mobility, or volume of contaminants through treatment. Though excavation and offsite disposal would eliminate the source of contamination, there would be no reduction in toxicity, mobility, or volume through treatment.

With Alternative 2 there would be an added short-term risk (in terms of dust, noise, and traffic) associated with the excavation activities and truck transport of large volumes of waste material or imported fill material. There is also potential for short-term risk to the environment, community, and workers due to particulate emissions (and possibly vapor emissions from fossil-fueled vehicles) during excavation of wastes. Proper safety precautions, including dust control and precautionary vapor control technologies, would be necessary.

F4.3.3 Implementability

Alternative 2 is technically feasible. Extensive coordination requirements and health and safety measures would be required; however, no special techniques, equipment, materials, or labor would be required to excavate the wastes. The materials and procedures are

readily available and well established. Many contractors have the skill and experience to perform the earthwork, possible short-term dewatering, revegetation, and the needed excavation-related construction activities.

F4.3.4 Costs

The costs to implement Alternative 2 were estimated using vendor and contractor quotes and methodologies prescribed by EPA for Superfund sites. The cost range, in year 2003 dollars, is summarized below. A range of costs is provided because of the uncertainty involved in estimating the excavation volumes at Site 4 AOPCs 1A and 2A.

Estimated Capital Cost ($): 210,000 to 880,000
Estimated Annual O&M Cost ($): 0
Estimated Present Worth ($): **210,000 to 880,000**

A breakdown of the costs by major task and the cost ranges is shown in Table F4-1.

F4.4 Uncertainties

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Due to the difficulty in completely characterizing and quantifying the contamination at Site 4 AOPCs 1A and 2A, the scope of removal actions is based largely on assumptions. These estimates are based on representative cleanup actions comprised of example technologies. These estimates are presented for the purpose of making comparative evaluations and cost estimates, and are not necessarily the specific technologies or methods that would be a part of the final engineering work plan. The final cost of the project would depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, the firm selected for final engineering design, and other variable factors. As a result, the final project cost would vary from the estimates presented herein.

A source of uncertainty that would affect the cost estimates presented in this EE/CA Addendum is the volume of material that would be excavated from Site 4 AOPCs 1A and 2A and the amount of dewatering that may be required during excavation.

As part of previous investigations at Site 4 AOPCs 1A and 2A, samples were collected and analyzed to better delineate the extent of contamination. Nevertheless, uncertainties lie with these volume estimates because previous investigations based findings on sampling points approximately 400 feet apart (BNI, 2001a). The actual soil volumes excavated from Site 4 AOPCs 1A and 2A may vary from the estimates presented in this EE/CA Addendum. The cost range provided is expected to capture this cost uncertainty.

In addition, the nature of the soil excavated (California-regulated nonhazardous waste versus California-regulated hazardous wastes versus RCRA hazardous wastes) also could impact the costs significantly. For the purposes of the cost estimates presented in this EE/CA, the nature of soil excavated from Site 4 AOPCs 1A and 2A is assumed to be 90 percent nonhazardous wastes (as defined by the California Code of Regulations Title 22) and 10 percent RCRA hazardous waste. The relatively lower percentage of hazardous waste

assumed is based on the levels of lead contamination detected in soil during previous investigations conducted at the site.

The amount of dewatering that may be required would depend on the actual depth to groundwater and soil moisture at the time of excavation. Both of these factors are dependent on time of excavation during the tidal cycle and on weather conditions.

Table F4-1. Summary of Estimated Removal Action Costs by Major Task
Site 4 EE/CA
NAVWPNSTA Seal Beach

Task	Units	Unit Costs	Alternative 1 - No Action	Alternative 2 - Excavation and Offsite Disposal	
			Cost	Low Cost	High Cost
Construction Direct Costs					
Mob/Demob/Operations	LS	-	$0	$6,173	$26,591
Survey	LS	-	$0	$1,500	$1,500
Site Preparation (access and clearing)	AC	$ 4,000	$0	$2,296	$10,537
X-Ray Fluorescence	WK	$ 1,500	$0	$1,300	$2,600
Excavation/Waste Handling in AOPC 1A	CY	$ 10	$0	$6,000	$22,000
Excavation/Waste Handling in AOPC 2A	CY	$ 10	$0	$6,000	$28,000
Relocation and Revegetation of Native Plant Species	AC	$ 20,000	$0	$11,478	$52,686
Excavation Confirmation Soil Sampling and Analysis for Lead	EA	$ 1,000	$0	$200	$900
Backfill Excavated Areas	CY	$ 18	$0	$21,600	$90,000
Sampling for Waste Characterization and Segregation	EA	$ 135	$0	$1,620	$6,750
Offsite Transportation and Disposal of Non-Haz Wastes	CY	$ 54	$0	$58,320	$243,000
Offsite Transportation and Disposal of Haz Wastes	CY	$ 122	$0	$14,640	$61,000
Monitoring Well Installation	LF	$ -	$0	$0	$0
Wetlands Mitigation Program	LS	$ 50,000	$0	$0	$14,348
Construction Subtotal			***$0***	***$132,000***	***$560,000***
Indirect Costs					
Field Office	LS		$0	$0	$0
Bid Contingency (15%)		15%	$0	$19,800	$84,000
Scope Contingency (20%)		20%	$0	$26,400	$112,000
Construction Total			***$0***	***$179,000***	***$756,000***
Permitting and Legal (3%)		3%	$0	$3,960	$16,800
Construction Quality Assurance (5%)		5%	$0	$6,600	$28,000
Services During Construction (8%)		8%	$0	$10,560	$44,800
Total Implementation Costs			***$0***	***$201,000***	***$846,000***
Engineering Design Costs (6%)		6%	$0	$7,920	$33,600
TOTAL CONSTRUCTION COSTS			$0	$210,000	$880,000
Annual O&M Costs - 5-year Duration					
Groundwater Monitoring	Ea	$ -	$0	$0	$0
Subtotal - 5-year Duration			***$0***	***$0***	***$0***
Contingency (10%)		10%	$0	$0	$0
Total Annual O&M			$0	$0	$0
O&M Present Worth for 5 yrs @ 2.8%APR (compounded monthly)	3%		$0	$0	$0
REMOVAL ACTION-ESTIMATED COST			$0	$210,000	$880,000

Assumptions:

Construction Costs

Excavation volumes based on areas presented in Bechtel Removal Site Evaluation (RSE) Report (Bechtel, 2001) and depth estimated to be 1 ft for practical purposes.

Assumes Site 4 removal action occurs concurrently with Site 7 removal action

Costs associated with installation of new groundwater (GW) monitoring wells are accounted for separately under the Groundwater Monitoring Progarm at Installation Restoration Sites 4, 5, 6, and 7 (Bechtel, 2002)

Assumes dewatering is not anticipated since excavation will not exceed 12 inches. However, GW depths are shallow and if for some reason excavations are deeper than 12 inches, GW could be encountered. Therefore, there are uncertainties to whether dewatering will be required

O&M Costs

Costs associated with O & M of GW monitoring wells are accounted for separately under the Groundwater Monitoring Progarm at Installation Restoration Sites 4, 5, 6, and 7 (Bechtel, 2002)

F5. Comparative Analysis of Removal Action Alternatives

In this section, the alternatives analyzed in Section F4 are compared against each order to evaluate the relative performance of each alternative in relation to each of the criterion. The criteria used in this comparison are the same as in Section F4, namely effectiveness, implementability, and cost. Table F5-1 presents a detailed summary of this comparison.

F5.1 Effectiveness of Alternatives

The effectiveness of each alternative was evaluated based on the overall protection of human health and the environment; long-term effectiveness and permanence; compliance with ARARs; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness.

F5.1.1 Overall Protection of Human Health and the Environment

Alternative 1, No Action, provides no protection for human health or the environment. Alternative 2 offers a higher degree of protectiveness for human health and the environment by removing the lead-contaminated soil from Site 4 AOPCs 1A and 2A, which poses a risk to ecological receptors.

F5.1.2 Long-Term Effectiveness and Permanence

Alternative 1 is not effective over the long-term because the lead in the soil could migrate towards or be consumed by ecological receptors.

The long-term effectiveness and permanence of Alternative 2 is higher than Alternative 1 because the soil remaining at Site 4 AOPCs 1A and 2A would not pose residual risk to ecological receptors.

F5.1.3 Compliance with ARARs

Alternative 1 does not meet minimum standards established by the Endangered Species Act, Migratory Bird Treaty Act, Protection of Wetlands (EO 11990), CDFG Code (2080, 2014, and 3005), Flood Plain Management (EO 11988), State Water Resource Control Board, California Code of Regulations, California Water Code, Comprehensive Water Quality Control Plan for the Santa Ana Region, the Resource Conservation and Recovery Act, and ARARs listed in Section F3.4.2. On the other hand, Alternative 2 removal actions may threaten wetlands and sensitive habitat, which may not meet minimum standards established by the Endangered Species Act, Migratory Bird Treaty Act, Protection of Wetlands (EO 11988), and CDFG ARARs. The excavation of lead-contaminated soils that is proposed in Alternative 2 activities would be carried out to a point where remaining lead concentrations are at or below regulatory agency-approved cleanup levels while protecting or restoring wetlands.

F5.1.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Neither of the alternatives evaluated would reduce toxicity, mobility, or volume of contaminants through treatment. However, Alternative 2 would involve excavation and removal of the lead-contaminated soils from the NWR portions of Site 4 AOPCs 1A and 2A for disposal at an approved facility (when treatment may or may not occur).

F5.1.5 Short-Term Effectiveness

The short-term effectiveness is lowest for Alternative 1 because the RAOs would never be met. Alternative 1 would not involve any removal action; therefore, any risk associated with the lead-contaminated soil would still exist.

The short-term effectiveness is higher for Alternative 2 because it would require excavation of lead-contaminated soil and transportation to an approved facility for disposal. Alternative 2 may require a substantial volume of soil backfill, so there is the added risk associated with the truck transport of imported fill material from an offsite source to the site. For Alternative 2, proper safety precautions, including dust control technologies, would be necessary. Alternative 2 would be more effective because there would be no unmanageable risks to the community, workers, or the environment during construction. Alternative 1 is not evaluated because there is no construction or implementation phase.

F5.2 Implementability of Alternatives

The implementability of Alternatives 1 and 2 was evaluated based on technical feasibility, commercial availability, administrative feasibility, anticipated regulatory acceptance, and anticipated community acceptance.

The alternatives use proven and demonstrated technologies and are feasible to implement. Alternative 2 involves earthwork and possible dewatering activities that can be provided by many local contractors. No special materials or labor are required for this alternative. However, the western portion of Site 4 AOPC 1A that is part of the NWR, is sensitive to wildlife and portions of Site 4 AOPC 2A meet the definition of wetlands. Therefore, if it is determined that lead-contaminated soil extends into the wetlands, mitigation measures for disturbance or destruction of wetlands or sensitive habitat would be required.

Technical feasibility, commercial availability, administrative feasibility, and community acceptance is not applicable to Alternative 1 because no action is taken. Although Alternative 2 would require standard contracting procedures, extensive approval and coordination requirement may be involved if contaminated soils extend into the wetlands. Regulatory and community acceptance should be more favorable than Alternative 1 because lead-contaminated soils would be removed for the site and only temporary disturbance would be anticipated.

TABLE F5-1. Comparative Analysis of Removal Action Alternatives
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Excavation and Offsite Disposal
Effectiveness		
• **Overall Protection of Human Health and the Environment**	Alternative 1 would not meet Removal Action Objectives (RAOs), and it provides the least overall protection of the environment compared to the alternatives considered. Immediate exposure as well as indirect exposure through stormwater runoff and/or wind erosion does not provide overall protection of human health and the environment.	Alternative 2 would meet RAOs. Risks are reduced through excavation of lead contaminated soil and offsite disposal at an approved facility. This alternative affords the maximum long-term protection to the environment. However, short-term risks during implementation are potentially high. Alternative 2 affords the greatest protection of the environment because Site 4 AOPCs 1A and 2A soils with lead concentrations exceeding the target cleanup goal (TCG) would be excavated and disposed offsite. Clean fill materials would be used to backfill the excavations.
• **Compliance with applicable or relevant and appropriate requirements (ARARs)**	Alternative 1 would not comply with ARARs.	Alternative 2 would comply with ARARs to the extent that protection of human health and the environment would be provided. • Lead contaminated soil and residuals would be removed to a point where remaining lead concentrations are at or below the TCG. • Extensive provisions to protect or improve existing water quality conditions are not required because of the existing hydrological conditions.

TABLE F5-1. Comparative Analysis of Removal Action Alternatives
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Excavation and Offsite Disposal
Long-Term Effectiveness and Permanence		
• **Magnitude of Residual Risk**	Under No Action, the magnitude of residual risk would be relatively high because the site would remain unchanged.	Under Alternative 2, the magnitude of residual risk would be relatively low because lead contaminated soil is excavated and disposed offsite at an approved facility.
• Adequacy and Reliability of Controls	Alternative 1 would not provide adequate and reliable controls since no removal action is taken.	Alternative 2 would not require any controls because lead contaminated soil at Site 4 AOPCs 1A and 2A is excavated and disposed offsite at an approved facility.
Reduction of Toxicity, Mobility, and Volume Through Treatment		
• Treatment Processes Used and Materials Treated • Amount of Hazardous Materials Destroyed or Treated • Expected Reductions in Toxicity, Mobility, and Volume • Irreversibility of Treatment • Type and Quantity of Treatment Residual	Alternative 1 would not reduce toxicity, mobility, or volume of contaminants through treatment.	Alternative 2 does not propose removal actions that involve treatment; therefore, Alternative 2 would not reduce toxicity, mobility, or volume of contaminants through treatment.

TABLE F5-1. Comparative Analysis of Removal Action Alternatives
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Excavation and Offsite Disposal
Short-Term Effectiveness		
• Protection of Community During Remedial Action • Protection of Workers During Removal Action • Environmental Impacts	Under No Action, unlike Alternative 2, there would not be any temporary risks posed to the community, workers, and the environment. However, risks from possible ongoing water seep discharges to the groundwater would exist.	Under Alternative 2, excavation of Site 4 AOPCs 1A and 2A would temporarily pose short-term risks to the workers and the environment (ecological receptors at the site). In general, there would be minor additional disturbance to the community during construction primarily due to increased traffic.
• Time Until RAOs are Achieved	Alternative 1 would not achieve the RAOs; therefore, the time taken would be indefinite.	It would take approximately 1 month to complete the removal actions under Alternative 2. The RAOs would be achieved upon completion of the excavation and backfilling activities.
Implementability		
• Technical Feasibility • Availability of Services and Materials	Alternative 1 would not have any technical implementability concerns because no action is being taken.	Under Alternative 2, the excavation activity at Site 4 AOPCs 1A and 2A does not require specialized equipment for excavation. The depth, area, and volume of excavation are expected to be limited to relatively small "hot spots," and specialized excavation, waste handling, and dewatering, are not expected to be required. The required equipment and experienced contractors are widely available in Southern California.

TABLE F5-1. Comparative Analysis of Removal Action Alternatives
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Excavation and Offsite Disposal
• Administrative Feasibility	Alternative 1 would not require any additional administration because no action is being taken.	There would be extensive regulatory coordination issues for excavation and offsite disposal. Because the removal action involves excavation within the NWR and adjacent wetland areas, DON would need to coordinate with DTSC, RWQCB, SCAQMD, USFWS, ACOE, and CDFG during the removal action.
• State (or Other Support Agency) Acceptance	It is anticipated that Alternative 1 would not be acceptable to the regulatory agencies (i.e., DTSC, RWQCB, USFWS, ACOE, and CDFG).	It is anticipated that DTSC, RWQCB, USFWS, ACOE, and CDFG would accept Alternative 2. However, the construction disturbance and site restoration may cause concern. The excavation of lead contaminated soil at Site 4 AOPCs 1A and 2A provides adequate protection of human health and the environment; therefore, this alternative would likely be the favored alternative for regulators.
• Community Acceptance	It is anticipated Alternative 1 may not be acceptable to the community.	The community's issues and concerns for Alternative 2 would be addressed based on public comments on the EE/CA. However, it is anticipated that the community would likely consider this alternative favorably because it involves removal of lead contaminated soil at Site 4 AOPCs 1A and 2A. One issue may be the increase in off-Station traffic, noise, and dust because of the need to transport and dispose waste materials offsite. Use of railroad transport for offsite waste hauling and onsite backfill would be a mitigating measure which would make traffic and noises issues less significant.

TABLE F5-1. Comparative Analysis of Removal Action Alternatives
NAVWPNSTA Seal Beach
Site 4 AOPCs 1A and 2A EE/CA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Excavation and Offsite Disposal
Cost		
Estimated Capital Costs ($ range)	$0	$210,000 to $880,000
Estimated Annual Operation and Maintenance (O&M) Costs	$0	$0
Estimated Present Worth ($ range)	$0	$210,000 to $880,000

Notes:

ACOE	United States Army Corps of Engineers
ARARs	applicable or relevant and appropriate requirements
CDFG	California Department of Fish and Game
DON	Department of the Navy
DTSC	Department of Toxic Substances Control
EE/CA	Engineering Evaluation/Cost Analysis
NWR	National Wildlife Refuge
O&M	Operation and Maintenance
RAOs	Removal Action Objectives
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
TCGs	target cleanup goals
USFWS	United States Fish and Wildlife Service

F5.3 Cost of Alternatives

The capital, O&M, and total present worth costs for the alternatives are shown in Table F5-1. A breakdown of costs by major task also is presented in Table F5-1. Alternative 1, No Action, has the lowest net present worth cost, as expected, because no activities would take place. Alternative 2 is the higher cost alternative, having a net present worth cost between $210,000 and $880,000, which includes the costs of disposal of excavated material and replacement backfill.

F5.3.1 Sensitivity of Costs

The cost estimates were prepared assuming the following:

- Unit costs in 2003 dollars
- Local sources for soil import
- Transportation of lead-contaminated soil to an approved facility via rail haul
- No significant dewatering required
- Removal action for Site 4 AOPC 1A and 2A is implemented concurrently with Site 7 removal action

F6. Recommended Removal Action Alternative

The EE/CA was performed in accordance with current EPA and DON guidance documents for a non-time critical removal action under CERCLA. The purpose of this EE/CA is to identify and analyze alternative removal actions to address lead-contaminated soil at Site 4 AOPCs 1A and 2A at NAVWPNSTA Seal Beach. Two alternatives were identified, evaluated, and compared.

- Alternative 1—No Action
- Alternative 2—Excavation and Offsite Disposal

This Site 4 removal action for AOPCs 1A and 2A will be conducted concurrently with the Site 7 removal action because the lead-contaminated soil hot spots are adjacent to Site 7 Station Landfill.

Based on the comparative analyses of the removal action alternatives completed in Section 5, the recommended removal action is Alternative 2. Alternative 2 consists of excavation followed by offsite disposal and clean imported backfill. The details for implementing the recommended alternative would be developed by the RAC and would be discussed in the RAP.

Excavation and offsite disposal of wastes is proposed to mitigate possible long-term risks to ecological receptors. Using field instrument technology (e.g., XRF) in conjunction with quality-controlled offsite commercial laboratory analyses, the lateral extent of lead contamination would be further delimited beyond that identified by the Site 4 AOPCs 1A and 2A RSE (BNI, 2001a). The removal action would involve excavation of lead contaminated soil. The excavated material would then be hauled offsite and disposed in an approved landfill. Clean earthfill would be used to backfill the excavation. The remediated areas would be revegetated to be consistent with the surrounding habitat.

Alternative 2, Excavation and Offsite Disposal is the recommended removal action because this alternative:

- Adequately protects public health and safety and the environment
- Complies with ARARs
- Meets the RAOs
- Provides moderate long-term effectiveness
- Provides high short-term effectiveness because of low impacts on the community, workers, and the environment
- Provides high technical feasibility and low administrative requirements
- Provides high reasonableness of costs, offering the highest benefit in terms of achieving RAOs for the estimated cost

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Attachment A
Applicable or Relevant and Appropriate Requirements Evaluation and DTSC Concurrence Letter for ARARs

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

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Ser 5NEN.SL/057
3 FEB '03

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Katherine Leibel
Office of Military Facilities
Department of Toxic Substances Control
Region 4
5796 Corporate Avenue
Cypress, CA 90630

Dear Ms. Leibel:

Pursuant to the Naval Weapons Station, Seal Beach IRP Project Managers Meeting held on 18 Sep 02, the Navy reviewed the ARARs identified in the final Engineering Evaluation/Cost Analysis (EE/CA) Report for Site 7 Station Landfill (SWDIV, 2002) for pertinence to Site 4 AOPCs 1A and 2A. The review of Site 7 ARARs was performed to identify if additional ARARs for Site 4 AOPCs 1A and 2A are needed. This review was necessary because of the Navy's decision to add Site 4 AOPCs 1A and 2A to the removal action for Site 7. Chemical-, location-, and action-specific ARARs were included in the review. No additional ARARs were identified for the inclusion of Site 4 AOPCs 1A and 2A to the Site 7 removal action.

Analytical data for AOPCs 1A and 2A, presented in the final Removal Site Evaluation Report (SWDIV, 2001) for Site 4, were reviewed. In soil samples from AOPC 1A, total 2,3,7,8-TCDD values exceeded the residential Preliminary Remediation Goal (rPRG) in 14 of 44 samples. Also, lead values were reported above statistical background. In groundwater samples from AOPC 1A, antimony and hexavalent chromium levels were above statistical background; the hazard quotient (HQ) values were 7.0 and 4.8 respectively, for the ecological risk assessment (ERA).

In soil samples from AOPC 2A, lead levels were above statistical background; the low-HQ value was exceeded for the robin (HQ=230). Total 2,3,7,8-TCDD values exceeded the rPRG in 16 of 34 samples; the HQ values were slightly exceeded for several indicator species. Also, lead values were reported at elevated concentrations indicating potential adverse health effects for a residential scenario at AOPC 2A. In groundwater samples from AOPC 2A, arsenic, antimony, and hexavalent chromium levels were above statistical background; the HQ values were 4.5, 5.3, and 1.2, respectively for the ERA.

Although Site 4 AOPCs 1A and 2A may have different chemicals of potential concern (COPCs) or different concentrations of COPCs compared to Site 7, no additional chemical-specific ARARs were identified.

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An Archaeological Resource Protection Plan (ARPP) for Site 4 (Chambers Group, 1994) was reviewed to identify any additional cultural or historical ARARs. The ARPP did not identify any cultural resources in the vicinity of AOPCs 1A and 2A (although a marine shell deposit was identified along the Westminster Avenue portion of Site 4 approximately two miles north of AOPCs 1A and 2A). Therefore, no cultural ARARs were identified for Site 4. No other additional location-specific ARARs were identified for Site 4 since AOPCs 1A and 2A are located directly south and adjacent to Site 7.

The planned removal action for Site 4 AOPCs 1A and 2A is excavation and off-site disposal. These activities are addressed in the removal action planned for Site 7. Therefore, no additional action-specific ARARs were identified for Site 4 AOPCs 1A and 2A.

In conclusion, no ARARs were identified for Site 4 AOPCs 1A and 2A in addition to the ARARs already identified in the final EE/CA for Site 7. Your concurrence or comments for this evaluation and our inclusion of Site 4 removal action with current planned Site 7 removal action is requested by 12 Feb 03. If you have any questions, please contact Si Le, at (619) 532-1235.

Sincerely,

M. R. GOOD
By direction of the Commander

Copy to:
Commanding Officer (Code N45WW)
Attn: Pei-Fen Tomashiro
Naval Weapons Station, Seal Beach, Bldg 110
800 Seal Beach Boulevard
Seal Beach, CA 90740-5000

Bryant Wong
CH2M Hill
3 Hutton Centre Drive, Suite 200
Santa Ana, CA 92707

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

February 27, 2003

Mr. Mark Good
Department of the Navy
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

Dear Mr. Good:

This is in response to your letter dated February 3, 2003. The letter indicated that the Navy has reviewed the ARARs identified in the final Engineering Evaluation/Cost Analysis (EE/CA) Report for Site 7 Station Landfill for pertinence to Site 4 AOPCs 1A and 2A. The review of Site 7 ARARs was performed to identify if additional ARARs for Site 4 AOPCs 1A and 2A are needed. The review was necessary because of the Navy's decision to add Site 4 AOPCs 1A and 2 A to the Site 7 removal action.

The Department of Toxic Substances Control hereby concurs with the Navy that no ARARs were identified for Site 4 AOPCs 1A and 2A in addition to the ARARs already identified in the final EE/CA for Site 7.

If you have any questions, please contact Ms. Katherine Leibel, Remedial Project Manager at (714) 484-5446.

Sincerely,

Shelia Lowe

Shelia Lowe
Unit Chief
Federal Facilities Unit B
Southern California Region
Office of Military Facilities

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.
Printed on Recycled Paper

cc: Mr. Si Le
Remedial Project Manager
SWDIV Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

Ms. Pei-Fen Tamashiro
Naval Weapons Station, Seal Beach, Bldg110
800 Seal Beach Boulevard
Seal Beach, CA 90740-5000

Attachment B
Summary of Data for Site 4 AOPCs 1A and 2A

Attachment B-1
Site 7 – Summary of Detected Analytes, Soil Samples (SWDIV, 1990b)

Table 4.6-4
Site 7 - Summary of Detected Analytes
Soil Samples

Volatile Organic Compounds (EPA Method 8240)	BLANK Soil ug/kg	W41-7-1 Soil ug/kg	W41-7-5 Soil ug/kg	W41-7-5D Soil ug/kg	W41-7-10 Soil ug/kg	W42-7-1 Soil ug/kg	W42-7-5 Soil ug/kg	W42-7-10 Soil ug/kg	W43-7-1 Soil ug/kg	W43-7-5 Soil ug/kg	W43-7-10 Soil ug/kg	W43-7-10D Soil ug/kg
Methylene chloride	8	600 b	580 b	400 b	510 b	380 b	350 b	310 b				
Toluene									190		9.3	34
Metallic Compounds		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Silver (Ag), total												
Arsenic (As), total		2.6	4.4	2.9	3.6	15.5	1.9	1.5	NR	NR	NR	NR
Cadmium (Cd), total						0.7			NR	NR	NR	NR
Chromium (Cr), total		17.5	32.3	28.9	24.6	86.6	11.8	13.6	24.3	26	53.4	37.2
Copper (Cu), total		26	35.9	64.2	26.7	68.8	9.6	15.2	NR	NR	NR	NR
Mercury (Hg), total		0.15		0.15		0.91			0.5	0.67	0.58	0.58
Nickel (Ni), total		12	21	21	12	21	7	11	19.1	19.8	27.4	16.8
Lead (Pb), total		28	21	19	14	2080	10	9	5.7	2.8	6.6	5.2
Zinc (Zn), total		126	94	92	65	437	43	72	85.4	66.6	112	88.8
Semi-Volatile Organic Compounds (EPA Method 8270)		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Chrysene									160			
Di-n-butyl phthalate									170			
Fluoranthene									120			
4-chloro-3-methylphenol												

Note:
Blank indicates analyte not detected.
NR indicates analysis not requested.
b indicates present in blank.
D indicates duplicate.

Attachment B-2
Surface Soil Screening Locations and Results
(SWDIV, 1995a)

Table 4-14
Surface Soil Field Screening Results - Site 7
NWS Seal Beach
RI Report

Station No.	Sample No.	Chromium (mg/kg)	Exceeds Criteria	Lead (mg/kg)	Exceeds Criteria	Zinc (mg/kg)	Exceeds Criteria
Lead "Hot Spot"							
07G09	07G09SA0-1	33.		539.	X	194.	
07G10	07G10SA0-1	60.	X	1,120.	X	366.	
07G11	07G11SA0-1	65.	X	1,540.	X	386.	
07G12	07G12SA0-1	30.		539.	X	194.	
07G13	07G13SA0-1	126.	X	509.	X	297.	
07G14	07G14SA0-1	75.	X	1,110.	X	373.	
07G15	07G15SA0-1	200.	X	4,940.	X	706.	X
07G16	07G16SA0-1	198.	X	4,490.	X	655.	X
07G17	07G17SA0-1	22.		83.		86.	
07G18	07G18SA0-1	18.		22.		70.	
07G19	07G19SA0-1	85.	X	5,180.	X	645.	X
07G20	07G20SA0-1	16.		36.		71.	
07G21	07G21SA0-1	15.		15.		74.	
07G22	07G22SA0-1	37.		1,590.	X	508.	
07G23	07G23SA0-1	21.		191.	X	126.	
07G23	07G23SA1-1	22.		166.	X	119.	
07G24	07G24SA0-1	19.		306.	X	139.	
07G25	07G25SA0-1	28.		96.		106.	
07G26	07G26SA0-1	78.	X	629.	X	112.	
07G27	07G27SA0-1	18.		107.		84.	
07G28	07G28SA0-1	16.		150.	X	76.	
07G29	07G29SA0-1	69.	X	945.	X	302.	
07G30	07G30SA0-1	80.	X	3,020.	X	400.	
07G31	07G31SA0-1	52.	X	268.	X	206.	
07G32	07G32SA0-1	46.	X	444.	X	204.	
07G33	07G33SA0-1	56.	X	363.	X	1,330.	X
07G34	07G34SA0-1	45.	X	465.	X	180.	
07G35	07G35SA0-1	34.		556.	X	193.	

Notes:
X = Exceeds screening criteria (44 mg/kg for chromium, 146 mg/kg for lead or 627 mg/kg for zinc).

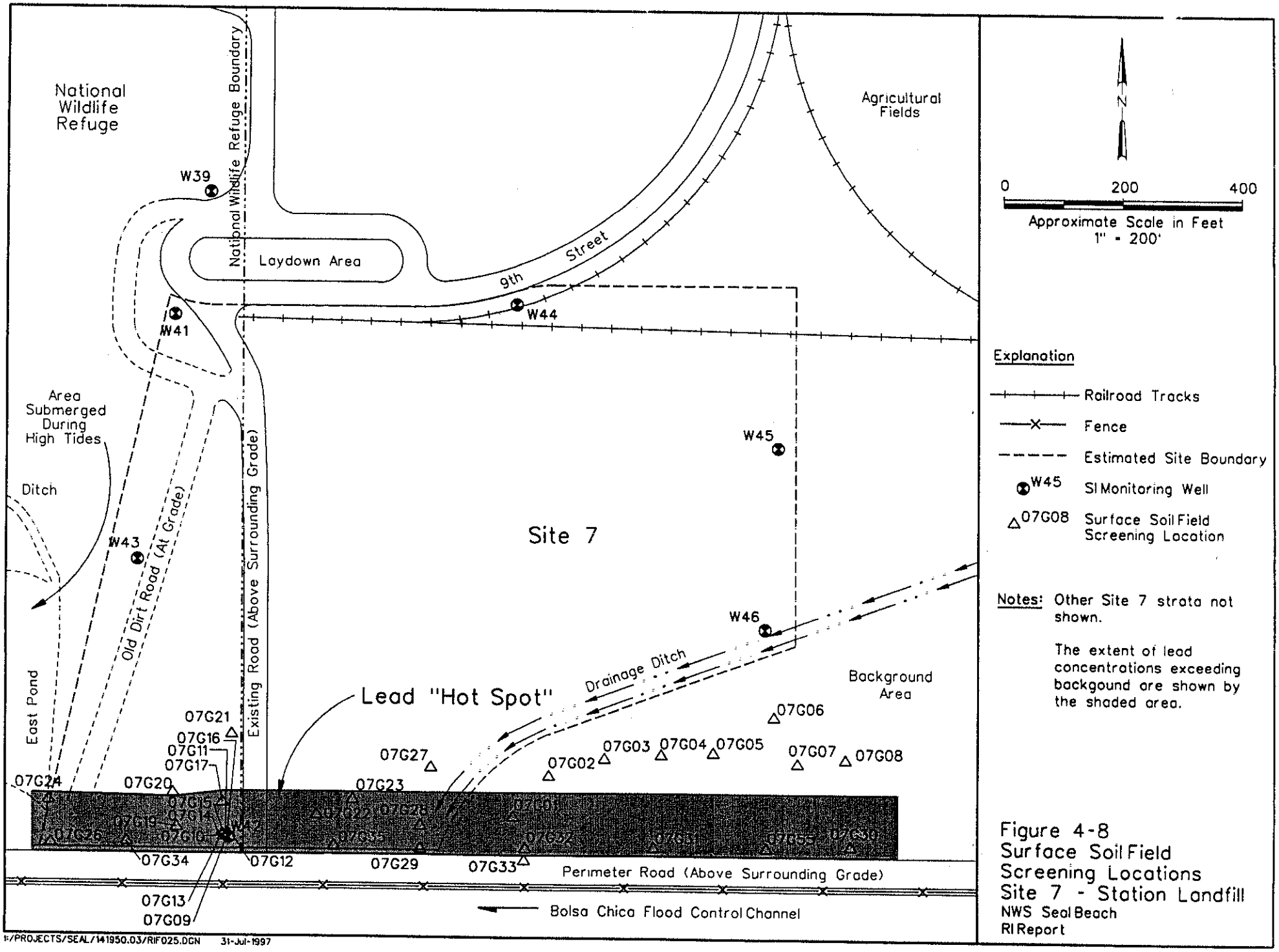

Figure 4-8
Surface Soil Field Screening Locations
Site 7 - Station Landfill
NWS Seal Beach
RI Report

I:/PROJECTS/SEAL/141950.03/RIF025.DGN 31-Jul-1997

Attachment B-3
Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4 AOPCs 1A and 2A (BNI, 2001a)

Table 5-5
Analytical Results of Detected Analytes
in Soil Samples Collected from IRP Site 4
AOPC 1A

Station ID	SB4-01A-01		SB4-01A-02		SB4-01A-03		SB4-01A-04	
Analyte / Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH	8.02	7.54	8.35	8.29	8.24	8.09	8.11	7.91
TOTAL ORGANIC CARBON, %	1.05J	0.56	0.38	0.49	2.41	0.39	0.53J	
PAHs, mg/kg								
ACENAPHTHYLENE	10U	0.1U	0.1U	0.1U	10U	0.1U	10U	0.1U
ANTHRACENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
BENZ(A)ANTHRACENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
BENZO(A)PYRENE	1U	0.01U	0.003J	0.004J	0.6J	0.01U	1U	0.01U
BENZO(B)FLUORANTHENE	2U	0.006J	0.005J	0.02U	1J	0.009J	2U	0.02U
BENZO(G,H,I)PERYLENE	2U	0.02U	0.02U	0.02U	2U	0.02U	2U	0.02U
BENZO(K)FLUORANTHENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
CHRYSENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
DIBENZ(A,H)ANTHRACENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
FLUORANTHENE	2U	0.02U	0.02U	0.02U	2U	0.02U	2U	0.02U
FLUORENE	2U	0.02U	0.02U	0.02U	2U	0.02U	2U	0.02U
INDENO(1,2,3-CD)PYRENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
NAPHTHALENE	10U	0.1U	0.1U	0.1U	10U	0.1U	10U	0.1U
PHENANTHRENE	1U	0.01U	0.01U	0.01U	1U	0.01U	1U	0.01U
PYRENE	2U	0.02U	0.02U	0.02U	2U	0.02U	2U	0.02U
PCDDs/PCDFs, pg/g								
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	304J	8.3J	7.8J	0.5U	173	3J	67	1U
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	24600J	720J	492J	39.3J	13960J	219J	5120J	55.1
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	200	6.1	6.1	0.59J	115	2.5J	53.4	2.7U
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	2920J	77.4	67	4.7J	1640	28.5	798	7.9
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	20.7J	0.5UJ	0.3U	0.3U	11	0.2U	4.4J	0.5U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	31.9	1J	0.73J	0.2U	23.2	0.38J	6.9	1.2U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	28	0.67J	0.86J	0.2U	12.1	0.32J	4.3J	0.4U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	28.7	0.95J	0.65J	0.1U	21.5	0.43J	4.7J	0.64U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	97	2.4J	2.4J	0.2U	45.6	0.8J	15.7	0.4U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.1J	0.2U	0.2U	0.2U	0.32J	0.1U	0.2U	0.3U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	107	2.6J	2.4J	0.2U	43	1J	17	0.4U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	7.1J	0.35J	0.1U	0.1U	3.4J	0.09U	1.1J	0.58J
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	14.9J	0.52J	0.2U	0.1U	7.9	0.1U	1.4J	0.3U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	66.4	2	1.5J	0.2U	51.3	0.94J	10.3	0.93U
2,3,4,7,8-PENTACHLORODIBENZOFURAN	29.1J	0.98J	0.66J	0.1U	18.1	0.42J	4J	0.95U
2,3,7,8-TETRACHLORODIBENZOFURAN	24.4	1.6	0.82J	0.1U	17.3	0.45J	2.6	1.5
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2	0.1U	0.4J	0.2U	1.1	0.1U	0.2U	0.3U
2,3,7,8-TCDD-EQUIVALENT, TOTAL	119J	3.45J	2.90J	0.092J	67.5J	1.17J	22.7J	0.31J
PCBs, mg/kg								
AROCLOR-1254	0.2	0.04J	0.1U	0.1U	0.4	0.1U	0.07J	0.1U
AROCLOR-1260	0.09J	0.1U	0.1U	0.1U	0.2	0.1U	0.03J	0.1U
METALS, mg/kg								
ALUMINUM	22000	19300	14900	15100	20600	17400	20600	26800
ANTIMONY	7.3J	6.3J	6.9J	5.4UJ	5.6UJ	5.6UJ		
ARSENIC	11	4.5	5.1	2.9	13.4	4.4	3.8	4.2
BARIUM	1290	130	102	108	771	107	189	181
BERYLLIUM	0.81	0.68	0.56	0.52	0.72	0.62	0.93	1.2
CADMIUM	0.61U	0.56U	0.53U	0.53U	0.72	0.54U	0.55U	0.64U
CHROMIUM	100J	27.9J	36.9J	21.4J	65.2J	24.5J	29.8J	37.7J
COBALT	13.6	10.7	8.3	8.5	11.2	10.5	11.8	15.3
COPPER	84.7	20.7	17.1	13.2	59.6	18.7	30.6	40.9
LEAD	3160J	161J	37.4J	9.4J	7760J	145J	148	82
MANGANESE	526	399	424	346	476	381	452	553
MERCURY	0.44	0.06U	0.05U	0.06U	0.3	0.06U	0.06UJ	0.07UJ
NICKEL	31.4	19.6	17.2	15.5	22.4	17.8	21.3	26.8
SELENIUM	0.55UJ	0.51UJ	0.48UJ	0.48J	0.49UJ	0.49UJ		
SILVER	0.72U	0.66U	0.8	0.62U	0.64U	0.64U	0.68	0.64
THALLIUM	0.36J	0.28J	0.24J	0.24	0.29J	0.25	0.25	0.29
VANADIUM	67.4	50.2	41.3	44.4	57.6	49.8	56.7	74.5
ZINC	778J	102J	64.4J	70.2J	630J	77J	143J	116J

(table continues)

Table 5-5
Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4
AOPC 1A

Station ID	SB4-01A-05		SB4-01A-06		SB4-01A-07		SB4-01A-08	
Analyte / Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH	8.11	8.53	8.06	8.14	8.09	8.23	8.19	7.99
TOTAL ORGANIC CARBON, %								
PAHs, mg/kg								
ACENAPHTHYLENE	10U	1U	10U	1U	10U	0.1U	0.1U	0.1U
ANTHRACENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
BENZ(A)ANTHRACENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
BENZO(A)PYRENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
BENZO(B)FLUORANTHENE	2U	0.2U	2U	0.2U	2U	0.02U	0.02U	0.02U
BENZO(G,H,I)PERYLENE	2U	0.2U	2U	0.2U	2U	0.02U	0.02U	0.02U
BENZO(K)FLUORANTHENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
CHRYSENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
DIBENZ(A,H)ANTHRACENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
FLUORANTHENE	2U	0.2U	2U	0.2U	2U	0.02U	0.02U	0.02U
FLUORENE	2U	0.2U	2U	0.2U	2U	0.02U	0.02U	0.02U
INDENO(1,2,3-CD)PYRENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
NAPHTHALENE	10U	1U	10U	1U	10U	0.1U	0.1U	0.1U
PHENANTHRENE	1U	0.1U	1U	0.1U	1U	0.01U	0.01U	0.01U
PYRENE	2U	0.2U	2U	0.2U	2U	0.02U	0.02U	0.02U
PCDDs/PCDFs, pg/g								
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	39.7J	8.2J	41.9	0.5U	30.6	0.9U	3.4J	2.3J
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	4670J	771	3820	41	2850	106	102J	5.8J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	36.1J	7.5	35.8	2U	23.6	2.4U	4.4U	2.6U
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	578J	74.3	360	4J	309	11.6	16.4	2.7J
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.9J	0.92U	3.1J	0.3U	2J	0.5U	0.38U	0.5U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	9.6	2.7J	7.9	1.1U	5.5	1.4U	1.7U	2.1U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	4.3J	0.8J	3.2J	0.2U	2.3J	0.4U	0.43J	0.4U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	5	1.3J	4.9J	0.54U	3.4J	0.2U	0.9U	0.9U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	14.4	2.9J	11.4	0.48J	8.4	0.4U	0.97J	0.4U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.7U	0.2U	0.3U	0.1U	0.2U	0.3U	0.1U	0.3U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	12.5	2.8J	9.1	0.2U	7	0.4U	1.1J	0.4U
1,2,3,7,8-PENTACHLORODIBENZOFURAN	1.7J	0.67J	1.4J	0.36J	1.3J	0.3U	0.65J	0.3U
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	2.5J	0.82J	1.5J	0.1U	1.3J	0.3U	0.37J	0.3U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	10.7	2.8J	10.9	0.49U	8.2	0.2U	1.1U	0.68U
2,3,4,7,8-PENTACHLORODIBENZOFURAN	7.3	1.6J	4.1J	0.37U	4.4J	0.3U	1U	0.3U
2,3,7,8-TETRACHLORODIBENZOFURAN	7.2	2.3	3.3		4	0.92U	1.5	1.4
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.3U	0.2U	0.3U	0.1U	0.2U	0.3U	0.1U	0.3U
2,3,7,8-TCDD-EQUIVALENT TOTAL	22.2J	4.40J	15.8J	0.15J	13.0J	0.22	0.89J	0.18J
PCBs, mg/kg								
AROCLOR-1254	0.5	0.05J	0.1	0.1U	0.06J	0.1U	0.1U	0.1U
AROCLOR-1260	0.2	0.1U	0.1	0.1U	0.05J	0.1U	0.1U	0.1U
METALS, mg/kg								
ALUMINUM	14600	18400	10400	20300	19400	20800	12800	15100
ANTIMONY								
ARSENIC	7.1	3	2.5	2.9	5.3	3.2	2.1	7.3
BARIUM	957	110	156	152	149	121	80.5	85.7
BERYLLIUM	0.56	0.9	0.42	0.78	0.8	0.78	0.51	0.71
CADMIUM	0.53U	0.57U	0.53U	0.56U	0.53U	0.53U	0.55U	0.55U
CHROMIUM	134J	24.9J	21.8J	25.6J	30.6J	25.9J	17.7J	18.5J
COBALT	10.8	11.4	6.4	10.6	10.5	11.2	7.5	8.4
COPPER	52.6	24.1	17.7	21.4	28.2	23.3	15.6	19.8
LEAD	1860	66.5	296	20.8	554	11.7	13.1	9.6
MANGANESE	388	426	260	386	453	566	324	417
MERCURY	0.75J	0.06UJ	0.29J	0.06UJ	0.32J	0.05UJ	0.06UJ	0.06UJ
NICKEL	22	17.2	10.1	18.8	17.1	17.8	13.2	14
SELENIUM								
SILVER	0.55	0.58	0.43U	0.48	0.43	0.44U	0.45U	0.45U
THALLIUM	0.24U	0.26U	0.24U	0.25U	0.26	0.27	0.25U	0.28
VANADIUM	44.5	50.3	31.5	55.9	52.6	56.5	37.9	40.5
ZINC	432J	77J	177J	75.5J	119J	78.4J	62.9J	62.9J

(table continues)

Table 5-5
Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4 AOPC 1A

Analyte	Station ID	SB4-01A-09		SB4-01A-10		SB4-01A-11		SB4-01A-12	
	Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH									
TOTAL ORGANIC CARBON, %									
PAHs, mg/kg									
ACENAPHTHYLENE		0.04J	0.02J	0.03J	0.09J	1U	1U	0.1U	0.1U
ANTHRACENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
BENZ(A)ANTHRACENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
BENZO(A)PYRENE		0.01U	0.004J	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
BENZO(B)FLUORANTHENE		0.02U	0.008J	0.01J	0.02U	0.2U	0.2U	0.02U	0.02U
BENZO(G,H,I)PERYLENE		0.02U	0.006J	0.02U	0.02U	0.2U	0.2U	0.02U	0.02U
BENZO(K)FLUORANTHENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
CHRYSENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
DIBENZ(A,H)ANTHRACENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
FLUORANTHENE		0.02U	0.02U	0.02U	0.02U	0.2UJ	0.2UJ	0.02UJ	0.02UJ
FLUORENE		0.02U	0.02U	0.02U	0.02U	0.2U	0.2U	0.02U	0.02U
INDENO(1,2,3-CD)PYRENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
NAPHTHALENE		0.1U	0.1U	0.1U	0.1U	1U	1U	0.1U	0.1U
PHENANTHRENE		0.01U	0.01U	0.01U	0.01U	0.1U	0.1U	0.01U	0.01U
PYRENE		0.02U	0.02U	0.02U	0.02U	0.2U	0.2U	0.02U	0.02U
PCDDs/PCDFs, pg/g									
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		12.1J	0.6UJ	10.4J	0.2U	19.5	1.8U	6.1J	2.2J
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		421J	0.8UJ	307J	1.2J	337J	1.2UJ	145J	28.9J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		8.4	0.2UJ	4.8J	0.1U	8.9	0.7U	4.5J	1.3J
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		60.3J	0.3UJ	35.1J	0.2U	50.6J	1.1UJ	19.1J	5.3J
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		0.6J	0.3UJ	0.53J	0.1U	1.3UJ	1UJ	0.4UJ	0.4UJ
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		0.97J	0.1UJ	0.55J	0.08U	1.1J	0.5U	0.2U	0.2U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		0.84J	0.2UJ	0.36J	0.1U	0.88J	0.6UJ	0.3UJ	0.3UJ
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		0.92J	0.1UJ	0.51J	0.07U	0.87J	0.4U	0.2U	0.2U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		2.2J	0.2UJ	1.1J	0.1U	2.8J	0.6U	1.1J	0.2U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		0.1U	0.2UJ	0.09U	0.09U	0.7UJ	0.6UJ	0.3UJ	0.2UJ
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		2.3J	0.2UJ	1.1J	0.1U	2.8J	0.7U	1.1J	0.3U
1,2,3,7,8-PENTACHLORODIBENZOFURAN		0.37J	0.1UJ	0.07U	0.08U	0.6U	0.5U	0.2U	0.2U
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		0.37J	0.1UJ	0.22J	0.08U	0.8U	0.6U	0.3UJ	0.2UJ
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		1.8J	0.1UJ	1.3J	0.08U	2J	0.5U	0.79J	0.42J
2,3,4,7,8-PENTACHLORODIBENZOFURAN		0.61J	0.1UJ	0.4J	0.08UJ	0.6U	0.5U	0.3U	0.2U
2,3,7,8-TETRACHLORODIBENZOFURAN		0.75J	0.1UJ	0.48J	0.2J	0.5U	0.4U	0.2U	0.2U
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN		0.08U	0.1UJ	0.21J	0.09U	0.7U	0.5U	0.3U	0.3U
2,3,7,8-TCDD-EQUIVALENT, TOTAL		2.61J	0	1.78J	0.021J	2.00J	0	0.69J	0.14J
PCBs, mg/kg									
AROCLOR-1254		0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
AROCLOR-1260		0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
METALS, mg/kg									
ALUMINUM		14000	10300	13000	24700	19700	21400	18200	19900
ANTIMONY		5.4UJ	6.1UJ	5.7UJ	6J	8.3UJ	7.4UJ	6.9UJ	7.2UJ
ARSENIC		4.4	1.6	4	5	7.4	6.2	6.6	7.4
BARIUM		83.5	63.4	85.5	151	108	109	104	98.2
BERYLLIUM		0.42	0.34	0.49	0.95	0.86	0.86	0.8	0.96
CADMIUM		0.53U	0.59U	0.55U	0.58U	0.81U	0.72U	0.67U	0.7U
CHROMIUM		20.5	14.4	19.2	33.7	32.8	33.9	28.2	31.2
COBALT		8.5	6.3	8.3	13.6	13	12	10.1	11.5
COPPER		16.8	10.5	15.9	32.3	30.3	29.5	26.6	25.6
LEAD		92.8	4.3	47.2	10.6	20.8J	12J	17.9J	11.8J
MANGANESE		372	330	323	652	427	424	380	391
MERCURY		0.05U	0.06U	0.06U	0.07U	0.07U	0.07U	0.07U	0.07U
NICKEL		12.2	9.5	13.5	23	24	27	22	20.2
SELENIUM		0.48UJ	0.54UJ	0.5UJ	0.53UJ	0.74UJ	0.66UJ	0.61UJ	0.63UJ
SILVER		0.62U	0.7U	0.65U	0.69U	0.96U	0.85U	0.79U	0.82U
THALLIUM		0.24	0.27U	0.25	0.4	0.37U	0.43U	0.36U	0.41U
VANADIUM		41.9	32.5	43.3	77.2	63.4	64	54.7	59.9
ZINC		69.1	51.1	69.8	91.6	110	95.5	89.7	93.6

(table continues)

Table 5-5
Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4
AOPC 1A

Station ID	SB4-01A-13		SB4-01A-14		SB4-01A-15		SB4-01A-16	
Analyte / Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	1.5 - 2
pH								
TOTAL ORGANIC CARBON, %								
PAHs, mg/kg								
ACENAPHTHYLENE	1U	0.1U	0.1U	0.1U	1U	0.1U	0.1U	0.1U
ANTHRACENE	0.1U	0.01U	0.01U	0.01U	0.1U	0.005J	0.01U	0.005J
BENZ(A)ANTHRACENE	0.1U	0.01U	0.004J	0.01U	0.1U	0.02	0.01U	0.01U
BENZO(A)PYRENE	0.1U	0.01U	0.008J	0.01U	0.2U	0.03	0.005J	0.002J
BENZO(B)FLUORANTHENE	0.2U	0.02U	0.02U	0.02U	0.2	0.04	0.02U	0.01J
BENZO(G,H,I)PERYLENE	0.2U	0.02U	0.02U	0.02U	0.09J	0.02	0.02U	0.02U
BENZO(K)FLUORANTHENE	0.1U	0.01U	0.01U	0.01U	0.07J	0.02	0.01U	0.01U
CHRYSENE	0.1U	0.01U	0.005J	0.01U	0.04J	0.02	0.003J	0.01
DIBENZ(A,H)ANTHRACENE	0.1U	0.01U	0.01	0.01U	0.5U	0.01U	0.06U	0.02U
FLUORANTHENE	0.2U	0.02U	0.02U	0.02U	0.2U	0.09	0.02U	0.07
FLUORENE	0.2U	0.02U	0.02U	0.02U	0.2U	0.006J	0.02U	0.006J
INDENO(1,2,3-CD)PYRENE	0.1U	0.01U	0.007J	0.01U	0.1U	0.02	0.003J	0.01U
NAPHTHALENE	1U	0.1U	0.1U	0.1U	1U	0.04J	0.1U	0.1U
PHENANTHRENE	0.1U	0.01U	0.01U	0.01U	0.1U	0.04	0.01U	0.02
PYRENE	0.2U	0.02U	0.005J	0.02U	0.2J	0.09	0.006J	0.01J
PCDDs/PCDFs, pg/g								
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	192J	0.5UJ	27.6J	0.5UJ	28.9	65.7	54.3	64.4
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1080J	1.3J	503J	10.3J	933J	666J	1110J	558J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	32.1	0.1U	12.8	0.2U	15.3	36.8	38.6	29
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	120J	0.3U	72J	0.75J	104	54.9	75.6	45.3
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2J	0.2U	0.83J	0.2U	0.9J	2.4J	0.77J	3.9J
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	2.2J	0.1U	1.5J	0.1U	1.7J	13.3	1.1J	10.6
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.94J	0.1U	1.4J	0.2U	0.67J	0.85J	0.2U	0.44J
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2J	0.09U	1.3J	0.09U	1.2J	3.6J	0.56J	4.1J
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	4.9J	0.2U	3.5J	0.2U	3J	2J	2.1J	1.5J
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.2U	0.1U	0.09U	0.1U	0.1U	0.32J	0.1U	0.41J
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	3.3J	0.2U	4.3J	0.2U	2.7J	3.8J	0.91J	1.8J
1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.82J	0.09U	0.81J	0.1U	0.64J	6	0.43J	3.1J
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.72J	0.07UJ	0.76J	0.1U	0.44J	0.51J	0.09U	0.46J
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	4.4J	0.1U	2.2J	0.1U	2.7J	3J	0.91J	3.9J
2,3,4,7,8-PENTACHLORODIBENZOFURAN	1.3J	0.09UJ	0.77J	0.1UJ	1.1J	4.3J	0.62J	2.9J
2,3,7,8-TETRACHLORODIBENZOFURAN	1.9	0.17J	1.9	0.1U	1.8	16.8	1.4	8.1
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.28J	0.1U	0.22J	0.1U	0.13J	0.33J	0.12J	0.16J
2,3,7,8-TCDD-EQUIVALENT TOTAL	6.11J	0.018J	4.02J	0.018J	4.47J	9.07J	3.46J	6.48J
PCBs, mg/kg								
AROCLOR-1254	0.03J	0.1U	0.02J	0.1U	0.4	0.1J	0.2U	0.09J
AROCLOR-1260	0.02J	0.1U	0.1U	0.1U	0.2	0.1U	0.1U	0.03J
METALS, mg/kg								
ALUMINUM	23600	18500	21700	18200	16100	20900	19900	19500
ANTIMONY	7.2UJ	7.3UJ	13UJ	7.5UJ	6UJ	12.7J	7.8J	6.4UJ
ARSENIC	11.7	5.6	7.7	6.7	10.1	8	7.5	4.7
BARIUM	132	99.3	86.3	100	456	134	109	117
BERYLLIUM	0.8	0.61	0.97	0.66	0.56	0.93	0.96	0.72
CADMIUM	0.7U	0.71U	1.3U	0.72U	0.58U	0.59U	0.66U	0.62U
CHROMIUM	39.7	29.3	32.1	25.6	64.5	33.7	41.3	28.9
COBALT	12	11.3	10.5	9.7	9	11.5	12.2	11.5
COPPER	37	22.8	24.5	20.7	64.7	42.7	45.2	27.8
LEAD	83	30.5	101	8.9	3180	43	72.1	27.1
MANGANESE	431	396	328	406	345	414	378	469
MERCURY	0.05U	0.07U	0.14U	0.07U	0.49	0.06U	0.06U	0.06U
NICKEL	28.9	22.5	30.8	18.6	23.2	22.5	22.9	21.7
SELENIUM	0.63UJ	0.64UJ	1.1UJ	0.66UJ	0.53UJ	0.54UJ	0.6UJ	0.56UJ
SILVER	0.82U	0.84U	1.5U	0.85U	0.69U	0.7U	0.77	0.79
THALLIUM	0.32U	0.32U	0.57U	0.36	0.37	0.43	0.3	0.28
VANADIUM	69.8	58.8	71.6	54.9	48.9	61.8	61.2	57.3
ZINC	111	90.2	88.3	75.1	550	153	194	176

(table continues)

Table 5-5
Analytical Results of Detected Analytes
in Soil Samples Collected from IRP Site 4
AOPC 1A

Analyte	Station ID	SB4-01A-17		SB4-01A-18		SB4-01A-19		SB4-01A-20	
	Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH									
TOTAL ORGANIC CARBON, %									
PAHs, mg/kg									
ACENAPHTHYLENE		0.1U	0.1U	1U	0.1U	0.1U	0.1U	1U	10U
ANTHRACENE		0.01U	0.01U	0.1U	0.01U	0.01U	0.01U	0.1U	1U
BENZ(A)ANTHRACENE		0.01U	0.01U	0.1U	0.01U	0.01U	0.01U	0.1U	1U
BENZO(A)PYRENE		0.01U	0.003J	0.1U	0.01U	0.01U	0.01U	0.1U	1U
BENZO(B)FLUORANTHENE		0.02U	0.02U	0.05J	0.02U	0.02U	0.02U	0.2U	2U
BENZO(G,H,I)PERYLENE		0.009J	0.02U	0.2U	0.02U	0.02U	0.02U	0.2U	2U
BENZO(K)FLUORANTHENE		0.01U	0.01U	0.1U	0.01U	0.01U	0.01U	0.1U	1U
CHRYSENE		0.01U	0.005J	0.03J	0.01U	0.01U	0.01U	0.1U	1U
DIBENZ(A,H)ANTHRACENE		0.01U	0.02U	0.1U	0.01U	0.01U	0.01U	0.1U	1U
FLUORANTHENE		0.02U	0.02U	0.2U	0.02U	0.02U	0.02U	0.2U	2U
FLUORENE		0.02U	0.02U	0.2U	0.02U	0.02U	0.02U	0.2U	2U
INDENO(1,2,3-CD)PYRENE		0.003J	0.01U	0.1U	0.01U	0.01U	0.01U	0.1U	1U
NAPHTHALENE		0.1U	0.1U	1U	0.1U	0.1U	0.1U	1U	10U
PHENANTHRENE		0.01U		0.1U	0.01U	0.01U	0.01U	0.1U	1U
PYRENE		0.02U	0.007J	0.2U	0.02U	0.02U	0.02U	0.2U	2U
PCDDs/PCDFs, pg/g									
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		355J	0.4UJ	96.5J	0.8UJ	1.7J	0.72J	15.8	2.4J
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		24120J	23.2J	7540J	49.2J	52	19.3J	557	154J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		249	0.4J	83.1	0.2U	1.8J	0.1U	32.6	2.6J
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		4150J	3.1J	952	6.4	6.5	2.9J	65	18.5
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		25.4	0.2U	5.7	0.2U	0.1U	0.2U	0.48J	0.2U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		23.9	0.11U	14.1J	0.09U	0.1U	0.19U	1.4J	0.22U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		19.8J	0.1UJ	8.7J	0.1UJ	0.07UJ	0.1UJ	0.78J	0.35J
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		14.2	0.08U	30.9	0.09U	0.05U	0.08U	0.92J	0.14J
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		75.5	0.1U	29.4	0.1U	0.07U	0.1U	2J	0.62J
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		1.4J	0.1U	0.2U	0.1U	0.06U	0.1U	0.2U	0.09U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		94.8	0.1U	34.4	0.2U	0.08U	0.1U	2.5J	0.84J
1,2,3,7,8-PENTACHLORODIBENZOFURAN		2.8J	0.1U	3.7J	0.08U	0.06U	0.1U	0.38J	0.09U
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		4.8J	0.1U	4.9J	0.09U	0.06U	0.1U	0.44J	0.1U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		34.4	0.09U	75.9	0.5J	0.05U	0.28J	1.5J	0.31J
2,3,4,7,8-PENTACHLORODIBENZOFURAN		11.3	0.1U	25	0.09U	0.06U	0.1U	0.83J	0.09U
2,3,7,8-TETRACHLORODIBENZOFURAN		8	0.65J	18.3	0.2J	0.33J	0.09U	1.3	0.41J
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN		0.36J	0.1U	0.42J	0.08U	0.06U	0.1U	0.2U	0.11J
2,3,7,8-TCDD-EQUIVALENT, TOTAL		104J	0.12J	54.8J	0.18J	0.17J	0.077J	3.25J	0.74J
PCBs, mg/kg									
AROCLOR-1254		0.09J	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
AROCLOR-1260		0.07J	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
METALS, mg/kg									
ALUMINUM		33300	32300	22800	17600	26200	23600	26700	19400
ANTIMONY		18J	6.9J	6.8J	6.8UJ	10J	8.2J	9.4J	8UJ
ARSENIC		13.4J	7.1J	10.2J	4.3J	10.8J	5J	4.4J	6J
BARIUM		450	199	720	148	136	174	132	147
BERYLLIUM		1.3	1.2	1.1	0.71	1	0.89	1.1	0.71
CADMIUM		0.61U	0.65U	0.65U	0.66U	0.65U	0.61U	0.77U	0.78U
CHROMIUM		86.2	38.1	73.2	24.9	34.9	31.5	38.1	36.1
COBALT		18.4	16.6	16.4	10.5	13.1	14.8	14.1	13.1
COPPER		64.6J	45.8J	62.9J	19.7J	32.7J	31.3J	30.9J	26.4J
LEAD		398	156	1390	38	35.5	14.8	34.3	41.7
MANGANESE		1310J	1050J	2360J	515J	478J	462J	796J	598J
MERCURY		0.06U	0.07U	0.16U	0.06U	0.06U	0.07U	0.08U	0.12U
NICKEL		33.4	27.2	30.2	16.2	21.8	21.1	27.4	24.4
SELENIUM		0.28UJ	0.3UJ	0.3UJ	0.3UJ	0.3UJ	0.28UJ	0.35UJ	0.35UJ
SILVER		0.72U	0.77U	0.77U	0.78U	0.77U	0.72U	0.92U	0.92U
THALLIUM		0.44J	0.39J	0.3U	0.33J	0.38J	0.31J	0.35J	0.35U
VANADIUM		91.6	88.2	73.5	51.4	72.7	71.9	65.7	59.8
ZINC		239	121	497	77.9	116	105	123	111

(table continues)

Table 5-5
Analytical Results of Detected Analytes in Soil Samples Collected from IRP Site 4 AOPC 1A

Analyte	Station ID	SB4-01A-21		SB4-01A-22	
	Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH					
TOTAL ORGANIC CARBON, %					
PAHs, mg/kg					
ACENAPHTHYLENE		0.1U	0.1U	1U	0.1U
ANTHRACENE		0.01U	0.01U	0.1U	0.01U
BENZ(A)ANTHRACENE		0.003J	0.01U	0.1U	0.01U
BENZO(A)PYRENE		0.005J	0.01U	0.1U	0.01U
BENZO(B)FLUORANTHENE		0.005J	0.02U	0.2U	0.02U
BENZO(G,H,I)PERYLENE		0.02U	0.02U	0.2U	0.02U
BENZO(K)FLUORANTHENE		0.003J	0.01U	0.1U	0.01U
CHRYSENE		0.005J	0.01U	0.1U	0.01U
DIBENZ(A,H)ANTHRACENE		0.01U	0.01U	0.1U	0.01U
FLUORANTHENE		0.008J	0.02U	0.2U	0.02U
FLUORENE		0.02U	0.02U	0.2U	0.02U
INDENO(1,2,3-CD)PYRENE		0.004J	0.01U	0.1U	0.01U
NAPHTHALENE		0.1U	0.1U	1U	0.1U
PHENANTHRENE		0.01U	0.01U	0.1U	0.01U
PYRENE		0.02J	0.02U	0.2U	0.02U
PCDDs/PCDFs, pg/g					
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		4.9J	0.33J	0.3UJ	0.2UJ
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		228J	17.8J	13.5J	1.1J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		2.3J	0.25J	0.35J	0.09UJ
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		34.7J	2.8J	2J	0.1UJ
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		0.2UJ	0.2UJ	0.2UJ	0.1UJ
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		0.56J	0.1UJ	0.1UJ	0.05UJ
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		0.27J	0.1UJ	0.2UJ	0.09UJ
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		0.39J	0.1UJ	0.1UJ	0.05UJ
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		0.69J	0.1UJ	0.2UJ	0.09UJ
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		0.1UJ	0.1UJ	0.2UJ	0.06UJ
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		0.96J	0.1UJ	0.2UJ	0.09UJ
1,2,3,7,8-PENTACHLORODIBENZOFURAN		0.35J	0.1UJ	0.2UJ	0.07UJ
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		0.24J	0.1UJ	0.1UJ	0.08UJ
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		0.81J	0.1UJ	0.1UJ	0.05UJ
2,3,4,7,8-PENTACHLORODIBENZOFURAN		0.57J	0.1UJ	0.2UJ	0.07UJ
2,3,7,8-TETRACHLORODIBENZOFURAN		0.8J	0.1UJ	0.2UJ	0.06UJ
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN		0.2UJ	0.2UJ	0.1UJ	0.05UJ
2,3,7,8-TCDD-EQUIVALENT, TOTAL		1.47J	0.049J	0.037J	0.0011J
PCBs, mg/kg					
AROCLOR-1254		0.1U	0.1U	0.1U	0.1U
AROCLOR-1260		0.1UJ	0.1UJ	0.1UJ	0.1UJ
METALS, mg/kg					
ALUMINUM		19000	23200	20600	7830
ANTIMONY		7.8J	7.5UJ	8.3UJ	6.4UJ
ARSENIC		6.3	5.8	6.8	2
BARIUM		138	197	103	51.4
BERYLLIUM		0.7	0.93	0.89	0.37
CADMIUM		0.62U	0.73U	0.81U	0.62U
CHROMIUM		27.1	33.1	34.3	11.8
COBALT		12	15.6	11.9	5.1
COPPER		30.5J	28J	40.5J	6.8J
LEAD		41.5	85	74.4	3.2
MANGANESE		605J	566J	1110J	193J
MERCURY		0.08U	0.06U	0.09U	0.06U
NICKEL		19	23.5	25.5	8.1
SELENIUM		0.28UJ	0.33UJ	0.37UJ	0.28UJ
SILVER		0.74U	1.2	0.95U	0.73U
THALLIUM		0.28U	0.43	0.37U	0.28U
VANADIUM		54.1	71.5	61.4	26.3
ZINC		127	114	156	39.9

(table continues)

Table 5-5 (continued)

AOPC 2A

Analyte / Station ID	SB4-02A-01		SB4-02A-02		SB4-02A-03		SB4-02A-04	
Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH	8.23	8.36	8.64	8.88	8.34	8.37	8.04	8.5
TOTAL ORGANIC CARBON, %	0.41	0.42	0.34	0.35	0.27	0.78		
PAHs, mg/kg								
ACENAPHTHYLENE	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	10U	0.1U
ANTHRACENE	0.01U	0.003J	0.01U	0.01U	0.01U	0.01U	1U	0.01U
BENZ(A)ANTHRACENE	0.01U	0.02	0.01U	0.01U	0.01U	0.01U	1U	0.01U
BENZO(A)PYRENE	0.01U	0.03	0.01U	0.01U	0.01U	0.01U	1U	0.02
BENZO(B)FLUORANTHENE	0.02J	0.02	0.02U	0.02U	0.02U	0.02U	2UJ	0.03J
BENZO(G,H,I)PERYLENE	0.02U	0.03U	0.02U	0.02U	0.02U	0.02U	2U	0.08
BENZO(K)FLUORANTHENE	0.01U	0.01	0.01U	0.01U	0.01U	0.01U	1U	0.01U
CHRYSENE	0.01U	0.07	0.01U	0.01U	0.01U	0.01U	1U	0.01U
FLUORANTHENE	0.02U	0.02	0.02U	0.02U	0.02U	0.02U	2U	0.02U
INDENO(1,2,3-CD)PYRENE	0.01U	0.01	0.01U	0.01U	0.01U	0.01U	1U	0.02
PHENANTHRENE	0.01U	0.003J	0.01U	0.01U	0.01U	0.01U	1U	0.01U
PYRENE	0.02U	0.04	0.02U	0.02U	0.02U	0.02U	2U	0.02U
PCDDs/PCDFs, pg/g								
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	65.2J	4J	1.1UJ	1.4UJ	4.9J	1.6J	1350J	79.6J
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	5050J	236J	106J	26.1J	246J	83J	49840J	6300J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	45.2	11.3	1.9J	0.95J	8.5	1J	921	58.3
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	544	28.2	13.5	2.5J	51.9	7.7	8120J	1040
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.4U	0.7U	0.4U	0.4U	0.7J	0.4U	88.7	6
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	9.6	0.77J	0.1U	0.2U	3J	0.1U	114	7.6
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	6	0.4U	0.2U	0.4U	1.2J	0.2U	64.2	4.7J
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	10.7	0.49J	0.1U	0.2U	3.3J	0.1U	41.9	2.8J
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	16.3	0.84J	0.2U	0.4U	3.5J	0.2U	279	18.7
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.7U	0.3U	0.2U	0.3U	0.1U	0.2U	5.9	0.44J
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	20.9	1.1J	0.2U	0.5U	3.7J	0.3U	321	20.9
1,2,3,7,8-PENTACHLORODIBENZOFURAN	2.1J	0.3U	0.2U	0.3U	0.79J	0.2U	13.4	1.1J
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	2.6J	0.5U	0.2U	0.5U	0.91J	0.3U	24.2	1.3J
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	28.8	1J	0.2U	0.2U	7.4	0.39J	82.2	5.8
2,3,4,7,8-PENTACHLORODIBENZOFURAN	9.9	0.4U	0.2U	0.4U	3.1J	0.2U	53.2	3.1J
2,3,7,8-TETRACHLORODIBENZOFURAN	7.4	0.3U	0.1U	0.3U	3.1	0.1U	103	5.9
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.9U	0.4U	0.1U	0.4U	0.13J	0.2U	1.9	0.3U
2,3,7,8-TCDD-EQUIVALENT, TOTAL	27.3J	1.06J	0.26J	0.061J	5.56J	0.21J	285J	26.4J
PCBs, mg/kg								
AROCLOR-1254	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	1	0.1
AROCLOR-1260	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.3	0.02J
METALS, mg/kg								
ALUMINUM	13800	18600	16900	20600	18100	21700	16400	16900
ANTIMONY	5.3UJ	5.5UJ	5.5UJ	11.3J	4.7UJ	5.9UJ	4.8UJ	4.7UJ
ARSENIC	4.3	6.6	3.9	5.5	23.9	7	14.2	4.1
BARIUM	117	129	113	132	123	151	856	228
BERYLLIUM	0.35U	0.66	0.52	0.6	0.62	0.72	0.48	0.6
CADMIUM	0.51U	0.59U	0.58U	0.59U	0.53U	0.75U	0.91U	0.67U
CHROMIUM	20.8	24.8	24.2	27.6	25.7	29.2	134	33.1
COBALT	7.2	10.8	9.2	10.7	10.7	12.3	9.4	9.1
COPPER	15J	20.3J	18.9J	24.3J	20.8J	27.4J	88.6	22.9
LEAD	167	42.8	107	33.1	114J	29.4	3500J	79.2J
MANGANESE	534	664	453	631	457	572	412	445
MERCURY	0.06U	0.06U	0.06U	0.06U	0.06U	0.06U	0.98	0.12U
NICKEL	9.8	13.8	18.3	17	16.1	19.5	20.3	19.6
THALLIUM	0.4U	0.48U	0.31U	0.52U	0.25UJ	0.55U	0.25UJ	0.25UJ
VANADIUM	41.1	54.2	48.2	57.4	51.8	57.6	47.4	51.6
ZINC	79.8	74.6	76.2	145	85.2J	92.9	499J	110J

(table continues)

Table 5-5 (continued)

AOPC 2A

Analyte / Station ID	SB4-02A-05		SB4-02A-06		SB4-02A-07		SB4-02A-08	
Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH	8.43	8.44	8.23	8.11	8.27	8.26	8.11	8.26
TOTAL ORGANIC CARBON, %								
PAHs, mg/kg								
ACENAPHTHYLENE	0.1U	0.05J	10U	0.1U	100U	1U	0.1U	0.1U
ANTHRACENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
BENZ(A)ANTHRACENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
BENZO(A)PYRENE	0.01U	0.01U	0.4J	0.02	10U	0.1U	0.01U	0.01U
BENZO(B)FLUORANTHENE	0.02UJ	0.02UJ	2UJ	0.02UJ	20U	0.2U	0.02U	0.02U
BENZO(G,H,I)PERYLENE	0.04U	0.02U	2U	0.02U	20U	0.2U	0.02U	0.02U
BENZO(K)FLUORANTHENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
CHRYSENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
FLUORANTHENE	0.02U	0.02U	2U	0.02U	20U	0.2U	0.02U	0.02U
INDENO(1,2,3-CD)PYRENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
PHENANTHRENE	0.01U	0.01U	1U	0.01U	10U	0.1U	0.01U	0.01U
PYRENE	0.02U	0.02U	2U	0.02U	20U	0.2U	0.02U	0.02U
PCDDs/PCDFs, pg/g								
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	4.6J	5J	129J	2.2J	66.1J	4.2J	2.7J	1.1UJ
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	268J	346J	11160J	172J	4510J	198J	97J	8.3J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	8.3	5.2	130	2.6J	54.8	5U	4.1U	4.5U
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	55.8	55	1400	20.9	504	24.9	19.3	4.7J
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.64J	0.53J	11.5	0.3U	3.6J	1.2U	0.43U	0.5U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	3.1J	1.5J	45.8	0.91J	11.1	2.1U	1.8U	3J
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.3J	0.64J	14.2	0.2U	4J	1.1J	0.59J	0.49J
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.4J	1.2J	27.2	0.62J	8.1	1.8J	0.95U	1.5J
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	3.5J	1.7J	54.6	0.2U	16.1	2.1J	1.3J	1.1J
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.1U	0.1U	0.83J	0.2U	0.29J	0.78J	0.1U	0.2U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	3.8J	2J	45.8	0.2U	13.9	2.1J	1.2J	1.2J
1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.75J	0.42J	5.9	0.23J	1.9J	1.2J	0.66J	1.1J
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.92J	0.09U	10.2	0.1U	3.1J	1.2J	0.2U	0.39J
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	7.5	2.1J	63.5	1J	19.4	2.1J	0.79U	1.2J
2,3,4,7,8-PENTACHLORODIBENZOFURAN	3.1J	0.98J	34.2	0.69J	7.2	1.6J	0.73U	1.5J
2,3,7,8-TETRACHLORODIBENZOFURAN	3.1	1.7	48.6	0.9J	4.3	0.83U	1.1U	2.4
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.1U	0.08U	1	0.1U	0.4J	0.21J	0.1U	0.2U
2,3,7,8-TCDD-EQUIVALENT, TOTAL	5.54J	2.55J	80.3J	1.11J	23.6J	3.12J	0.63J	2.14J
PCBs, mg/kg								
AROCLOR-1254	0.1U	0.1U	0.2	0.1U	0.2	0.1U	0.1U	0.1U
AROCLOR-1260	0.1U	0.1U	0.1	0.1U	0.1	0.1U	0.1U	0.1U
METALS, mg/kg								
ALUMINUM	17200	15200	19100	17400	17100	17200	14200	12400
ANTIMONY	4.7UJ	4.9UJ	4.6UJ	4.8UJ			4.9J	
ARSENIC	2.7	2.3	6.6	4.2	4.7	3.6	2.6	3.7
BARIUM	111	95.8	384	135	301	122	102	79
BERYLLIUM	0.56	0.6	0.63	0.56	0.69	0.66	0.58	0.54
CADMIUM	0.59U	0.57U	0.54U	0.57U	0.5U	0.57U	0.54U	0.58U
CHROMIUM	22.2	20.6	46.8	24.8	38.7J	24.7J	18.7J	18.1J
COBALT	9.2	8.7	10.5	11.2	9	11	8.3	8.8
COPPER	17.9	15.2	40.9	19.5	32.4	19.9	17.1	13.8
LEAD	47.4J	6J	1880J	60.4J	971	25.3	9.2	4.9
MANGANESE	487	416	399	787	397	486	376	367
MERCURY	0.06U	0.06U	0.38	0.06U	0.56J	0.13J	0.05UJ	0.06UJ
NICKEL	15.1	14.2	21.7	17.8	16.9	18.8	14.5	13.9
THALLIUM	0.25UJ	0.26UJ	0.24UJ	0.26UJ	0.25	0.28	0.27	0.29
VANADIUM	47.6	48.1	52.5	54.1	45.7	50.8	40.9	39.2
ZINC	70.8	59.8J	451J	85.7J	285J	83.3J	63.9J	58.5J

(table continues)

Table 5-5 (continued)

AOPC 2A

Analyte	Station ID	SB4-02A-09		SB4-02A-10		SB4-02A-11		SB4-02A-12	
	Sample Depth, feet bgs	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5	0 - 1	2 - 2.5
pH									
TOTAL ORGANIC CARBON, %									
PAHs, mg/kg									
ACENAPHTHYLENE		0.1U	0.1U	10U	1U	10U	0.05J	10U	0.04J
ANTHRACENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
BENZ(A)ANTHRACENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
BENZO(A)PYRENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
BENZO(B)FLUORANTHENE		0.02U	0.02U	2U	0.2U	2U	0.02U	2U	0.02U
BENZO(G,H,I)PERYLENE		0.02U	0.02U	2U	0.2U	2U	0.02U	2U	0.02U
BENZO(K)FLUORANTHENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
CHRYSENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
FLUORANTHENE		0.02U	0.02U	2UJ	0.2UJ	2UJ	0.02UJ	2UJ	0.02UJ
INDENO(1,2,3-CD)PYRENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
PHENANTHRENE		0.01U	0.01U	1U	0.1U	1U	0.01U	1U	0.01U
PYRENE		0.02U	0.02U	2U	0.2U	2U	0.02U	2U	0.02U
PCDDs/PCDFs, pg/g									
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		11.1J	0.3UJ	167	2J	57.3	2U	90.1J	0.3UJ
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		437J	4.4J	8780J	114	3410J	23.8J	5230J	9.8J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		9.3	0.1U	58.7	0.73U	40.4	0.6U	41.7J	0.37U
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		99.5J	0.8J	618J	6.9	411J	2.3J	542J	1.1J
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		0.79J	0.1U	5.9J	0.2U	4.4J	0.9UJ	4.2J	0.1U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		2.6J	0.06U	3.9J	0.07U	13.3	0.5U	4.2J	0.06U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		1.6J	0.09U	3.1J	0.1U	4.8J	0.6UJ	3.8J	0.08U
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		2.7J	0.06U	2.5J	0.07U	9.7	0.4U	2.1J	0.06U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		5.1	0.1U	16.5	0.1U	17.4	0.6U	14.7J	0.08U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		0.1U	0.07U	0.06U	0.08U	0.6UJ	0.6UJ	0.4UJ	0.07U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		6.7	0.1U	10.2	0.1U	14.4	0.6U	13.1J	0.09U
1,2,3,7,8-PENTACHLORODIBENZOFURAN		0.97J	0.07U	0.83J	0.08U	1.7J	0.5U	0.4UJ	0.06U
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		0.91J	0.06U	1.8J	0.08U	4.6J	0.6U	1.7J	0.07U
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		6.8	0.06U	7.6	0.07U	35	0.5U	5.6J	0.06U
2,3,4,7,8-PENTACHLORODIBENZOFURAN		2.4J	0.07UJ	1.8J	0.08U	10.8	0.5U	2.6UJ	0.06U
2,3,7,8-TETRACHLORODIBENZOFURAN		2.4	0.07U	2	0.07U	9.3	0.4U	2.1J	0.24U
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN		0.07U	0.15J	0.25J	0.07U	0.5U	0.6U	0.4UJ	0.07J
2,3,7,8-TCDD-EQUIVALENT TOTAL		6.04J	0.16J	22.4J	0.19J	26.2J	0.047J	16.6J	0.091J
PCBs, mg/kg									
AROCLOR-1254		0.1U	0.1U	0.03J	0.1U	0.07J	0.1U	0.04J	0.1U
AROCLOR-1260		0.1U	0.1U	0.07J	0.03J	0.09J	0.1U	0.05J	0.1U
METALS, mg/kg									
ALUMINUM		16700	15700	13800	15200	14100	12000	13100	12900
ANTIMONY		5.6UJ	6UJ	4.7UJ	5UJ	5.1UJ	5.6UJ	4.9UJ	5.3UJ
ARSENIC		3.4	3.1	6.5	4.3	3.7	3.1	6.2	2.7
BARIUM		111	106	220	142	229	79.8	158	81.2
BERYLLIUM		0.6	0.54	0.54	0.61	0.51	0.49U	0.45U	0.64
CADMIUM		0.54U	0.58U	0.46U	0.49U	0.49U	0.54U	0.47U	0.51U
CHROMIUM		22.5	23.1	45.5	28.6	34.8	17.4	31.8	18
COBALT		9.8	8.8	8.1	9.2	8.1	7.6	7.5	7.2
COPPER		19.7	15.6	34	26.5	26.9	14.6	22.7	13.2
LEAD		24.4	6	211J	309J	814J	14.5J	243J	8.3J
MANGANESE		463	391	423	475	420	348	373	397
MERCURY		0.06U	0.05U	0.22	0.13	0.32	0.05U	0.16	0.06U
NICKEL		15.5	14.1	18.6	16.3	14.9	11.1	16.8	12.6
THALLIUM		0.25	0.34	0.23U	0.24U	0.29U	0.27U	0.28U	0.25U
VANADIUM		45.5	48	42	44.3	39.2	38.2	37.9	38.4
ZINC		77.3	68.5	204	94.9	220	56.9	158	51.1

(table continues)

Table 5-5 (continued)

AOPC 2A

Analyte	Station ID / Sample Depth, feet bgs	SB4-02A-13 0 - 1	SB4-02A-13 2 - 2.5	SB4-02A-14 0 - 1	SB4-02A-14 2 - 2.5	SB4-02A-15 0 - 1	SB4-02A-15 2 - 2.5	SB4-02A-16 0 - 1	SB4-02A-16 2 - 2.5
pH									
TOTAL ORGANIC CARBON, %									
PAHs, mg/kg									
ACENAPHTHYLENE		10U	1U	10U	1U	10U	1U	10U	0.1U
ANTHRACENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
BENZ(A)ANTHRACENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
BENZO(A)PYRENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
BENZO(B)FLUORANTHENE		2U	0.2U	2U	0.2U	2U	0.2U	2U	0.02U
BENZO(G,H,I)PERYLENE		2U	0.2U	2U	0.2U	2U	0.2U	2U	0.02U
BENZO(K)FLUORANTHENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
CHRYSENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
FLUORANTHENE		2UJ	0.2UJ	2UJ	0.2UJ	2UJ	0.2UJ	2U	0.02U
INDENO(1,2,3-CD)PYRENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
PHENANTHRENE		1U	0.1U	1U	0.1U	1U	0.1U	1U	0.01U
PYRENE		2U	0.2U	2U	0.2U	2U	0.2U	2U	0.02U
PCDDs/PCDFs, pg/g									
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		59.2J	0.5UJ	55J	0.98J	110J	0.3UJ	90.8J	0.6UJ
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		3690J	4.3J	3400J	22.6J	9360J	7J	7250J	3.1J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		31.4	0.1U	21.7	0.35U	74.8	0.1U	39.8	0.2U
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		378	0.2U	270J	1.3J	970	0.61J	527	0.4U
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		2.9J	0.2U	2J	0.2UJ	7.1	0.2U	3.2J	0.3U
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		6	0.08U	2U	0.15U	13.3	0.08U	3.2J	0.1U
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		2.6J	0.1U	1.7J	0.09U	5.7	0.1U	2.4J	0.2UJ
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		5	0.07U	1.3J	0.06U	10.1	0.08U	2.4J	0.1U
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		11	0.1U	7.8	0.08U	24.8	0.1U	12.8	0.2U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		0.27J	0.09U	0.1U	0.08U	0.2U	0.09U	0.2U	0.2U
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		9.2	0.1U	5.5	0.1U	21.3	0.1U	8.8	0.64J
1,2,3,7,8-PENTACHLORODIBENZOFURAN		1.7J	0.08U	0.39J	0.06U	3.7J	0.08U	0.78J	0.07U
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		1.7J	0.09U	0.87J	0.06U	3.3J	0.08U	1.3J	0.1UJ
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		13.4	0.08U	3.3J	0.07U	26.7	0.08U	5.1	0.1U
2,3,4,7,8-PENTACHLORODIBENZOFURAN		4.1J	0.08U	1J	0.06U	9.6	0.08U	2.1J	0.08U
2,3,7,8-TETRACHLORODIBENZOFURAN		2.3	0.08U	0.96U	0.2U	7.4	0.22U	1.4	0.08U
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN		0.27J	0.1U	0.25J	0.06U	0.49J	0.09U	0.25J	0.08U
2,3,7,8-TCDD-EQUIVALENT, TOTAL		16.1J	0.0043J	9.56J	0.037J	38.0J	0.013J	18.6J	0.067J
PCBs, mg/kg									
AROCLOR-1254		0.1U	0.1U	0.02J	0.1U	0.07J	0.1U	0.03J	0.1U
AROCLOR-1260		0.03J	0.1U	0.04J	0.1U	0.1	0.1U	0.1	0.1U
METALS, mg/kg									
ALUMINUM		10200	12000	13200	10300	15000	19500	12400	18400
ANTIMONY		5UJ	5.3UJ	4.8UJ	4.8UJ	5.1UJ	5.6J	5.1UJ	5.2UJ
ARSENIC		2.5	1.9	4.7	2.7	5.7	6.4	7.1	2.7
BARIUM		101	84.1	112	74.1	359	116	173	163
BERYLLIUM		0.33U	0.37U	0.49U	0.35U	0.54	0.81	0.54U	0.72U
CADMIUM		0.48U	0.52U	0.47U	0.47U	0.49U	0.52U	0.52	0.51U
CHROMIUM		20.3	17.9	23.8	15.5	53.7	26.8	30	22.7
COBALT		5.8	6.8	7.3	6.2	9.3	9.8	7.6	9.2
COPPER		12.6	12.5	18.6	11.9	41.5	21.7	21.5	26.1
LEAD		253J	14.8J	148J	16.5J	1820J	61.1J	391J	10.1J
MANGANESE		288	330	379	321	476	528	371	579
MERCURY		0.05U	0.06U	0.11	0.05U	0.47	0.06U	0.39	0.06U
NICKEL		10.2	12.4	12.3	10.3	19.7	18	13.3	16
THALLIUM		0.24U	0.31U	0.28U	0.32U	0.27U	0.33U	0.38U	0.42U
VANADIUM		28.6	36.5	38	31.2	43.8	55.2	36.4	46.4
ZINC		164	62.4	86.3	49.4	342	79	139J	63J

(table continues)

Table 5-5 (continued)

AOPC 2A

Analyte	Station ID / Sample Depth, feet bgs	SB4-02A-17 0 - 1	SB4-02A-17 2 - 2.5
pH			
TOTAL ORGANIC CARBON, %			
PAHs, mg/kg			
ACENAPHTHYLENE		10U	0 04J
ANTHRACENE		1U	0.01U
BENZ(A)ANTHRACENE		1U	0.01U
BENZO(A)PYRENE		1U	0.01U
BENZO(B)FLUORANTHENE		2U	0.02U
BENZO(G,H,I)PERYLENE		2U	0.02U
BENZO(K)FLUORANTHENE		1U	0.01U
CHRYSENE		1U	0.01U
FLUORANTHENE		2U	0.02U
INDENO(1,2,3-CD)PYRENE		1U	0.01U
PHENANTHRENE		1U	0.01U
PYRENE		2U	0.02U
PCDDs/PCDFs, pg/g			
1 2,3 4 6 7,8,9-OCTACHLORODIBENZOFURAN		168J	2.5J
1,2 3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		13930J	141J
1,2 3,4 6,7,8-HEPTACHLORODIBENZOFURAN		130	2.4J
1,2,3,4 6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		1740	14 2
1,2,3 4,7,8,9-HEPTACHLORODIBENZOFURAN		11.3	0 7U
1 2 3,4,7,8-HEXACHLORODIBENZOFURAN		23 7	0.62J
1 2 3,4 7,8-HEXACHLORODIBENZO-P-DIOXIN		11 2J	0.4UJ
1 2 3 6,7 8-HEXACHLORODIBENZOFURAN		18.4	0.3U
1,2 3,6,7 8-HEXACHLORODIBENZO-P-DIOXIN		45	0.4U
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		0.6J	0.4U
1 2,3 7,8,9-HEXACHLORODIBENZO-P-DIOXIN		42 3	0 4U
1 2,3 7 8-PENTACHLORODIBENZOFURAN		4.6	0 2U
1,2 3,7,8-PENTACHLORODIBENZO-P-DIOXIN		5 7J	0.2UJ
2,3,4 6,7,8-HEXACHLORODIBENZOFURAN		45.7	0.38J
2,3 4,7,8-PENTACHLORODIBENZOFURAN		16.9	0 2U
2 3,7 8-TETRACHLORODIBENZOFURAN		13 4	0.22J
2 3,7 8-TETRACHLORODIBENZO-P-DIOXIN		0.58J	0.2U
2 3,7 8-TCDD-EQUIVALENT, TOTAL		65 1J	0.43J
PCBs, mg/kg			
AROCLOR-1254		0.2	0 1U
AROCLOR-1260		0.2	0 1U
METALS, mg/kg			
ALUMINUM		15200	13200
ANTIMONY		5 2UJ	5 2UJ
ARSENIC		5 2	1 3
BARIUM		383	84
BERYLLIUM		0.65U	0.57U
CADMIUM		0 91	0.51U
CHROMIUM		62 1	18 9
COBALT		9.4	7 4
COPPER		43 9	12.9
LEAD		1370J	18.7J
MANGANESE		499	379
MERCURY		1 1	0.06U
NICKEL		18 5	11 4
THALLIUM		0.41U	0.34U
VANADIUM		44 2	39 1
ZINC		440J	63.4J

(table continues)

Table 5-9
Analytical Results of Detected Analytes
in Groundwater Samples Collected from IRP Site 4
AOPC 1A

Analyte	Station ID / Sample Depth, feet bgs	HP4-01A-01 / 5 - 8	HP4-01A-02 / 6 - 9	HP4-01A-03 / 7 - 10
PCDDs/PCDFs, pg/L				
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		7 6J	9.1UJ	17.8UJ
2,3,7,8-TCDD[i]-EQUIVALENT, TOTAL		0.0076J	0	0
METALS, µg/L				
ANTIMONY		26.5	49 9	61 1
BARIUM		69.4J	157	82.6
CADMIUM		2.5	2.2U	2.2U
MANGANESE		7440J	1580	4880
SELENIUM		16.2J		23J
VANADIUM		8.7	13 5	11.2
CHROMIUM, HEXAVALENT		0.336UJ	0.993UJ	9.5J
WATER QUALITY PARAMETERS, mg/L				
SOLIDS, TOTAL DISSOLVED		50500J	36700J	42600J
ALKALINITY*		724	1260	730
CHLORIDE		26600	22500	25000
NITRATE		0 07J	0.2UJ	0.2U
PHOSPHATE		0 55	0.22J	0.06J
SULFATE		3630	1520	2960

(table continues)

Table 5-9 (continued)

AOPC 2A

Analyte	Station ID / Sample Depth, feet bgs	HP4-02A-01	HP4-02A-02	HP4-02A-03
		9 - 12	9 - 12	10 - 13
PCDDs/PCDFs, pg/L				
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN		3.3UJ	11.1J	5.8UJ
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN		10.1J	11.9U	7.9J
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		1.2U	2.2U	1.5J
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		1.4J	1.3U	0.7U
2,3,7,8-TETRACHLORODIBENZOFURAN		1.9J	2.4J	0.8U
2,3,7,8-TCDD-EQUIVALENT, TOTAL		0.34J	0.25J	0.023J
METALS, µg/L				
ANTIMONY		32.1	39.2	46
ARSENIC		36J	5UJ	5UJ
BARIUM		377J	153	71.8
CADMIUM		3.3	3.6	2.2U
MANGANESE		1810J	6240	820
SELENIUM		15.3		15.5J
VANADIUM		8.9	16.2	27.5
ZINC		1.7	1.4U	3.2U
CHROMIUM, HEXAVALENT		0.6U	1.86UJ	2.41J
WATER QUALITY PARAMETERS, mg/L				
SOLIDS, TOTAL DISSOLVED		35500J	57800J	29600J
ALKALINITY*		1450	558	1600
CHLORIDE		20900	34300	14500
NITRATE		0.04J	0.2U	1.7
PHOSPHATE		0.8	0.12	0.22
SULFATE		1120	4290	3970

(table continues)

Table 5-9 (continued)

Note: *alkalinity reported as calcium carbonate

Acronyms/Abbreviations:

AOPC - area of potential concern
bgs - below ground surface
IRP - Installation Restoration Program
J - reported value is estimated
mg/L - milligrams per liter
µg/L - micrograms per liter
PCDD - polychlorinated dibenzodioxin
PCDF - polychlorinated dibenzofuran
pg/L - picograms per liter
TCDD - tetrachlorodibenzo-p-dioxin
U - not detected above the reported sample quantitation limit
UJ - not detected above the estimated sample quantitation limit

Attachment C
Review Comments by Department of Toxic Substances Control (27 June 03), Regional Water Quality Control Board, Santa Ana Region (17 June 03), and the City of Seal Beach (16 June 03); and Response to Comments

Project Note

Date issued:	28 July 2003
Recorded by:	Marielle Coquia/CH2M HILL
Project Number:	171335.24.EE
Subject:	Responses to the 23 June 2003 James M. Polisini, Department of Toxic Substances Control Comments Re: *Draft Addendum to the Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7, Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, Naval Station Landfill, U.S. Naval Weapons Station, Seal Beach*
	Responses to the 17 June 2003 John Broderick, California Regional Water Quality Control Board, Santa Ana Region Comments Re: Appendix F, *Draft Addendum to the Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7, Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, Naval Station Landfill, U.S. Naval Weapons Station, Seal Beach*
	Responses to the 16 June 2003 Lee Whittenberg, City of Seal Beach Comments Re: *Draft Addendum to the Engineering Evaluation/Cost Analysis (EE/CA), Non-Time Critical Removal Action for Site 7, Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, Naval Station Landfill, U.S. Naval Weapons Station, Seal Beach*

Response to Comments 23 June 2003 by James M. Polisini, Department of Toxic Substances Control

GENERAL COMMENTS

HERD has limited comments centering on the application of the proposed Ecological Remedial Action Objective (ERAO).

Response

Comment noted.

SPECIFIC COMMENTS

Comment

1. While it has no impact on the implementation of the Site 4 EE/CA activities, please explain what limited recreational activities are authorized for military and retired military personnel in the NWR (Section F2.1.6, page F2-7).

Response

The limited recreational activities refer to sailing of small boats in the lower estuaries of the Seal Beach National Wildlife Refuge. Note that this will not result in a change to the text of the report, and is provided for information purposes only.

Comment

2. In a February 5, 2003 telephone discussion with Navy contractors, HERD agreed to the methodology used for Site 4 AOPCs as Site 4 specific (Section F2.5.1.2). However, HERD does not categorically agree that an adverse effect level of 20 percent, based on a Lowest Observable Adverse Effect Level (LOAEL) on individual adverse effects, is indicative of the level at which wildlife populations are adversely affected (Section F2.5.1.2, page F2-13). Extrapolation from individual effects to population effects is extremely complex, dependent on many factors such as whether a species is an r-selected or k-selected species. This comment is meant only to clarify HERD's general policy and no response is required.

Response

Comment noted.

Comment

3. The cumulative frequency plot provided for the existing soil lead concentrations (Figure F2-3) was extremely helpful in support of the proposed ERAO of 600 mg/kg lead. The Navy should consider a similar presentation when developing ERAOs for NWS Seal Beach or other facilities.

Response

Comment noted.

Comment

4. The implementation of the 600 mg/kg ERAO does not appear to involve the limitations HERD recommended. The 600 mg/kg lead in soil is meant to be a not-to-exceed concentration. The average of the soil lead concentration remaining should be reasonably similar to the mean and median values presented in the documentation used to develop the ERAO of 600 mg/kg. Here is the language transmitted by HERD in a March 14, 2003 memorandum regarding the implementation of this ERAO:

   The proposed ERAO for Site 4 Area 1A and 2A of 600 mg/kg lead is acceptable for this site. Based on the draft submittals, regarding the potential ecological hazard to upper trophic level receptors based on Lowest Observable Adverse Effect Levels (LOAELs), forwarded for review (Appendix A, this memorandum) this acceptance is based on the following:

   A. Based on the samples currently available, removal or remediation of material in Area 1A and 2A, exceeding 600 mg/kg lead would result in an arithmetic average lead soil concentration of approximately 80 mg/kg.

B. Site 4 is the linear perimeter road at Seal Beach. It is much more likely, given the proximity of the National Wildlife Refuge (NWR) that receptors would preferentially forage in areas of the NWR as opposed to the perimeter road and the boundary of the perimeter road. Incremental exposure from Site 4 would therefore be further reduced.

C. Post-remediation confirmation sampling should be required to determine the lead concentration following remedial action is less than a maximum of 600 mg/kg with an area-wide arithmetic average in Area 1A and Area 2A of less than 100 mg/kg. The statement of the ERAO should indicate these criteria.

D. The not-to-exceed 600 mg/kg maximum and 100 mg/kg average concentration for lead should apply to all depths which could reasonably be accessible to ecological receptors along the berm of the Perimeter Road. Guidance on the depth to which ecological receptors may be exposed to soil contamination is available on the HERD website at http://www.dtsc.ca.gov/Science Technology/eco.html.

The statement of Removal Action Objectives (Section F3.4, page F3-4) do not make the explicit statement that the 600 mg/kg soil lead is a not-to-exceed concentration. Neither is the requirement that the arithmetic average of the soil lead concentration in the confirmation samples should not exceed 100 mg/kg, which is a safety factor of 2.5 times the arithmetic average of the data set used to develop the 600 mg/kg ERAO. The arithmetic average condition should be included in the Remedial Action Objective section. Sampling results from the data set used to develop the ERAO can be used in concert with the confirmation sampling results if those locations are not excavated or impacted by the removal action. Once the confirmation sampling results are available HERD will be available to meet with the Navy to evaluate the confirmation sampling results.

Response

In response to DTSC's comments, the following revisions will be made to the EE/CA document to clarify the ERAO and the limitations recommended by DTSC/HERD (note that the bold text indicates added text):

1) The first sentence of the last paragraph on Page F2-14 will be clarified by revising the sentence to read: "....., a site-specific maximum TCG of 600 mg/kg **for lead** is proposed."

2) The following sentence will be inserted following the first sentence of the last paragraph on Page F2-14: **"This is in addition to an area-wide arithmetic average TCG of less than 100 mg/kg for lead in soils for Site 4 AOPCs 1A and 2A."**

3) The sixth sentence of the last paragraph on Page F2-14 will be revised to read: "Thus, remediation to **a maximum** TCG of 600 mg/kg for lead **with an area-wide arithmetic average TCG of less than 100 mg/kg for lead** is expected to virtually eliminate risks from lead to wildlife in Site 4."

4) First sentence of first paragraph on Page F2-19 will be revised to read: " A site-specific maximum TCG of 600 mg/kg **for lead**....."

5) Fourth sentence of first paragraph on Page F2-19 will be revised to read: " ...., plus the final site-specific **maximum** TCG of 600 mg/kg **for lead**...."

6) Third sentence of the first paragraph after the bullet list on Page F3-4 will be revised to read: "For Site 4 AOPCs 1A and 2A, a site-specific **maximum** TCG of 600 mg/kg for lead **coupled with an area-wide arithmetic average TCG of less than 100 mg/kg for lead were** developed based on...."

Response to Comments 17 June 2003 by John Broderick, California Regional Water Quality Control Board, Santa Ana Region

COMMENT

F2.5.2 Health and Environmental Effects Associated with Chemicals of Concern and Threat to Nearby Human Populations and Environment, F2.5.2.1 Lead, Page F2-19: For the nearby 880-acre Bolsa Chica coastal wetlands restoration project, the site lead LCI T50 is 96 mg/kg and twice the ERM is 654 mg/kg.

Response

Comment noted and was provided to the Navy for informational purposes only. No change to the text is required.

Response to Comments 16 June 2003 by Lee Whittenberg, Director of Development Services, City of Seal Beach

COMMENT

The City of Seal Beach concurs with the determination of the Navy to implement Alternative 2. "Excavation and Offsite Removal". The proposed removal action offers a high degree of protectiveness for human health and the environment by removing the lead-contaminated soils from Site 4 AOPCs 1A and 2A, which pose a risk to ecological receptors. This alternative will:

- ❑ Adequately protects public health and safety and the environment
- ❑ Complies with "Applicable or Relevant and Appropriate Requirements" (ARARs)
- ❑ Meets the "Removal Action Objectives" (RAOs)
- ❑ Provide short-term effectiveness because of low impacts on the community, workers, and the environment
- ❑ Provides high technical feasibility and low administrative requirements
- ❑ Provides high reasonableness of costs, offering the highest benefit in terms of achieving the RAOs for the estimated cost.

The City of Seal Beach also concurs with the "target cleanup goal" (TCG) level. The City understands that the TCG has been reviewed and approved by the Human and Ecological Risk Division of the California Department of Toxic Substances Control (DTSC). Additionally, DTSC has stated that the human health risk did not appear to be an issue, particularly due to the low exposure related to intermittent travel on the perimeter road.

Response

Comment noted and was provided to the Navy for informational purposes only. No change to the text is required.

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

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To BRYANT WONG	From SI HE
Dept./Agency	Phone # (619) 532-1235
Fax # (714) 924-2065	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

June 27, 2003

Ms. Pei-Fen Tamashiro
Naval Weapons Station, Seal Beach
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

REVIEW OF THE DRAFT ADDENDUM TO THE ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), NON-TIME CRITICAL REMOVAL ACTION FOR SITE 7, SITE 4 AREAS OF POTENTIAL CONCERN (AOPCs) 1A AND 2A, NAVAL WEAPONS STATION, SEAL BEACH, CALIFORNIA, DATED May 21, 2003

Dear Ms.Tamashiro:

The Department of Toxic Substances Control (DTSC) has reviewed the subject document prepared by CH2MHILL, for the Department of Navy (DON), Southwest Division, Naval Facilities Engineering Command. Upon review, DTSC has enclosed comments.

If you have any questions, please call me at (714) 484-5446.

Sincerely,

Katherine Leibel
Remedial Project Manager
Federal Facilities Unit B
Office of Military Facilities
Southern California Region

Enclosure

cc: See next page.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

Printed on Recycled Paper

cc: Mr. Si Le
Remedial Project Manager
SWDIV Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

Department of Toxic Substances Control

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Gray Davis
Governor

TO: Katherine Leibel, DTSC Project Manager
Office of Military Facilities - Cypress Office
5796 Corporate Avenue
Cypress, CA 90630

FROM: James M. Polisini, Ph.D.
Staff Toxicologist, HERD
1011 North Grandview Avenue
Glendale, CA 91201

DATE: June 23, 2003

SUBJECT: SEAL BEACH NAVAL WEAPONS STATION SITE 4 EE/CA
[SITE 400136-47 PCA 14740 H:16]

BACKGROUND

HERD has reviewed the document titled *Appendix F, Draft Addendum to the Engineering Evaluation/Cost Analysis (EE/CA) Non-Time Critical Removal Action for Site 7, Site 4 Areas of Potential Concern (AOPCs) 1A and 2A, Naval Weapons Station Seal Beach, Seal Beach, California*. This undated document is meant to be an appendix to the Final EE/CA, Non-Time Critical Removal Action for Site 7. Inclusion of this appendix into the Final EE/CA for Site 7 will allow the non-time critical removal action for Site 4 AOPCs to be performed at the same time as the non-time critical removal action at Site 7. Site 4 and Site 7 are in close proximity. This appendix was prepared by CH2MHill of Santa Ana, California.

Site 4 consists of the Perimeter Road and adjacent areas that extend around Naval Weapons Station (NWS) Seal Beach for a total of approximately 12 miles. The southwest portion of the Perimeter Road, along Edinger Avenue, is located adjacent to the Seal Beach National Wildlife Refuge (NWR) and the Site 7 Station Landfill. This stretch of the Perimeter Road is the location of Site 4 AOPC 1A and 2A, which extend northward from the Perimeter Road approximately 100 feet. The main contaminant of concern at Site 4 AOPCs is lead in soil apparently from the application of waste oil for dust suppression from the mid-1960s to 1973. Oil was applied one to three times per year. From 1972 to 1973 an estimated 40,000 gallons of waste oil, generated at off-site crude oil and

petroleum operations, were sprayed on the Perimeter Road. Since early 1974 the Perimeter Road has been sprayed with quality-controlled penetrating oil consisting of 70 percent water and 30 percent emulsified agent.

NWS Seal Beach is located approximately 26 miles south of the Los Angeles urban center and consists of about 5000 acres of land along the Pacific Ocean within the city of Seal Beach in Orange County, California. Naval Weapons Station (NWS) Seal Beach is bordered on the southwest by Anaheim Bay, to the north, east and west by Long Beach, Seal Beach, Los Alamitos, Westminster and Huntington Beach. Anaheim Bay and the associated salt marsh were designated a National Wildlife Refuge (NWR) in 1964. On August 30, 1972, 200 additional upland acres were added to the NWR.

GENERAL COMMENTS

HERD has limited comments centering on the application of the proposed Ecological Remedial Action Objective (ERAO).

SPECIFIC COMMENTS

1. While it has no impact on the implementation of the Site 4 EE/CA activities, please explain what 'limited recreational activities are authorized' for military and retired military personnel in the NWR (Section F2.1.6, page F2-7).

2. In a February 5, 2003 telephone discussion with Navy contractors, HERD agreed to the methodology used for Site 4 AOPCs as Site 4 specific (Section F2.5.1.2). However, HERD does not categorically agree that an adverse effect level of 20 percent, based on a Lowest Observable Adverse Effect Level (LOAEL) on individual adverse effects, is indicative of the level at which wildlife populations are adversely affected (Section F2.5.1.2, page F2-13). Extrapolation from individual effects to population effects is extremely complex, dependent on many factors such as whether a species is an r-selected or k-selected species. This comment is meant only to clarify HERD's general policy and no response is required.

3. The cumulative frequency plot provided for the existing soil lead concentrations (Figure F2-3) was extremely helpful in support of the proposed ERAO of 600 mg/kg lead. The Navy should consider a similar presentation when developing ERAOs for NWS Seal Beach or other facilities.

4. The implementation of the 600 mg/kg ERAO does not appear to involve the limitations HERD recommended. The 600 mg/kg lead in soil is meant to be a not-to-exceed concentration. The average of the soil lead concentration remaining should be reasonably similar to the mean and median values presented in the documentation used to develop the ERAO of 600 mg/kg. Here is the language transmitted by HERD in a March 14, 2003 memorandum regarding the implementation of this ERAO:

   The proposed ERAO for Site 4 Area 1A and 2A of 600 mg/kg lead is acceptable for this site. Based on the draft submittals, regarding the potential ecological hazard to upper trophic level receptors based on Lowest Observable Adverse Effect Levels (LOAELs), forwarded for review (Appendix A, this memorandum) this acceptance is based on the following:

   A. Based on the samples currently available, removal or remediation of material in Area 1A and 2A exceeding 600 mg/kg lead would result in an arithmetic average lead soil concentration of approximately 80 mg/kg.
   B. Site 4 is the linear perimeter road at Seal Beach. It is much more likely, given the proximity of the National Wildlife Refuge (NWR) that receptors would preferentially forage in areas of the NWR as opposed to the perimeter road and the boundary of the perimeter road. Incremental exposure from Site 4 would therefore be further reduced.
   C. Post-remediation confirmation sampling should be required to determine the lead concentration following remedial action is less than a maximum of 600 mg/kg with an area-wide arithmetic average in Area 1A and Area 2A of less than 100 mg/kg. The statement of the ERAO should indicate these criteria.
   D. The not-to-exceed 600 mg/kg maximum and 100 mg/kg average concentration for lead should apply to all depths which could reasonably be accessible to ecological receptors along the berm of the Perimeter Road. Guidance on the depth to which ecological receptors may be exposed to soil contamination is available on the HERD web site at http://www.dtsc.ca.gov/ScienceTechnology/eco.html.

   The statement of Removal Action Objectives (Section F3.4, page F3-4) do not make the explicit statement that the 600 mg/kg soil lead is a not-to-exceed concentration. Neither is the requirement that the arithmetic average of the soil lead concentration in the confirmation samples should not exceed 100 mg/kg, which is a safety factor of 2.5 times the arithmetic average of the data set

used to develop the 600 mg/kg ERAO. The arithmetic average condition should be included in the Remedial Action Objective section. Sampling results from the data set used to develop the ERAO can be used in concert with the confirmation sampling results if those locations are not excavated or impacted by the removal action. Once the confirmation sampling results are available HERD will be available to meet with the Navy to evaluate the confirmation sampling results.

CONCLUSIONS

HERD has one substantive comment on the Site 4 EE/CA. The condition that confirmation samples should be evaluated on a not-to-exceed 600 mg/kg soil lead, as HERD agreed, is included. However, the additional criterion that the arithmetic average of the soil lead concentration should not exceed 100 mg/kg in confirmation samples is not included. This latter arithmetic average condition should be included in Section F3.4.

Once the confirmation sampling results are available HERD will be available to meet with the Navy to evaluate the confirmation sampling results.

HERD Internal Reviewer: Brian K. Davis, Ph.D.
Staff Toxicologist, HERD

cc: Vicki Lake, BTAG Member
California Department of Fish and Game
1700 K Street, Suite 250
P.O. Box 944209
Sacramento, CA 94244-2090

John Bradley
U.S. Fish and Wildlife Service
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2730 Loker Avenue
Carlsbad, CA 92008

Laurie Sullivan, BTAG Member
Coastal Resources Coordinator (H-1-2)
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75 Hawthorne Street
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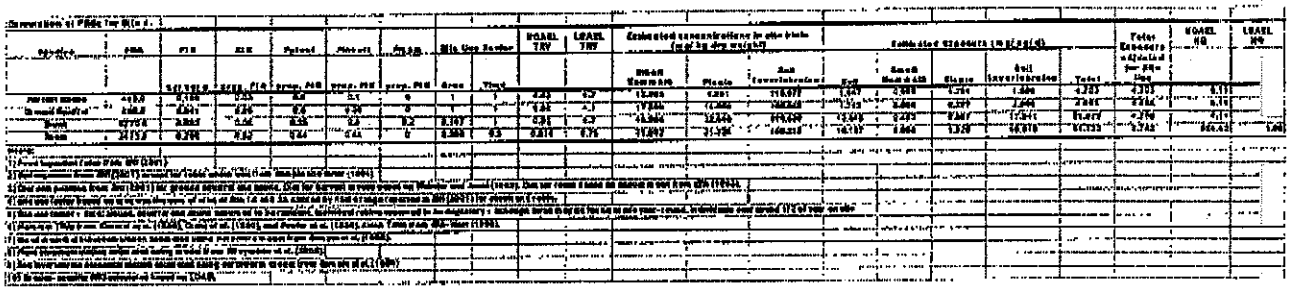
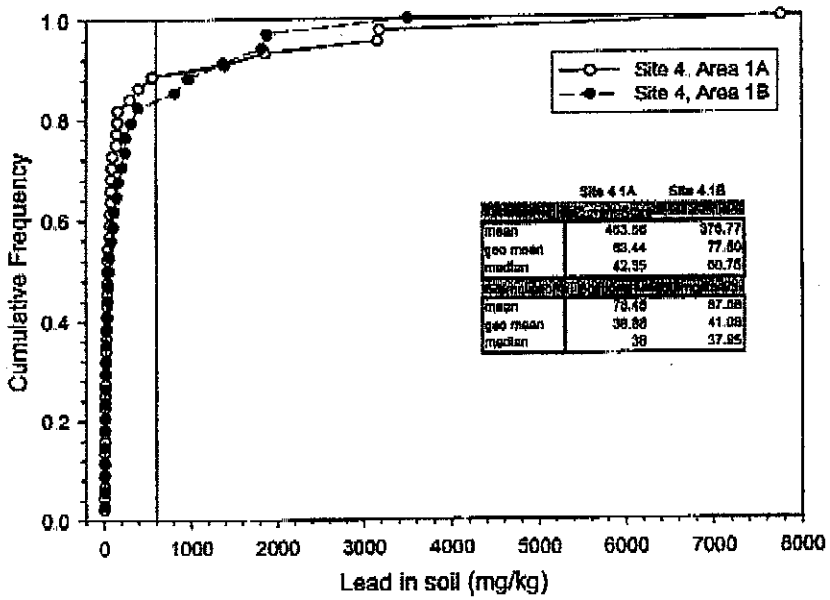
C:\Risk\SEAL\Site 4 EE-CA.doc/tt:16

ATTACHMENT A: SPREADSHEET CALCULATIONS REGARDING PROPOSED LEAD ECOLOGICAL REMEDIAL ACTION OBJECTIVE (ERAO) FOR THE PERIMETER ROAD OF THE NATIONAL WILDLIFE REFUGE (NWR) AT NWS SEAL BEACH.



ATTACHMENT B: FIGURE OF LEAD SAMPLE CONCENTRATIONS AND THE PROPOSED LEAD ERAO FOR THE PERIMETER ROAD OF THE NWR AT NWS SEAL BEACH AS SUBMITTED TO HERD. LEAD CONCENTRATIONS REFER TO SITE 4 AREA OF CONCERN 1A AND 2A.

Distribution of lead in soil at Site 4 Areas 1A and 1B.



	Site 4 1A	Site 4 1B
mean	453.56	379.77
geo mean	63.44	77.80
median	42.35	60.76
mean	78.49	87.08
geo mean	38.88	41.08
median	38	37.95

California Regional Water Quality Control Board

Santa Ana Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb8
3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (909) 782-4130 - FAX (909) 781-6288

Gray Davis
Governor

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.swrcb.ca.gov/rwqcb8.

July 17, 2003

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Fax (714) 424-2065 Fax #
NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Ms. Pei-Fen Tamashiro
Installation Restoration Coordinator
Naval Weapons Station, Seal Beach
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

COMMENTS ON APPENDIX F, DRAFT ADDENDUM TO THE ENGINEERING EVALUATION/COST ANALYSIS, NON-TIME CRITICAL REMOVAL ACTION FOR SITE 7, SITE 4 AREAS OF POTENTIAL CONCERN 1A AND 2A, NAVAL WEAPONS STATION, SEAL BEACH

Dear Ms. Tamashiro:

We have reviewed the above referenced document, not dated, which we received May 22, 2003. We have the following comments:

F2.5.2 Health and Environmental Effects Associated with Chemicals of Concern and Threat to Nearby Human Populations and Environment, F2.5.2.1 Lead, Page F2-19: For the nearby 880-acre Bolsa Chica coastal wetlands restoration project, the site specific lead LCI T50 is 96 mg/kg and twice the ERM is 654 mg/kg.

For any questions please call me at (909) 782-4494 or email at jbroderic@rb8.swrcb.ca.gov.

Sincerely,

John Broderick
SLIC/DOD Section

cc: Mr. Si Le, NAVFACENGCOM, Southwest Division
Ms. Katherine Leibel, DTSC, Office of Military Facilities
Mr. John Bradley, Seal Beach National Wildlife Refuge

City of Seal Beach

CITY HALL 211 EIGHTH STREET
SEAL BEACH, CALIFORNIA 90740
(562) 431-2527 • www.ci.seal-beach.ca.us

June 16, 2003

Department of the Navy
Naval Weapons Station Seal Beach
Attn: Pei-Fen Tamashiro
Installation Restoration Coordinator
800 Seal Beach Boulevard
Seal Beach, CA 90740

Dear Ms Tamashiro:

SUBJECT: **CITY OF SEAL BEACH COMMENTS RE: "DRAFT ADDENDUM TO THE ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) NON-TIME CRITICAL REMOVAL ACTION FOR IR SITE 7, SITE 4 AREAS OF POTENTIAL CONCERN (AOPCS) 1A AND 2A, NAVAL WEAPONS STATION, SEAL BEACH"**

The City of Seal Beach has received the above referenced document and is providing comments based on a staff review of the document. The City prefers to have the Environmental Quality Control Board review documents of this nature and respond with any written comments that they determine to be appropriate. Due to the shortened review and comment period on this document, this is not possible for this particular document.

The City of Seal Beach concurs with the determination of the Navy to implement Alternative 2, "Excavation and Offsite Removal". The proposed removal action offers a high degree of protectiveness for human health and the environment by removing the lead-contaminated soils from Site 4 AOPCs 1A and 2A, which pose a risk to ecological receptors. This alternative will:

- Adequately protects public health and safety and the environment
- Complies with "Applicable or Relevant and Appropriate Requirements" (ARARs)
- Meets the "Removal Action Objectives" (RAOs)
- Provide moderate long-term effectiveness
- Provide short-term effectiveness because of low impacts on the community, workers, and the environment

- Provides high technical feasibility and low administrative requirements
- Provides high reasonableness of costs, offering the highest benefit in terms of achieving the RAOs for the estimated cost.

The City of Seal Beach also concurs with the "target cleanup goal" (TCG) level. The City understands that the TCG has been reviewed and approved by the Human and Ecological Risk Division of the California Department of Toxic Substances Control (DTSC). Additionally, DTSC has stated that the human health risk did not appear to be an issue, particularly due to the low exposure related to intermittent travel on the perimeter road.

Thank you for allowing the City the opportunity to review and provide comments on this document. Please contact my office at your earliest convenience if you require additional information or have questions regarding this letter. I can be reached at (562) 431-2527, extension 313, or by e-mail at lwhittenberg@ci.seal-beach.ca.us.

Sincerely,

Lee Whittenberg
Director of Development Services

Distribution: Mayor and City Council
Chairman and Members of the Environmental Quality Control Board

John Bahorski, City Manager