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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

FINAL
ENGINEERING EVALUATION/COST ANALYSIS NON-TIME-CRITICAL REMOVAL ACTION FOR INSTALLATION RESTORATION SITE 10 NAVAL AIR FACILITY EL CENTRO EI CENTRO, IMPERIAL COUNTY, CALIFORNIA

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SUMMARY

This Engineering Evaluation/Cost Analysis (EE/CA) report has been prepared to support a non-time-critical removal action at Installation Restoration (IR) Program Site 10, former Sewer Stabilization Ponds, Naval Air Facility El Centro, California. The IR Program at Naval Air Facility El Centro does not group sites into operable units but addresses them individually. This EE/CA was conducted in accordance with current United States Environmental Protection Agency and Department of the Navy (DON) 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 & Safety Code* (Cal. Health & Safety Code). The report describes site characteristics, removal action objectives, screening of technologies, and removal action alternatives and recommends a removal action alternative.

CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 *Code of Federal Regulations* [C.F.R.] Part 300), and Cal. Health & Safety Code Section (§) 25323 define "removal actions" as the cleanup or removal of released hazardous substances, actions to monitor the threat of release of hazardous substances, and actions to mitigate or prevent damage to public health or welfare or the environment. The NCP includes provisions for the "excavation, consolidation, or removal of highly contaminated soils from drainage or other areas—where such actions will reduce the spread of, or direct contact with, the contamination" and "containment, treatment, disposal, or incineration of hazardous materials—where needed to reduce the likelihood of human, animal, or food chain exposure (40 C.F.R § 300.415[e][6 and 8])."

IR Site 10 is located just north of the operating base sewage treatment plant and consists of three unlined ponds with bermed sides. The stabilization ponds functioned as the only sewage treatment for the base from the 1940s until 1976. Domestic and industrial sewage flowed into Pond No. 1, where most solids settled out. The effluent would flow into Pond Nos. 2 and 3 and then to the New River. There is no record that accumulated sludge was removed from the pond bottoms. Currently, all the ponds are dry and partially covered with vegetation. Historically, the waste stream has included volatile organic compounds and petroleum hydrocarbons from fuels, oils, degreasers, antifreeze, and solvents; polychlorinated biphenyls (PCBs) from waste oils; and metals and cyanide from photographic waste (Ogden 1992).

The recommendation to undertake a removal action at IR Site 10 was based on the findings in the Data Gaps Study Report (BNI 1998a) and the Extended Site Investigation Technical Memorandum (BEI 2004a). Results of the human-health and ecological screening risk assessments indicated that there is slight risk to human receptors from PCBs, pesticides, and metals; there is risk to ecological receptors from metals in soil, primarily cadmium.

The vertical extent of on-site soil contamination is primarily limited to shallow surface soils. Groundwater is approximately 22 to 37 feet below ground surface and does not appear to be impacted by on-site activities (BEI 2003). This removal action focuses on soil.

This EE/CA report identifies removal action alternatives to reduce the risk to human health and ecological receptors from chemicals of potential concern in soil at IR Site 10. After evaluation and screening of multiple removal technologies and process options, the following two alternatives were identified and considered:

- Alternative 1 (Options A and B), cover with institutional controls
- Alternative 2 (Options A and B), excavation with off-site disposal

On the basis of this analysis, the DON recommends Alternative 2, Option B, excavation with off-site disposal and backfill using berm soil. This alternative best meets NCP criteria of overall protectiveness of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness; reduction of mobility, toxicity, or volume through treatment; short-term effectiveness; implementability; cost; and state and community acceptance. The proposed removal action, when implemented, should meet the cleanup objective under CERCLA and the NCP.

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ACRONYMS/ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BNI	Bechtel National, Inc
Cal. Code Regs.	*California Code of Regulations*
Cal/EPA	California Environmental Protection Agency
Cal. Fish & Game Code	*California Fish & Game Code*
Cal. Health & Safety Code	*California Health & Safety Code*
CDFG	California Department of Fish and Game
CEG	certified engineering geologist
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	*Code of Federal Regulations*
CIMIS	California Irrigation Management Information System
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CTO	contract task order
DTSC	(Cal/EPA) Department of Toxic Substances Control
EE/CA	engineering evaluation/cost analysis
ESI	extended site inspection
Exec. Order No.	executive order number
°F	degrees Fahrenheit
HAR	hydrogeological assessment report
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration (Program)
mg/kg	milligrams per kilogram
NAF	Naval Air Facility
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NTCRA	non-time-critical removal action

O&M	operation and maintenance
Ogden	Ogden Environmental and Energy Services Co., Inc.
OSHA	Occupational Safety and Health Administration
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RAC	remedial action contractor
RAO	removal action objective
RAP	remedial action plan
RAW	removal action work plan
RCRA	Resource Conservation and Recovery Act
RWQCB	(California) Regional Water Quality Control Board
§	section
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
SWDIV	Southwest Division Naval Facilities Engineering Command
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TDS	Tierra Data Systems
tit.	title
U.S.C.	*United States Code*
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WET	(California) Waste Extraction Test

Section 1
INTRODUCTION

This Engineering Evaluation/Cost Analysis (EE/CA) report describes the identification and evaluation of removal action alternatives for addressing soil impacted primarily with metals at Installation Restoration (IR) Program Site 10, the former Sewage Stabilization Ponds, Naval Air Facility (NAF) El Centro, California. Bechtel Environmental, Inc., has prepared this EE/CA for Southwest Division Naval Facilities Engineering Command (SWDIV) in accordance with Contract Task Order 0043, issued under the Comprehensive Long-Term Environmental Action Navy 3 Program, Contract No. N68711-95-D-7526. The previous version of this EE/CA report was prepared in accordance with CTO-0043.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) define removal actions as "the cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed 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 Environmental Protection Agency (U.S. EPA) has classified removal actions into three types—emergency, time critical, and non-time-critical—on the basis of the circumstances surrounding the release or threat of release.

The removal action at IR Site 10, which the Navy has determined to be appropriate, will be non-time-critical because on-site removal activities will be initiated more than 6 months after the planning period begins (Title 40 *Code of Federal Regulations* [C.F.R.] Section [§] 300.415[b][4]).

Additionally, the *California Health & Safety Code* (Cal. Health & Safety Code) specifies the type of documents, depending on the cost of removal action, that are required to implement the action. The Cal. Health & Safety Code requires preparing either a remedial action plan (RAP) for removal actions that cost $1 million or more or a removal action work plan (RAW) for removal actions that cost less than $1 million. Furthermore, the Cal. Health & Safety Code authorizes the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) to waive the RAP requirements in favor of a RAW or a RAP-equivalent document when an "imminent and/or substantial endangerment" determination exists. DTSC may also waive the RAP requirements of Cal. Health & Safety Code § 25356.1(d)(1)–(6) if a RAP-equivalent document that meets the requirements of Cal. Health & Safety Code § 25356.1(h)(3) is prepared.

A RAW will be prepared for IR Site 10. It will be a RAP-equivalent document that will meet the requirements of Cal. Health & Safety Code § 25356.1(h)(3).

The removal action alternatives described herein address impacted soil at IR Site 10. Three unlined stabilization ponds at the site (Pond Nos. 1 through 3) functioned as the only sewage treatment for the base from the 1940s until 1976. Domestic and industrial sewage flowed into Pond No. 1, where most solids settled out, then into Pond Nos. 2 and 3, and ultimately to the New River. There are no records indicating that accumulated sludge was removed from any of the ponds. Currently, the ponds are dry and are partially covered with vegetation.

This EE/CA report addresses the implementability, effectiveness, and cost of a non-time-critical removal action (NTCRA) and applicable regulatory requirements for IR Site 10 and will be used as the basis for a future removal action under CERCLA. The Navy, with state regulatory oversight, is the lead agency for this NTCRA. As the lead agency, the Navy has the final approval authority for the alternative that is selected and overall public participation activities, with state of California concurrence. To implement this removal action, the Navy is working in cooperation with DTSC and California Regional Water Quality Control Board (RWQCB) Colorado River Basin Region.

This EE/CA report is being issued in accordance with the Community Relations Plan (BNI 1998b) prepared by NAF El Centro to facilitate public involvement in the decision-making process. The public will be encouraged to review and comment on the proposed removal activities described in this EE/CA report during a formal 30-day comment period, which will open after this EE/CA report is released to the public. The Navy will provide written responses to public comments after the public comment period is closed.

An action memorandum will be prepared on the basis of this EE/CA report. The action memorandum will incorporate regulatory agency and public comments and will provide a written record of the decision to select an appropriate removal action. As the primary decision document, the action memorandum will substantiate the need for a removal action, identify the proposed action, and explain the rationale for the removal action selection. This EE/CA report and the action memorandum will also, in part, satisfy Cal. Health & Safety Code's requirements for documenting the removal action.

To gain a more thorough understanding of the activities associated with this removal action and other NAF El Centro activities, the public can review documents contained in the information repositories maintained in El Centro and Brawley, California. The information repositories contain partial record files and are at the following locations:

El Centro Public Library
539 State Street, El Centro, California 92243
(760) 337-4565

Hours:	Monday through Thursday:	9 a.m. to 6 p.m.
	Friday and Saturday:	9 a.m. to 5 p.m.
	Sunday:	Closed

Brawley Public Library
400 Main Street, Brawley, California 92227
(760) 344-1891

Hours:	Tuesday through Thursday:	11 a.m. to 7 p.m.
	Friday and Saturday:	9 a.m. to 5 p.m.
	Sunday and Monday:	Closed

Project documents are also available for public review through the Administrative Record. The complete Administrative Record is located at SWDIV, 1220 Pacific Highway, Building 129, San Diego, California 92132-5190, and is maintained by Ms. Diane Silva, SWDIV Administrative Record Coordinator, (619) 532-3676.

Section 2
SITE CHARACTERIZATION

This section includes descriptions of the facility and background, previous investigations, nature and extent of contamination, and risk-screening evaluation. The information for this site characterization was taken from Extended Site Investigation (ESI) (BEI 2004a); various annual groundwater monitoring reports (BNI 1998b, 2001; BEI 2003); Data Gaps Study Report (BNI 1998a); Hydrogeological Assessment Report (HAR) (Ogden 1992); and NAF El Centro Master Plan (Gillespie DeLorenzo 1988), except where referenced otherwise.

2.1 DESCRIPTION AND BACKGROUND OF FACILITY

NAF El Centro is a fully operational 2,289-acre facility located 6 miles northwest of the city of El Centro, 11 miles north of the Mexican border, and 85 miles east of the city of San Diego (Figure 2-1). The main gate is located at the intersection of Bennett and Havens Roads, approximately 6 miles west of the city of El Centro.

NAF El Centro historically provided support to fleet squadrons that took advantage of the clear, dry weather and open space in the Imperial Valley. The facility has supported a variety of activities, including parachute testing and training and aeronautical escape system testing, evaluation, and design.

In the early 1990s, the NAF El Centro mission was redefined as a support and training facility for military aviation units. NAF El Centro provides services and housing to military personnel and maintains and operates facilities to support aviation activities, including machine and welding shops, a photographic laboratory, an instrument laboratory, a yardage shop, and a transportation garage.

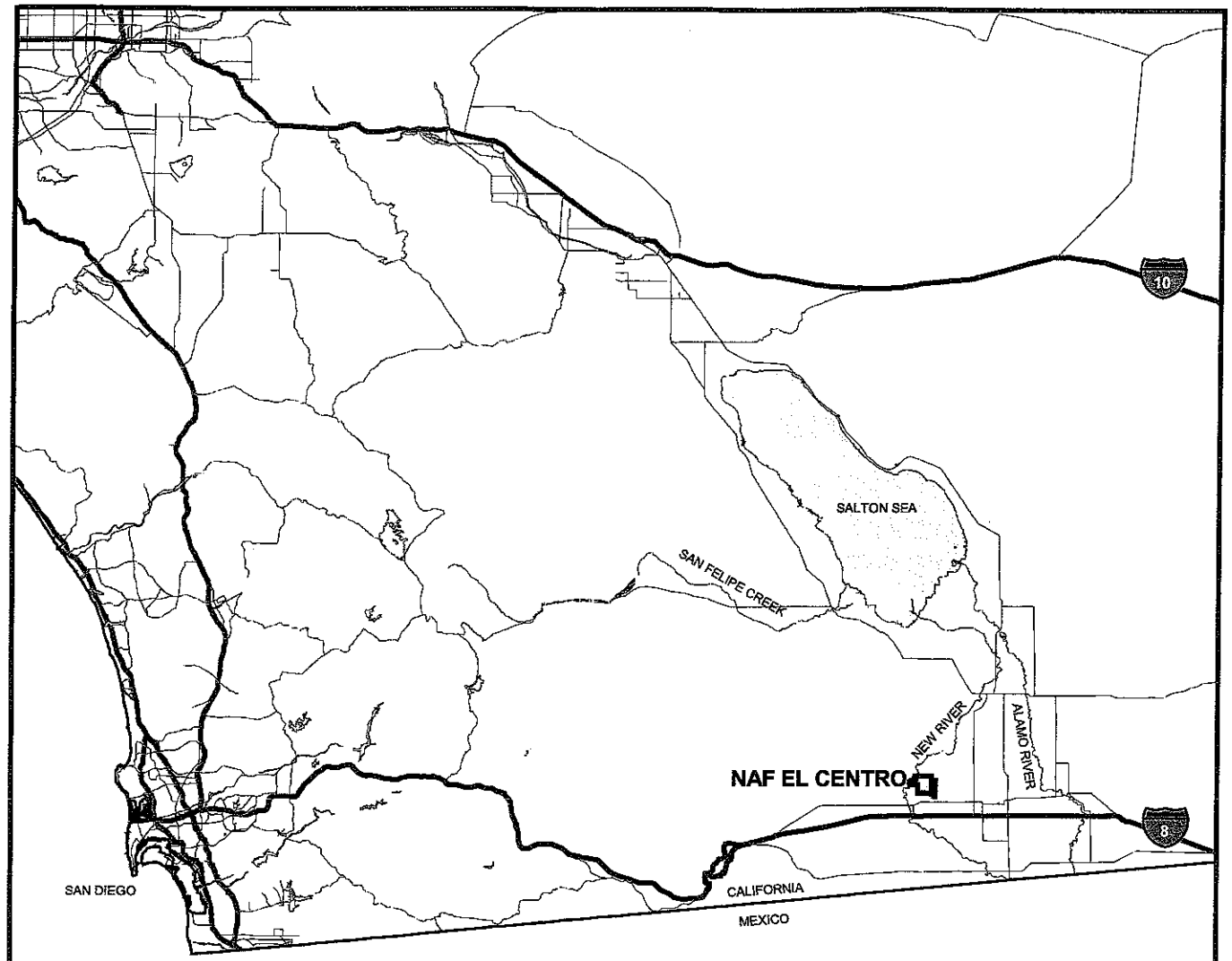
2.1.1 Site Location

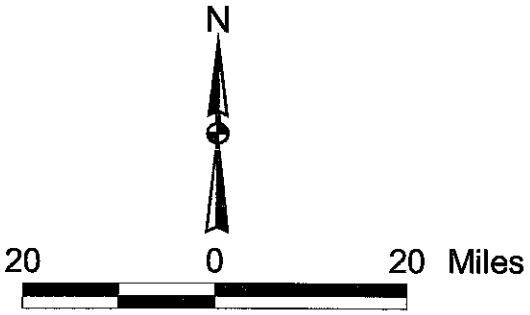
IR Site 10 is a rectangular, 6-acre area consisting of three unlined stabilization ponds, located in the northwest corner of the base, outside the main fence. IR Site 10 is located immediately north of the present sewage/wastewater treatment plant for the base (Figure 2-2). NAF El Centro lies within Township 15 South and Ranges 12 and 13 West, using the Seeley, California, 7.5 minute quadrangle. The approximate latitude and longitude of IR Site 10 are 32° 50′ 24″ north and 115° 40′ 50″ west, respectively.

2.1.2 Type of Facility and Operational Status

IR Site 10 consists of the three unlined stabilization ponds with bermed sides (Figure 2-3). The largest pond (No. 1) is about 550 by 250 feet and is 10 feet deep. The two smaller ponds (Nos. 2 and 3) are about 250 by 125 feet and are 10 feet deep. The pond floors (combined area of about 4.6 acres) are approximately 2 feet below adjacent grade, and the berms surrounding the ponds are approximately 6 to 8 feet above the adjacent grade.

The stabilization ponds functioned as the only sewage treatment for the base from the 1940s until 1976. Domestic and industrial sewage flowed into Pond No. 1, where most solids settled out. The effluent would flow into Pond Nos. 2 and 3 and then to the





Engineering Evaluation/Cost Analysis, IR Site 10

Figure 2-1

Regional Location Map

NAF El Centro, Imperial County, California

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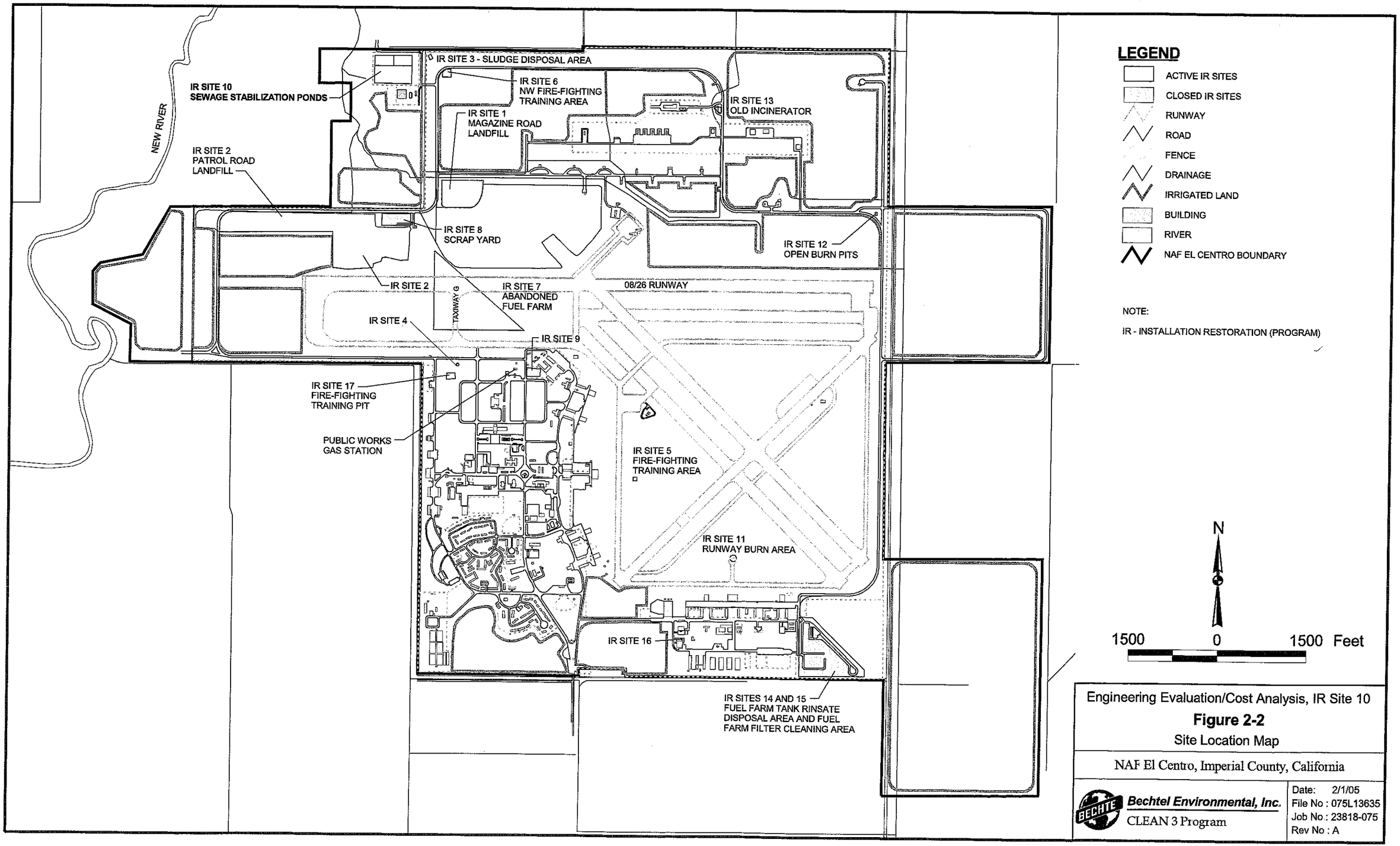
Job No.: 23818-075
Rev No.: A



Engineering Evaluation/Cost Analysis, IR Site 10

Figure 2-2

Site Location Map

NAF El Centro, Imperial County, California

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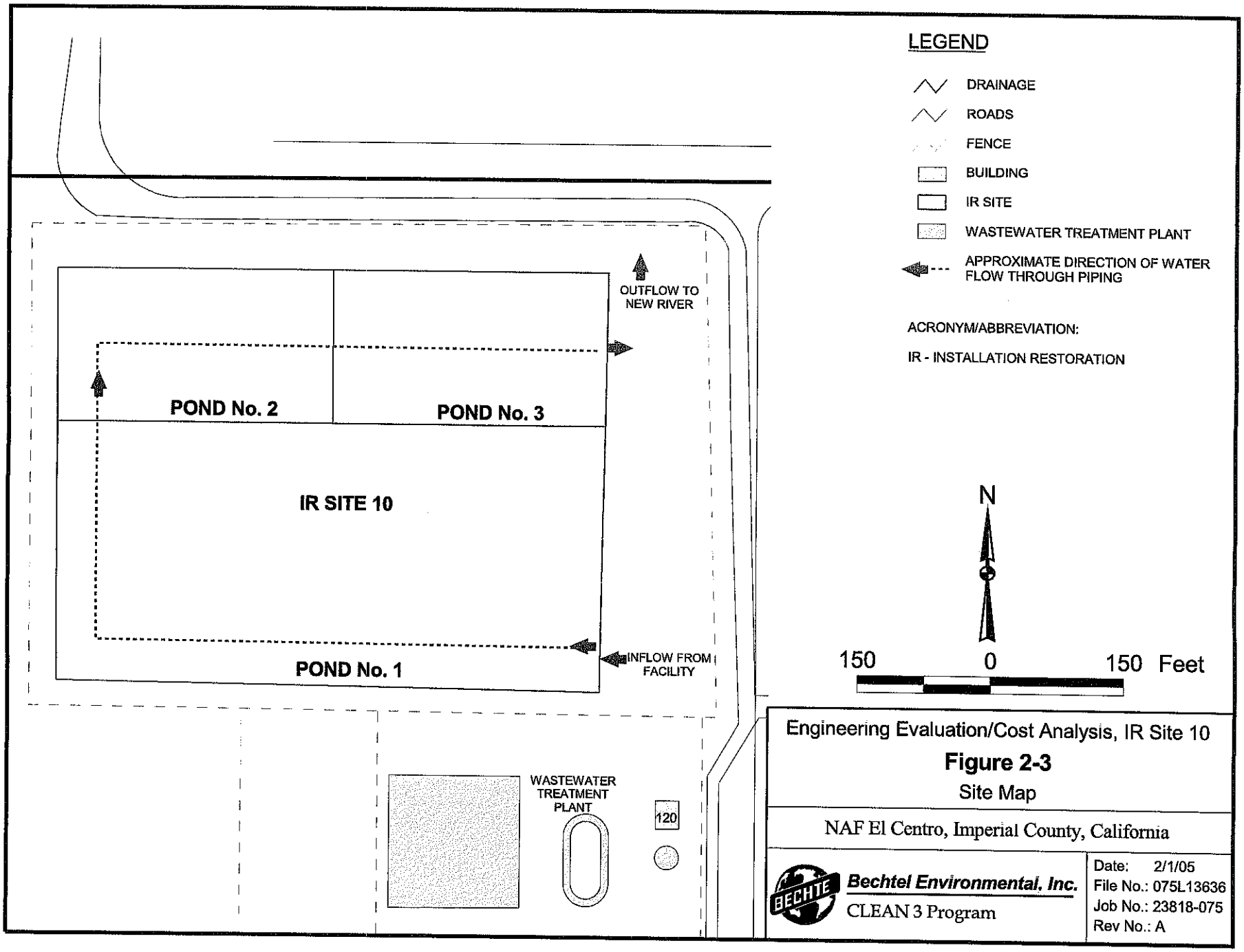
Rev No : A



Engineering Evaluation/Cost Analysis, IR Site 10

Figure 2-3

Site Map

NAF El Centro, Imperial County, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/1/05
File No.: 075L13636
Job No.: 23818-075
Rev No.: A

New River. There is no record that accumulated sludge was removed from the pond bottoms. Historically, the waste stream has included volatile organic compounds (VOCs) and petroleum hydrocarbons from fuels, oils, degreasers, antifreeze, and solvents; polychlorinated biphenyls (PCBs) from waste oils; and metals and cyanide from photographic waste (Ogden 1992). Currently, all the ponds are dry and partially covered with vegetation.

2.1.3 Topography/Structures

NAF El Centro is located on the western side of the central Imperial Valley. The topography is relatively flat with surface elevations from 45 to 50 feet below mean sea level. The surrounding area is also relatively flat, with the exception of bluffs on the banks of the New River, west of the base.

Two drainage ditches exist approximately 150 feet to the east and approximately 150 feet to the north of IR Site 10. A tributary to the New River is located approximately 600 feet to the west of the site. The Elder Canal, part of the Imperial Irrigation District Canal System, is located approximately 200 feet to the east of the site. The water from this system comes from the All American Canal, which transports water from the Colorado River.

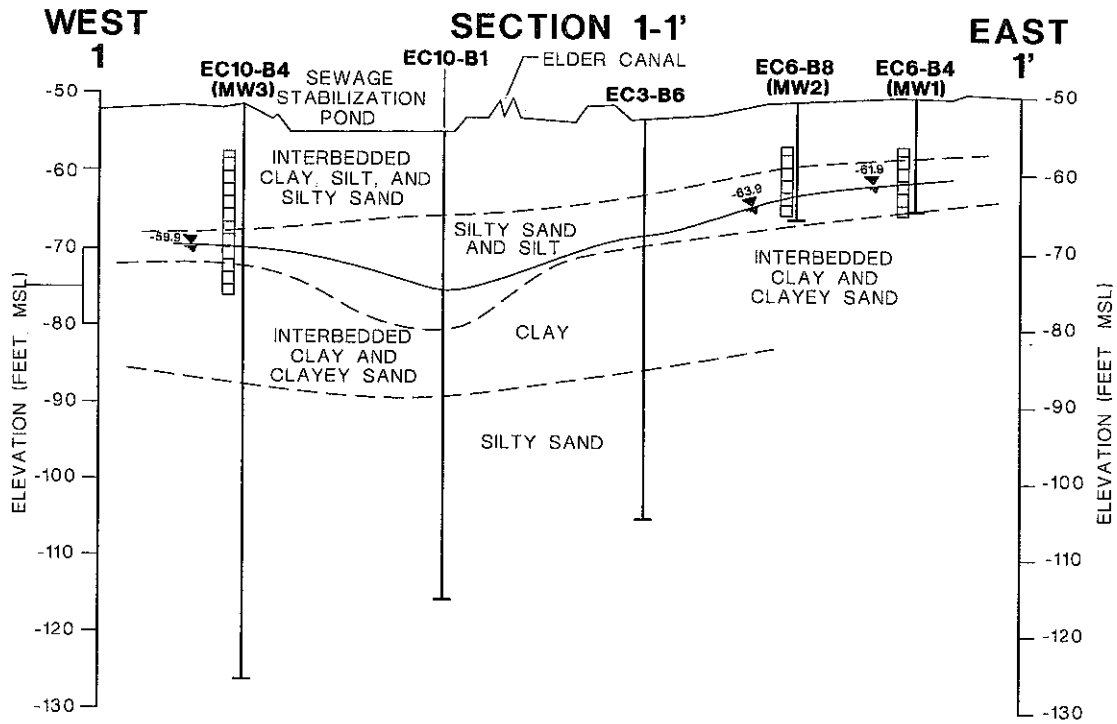
No buildings are currently within IR Site 10. Sparse vegetation grows within the former ponds area, offering alkali desert scrub and desert scrub habitat. IR Site 10 is located outside a locked 8-foot chain-link fence that surrounds the majority of NAF El Centro. A separate, locked, 8-foot chain-link fence encloses IR Site 10.

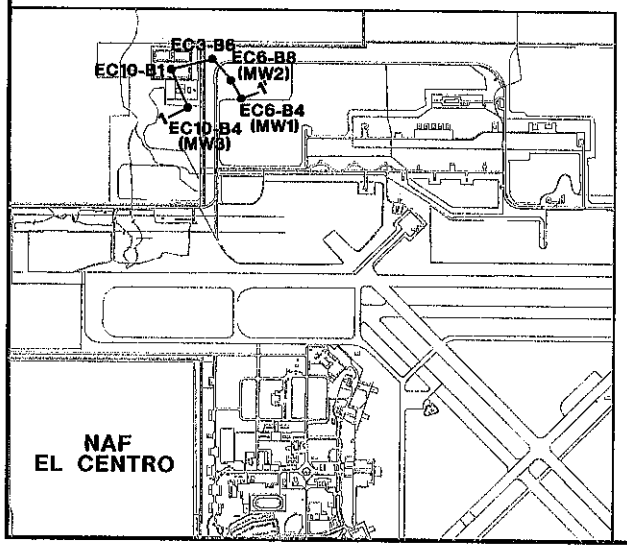
2.1.4 Geology/Soil Information

NAF El Centro is located in the Imperial Valley, within the Colorado Desert geomorphic province of California (Norris and Webb 1990). The Imperial Valley occupies the north-central part of the Salton Trough, a large topographic and structural depression that extends from near Palm Springs, south to the head of the Gulf of California, approximately 180 miles. The Salton Trough is separated from the Gulf of California by the broad, fan-shaped delta of the Colorado River. The lowest part of the trough is occupied by the Salton Sea, a saline lake fed primarily by waste irrigation water imported from the Colorado River (Figure 2-1). Much of the land surface in the Salton Trough is below sea level.

The geologic strata underlying the Imperial Valley consist of Cenozoic valley-fill deposits more than 20,000 feet thick. The surficial deposits in the area of NAF El Centro are Holocene Cahuilla Lake deposits and consist of lacustrine sediments. The lacustrine sediments near IR Site 10 consist predominantly of clays, silts, sands, and sand-silt-clay mixtures. These lacustrine sediments are underlain by Pliocene and Pleistocene, heterogeneous, nonmarine, sedimentary rocks.

Figure 2-4 presents a generalized geologic cross section illustrating subsurface conditions beneath NAF El Centro. Lithologic data from soil boring logs indicate that superficial





LEGEND

SOIL BORING

SCREENED INTERVAL

WATER LEVELS OBTAINED MARCH 1992

NOTES:

MSL MEAN SEA LEVEL
NAF - NAVAL AIR FACILITY

Engineering Evaluation/Cost Analysis, IR Site 10

Figure 2-4

Geologic Cross Section 1-1'

NAF El Centro, Imperial County, California

Bechtel Environmental, Inc.
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lacustrine sediments at IR Site 10 consist of about 12 to 16 feet of laminated silty clay to silt interbedded with fine sandy silt and fine sand. At 16 to 30 feet below ground surface (bgs), there is typically a thick interval of silty sand and fine-grained sand with some interbedded clay and silty to sandy clay. The various strata range from less than 1 foot up to 7 feet thick. The sand interval is underlain by one or more clay layers of thickness ranging from less than 1 foot up to 1.5 feet thick. The clay layers are typically between 30 and 35 feet bgs. Silty sands and fine sands continue from approximately 35 feet bgs to at least 70 feet bgs, interrupted by multiple, foot-scale clay layers between 55 and 60 feet bgs (BNI 1998a).

The water table in the central Imperial Valley is generally close to the ground surface because of intensive agricultural irrigation in the area. The depth to groundwater at the base ranges from approximately 6 feet bgs at the southeast corner to approximately 40 feet bgs at the northwest corner of the base. At IR Site 10, groundwater in the shallow water-bearing zone is present at depths from 22 to 37 feet bgs, varying primarily in response to irrigation practices. The shallow water-yielding materials are fine-grained sands and silty sands generally present between 16 and 30 feet bgs. A deeper saturated zone is present beneath IR Site 10 at depths between about 40 and 80 feet bgs. The deeper saturated zone may be semiconfined by the overlying clay interval.

The Imperial Valley drains northward into the Salton Sea. The groundwater flow direction across the base follows this pattern and is generally from southeast to northwest. The primary interaction between surface water and groundwater is interpreted to occur within and around irrigated areas, through percolation of irrigation water and collection of groundwater in deep drainage ditches or discharge into the New River and/or its tributaries in the northern portion of the base. At IR Site 10, the general direction of groundwater flow is northwestward toward the New River. Historic groundwater flow directions and horizontal hydraulic gradients have been influenced by irrigation practices in agricultural fields near IR Site 10.

The Imperial Valley is a seismically active area that historically has experienced numerous strong earthquakes. Many of the faults in Imperial Valley are considered part of the San Andreas Fault system. Nearly all of the recognized faults are active (California Division of Mines and Geology 1994).

2.1.5 Surrounding Land Use and Populations

NAF El Centro is located within Imperial County unincorporated lands. Land use surrounding the base is primarily agricultural. The closest medium-density residential area is the community of Seeley, a 340-acre township located approximately 1 mile south of the base. Ten elementary schools in the El Centro School District are each greater than 6 miles from IR Site 10.

The majority of the land surrounding the base has been shaped by agricultural practices that began in the early 1900s. Clearing of the valley floor for farming has restricted much of the native, predominantly highly salt-tolerant plant life to areas along natural drainages.

As a result, the areas adjacent to rivers, canals, and drainage channels provide the primary source of refuge necessary for wildlife.

The Imperial Irrigation District provides the only source of water to the base. Raw water is obtained from the Imperial Irrigation District's Elder Canal and is treated by the water treatment facility located at the southwestern portion of the base. The treated water is distributed within the base for domestic and other uses.

2.1.6 Sensitive Ecosystems

The IR Site 10 area offers 6 acres of primarily alkali desert scrub and desert scrub habitat. The primary habitat, cropland, is present throughout the Imperial Valley and in the regions adjacent to IR Site 10. Agricultural areas are habitat, generally of little value to wildlife, used by opportunistic and human-tolerant species. Areas of barren and urban habitat, generally of little value to wildlife, can be found to the south of IR Site 10.

Ecological receptors at the site are limited because of the periodic clearing of vegetation from each pond's unlined soil bottom and resultant exposure of barren soil. Terrestrial ecological receptors such as rabbits, rodents, lizards, and mourning doves may occur at the site. Because of the distance to the nearest surface water body and the depth to the groundwater at IR Site 10, no aquatic ecosystems are present at the site.

2.1.7 Meteorology

The climate of the NAF El Centro area is arid with elevated summer temperatures and mild winters. Temperatures range from approximately 30 degrees Fahrenheit (°F) in the winter to more than 115° F in the summer. Mean annual precipitation is less than 3 inches per year, characterized by isolated thunderstorms with intense rainfall. Annual average evapotranspiration is approximately 75 inches per year (CIMIS 2004). Prevailing winds are westerly in the winter and spring and southeasterly in the summer.

2.2 PREVIOUS REMOVAL ACTIONS, INVESTIGATIONS, AND ACTIVITIES

IR Site 10 was added to the IR Program in 1987. The following discusses previous removal actions, investigations, and activities.

2.2.1 Previous Removal Actions

There have been no previous removal actions taken at IR Site 10.

2.2.2 Previous Investigations

Previous investigations from 1987 to 2004 are discussed below.

2.2.2.1 PRELIMINARY ASSESSMENTS/SITE INSPECTIONS

In 1987, the Naval Energy and Environmental Support Activity (NEESA) conducted preliminary assessments/site inspections for 14 IR sites at NAF El Centro, including

IR Site 10, as part of the Navy IR Program (NEESA 1987). Historical records, aerial photographs, on-site surveys, and personnel interviews indicated that IR Site 10 was a potential threat to human health or the environment due to contamination from past usage. The site was evaluated for contamination characteristics, migration pathways, and biological receptors. The Preliminary Assessment/Site Inspection Report recommended further investigation (NEESA 1987).

2.2.2.2 HYDROGEOLOGICAL ASSESSMENT

In 1992, a HAR was prepared for IR Site 10 by Ogden Environmental and Energy Services (Ogden) (1992). The objectives of the hydrogeological assessment were to assess the mobility of hazardous waste constituents impounded within soils of the dry pond bottom and to consider any impact on groundwater quality.

The HAR indicated that priority pollutant metals in soil are the primary chemicals of potential concern (COPCs) at the site. Metals reported at concentrations exceeding preliminary remediation goals (PRGs) were arsenic, beryllium, and cadmium. VOCs and semivolatile organic compounds (SVOCs) were reported in some soil samples at concentrations below PRGs. Petroleum hydrocarbons in soil were reported at concentrations up to 240 milligrams per kilogram (mg/kg). Low concentrations (less than 5 micrograms per liter) of trihalomethane compounds and several priority pollutant metals were reported in groundwater. Detected COPCs at IR Site 10 were considered to have low potential for off-site migration or degradation of groundwater quality. The HAR recommended that the site be capped and that no further action be performed (Ogden 1992).

2.2.2.3 DATA GAPS STUDY

In 1998, a Data Gaps Study Report was prepared for NAF El Centro IR sites, including IR Site 10 (BNI 1998a). The purpose of the study was to supplement data collected during previous investigations. These data, in conjunction with historical data, were used to assess risk to human health and to support implementation of any necessary remedies.

The data gaps study identified metals, PCBs, and pesticides in soil as the dominant risk drivers. Metals reported in soil at concentrations exceeding PRGs were arsenic, beryllium, cadmium, total chromium, mercury, and silver. Non-metals reported at concentrations exceeding PRGs were PCBs and dieldrin. Most of the soil samples with COPCs exceeding the PRGs (except arsenic and beryllium) were from Pond No. 1, at the surface of and to 1 foot below the pond bottom. The highest concentrations of COPCs were reported in samples from the eastern portion of Pond No. 1, where sewage effluent entered this primary settling basin. It was recommended that a removal action, such as excavation and disposal of the upper 0.5 to 1.0 foot of soil, be performed at Pond No. 1. Additional surface soil sampling was recommended to fully characterize the extent of contaminants at the surface and evaluate whether further action was required for Pond Nos. 2 and 3 (BNI 1998a).

2.2.2.4 GROUNDWATER MONITORING

In 1998, the final Annual Groundwater Monitoring Report was prepared for NAF El Centro IR sites, including IR Site 10 (BNI 1998b). The report presented the results of groundwater monitoring activities conducted by Bechtel National, Inc. (BNI), from April 1996 through February 1997 and summarized previous groundwater monitoring results conducted by Ogden at NAF El Centro. Subsequent annual groundwater monitoring events included those in 2001 (BNI 2001), 2002 (BEI 2003), and 2003 (BEI 2004b).

Groundwater samples were analyzed for organic and inorganic compounds. It was recommended in the Annual Groundwater Monitoring Report for 2002 that groundwater monitoring be discontinued because concentrations of compounds reported in groundwater indicated stable trends when the 2002 results were compared to sampling results since 1996 (BEI 2003). However, it was requested during regulatory review that groundwater monitoring continue until the removal action was implemented at IR Site 10.

2.2.2.5 EXTENDED SITE INVESTIGATION

A final Technical Memorandum, ESI was presented in 2004 (BEI 2004a). The purpose of the ESI was to perform surface-soil sampling at Pond Nos. 2 and 3, reassess human-health risk for Pond Nos. 2 and 3, evaluate ecological risk for all the ponds together, and determine if Pond Nos. 2 and 3 were eligible for a recommendation of no further response action planned. As part of the ESI, soil at depths of 0 to 0.5 foot was sampled at locations within Pond Nos. 2 and 3 to provide data necessary to fully characterize the extent of contaminants at the surface. In addition, groundwater from two wells within Pond Nos. 1 and 3 (the other wells were dry) was analyzed for the presence of VOCs to determine the migration potential of dissolved VOCs to soil gas.

Using these and historical data, screening human-health and ecological risk assessments were performed. Surface soil and soil gas were not found to pose a significant risk to human health.

2.2.3 Previous Activities

Groundwater monitoring of wells within and around IR Site 10 has been conducted since 1991. As part of the groundwater monitoring, interior wells EC10-MW1, EC10-MW2, and EC10-MW4 and background well EC10-MW3 were sampled in 1991. Interior well EC10-MW5 would have been sampled in 1991, but it was dry. Downgradient wells EC10-MW7 and EC10-MW8 and upgradient well EC10-MW6 were sampled in 1996, 1997, 2001, and 2002. Piezometer EC-P7 was also sampled in 1997, 2001, and 2002. EC10-MW6, EC10-MW7, EC10-MW8, and EC-P7 were sampled again in early 2004 (representing the 2003 annual monitoring round). EC10-MW6 would have also been sampled in early 2004, but it was dry.

In 2003, interior wells EC10-MW2 and EC10-MW4 were sampled for VOCs. No VOCs were reported above the detection limits. These results indicate there is limited potential for generation of gaseous-phase VOCs through volatilization of dissolved-phase VOCs.

2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

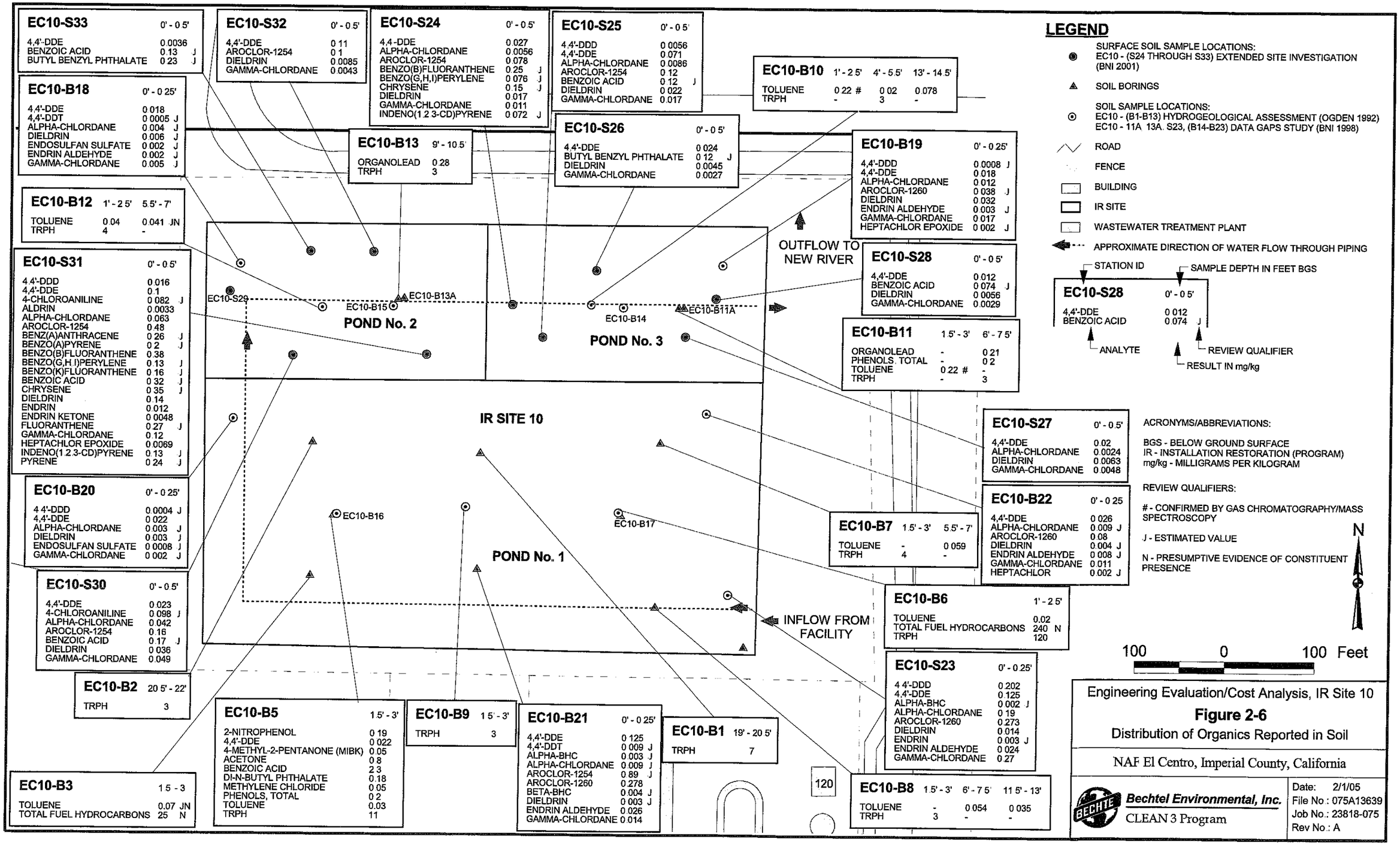
As discussed in Section 2.1.2, the source and nature of contamination at IR Site 10 are associated with the stabilization ponds. There is no record of the accumulated sludge removal. Operation of the former sewage treatment ponds has resulted in the release of contaminants at IR Site 10, with potential migration off-site. A human-health risk screening, performed as part of the data gaps study, identified metals, PCBs, and pesticides in Pond No. 1 as the dominant risk drivers.

Soil samples were collected from IR Site 10 as part of the hydrogeological assessment, data gaps study, and ESI (Figures 2-5 and 2-6). Arsenic and cadmium were the most frequently reported contaminants that exceeded both PRGs and base background threshold concentrations. Arsenic and cadmium were each reported in 6 percent of the soil samples. Arsenic detections that exceeded both PRGs and base background threshold concentrations were restricted to locations within Pond No. 1 at depths from 0 foot to 8.5 feet bgs and one surface location in Pond No. 2. Cadmium detections that exceeded both PRGs and base background threshold concentrations occurred in Pond Nos. 1 and 2 at 0 foot to 1.5 feet below pond bottom. The remaining metals (chromium, lead, and silver) exceeding both PRGs and base background threshold concentrations were detected in surface samples in Pond No. 1.

Figure 2-5 shows metals concentrations reported above background reported in soil samples.

An assessment of potential leaching of metals from IR Site 10 sediments to shallow groundwater was conducted as part of the data gaps study. Potential percolation of rainwater to groundwater at IR Site 10 is minimal, considering the evapotranspiration rate of greater than 60 inches per year versus the average annual rainfall of 3 inches. Results of metals analyses by the California Waste Extraction Test (WET) method were below soluble threshold limit concentration (STLC) values, indicating a low potential for metals to leach from the soils. Hexavalent chromium was not reported in the samples collected during the data gaps study, indicating that chromium is present in the trivalent form.

Nonmetal contaminants that exceeded PRGs included reported PCB detections (Aroclors 1254 and 1260) at two surface locations in Pond No. 1. At a single surface location in Pond No. 3, the reported concentration of the pesticide dieldrin exceeded the PRG. Organolead was detected in two samples at 6 and 9 feet bgs from Pond Nos. 2 and 3. Subsequently, duplicate samples were collected from the two locations that recorded organolead detections. In the duplicate samples, recorded concentrations were not above the detection limit. It is, therefore, uncertain if the reported values are the result of site contamination, laboratory interference, or false positives. Basewide,


EC10-S33 0' - 0.5'
4,4'-DDE 0.0036
BENZOIC ACID 0.13 J
BUTYL BENZYL PHTHALATE 0.23 J
EC10-S32 0' - 0.5'
4,4'-DDE 0.11
AROCLOR-1254 0.1
DIELDRIN 0.0085
GAMMA-CHLORDANE 0.0043
EC10-S24 0' - 0.5'
4,4-DDE 0.027
ALPHA-CHLORDANE 0.0056
AROCLOR-1254 0.078
BENZO(B)FLUORANTHENE 0.25 J
BENZO(G,H,I)PERYLENE 0.076 J
CHRYSENE 0.15 J
DIELDRIN 0.017
GAMMA-CHLORDANE 0.011
INDENO(1,2,3-CD)PYRENE 0.072 J
EC10-S25 0' - 0.5'
4,4'-DDD 0.0056
4,4'-DDE 0.071
ALPHA-CHLORDANE 0.0086
AROCLOR-1254 0.12
BENZOIC ACID 0.12 J
DIELDRIN 0.022
GAMMA-CHLORDANE 0.017
EC10-B10 1' - 2.5' 4' - 5.5' 13' - 14.5'
TOLUENE 0.22 # 0.02 0.078
TRPH - 3 -
EC10-B18 0' - 0.25'
4,4'-DDE 0.018
4,4'-DDT 0.0005 J
ALPHA-CHLORDANE 0.004 J
DIELDRIN 0.006 J
ENDOSULFAN SULFATE 0.002 J
ENDRIN ALDEHYDE 0.002 J
GAMMA-CHLORDANE 0.005 J
EC10-B13 9' - 10.5'
ORGANOLEAD 0.28
TRPH 3
EC10-S26 0' - 0.5'
4,4'-DDE 0.024
BUTYL BENZYL PHTHALATE 0.12 J
DIELDRIN 0.0045
GAMMA-CHLORDANE 0.0027
EC10-B19 0' - 0.25'
4,4'-DDD 0.0008 J
4,4'-DDE 0.018
ALPHA-CHLORDANE 0.012
AROCLOR-1260 0.038 J
DIELDRIN 0.032
ENDRIN ALDEHYDE 0.003 J
GAMMA-CHLORDANE 0.017
HEPTACHLOR EPOXIDE 0.002 J
EC10-B12 1' - 2.5' 5.5' - 7'
TOLUENE 0.04 0.041 JN
TRPH 4 -
OUTFLOW TO NEW RIVER
EC10-S28 0' - 0.5'
4,4'-DDE 0.012
BENZOIC ACID 0.074 J
DIELDRIN 0.0056
GAMMA-CHLORDANE 0.0029
EC10-S31 0' - 0.5'
4,4'-DDD 0.016
4,4'-DDE 0.1
4-CHLOROANILINE 0.082 J
ALDRIN 0.0033
ALPHA-CHLORDANE 0.063
AROCLOR-1254 0.48
BENZ(A)ANTHRACENE 0.26 J
BENZO(A)PYRENE 0.2 J
BENZO(B)FLUORANTHENE 0.38
BENZO(G,H,I)PERYLENE 0.13 J
BENZO(K)FLUORANTHENE 0.16 J
BENZOIC ACID 0.32 J
CHRYSENE 0.35 J
DIELDRIN 0.14
ENDRIN 0.012
ENDRIN KETONE 0.0048
FLUORANTHENE 0.27 J
GAMMA-CHLORDANE 0.12
HEPTACHLOR EPOXIDE 0.0069
INDENO(1,2,3-CD)PYRENE 0.13 J
PYRENE 0.24 J
EC10-S29
EC10-B15
EC10-B13A
POND No. 2
EC10-B14
EC10-B11A
POND No. 3
EC10-B11 1.5' - 3' 6' - 7.5'
ORGANOLEAD - 0.21
PHENOLS, TOTAL - 0.2
TOLUENE 0.22 # -
TRPH - 3
IR SITE 10
EC10-S27 0' - 0.5'
4,4'-DDE 0.02
ALPHA-CHLORDANE 0.0024
DIELDRIN 0.0063
GAMMA-CHLORDANE 0.0048
EC10-B20 0' - 0.25'
4,4'-DDD 0.0004 J
4,4'-DDE 0.022
ALPHA-CHLORDANE 0.003 J
DIELDRIN 0.003 J
ENDOSULFAN SULFATE 0.0008 J
GAMMA-CHLORDANE 0.002 J
EC10-B16
EC10-B17
EC10-B22 0' - 0.25
4,4'-DDE 0.026
ALPHA-CHLORDANE 0.009 J
AROCLOR-1260 0.08
DIELDRIN 0.004 J
ENDRIN ALDEHYDE 0.008 J
GAMMA-CHLORDANE 0.011
HEPTACHLOR 0.002 J
EC10-B7 1.5' - 3' 5.5' - 7'
TOLUENE - 0.059
TRPH 4 -
POND No. 1
EC10-S30 0' - 0.5'
4,4'-DDE 0.023
4-CHLOROANILINE 0.098 J
ALPHA-CHLORDANE 0.042
AROCLOR-1254 0.16
BENZOIC ACID 0.17 J
DIELDRIN 0.036
GAMMA-CHLORDANE 0.049
EC10-B6 1' - 2.5'
TOLUENE 0.02
TOTAL FUEL HYDROCARBONS 240 N
TRPH 120
INFLOW FROM FACILITY
EC10-B2 20.5' - 22'
TRPH 3
EC10-S23 0' - 0.25'
4,4'-DDD 0.202
4,4'-DDE 0.125
ALPHA-BHC 0.002 J
ALPHA-CHLORDANE 0.19
AROCLOR-1260 0.273
DIELDRIN 0.014
ENDRIN 0.003 J
ENDRIN ALDEHYDE 0.024
GAMMA-CHLORDANE 0.27
EC10-B5 1.5' - 3'
2-NITROPHENOL 0.19
4,4'-DDE 0.022
4-METHYL-2-PENTANONE (MIBK) 0.05
ACETONE 0.8
BENZOIC ACID 2.3
DI-N-BUTYL PHTHALATE 0.18
METHYLENE CHLORIDE 0.05
PHENOLS, TOTAL 0.2
TOLUENE 0.03
TRPH 11
EC10-B9 1.5' - 3'
TRPH 3
EC10-B21 0' - 0.25'
4,4'-DDE 0.125
4,4'-DDT 0.009 J
ALPHA-BHC 0.003 J
ALPHA-CHLORDANE 0.009 J
AROCLOR-1254 0.89 J
AROCLOR-1260 0.278
BETA-BHC 0.004 J
DIELDRIN 0.003 J
ENDRIN ALDEHYDE 0.026
GAMMA-CHLORDANE 0.014
EC10-B1 19' - 20.5'
TRPH 7
120
EC10-B3 1.5 - 3
TOLUENE 0.07 JN
TOTAL FUEL HYDROCARBONS 25 N
EC10-B8 1.5' - 3' 6' - 7.5' 11.5' - 13'
TOLUENE - 0.054 0.035
TRPH 3 - -
LEGEND
SURFACE SOIL SAMPLE LOCATIONS:
EC10 - (S24 THROUGH S33) EXTENDED SITE INVESTIGATION (BNI 2001)
SOIL BORINGS
SOIL SAMPLE LOCATIONS:
EC10 - (B1-B13) HYDROGEOLOGICAL ASSESSMENT (OGDEN 1992)
EC10 - 11A, 13A, S23, (B14-B23) DATA GAPS STUDY (BNI 1998)
ROAD
FENCE
BUILDING
IR SITE
WASTEWATER TREATMENT PLANT
APPROXIMATE DIRECTION OF WATER FLOW THROUGH PIPING
STATION ID
SAMPLE DEPTH IN FEET BGS
EC10-S28 0' - 0.5'
4,4'-DDE 0.012
BENZOIC ACID 0.074 J
ANALYTE
REVIEW QUALIFIER
RESULT IN mg/kg
ACRONYMS/ABBREVIATIONS:
BGS - BELOW GROUND SURFACE
IR - INSTALLATION RESTORATION (PROGRAM)
mg/kg - MILLIGRAMS PER KILOGRAM
REVIEW QUALIFIERS:
- CONFIRMED BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF CONSTITUENT PRESENCE
N
100 0 100 Feet
Engineering Evaluation/Cost Analysis, IR Site 10
Figure 2-6
Distribution of Organics Reported in Soil
NAF El Centro, Imperial County, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 2/1/05
File No.: 075A13639
Job No.: 23818-075
Rev No.: A

organolead has been reported above detection limits in two background soil samples from IR Sites 5 and 11. If organolead is present at IR Site 10, it is believed to be restricted to isolated occurrences.

Figure 2-6 shows nonmetals concentrations reported in soil samples.

2.4 ANALYTICAL DATA

This section discusses analytical data and summarizes data quality from the HAR; Data Gaps Study Report; various Annual Groundwater Monitoring Reports; and ESI Report, IR Site 10, Pond Nos. 2 and 3, NAF El Centro, Imperial County, California.

2.4.1 Presentation of Analytical Data

Soil samples were collected from within and along the perimeter of the IR Site 10 former stabilization ponds during the hydrogeological assessment, data gaps study, and ESI. The hydrogeological assessment field investigation activities included drilling 13 soil borings (to depths from 16.5 to 75 feet bgs) and installing and sampling 5 groundwater monitoring wells. Thirty-eight soil samples and five groundwater samples were collected from Pond Nos. 1, 2, and 3 and analyzed for COPCs. The data gaps study field investigation activities included drilling 12 soil borings (from 10 to 25 feet bgs). Twenty-six soil samples were collected from soil borings in Pond Nos. 1, 2, and 3 and were analyzed for COPCs. The ESI included collection of ten soil samples from Pond Nos. 2 and 3. In total, 74 soil samples were collected at IR Site 10.

Tables 2-1 and 2-2 show the analyses performed and the reported concentrations, respectively. A complete set of laboratory results can be found in the Data Gaps Study Report (BNI 1998a) and the final Technical Memorandum, ESI, IR Site 10, Pond Nos. 2 and 3 (BEI 2004a).

2.4.2 Data Quality

BNI reviewed the HAR (Ogden 1992) for data quality. In general, the information contained in the HAR was found to adequately describe site conditions. Soil and groundwater samples were analyzed using U.S. EPA analytical methods. Field and laboratory quality control (QC) samples were analyzed at appropriate frequencies.

A formal project quality assurance project plan (QAPP) was not generated as part of Ogden's HAR. Precision, accuracy, representativeness, comparability, and completeness (PARCC) parameter calculations were not defined as part of the HAR. As a result, an evaluation of the analytical data relative to PARCC criteria was not possible. However, the following systematic project controls were established, followed, and documented.

- Analytical data were validated in general accordance with Laboratory Data Validation Functional Guidelines for Evaluating Organic and Inorganic Analyses. Quality Assurance (QA)/QC procedures followed NEESA Level C

Table 2-1
Analyses Performed by Sampling Location and Depth

Analyses	ANALYTE (U.S. EPA METHOD)											
	VOCs (8010, 8020, 8021, or 8240)	TPH (8015 Modified)	TRPH (418.1)	SVOCs (8270)	Pesticides/ PCBs (8080 or 8080A)	Priority Pollutant Metals (6010, 6020, or 7000 series)	Hexavalent Chromium (3060A)	Soluble Metals (WET)	Cyanide (9012)	Organolead (DHS LUFT Manual)	Total Phenols (9066)	EDB (504)
Pond No. 1												
EC10-B1 at 4.0 feet	X	X				X			X			
EC10-B1 at 13.0 feet	X	X				X			X			
EC10-B1 at 19.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B2 at 1.5 feet	X	X				X			X			
EC10-B2 at 8.5 feet	X	X				X			X			
EC10-B2 at 20.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B3 at 1.5 feet	X	X				X			X			
EC10-B3 at 5.0 feet	X	X				X			X			
EC10-B3 at 15.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B5 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B5 at 5.5 feet	X	X				X			X			
EC10-B5 at 21.0 feet	X	X				X			X			
EC10-B6 at 1.0 foot	X	X	X	X	X	X			X	X	X	X
EC10-B6 at 3.0 feet	X	X				X			X			
EC10-B6 at 9.0 feet	X	X				X			X			
EC10-B7 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B7 at 5.5 feet	X	X				X			X			
EC10-B7 at 15.5 feet	X	X				X			X			
EC10-B8 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B8 at 6.0 feet	X	X				X			X			
EC10-B8 at 11.5 feet	X	X				X			X			
EC10-B9 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B9 at 6.0 feet	X	X				X			X			
EC10-B9 at 14.0 feet	X	X				X			X			

(table continues)

Table 2-1 (continued)

Analyses	VOCs (8010, 8020, 8021, or 8240)	TPH (8015 Modified)	TRPH (418.1)	SVOCs (8270)	Pesticides/ PCBs (8080 or 8080A)	Priority Pollutant Metals (6010, 6020, or 7000 series)	Hexavalent Chromium (3060A)	Soluble Metals (WET)	Cyanide (9012)	Organolead (DHS LUFT Manual)	Total Phenols (9066)	EDB (504)
	ANALYTE (U.S. EPA METHOD)											
Pond No. 1 (continued)												
EC10-B16 at 0.75 foot						X*		X				
EC10-B16 at 2.75 feet						X*		X				
EC10-B16 at 4.25 feet						X*		X				
EC10-B17 at 0.75 foot						X*		X				
EC10-B17 at 2.75 feet						X*		X				
EC10-B17 at 4.25 feet						X*		X				
EC10-B20 at 0 foot					X	X				X		
EC10-B20 at 13.5 feet						X				X		
EC10-B21 at 0 foot					X	X				X		
EC10-B21 at 23.5 feet						X				X		
EC10-B22 at 0 foot					X	X				X		
EC10-B22 at 13.5 feet						X				X		
EC10-S23 at 0 foot					X	X				X		
EC10-B23 at 23.5 feet						X				X		
Pond No. 2												
EC10-B12 at 1.0 foot	X	X	X	X	X	X			X	X	X	
EC10-B12 at 5.5 feet	X	X				X						
EC10-B12 at 21.5 feet	X	X				X						
EC10-B13 at 4.0 feet	X	X				X						X
EC10-B13 at 9.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B13 at 20.5 feet	X	X										X
EC10-B13A at 7.5 feet										X		
EC10-B15 at 0.75 foot						X*		X				
EC10-B15 at 2.75 feet						X*		X				
EC10-B15 at 4.25 feet						X*		X				

(table continues)

Table 2-1 (continued)

Analyses	ANALYTE (U.S. EPA METHOD)											
	VOCs (8010, 8020, 8021, or 8240)	TPH (8015 Modified)	TRPH (418.1)	SVOCs (8270)	Pesticides/ PCBs (8080 or 8080A)	Priority Pollutant Metals (6010, 6020, or 7000 series)	Hexavalent Chromium (3060A)	Soluble Metals (WET)	Cyanide (9012)	Organolead (DHS LUFT Manual)	Total Phenols (9066)	EDB (504)
Pond No. 2 (continued)												
EC10-B18 at 0 foot					X	X				X		
EC10-B18 at 10.5 feet						X				X		
EC10-S29 at 0 foot				X	X	X	X		X	X		
EC10-S30 at 0 foot				X	X	X	X		X	X		
EC10-S31 at 0 foot				X	X	X	X		X	X		
EC10-S32 at 0 foot				X	X	X	X		X	X		
EC10-S33 at 0 foot				X	X	X	X		X	X		
Pond No. 3												
EC10-B10 at 1 foot	X	X				X			X			
EC10-B10 at 4.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B10 at 13.5 feet	X	X				X			X			
EC10-B11 at 1.5 feet	X	X				X			X			
EC10-B11 at 6.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B11 at 15.0 feet	X	X				X			X			
EC10-B11A at 4.5 feet										X		
EC10-B14 at 0.6 foot						X*		X				
EC10-B14 at 2.6 feet						X*		X				
EC10-B14 at 4.1 feet						X*		X				
EC10-B19 at 0 foot					X	X				X		
EC10-B19 at 10.5 feet						X				X		
EC10-S24 at 0 foot				X	X	X	X		X	X		
EC10-S25 at 0 foot				X	X	X	X		X	X		
EC10-S26 at 0 foot				X	X	X	X		X	X		
EC10-S27 at 0 foot				X	X	X	X		X	X		
EC10-S28 at 0 foot				X	X	X	X		X	X		

(table continues)

Table 2-1 (continued)

Analyses	ANALYTE (U.S. EPA METHOD)											
	VOCs (8010, 8020, 8021, or 8240)	TPH (8015 Modified)	TRPH (418.1)	SVOCs (8270)	Pesticides/ PCBs (8080 or 8080A)	Priority Pollutant Metals (6010, 6020, or 7000 series)	Hexavalent Chromium (3060A)	Soluble Metals (WET)	Cyanide (9012)	Organolead (DHS LUFT Manual)	Total Phenols (9066)	EDB (504)
Background												
EC10-B4 at 1.5 feet	X	X	X	X	X	X			X	X		X
EC10-B4 at 4.5 feet	X	X	X	X	X	X			X	X	X	X

Note:
* chromium only

Acronyms/Abbreviations:
DHS – (California) Department of Health Services
EDB – ethylene dibromide
LUFT – leaking underground fuel tank
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound
WET – (California) Waste Extraction Test

Table 2-2
Maximum Reported Concentrations for Analytes Reported in Soil
(units in milligrams per kilogram)

Analyte	POND NO. 1 Max Result	POND NO. 1 Location	POND NO. 1 Depth (feet)	POND NO. 2 Max Result	POND NO. 2 Location	POND NO. 2 Depth (feet)	POND NO. 3 Max Result	POND NO. 3 Location	POND NO. 3 Depth (feet)
Volatile Organic Compounds									
acetone	0.8	EC10-B5	1.5	—*	—	—	—	—	—
methylene chloride	0.05	EC10-B5	1.5	—	—	—	—	—	—
4-methyl-2-pentanone	0.05	EC10-B5	1.5	—	—	—	—	—	—
toluene	0.07 JN	EC10-B3	1.5	0.041 JN	EC10-B12	5.5	0.22 #	EC10-B10 & EC10-B11	1 & 1.5
Petroleum Hydrocarbons									
total fuel hydrocarbons	240 N	EC10-B6	1	—	—	—	—	—	—
total recoverable petroleum hydrocarbons	120	EC10-B6	1	4	EC10-B12	1	3	EC10-B10 & EC10-B11	4 & 6
Semivolatile Organic Compounds									
benz(a)anthracene	—	—	—	0.26 J	EC10-S31	0	—	—	—
benzo(b)fluoranthene	—	—	—	0.38	EC10-S31	0	0.25 J	EC10-S24	0
benzo(k)fluoranthene	—	—	—	0.16 J	EC10-S31	0	—	—	—
benzoic acid	2.3	EC10-B5	1.5	0.32 J	EC10-S31	0	0.12 J	EC10-S25	0
benzo(g,h,i)perylene	—	—	—	0.13 J	EC10-S31	0	0.076 J	EC10-S24	0
benzo(a)pyrene	—	—	—	0.2 J	EC10-S31	0	—	—	—
butyl benzyl phthalate	—	—	—	0.23 J	EC10-S33	0	0.12 J	EC10-S26	0
4-chloroaniline	—	—	—	0.098 J	EC10-S30	0	—	—	—
chrysene	—	—	—	0.35 J	EC10-S31	0	0.15 J	EC10-S24	0
di-n-butyl phthalate	0.18	EC10-B5	1.5	—	—	—	—	—	—
fluoranthene	—	—	—	0.27 J	EC10-S31	0	—	—	—
indeno(1,2,3-cd)pyrene	—	—	—	0.13	EC10-S31	0	0.072 J	EC10-S24	0
2-nitrophenol	0.19	EC10-B5	1.5	—	—	—	—	—	—
pyrene	—	—	—	0.24 J	EC10-S31	0	—	—	—

(table continues)

Table 2-2 (continued)

Analyte	POND NO. 1 Max Result	POND NO. 1 Location	POND NO. 1 Depth (feet)	POND NO. 2 Max Result	POND NO. 2 Location	POND NO. 2 Depth (feet)	POND NO. 3 Max Result	POND NO. 3 Location	POND NO. 3 Depth (feet)
Pesticides/Polychlorinated Biphenyls									
aldrin	—	—	—	0.0033	EC10-S31	0	—	—	—
Aroclor 1254	0.890 J	EC10-B21	0	0.48	EC10-S31	0	0.12	EC10-S25	0
Aroclor 1260	0.278	EC10-B21	0	—	—	—	0.038 J	EC10-B19	0
alpha-BHC	0.003 J	EC10-B21	0	—	—	—	—	—	—
beta-BHC	0.004 J	EC10-B21	0	—	—	—	—	—	—
alpha-chlordane	0.19	EC10-S23	0	0.063	EC10-S31	0	0.012	EC10-B19	0
gamma-chlordane	0.27	EC10-S23	0	0.12	EC10-S31	0	0.017	EC10-B19 & EC10-S25	0 & 0
4,4′-DDD	0.202	EC10-S23	0	0.016	EC10-S31	0	0.0056	EC10-S25	0
4,4′-DDE	0.125	EC10-B21 & EC10-S23	0 & 0	0.11	EC10-S32	0	0.071	EC10-S25	0
4,4′-DDT	0.009 J	EC10-B21	0	0.0005 J	EC10-B18	0	—	—	—
dieldrin	0.014	EC10-S23	0	0.14	EC10-S31	0	0.032	EC10-B19	0
endosulfan sulfate	0.0008 J	EC10-B20	0	0.002 J	EC10-B18	0	—	—	—
endrin	0.003 J	EC10-S23	0	0.012	EC10-S31	0	—	—	—
endrin aldehyde	0.026	EC10-B21	0	0.002 J	EC10-B18	0	0.003 J	EC10-B19	0
endrin ketone	—	—	—	0.0048	EC10-S31	0	—	—	—
heptachlor	0.002 J	EC10-B22	0	—	—	—	—	—	—
heptachlor epoxide	—	—	—	0.0069	EC10-S31	0	0.002 J	EC10-B19	0
Metals									
antimony	0.58	EC10-B8	11.5	0.52	EC10-B13	9	0.48	EC10-B11	6
arsenic	10	EC10-B22	0	8.7	EC10-S32	0	4	EC10-B19	0
beryllium	0.99	EC10-B9	6	0.98	EC10-B13	9	1	EC10-B11	15
cadmium	59	EC10-S23	0	22 J	EC10-S32	0	3.08	EC10-B19	0
chromium	463	EC10-B22	0	41	EC10-S32	0	79.2	EC10-S25	0
copper	696	EC10-S23	0	326 J	EC10-S32	0	52.7 J	EC10-S25	0

(table continues)

Table 2-2 (continued)

Analyte	POND NO. 1 Max Result	POND NO. 1 Location	POND NO. 1 Depth (feet)	POND NO. 2 Max Result	POND NO. 2 Location	POND NO. 2 Depth (feet)	POND NO. 3 Max Result	POND NO. 3 Location	POND NO. 3 Depth (feet)
Metals (continued)									
hexavalent chromium	—	—	—	4 J	EC10-S30	0	—	—	—
lead	172	EC10-B22	0	51.3	EC10-S32	0	23.7	EC10-B19	0
mercury	2	EC10-S23	0	0.38	EC10-S31	0	0.19	EC10-S25	0
nickel	35.6	EC10-S23	0	20.9 J	EC10-S32	0	17.7 J	EC10-S26	0
selenium	19	EC10-B22	0	15.1	EC10-S32	0	4	EC10-B19	0
silver	446	EC10-B22	0	84.8	EC10-S32	0	47.8	EC10-B19	0
thallium	0.23	EC10-B22	0	0.23	EC10-B18	10.5	0.18	EC10-B19	0
zinc	1,370	EC10-S23	0	354	EC10-S32	0	105	EC10-B19	0
Soluble Metals (mg/L)									
copper	0.01	EC10-B16	0.75	—	—	—	—	—	—
Other									
cyanide	0.6	EC10-B7	1.5	1.7 J	EC10-S32	0	0.5	EC10-B11	15
organolead	—	—	—	0.28	EC10-B13	9	0.21	EC10-B11	6
phenols, total	0.2	EC10-B5	1.5	—	—	—	0.2	EC10-B11	6

Note:
* dash indicates not analyzed

Acronyms/Abbreviations:
alpha-BHC – alpha isomer of 1,2,3,4,5,6-hexachlorocyclohexane
beta-BHC – beta isomer of 1,2,3,4,5,6-hexachlorocyclohexane
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/L – milligrams per liter

Review Qualifiers:
– confirmed by gas chromatography/mass spectroscopy
J – estimated value
N – presumptive evidence of constituent presence

(Level III) QC guidelines. Level III validation entails review of data reports, QC measurements, and data quality indicators.

- Critical samples were chosen for full data validation for laboratory QA/QC; all data were validated for sample handling and management and field QA/QC. The choice of critical samples was based on several criteria: detection of relatively high concentrations of contaminant compounds, many compounds detected in a particular sample, detection of contaminant compounds where none were expected (i.e., background samples), instances of nondetection where contaminants were expected, vertical and lateral spatial coverage, and coverage of each sample matrix. For each critical sample selected, results from all analyses for that sample were validated.
- Validation of laboratory QA/QC was performed by an independent contractor.

Analytical data presented in the following investigation reports were determined to be of acceptable quality to adequately describe site conditions: final ESI Technical Memorandum (BEI 2004a), final Annual Groundwater Monitoring Report (BNI 1998b), Data Gaps Study Report (BNI 1998a), and HAR (Ogden 1992). Soil and groundwater samples were analyzed using U.S. EPA analytical methods. Field and laboratory QC samples were analyzed at appropriate frequencies.

The data from the previously mentioned investigations conform to the QC specifications identified in the QAPP and were flagged in accordance with the project QAPP data validation functional guidance. Independent validation of laboratory deliverables was performed to assess compliance with methods, review of quality indices, verification of frequency of QC analyses, and assessment of usability of data with respect to data needs. Level III validation was performed on approximately 90 percent of the samples submitted and entailed review of data reports, QC measurements, and data quality indicators. Level IV data validation was performed on the remaining 10 percent of the samples submitted and included raw data checks (i.e., laboratory instrument output/bench record reviews for laboratory calculations, algorithms, and transcription errors) to detect any systematic procedural errors in the laboratory results. Results of the data validation did not indicate significant issues regarding data quality.

The following PARCC parameter calculations were defined in the QAPP and evaluated in the final ESI Technical Memorandum (BEI 2004a), final Annual Groundwater Monitoring Report (BNI 1998b), and Data Gaps Study Report (BNI 1998a).

- Precision data were found to meet project objectives and were within limits.
- Accuracy measurement data were found to meet project objectives and were within limits.
- Representativeness was assessed in both qualitative and quantitative terms. The project report discussed the qualitative aspects of representativeness in terms of design of the field sampling plan, sampling techniques, sample handling protocols, and associated documentation. Quantitative measures of representativeness included field and laboratory blank measurements to identify

whether contamination was introduced through field or laboratory operations. Field duplicate measurements were used to establish variability.

- Comparability of the data was established through the use of standard analytical methods and QC procedures established in the project QAPP, consistent reporting units for a specified procedure, and method detection limits for all analytical parameters that were established in accordance with 40 C.F.R. Part 136, Appendix B, before the start of the analyses to meet the project requirements.
- Field activity completeness was assessed within the context of the overall sampling design. Data completeness met the project needs and expectations.

2.5 STREAMLINED RISK EVALUATION

The decision to proceed with a removal action at IR Site 10 was based largely on the results of the human-health and ecological risk screening for soils performed as part of the data gaps study (BNI 1998a) and the ESI (BEI 2004a). The risk evaluations focused on chemicals in soil. Risk from soil gas generated by VOCs dissolved in groundwater was also evaluated.

Targets potentially affected by contamination at IR Site 10 include human and ecological receptors. Human-health risk screening was conducted as part of the data gaps study and the ESI. Potential ecological receptors occupying or foraging at NAF El Centro were considered in a Phase I predictive ecological risk assessment, described in the ESI Technical Memorandum.

2.5.1 Previous Risk Evaluations and Findings

Results of the risk assessment are summarized in Section 2.5.1.1. Human-health risk screening for soils at IR Site 10 was performed as part of the data gaps study (BNI 1998a). COPCs that were evaluated included VOCs, SVOCs, PCBs, pesticides, and metals. Human-health risk screening indicated there are potential risks to human health from COPCs in shallow soil at IR Site 10, primarily in Pond No. 1.

Human-health and ecological risk screening for soils at IR Site 10 were performed as part of the ESI at IR Site 10. COPCs that were evaluated included VOCs, SVOCs, PCBs, pesticides, and metals. Human-health risk screening at Pond Nos. 2 and 3 indicated cancer risk estimates were within the generally acceptable range. However, the estimated noncancer risk for Pond No. 2 was elevated. The ecological risk screening suggested that chemical concentrations at IR Site 10 may represent a condition of ecological risk. Risk associated with migration of dissolved VOCs to indoor air in potential future structures was found to be within an acceptable range of values.

According to the NCP, eight factors must be considered in determining the appropriateness of a removal action. Conditions at IR Site 10 meet one of those NCP factors for a removal action (40 C.F.R. § 300.415 [b][2]): "actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants."

The removal action will be conducted as an NTCRA because the on-site activities will be initiated more than 6 months after the planning period begins (40 C.F.R. § 300.415[b][4]).

2.5.1.1 HUMAN-HEALTH RISK ASSESSMENT

Human-health risk was assessed as parts of the data gaps study and the ESI.

Data Gaps Study

During the human-health risk assessment performed as part of the data gaps study, the highest concentrations for all soil analytes were compared with site background concentrations, when available, and California-modified residential PRGs (BNI 1998a). The incremental cancer risk and noncancer hazard quotient (HQ) for each COPC were then estimated. The maximum concentration of chemicals in soil at the site yielded an incremental cancer risk of 4×10^{-5}, within the generally acceptable (or "risk management") range as denoted in the NCP, and a noncancer hazard index (HI) of 50. The dominant risk drivers for carcinogenic effects were arsenic, cadmium, chromium, Aroclor 1254, Aroclor 1260, and dieldrin. The noncarcinogenic risk drivers were cadmium, lead, silver, and organolead.

Table 2-3 summarizes the risk estimate results. The HI of 50 was based primarily on the maximum organolead concentrations. However, it was later determined that organolead was not a COPC because historical results for it could not be reproduced and its frequency of detection was low. The HI goes down to 5 if the contribution from organolead is removed.

The highest concentrations of COPCs were reported in samples from the eastern portion of Pond No. 1, where sewage effluent entered this primary settling basin. COPCs reported in soil samples from Pond Nos. 2 and 3 were generally within established background levels and below residential PRGs.

Extended Site Inspection

As part of the ESI, human-health cancer risk from chemicals in soil at Pond Nos. 2 and 3 was assessed and found to be within the generally acceptable risk range. Also, there was a slight potential noncancer risk at Pond No. 2 (HI = 2) and acceptable noncancer risk at Pond No. 3 (Table 2-3) (BEI 2004a).

Human-health risk associated with migration of soil gas to future potential human structures at IR Site 10 was assessed by modeling the migration VOCs from groundwater to indoor air. The modeling revealed that low concentrations of VOCs in IR Site 10 groundwater pose an insignificant risk to occupants of potential structures at IR Site 10.

No further action was recommended for Pond Nos. 2 and 3. A removal action, such as excavation and disposal of the upper 0.5 to 1.0 foot of soil, was recommended for Pond No. 1 on the basis of elevated risk to human health.

Table 2-3
Human-Health Risk Screening Results

	CANCER RISK			HAZARD INDEX	
	Residential (U.S. EPA)	Residential (Cal/EPA)	Industrial	Residential	Industrial
All Ponds, With Pond No. 1 as Major Driver (DGS)					
Total	6×10^{-5}	—[a]	3×10^{-6}	**5**[b] **(without organolead)** **50**[b] **(with organolead)**	—
Background metals	2×10^{-5}	—	4×10^{-8}	—	—
Incremental	4×10^{-5}	—	3×10^{-6}	—	—
Pond No. 2 (ESI)					
Total	1×10^{-5}	3×10^{-5}	3×10^{-6}	**2**[b]	0.1
Background metals	9×10^{-8}	5×10^{-7}	4×10^{-8}	0.09	0.004
Incremental	1×10^{-5}	3×10^{-5}	3×10^{-6}	—	—
Pond No. 3 (ESI)					
Total	3×10^{-6}	3×10^{-6}	7×10^{-7}	0.4	0.03
Background metals	9×10^{-8}	3×10^{-7}	4×10^{-8}	0.08	0.003
Incremental	3×10^{-6}	3×10^{-6}	6×10^{-7}	—	—

Notes:
[a] dash indicates not established
[b] **boldface** indicates hazard index ≥ 1

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
DGS – data gaps study
ESI – extended site investigation
U S EPA – United States Environmental Protection Agency

2.5.1.2 ECOLOGICAL RISK ASSESSMENT

As part of the ESI, a screening-level ecological risk assessment was performed for contaminants present in soil at IR Site 10. Six metals (cadmium, copper, lead, nickel, selenium, and zinc) were reported with HQs using low toxicity reference values (HQ-lows) exceeding 1, indicating the potential for ecological risk (Table 2-4). However, the HQ-low for nickel was the same as that for the background concentration, representing a potential risk equivalent to background. Only cadmium showed an HQ-high that exceeded 1, indicating cadmium was the principal chemical of potential ecological concern (COPEC). Organic compounds exhibiting potential risk (i.e., HQ-low greater than 1) were pesticides, with an HI of 2. The conservative factors included in the risk estimate suggest the likelihood that pesticides, represent a condition of negligible ecological risk.

A site remediation may be implemented to reduce the risk to ecological receptors. The potential risk will be sufficiently reduced if the site exposure characterization is no greater than the background characterization or if the exposure characterization represents an HQ of 1. Section 3.5 contains a description of a residual ecological risk assessment considering a postremoval action exposure scenario.

Table 2-4
Summary of Compounds With HQs and HIs Greater Than or Equal to 1

Analyte	Background Concentration (HQ-Low)	NAF El Centro IR Site 10 (HQ-Low)	NAF El Centro IR Site 10 (HQ-High)
cadmium	**4E+1**[a]	**2E+2**[a]	**4E+0**[a]
copper	7E-1	**4E+0**[a]	3E-2
lead	**9E+0**[a]	**2E+1**[a]	3E-2
nickel	**2E+1**[a]	**2E+1**[a]	7E-2
selenium	**2E+0**[a]	**1E+1**[a]	6E-1
zinc	**3E+0**[a]	**1E+1**[a]	3E-1
HI[b] – metals	**7E+1**[a]	**2E+2**[a]	**5E+0**[a]
HI[b] – pesticides	NA	**2E+0**[a]	7E-2

Notes:
[a] **boldface** indicates HQ or HI ≥ 1
[b] HI is the sum of the analyte-specific HQs presented in each column

Acronyms/Abbreviations:
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
NA – not available
NAF – Naval Air Facility

2.5.2 Health and Environmental Effects of Cadmium and Threat to Nearby Human Populations and Environment

Cadmium can occur naturally in soils as the result of weathering of cadmium-containing minerals. A background threshold value of 4.6 mg/kg has been established for sediments at NAF El Centro. An additional source of cadmium in soil comes from airborne cadmium generated by the burning of fossil fuels and the incineration of municipal waste (U.S. EPA 2004).

Elevated concentrations of cadmium in soil may lead to ingestion, inhalation, or dermal exposure. Limited animal data are available, although some reproductive effects, such as decreased reproduction and testicular damage, have been noted following oral exposures. Animal studies have demonstrated an increase in lung cancer from long-term inhalation exposure to cadmium. In occupational settings, chronic exposure to cadmium in air has resulted in bronchiolitis and emphysema. Animal studies provide evidence that cadmium has developmental effects, such as low fetal weight, skeletal malformations, interference with fetal metabolism, and impaired neurological development (U.S. EPA 2004). The acute effects of cadmium inhalation in humans is mainly to the lungs, such as pulmonary irritation. Chronic inhalation or oral exposure to cadmium leads to a buildup of cadmium in the kidneys that can cause kidney disease.

2.5.3 Documented Exposure Pathways

The following species represent terrestrial ecological receptors of potential concern that live on or otherwise contact soil at IR Site 10.

- The mourning dove has a small body size and nests in the study area. The mourning dove is mostly herbivorous, ingesting seeds and grit that have been in contact with contaminated soils.
- The deer mouse is a small, mostly invertebrate-feeding mammal that is a primary food item for predators. Its burrowing and foraging activities increase its chance of exposure from soilborne COPECs.
- The American kestrel has been observed in terrestrial habitats throughout NAF El Centro. Because the American kestrel is considered high on the food chain, its exposure potential to COPECs that biomagnify is increased
- The American robin represents several species of birds that spend time in the study area and feed on insects, earthworms, and other invertebrates. It has a small body size, nests in the area, and ingests soil, grit, and food items that have been in contact with contaminated soils.
- The cottontail rabbit is a small, mostly herbivorous mammal present at the site. It is a primary food item for predators.
- The coyote is a larger, mostly carnivorous mammal; its foraging activities and high position on the food chain increase its exposure potential from soilborne

COPECs, particularly bioaccumulative compounds. It is the primary predator in the habitat.

2.5.4 Sensitive Populations

Several special-status species are classified as threatened, endangered, or species of concern by state or federal agencies and are known to occur or have potential to occur in habitats in the vicinity of IR Site 10 (CDFG 2002a,b,c,d). The likelihood of these species occurring at or near IR Site 10 is limited because of the periodic removal of vegetative habitat from the pond bottoms.

No special-status plant species are expected to occur in the IR Site 10 area because significant habitat disruption is characteristic of the Imperial Valley in general. Nearly 100 years of agricultural activities in the Imperial Valley have essentially eliminated the natural vegetation.

No special-status reptiles, amphibians, or fish have been reported in the vicinity of IR Site 10.

Several special-status bird species may occur within the vicinity of IR Site 10. These do not generally include sea birds, shore birds, and ducks because they prefer aquatic areas and are unlikely to occur at IR Site 10. Yuma clapper rail, bank swallow, and willow flycatcher prefer habitats close to water and may occur in the area of the New River. Resident special-status birds of the desert scrub habitat include black-tailed gnatcatcher and Le Conte's thrasher. Predatory birds, including the burrowing owl, Swainson's hawk, the white-tailed kite, the prairie falcon, and the American peregrine falcon, make up the majority of the special-status birds potentially occurring at or near IR Site 10.

Two special-status mammals may potentially occur at desert scrub habitats such as IR Site 10: Nelson's bighorn sheep (including the distinct subspecies Peninsular bighorn sheep) and Yuma mountain lion. Both of these mammals require large territories and are very sensitive to human activities; therefore, they are unlikely to occur in the vicinity of IR Site 10.

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Section 3
IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section identifies the removal action scope and objectives for IR Site 10. Removal action objectives (RAOs) are based on CERCLA, NCP, streamlined risk evaluation (Section 2.5), sensitive ecosystems (Section 2.1.6), and chemical- and location-specific applicable or relevant and appropriate requirements (ARARs) (Section 3.4.2). These objectives were used to screen technologies and to develop removal action alternatives (Sections 4 and 5).

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 Number (Exec. Order No.) 12580. This order authorizes the Navy to conduct and finance removal actions. This removal action is non-time-critical because more than a 6-month planning period will have been available from the time the Navy determined that a removal action was appropriate and the time that on-site activities will be initiated. Requirements for this EE/CA and its mandated public comment period provided opportunity for public input to the cleanup process.

Additionally, the Cal. Health & Safety Code specifies required documentation, which depends upon the costs of the removal action. The Cal. Health & Safety Code § 25356.1(h) requires development of either a RAP (for removal actions that cost $1 million or more) or a RAW (for removal actions that cost less than $1 million). DTSC may waive the RAP requirements in favor of a RAW for removal actions when an "imminent and/or substantial endangerment" determination exists. Furthermore, DTSC may also waive the RAP requirements if a RAP-equivalent document that meets the requirements of Cal. Health & Safety Code § 25356.1(h)(3) is prepared.

The Navy, with state regulatory oversight, is the lead agency for the removal action. As such, the Navy has final approval authority over the recommended alternative and all public participation activities with state concurrence. SWDIV, as regional manager of the Navy's CERCLA Program, is providing technical expertise to NAF El Centro to conduct activities specific to the preparation of this EE/CA and the execution of the recommended alternative.

This EE/CA complies with the requirements of CERCLA, Superfund Amendments and Reauthorization Act, NCP at 40 C.F.R. Part 300; Defense Environmental Restoration Program at 10 *United States Code* (U.S.C.) § 2701, et seq.; and Exec. Order No. 12580. This EE/CA is considered appropriate on the basis of the following factor under 40 C.F.R. § 300.415(b)(2)(i): "actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants."

This EE/CA report, along with the action memorandum, will also satisfy Cal. Health & Safety Code § 25323.1 requirements for a removal action.

3.2 DETERMINATION OF REMOVAL ACTION SCOPE

The scope of this removal action is to reduce risk to human and ecological receptors from exposure to elevated concentrations of COPCs in soil associated with the former

stabilization ponds at IR Site 10. The removal action alternatives considered in this EE/CA report may result in a determination that no further response action for CERCLA compliance is appropriate at IR Site 10 for current and future land use.

A project work plan will be prepared by the remedial action contractor (RAC) to implement the final alternative selected by the Navy. The project work plan will describe planning and design to facilitate the removal action, including a confirmation sampling program, as necessary. A project report will be prepared to document the removal action activities; the report will provide the basis if a decision for no further action is recommended following the removal.

3.3 DETERMINATION OF REMOVAL ACTION SCHEDULE

There are neither anticipated weather-related restrictions nor availability-of-services restrictions expected to impact the removal schedule. This EE/CA report, which will be available for public review and agency comment for a minimum of 30 days, identifies and recommends a removal action alternative. The Navy will review and prepare written responses to significant public and agency comments.

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 citing laws" (40 C.F.R. § 300.415[j]).

The evaluation of ARARs for this EE/CA is included as Appendix B. The following subsections provide an overview of the ARARs process and a summary of ARARs that potentially affect the development of RAOs.

3.4.1 ARARs Overview

Identification of ARARs is a site-specific determination that involves a two-part analysis. First, it must be determined whether a given requirement is applicable; then, if it is not applicable, it must be determined whether the requirement is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the COPC, removal 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 site circumstances are sufficiently similar to circumstances in which the law otherwise applies and the requirement is well suited to the conditions of the site.

A requirement must be substantive to constitute an ARAR for activities conducted on-site. Procedural or administrative requirements (e.g., permits and reporting requirements) are not ARARs.

In addition to ARARs, 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, the Navy has primary responsibility for the identification of federal ARARs for IR Site 10. As the lead state agency, DTSC has responsibility for identifying state ARARs.

The Navy formally requested state chemical-, location-, and action-specific ARARs for IR Site 10 in a letter, dated 07 April 2003, and received responses as indicated from the following agencies:

- California Integrated Waste Management Board (response received 20 June 2003)
- RWQCB (response received 13 May 2003)
- DTSC (response received 20 May 2003)
- California Department of Fish and Game (response received 01 May 2003)
- Imperial County Air Pollution Control District (no reply, requiring use of 07 January 2003 submittal for IR Site 2)

Requirements of ARARs and TBCs are generally divided into three categories: chemical-, location-, and action-specific requirements. Chemical- and location-specific ARARs affecting the development of RAOs are discussed in the following section. Other chemical-, location-, and action-specific ARARs are presented in Section 5 for each alternative considered. Appendix B includes a detailed discussion of all ARARs considered during this EE/CA.

3.4.2 ARARs Affecting Removal Action Objectives

The substantive provisions of the following chemical- and location-specific requirements may impact the development of the RAOs:

- Resource Conservation and Recovery Act (RCRA) hazardous waste characterization requirements at California Code of Regulations (Cal. Code Regs.) Title (tit.) 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, including characterization of solid waste as toxic based on toxicity characteristic leaching procedure (TCLP)
- non-RCRA (California) hazardous waste characterization requirements at 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)
- Exec. Order No. 11990, Protection of Wetlands

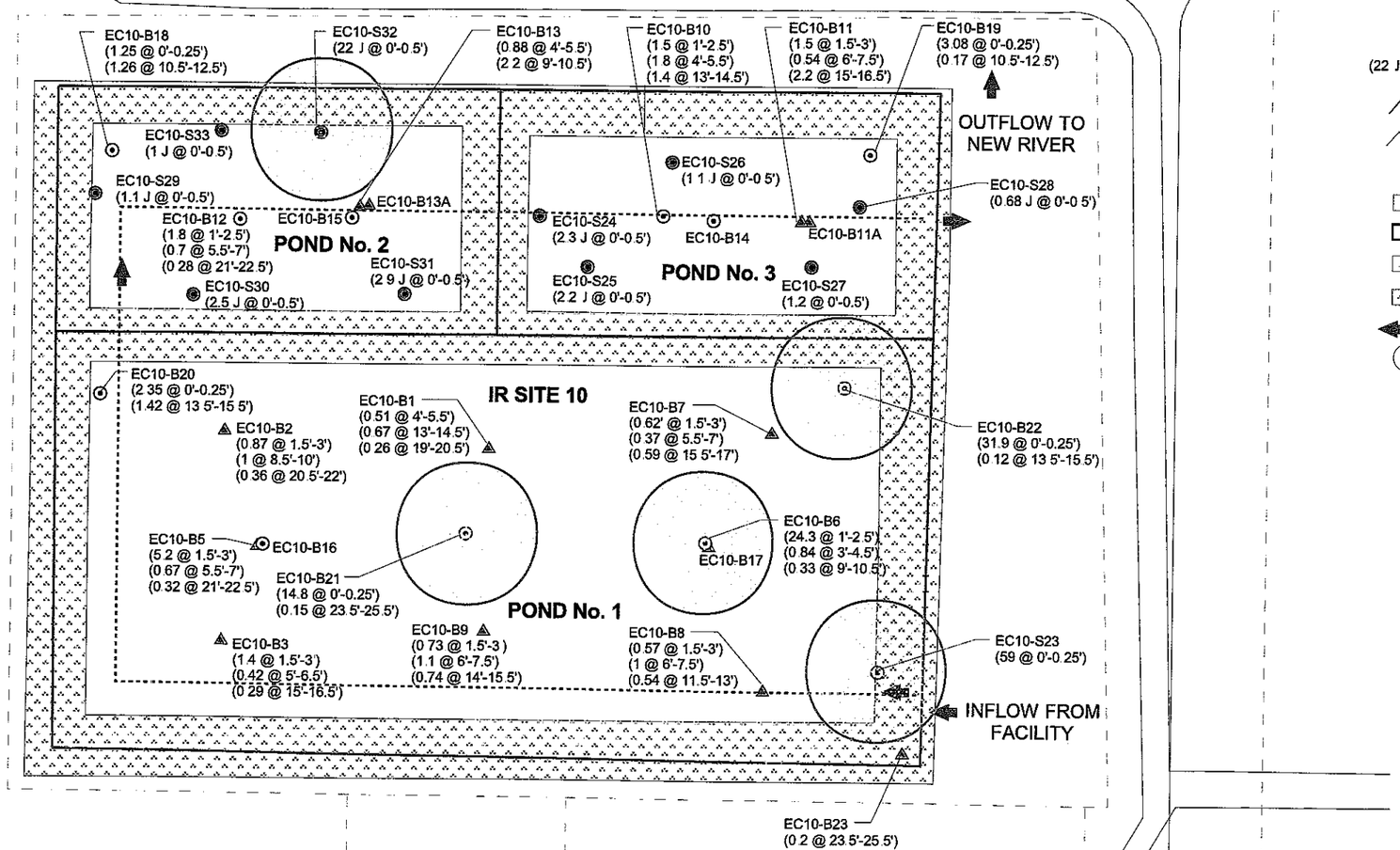
- Endangered Species Act of 1973 requirement at 16 U.S.C. § 1536(a), (h)(1)(B) regarding protecting listed species or critical habitat
- Migratory Bird Treaty Act of 1972 requirement at 16 U.S.C. § 703 regarding the protection of native migratory birds, including poisoning at hazardous waste sites
- California Endangered Species Act § 2080 regarding the take of endangered or threatened species

3.5 REMOVAL ACTION OBJECTIVES

Based on CERCLA, NCP, human-health and ecological risk screening in the data gaps study and ESI, and ARARs, the RAOs are as follows

- Reduce risk to ecological receptors from contaminants in soil to allowable levels.
- Reduce risk to human health from contaminants in soil to allowable levels.

IR Site 10 data indicate that maximum concentrations of soil COPCs and COPECs occur at similar locations. Elevated cadmium concentrations, the principle COPEC, were used to identify the areas proposed for removal (Figure 3-1). The data indicate that removal of the upper 1 to 2 feet of soil at Pond No. 1 sampling locations EC10-B6, EC10-B21, EC10-B22, and EC10-S23 and Pond No. 2 sampling location EC10-S32 would likely result in negligible human-health and ecological risk. Residual human-health and ecological risks were estimated on the basis of removal of soil from these five areas (Appendix A). On the basis of this cleanup strategy, estimates of residual human-health risk (Table 3-1) and residual ecological risk (Table 3-2) result in allowable residual risk levels. This would be verified with confirmation sampling following the removal.



LEGEND

- SURFACE SOIL SAMPLE LOCATIONS: EC10 - (S24 THROUGH S33) EXTENDED SITE INVESTIGATION (BNI 2001)
- SOIL BORINGS
- SOIL SAMPLE LOCATIONS: EC10 - (B1-B13) HYDROGEOLOGICAL ASSESSMENT (OGDEN 1992) EC10 - 11A, 13A, S23 (B14-B23) DATA GAPS STUDY (BNI 1998)
- (22 J @ 0'-0.5') CADMIUM RESULT IN mg/kg WITH REVIEW QUALIFIER AND SAMPLE DEPTH BGS
- DRAINAGE
- ROAD
- FENCE
- BUILDING
- IR SITE
- WASTEWATER TREATMENT PLANT
- APPROXIMATE BERM AND DIRT ROAD AREA
- APPROXIMATE DIRECTION OF WATER FLOW THROUGH PIPING
- AREAS PROPOSED FOR REMOVAL

ACRONYMS/ABBREVIATIONS:

BGS - BELOW GROUND SURFACE
IR - INSTALLATION RESTORATION (PROGRAM)
mg/kg - MILLIGRAMS PER KILOGRAM

REVIEW QUALIFIER:

J - ESTIMATED VALUE

N

100 0 100 Feet

Engineering Evaluation/Cost Analysis, IR Site 10

Figure 3-1

Areas Proposed for Removal

NAF El Centro, Imperial County, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/1/05
File No.: 075A13640
Job No.: 23818-075
Rev No.: A

Table 3-1
Residual Human-Health Risk

	CANCER RISK			HAZARD INDEX	
	U.S. EPA Residential	Cal/EPA Residential	Industrial	Residential	Industrial
Total risk[a]	1×10^{-5}	2×10^{-5}	4×10^{-6}	0.6	0.05
Background metals risk	2×10^{-5}	2×10^{-5}	4×10^{-6}	0.4	0.04
Incremental risk	6×10^{-6}	7×10^{-6}	2×10^{-6}	—[b]	—

Notes:
[a] exposure point for lead (13 5 mg/kg) was below the residential and industrial PRGs of 150 and 750 mg/kg, respectively
[b] dash indicates not applicable

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
mg/kg – milligrams per kilogram
PRG – preliminary remediation goal
U.S. EPA – United States Environmental Protection Agency

Table 3-2
Residual Ecological Risk

Analyte	Background Concentration (HQ-Low)	NAF El Centro IR Site 10 (HQ-Low)
cadmium	**4E+1**[a]	**3E+1**[a]
copper	7E-1	1E+0
lead	**9E+0**[a]	**8E+0**[a]
selenium	**2E+0**[a]	**6E+0**[a]
zinc	**3E+0**[a]	**3E+0**[a]
dieldrin	NA	**2E+0**[a]
HI[b] – metals	**7E+1**[a]	**4E+1**[a]
HI[b] – pesticides	NA	**2E+0**[a]

Notes:
[a] boldface indicates HQ ≥ 1
[b] HI is the sum of the analyte-specific HQs presented in each column

Acronyms/Abbreviations:
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
NA – not available
NAF – Naval Air Facility

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Section 4
IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Before the removal alternatives were developed, general response actions were determined on the basis of the RAOs. The primary RAO for IR Site 10 is to reduce to allowable levels the risk to ecological receptors from exposure to metals-impacted soil. In so doing, risk to human health would also be reduced and land use would be unrestricted.

Technologies and process options correlating with the general response action categories were then identified and screened for effectiveness, implementability, and cost. The retained technologies and process options were assembled into the removal alternatives that are described and evaluated in Section 5.

4.1 GENERAL RESPONSE ACTIONS

For this effort, the following five general response action categories were considered.

- **Institutional controls** restrict land use or activities conducted at or in adjacent areas to the site.
- **Engineering controls** limit exposure to the site by physical means (e.g., fencing and cover). This type of response action does not reduce the level of contamination on-site.
- **Treatment** involves chemically or biologically altering contaminants (*in situ* or *ex situ*) to become less harmful by-products or physically altering the contaminated media (e.g., by electrokinetic remediation, phytoremediation, soil washing, or solidification/stabilization).
- **Excavation/backfilling** involves removing contaminated soil using mechanical equipment. Following excavation, if desired, the area can be backfilled and returned to original grade. The site would revegetate naturally
- **Disposal** involves the transfer and disposition of excavated soil to an on- or off-site location.

4.2 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

Identification of technologies was based on the general response action categories (Section 4.1). The following technologies were screened:

- land-use restrictions
- access restrictions
- caps and covers
- physical/chemical treatment
- biological treatment
- excavation
- backfilling

- on-site disposal
- off-site disposal

For each technology, representative process options were selected. The process options were screened against the general criteria discussed in Section 4.3. Table 4-1 lists removal technologies and process options identified for the screening process and summarizes the results.

4.3 SCREENING CRITERIA

Removal action technologies were screened following U.S. EPA technical guidance (U.S. EPA 1988). Process options that were retained following this screening evaluation were assembled into removal action alternatives that were also screened for effectiveness, implementability, and cost (Section 5).

4.3.1 Effectiveness

Effectiveness evaluation emphasizes each process option's performance and ability to meet RAOs. To evaluate the effectiveness of the process options, consideration was given to the following:

- overall protection of human health and the environment
- compliance with ARARs
- long-term effectiveness
- reduction of toxicity, mobility, or volume of contaminants
- short-term effectiveness

The less effective process options from each technology group were eliminated. Process options that did not provide adequate protection of human health and the environment were also eliminated from further consideration.

4.3.2 Implementability

Implementability evaluation considers the relative ease to implement a process option. This includes technical feasibility, commercial availability of materials and equipment, and availability of the technology. Other factors would be availability of skilled labor, logistics, and state and/or community acceptance. Process options that are technically or administratively infeasible or that would require equipment, specialists, or facilities that are not available within a reasonable period of time may be eliminated from further consideration.

4.3.3 Cost

Process options with lower costs were preferred if the effectiveness and implementability criteria were judged to be similar.

Table 4-1
General Response Actions, Technologies, and Process Options Compared to Screening Criteria

General Response Action	Technology	Process Option	Description	Effectiveness	Implementability	Cost	Retained?
Institutional Controls	Land-use restrictions	Land-use controls	Typically, formal program to control access to or restrict land use at a site	Would not reduce site access for ecological receptors to impacted soil Would limit site access or restrict access for humans Would not reduce toxicity, mobility, or volume of contaminated material	Minimal effort to implement legal processes	Cost associated with labor and time to implement laws would be medium to low.	Yes
Engineering Controls	Access restrictions	Fencing	Vertical barrier (such as combination of galvanized steel/barbed-wire fencing) at the perimeter of the contaminated area	Would not effectively restrict ecological-receptor access to impacted soil Would restrict human access to impacted soil Would not reduce toxicity, mobility, or volume of contaminated material Would restrict land use Would negatively affect aesthetics	Minimal effort to install fence	Cost would be medium to low.	Yes
		Alarms	Motion- or heat-sensing devices that would produce sound to deter access	Would not prevent access to the site Would not reduce toxicity, mobility, or volume of contaminated material Would present noise concerns	Minimal effort to install alarms and monitor system monthly	Cost of personnel salary while they monitor alarms, cost of long-term maintenance of alarms, and capital cost of alarms would be medium.	No
	Caps and covers	Soil/vegetative cover	Cap that separates receptors from contamination	Would separate burrowing species from contamination if thick enough or if used with nonburrowing barrier May expose workers who install cap/cover to contamination Would require long-term maintenance and monitoring Would restrict land use Would not reduce toxicity, mobility, or volume through treatment May raise existing grades and may be visually unattractive	Worker exposure to contaminants, but implementation feasible	Capital cost of cap/cover, and cost of personnel salaries while they install cap/cover and maintain/monitor it for long term would be medium	Yes
		Crushed rock barrier	Barrier that prevents burrowing	Would separate burrowing species from contamination May expose workers who install barrier to contamination Would require long-term maintenance/monitoring Would restrict land use Would not reduce toxicity, mobility, or volume through treatment	Worker exposure to contaminants, but implementation feasible	Capital cost of crushed rock, and cost of personnel salaries while they install barrier and maintain/monitor it for long-term would be medium	Yes

(table continues)

Table 4-1 (continued)

General Response Action	Technology	Process Option	Description	Effectiveness	Implementability	Cost	Retained?
Treatment	Physical/chemical treatment	Electrokinetic remediation	*In situ* process in which an electrical field is created in soil matrix by applying a low-intensity direct current to cause metals to migrate toward a collection area, with resulting removal of soil with concentrated metals in the collection area	Would be ineffective because of the shallow nature of contaminants and low moisture in surface soils	Proportionately large implementation effort in comparison to the low volume of contamination Extensive testing required	Cost would be high	No
		Soil washing	Liquid (usually water, sometimes combined with chemical additives) and mechanical process to scrub soil, removing hazardous contaminants and concentrating them into a smaller volume, which works if the contaminants are concentrated in small volume of fine particles (clay), and to then further treat this smaller volume of soil by other methods so that the clean, larger volume of soil can potentially be used as backfill	Would still have to remove and dispose small volume of soil Would have limited effectiveness because the majority of site soils are fine (e g., silt) Would require extensive and expensive tests Would minimize or eliminate risk from off-site transportation	Feasible implementation because contamination is limited to top few feet of soil Implementation of accompanying technology required	Cost would be high	No
		Solidification/ stabilization	Processes in which contaminants are physically bound or enclosed within a stabilized mass and then chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility	Would not totally prevent contact with contaminants by ecological receptors, particularly if the result is loamy Would increase the volume of contaminated soil Would restrict land use Would minimize or eliminate risk from off-site transportation	Feasible implementation; treatability studies generally required Solidified material, which may hinder future site use Significant increase in volume, up to double the original volume, for some processes	Cost would be fairly high for mobilization of specialized equipment	No
	Biological treatment	Phytoremediation	Variety of remediation methods that use plants to remove contaminants from soil, for example, phytoextraction, during which water-soluble metals are taken up by the plant species and the metals are stored in the plant's aerial shoots that are harvested and either smelted for potential metal recycling/recovery or disposed as a hazardous waste	Would be ineffective in short term and would require maintenance in long term Would be potentially effective long term but the harvesting of plants would still periodically disturb site surface soils Would require additional human activity at the site that may interfere with ecological receptors Plants could acquire hazardous characteristics	Long implementation process	Cost may be high for personnel to monitor plants, capital cost of plants, and disposal of plants at end of technology period	No
Excavation/ Backfilling	Excavation	Selective excavation	Physical removal of contaminated soil using mechanical equipment	Would result in removal of contamination, reducing the risk to allowable levels Would involve some potential for short-term exposure, which could be minimized through engineering controls Would be effective in long term	Feasible implementation and short duration	Cost would be somewhat high	Yes

(table continues)

Table 4-1 (continued)

General Response Action	Technology	Process Option	Description	Effectiveness	Implementability	Cost	Retained?
Excavation/ Backfilling (continued)	Backfilling	Selective backfilling	Process to restore and regrade the site after excavation, allowing the site to naturally revegetate	Would minimize injury to humans and impacts to aesthetics after contaminants have been removed Would not restrict future land use	Feasible implementation, depending on quality of soil, which may have to be imported to the site if soil from the berms is not of suitable quality	Cost would be low if the berm soil is useable. Cost of transportation and labor associated with obtaining clean soil would be medium.	Yes
Disposal	On-site disposal	On-site beneficial reuse	Process in which, after soil is excavated, stockpiled, and classified, it is staged temporarily on-site and then relocated to other NAF El Centro project locations for beneficial reuse (e g., foundation material for landfill cap)	Would expose workers to contaminated soil during handling and transporting	Feasible implementation if the soil is suitable, but no appropriate use for the soil anticipated at this time	Cost associated with transportation of contaminated soil to the disposal site is low.	No
	Off-site disposal	Off-site disposal/ recycling	Process in which, after soil is excavated, stockpiled, and classified, it is disposed, with disposal options chosen according to the classification of the soil and the excavated soil transported to an appropriate permitted landfill	Would potentially expose workers to contaminated soil during handling and transporting Would have small potential for spills in community during transportation of soil	Feasible implementation, depending on the classification of the soil removed, which would determine where the soil should be disposed and the procedures to be followed	Costs associated with transportation of contaminated soil to the disposal site and with disposal fees would be medium.	Yes

Acronym/Abbreviation:
NAF – Naval Air Facility

Section 5
IDENTIFICATION AND ANALYSES OF REMOVAL ACTION ALTERNATIVES

On the basis of the RAOs presented in Section 3 and results of the technology screening described in Section 4, the following two alternatives were identified for the removal action at IR Site 10:

- Alternative 1, cover with institutional controls
- Alternative 2, excavation with off-site disposal

The two alternatives are described and evaluated on the basis of their effectiveness, implementability, and cost in the following sections.

Section 4.3 presents some of the factors considered under each screening criterion. To evaluate the effectiveness of the removal alternatives, additional consideration was given to the overall protection of human health and the environment, compliance with ARARs and other guidance, and long- and short-term effectiveness. Evaluation of the implementability of the removal alternative included consideration of the technical feasibility, commercial availability, administrative feasibility, and public acceptance. Cost evaluation of the removal alternatives was based primarily on estimates calculated using the Remedial Action Cost Engineering and Requirements system developed by the U.S. Air Force. Appendix C provides supporting cost information.

5.1 ALTERNATIVE 1, COVER WITH INSTITUTIONAL CONTROLS

Alternative 1 would involve placing a cover over impacted soil to eliminate human-health and ecological pathways for exposure to soil containing elevated concentrations of COPCs and COPECs contributing to unallowable human-health and ecological risk, respectively. Under this alternative, it is assumed that, if there is hazardous waste at the site, it would be excavated, transported, and disposed at an appropriate permitted landfill.

Alternative 1 contains two options. Under Option A, a half-foot permeable layer of crushed rock would first be placed over the impacted areas to prevent burrowing. Then a 2-foot soil cover, using the berm soil, would be placed over the crushed rock. Under Option B, a 6-foot soil cover, using the berm soil, would be used.

5.1.1 Description

Under Alternative 1, a cover would be added in the areas with the elevated cadmium results identified in Figure 3-1. Prior to placing the cover, final characterization sampling would be conducted within the top 0.5 foot of soil to refine the area requiring action. Some metals (lead, mercury, and selenium) that reported at concentrations indicating the potential presence of hazardous waste have not been previously analyzed by WET. Therefore, samples would be collected from these locations and analyzed by WET to determine if hazardous levels are, in fact, present. If analytical results indicate that the soil in a certain area is hazardous, soil from that area would be removed and disposed at a permitted landfill.

Under Option A, a half-foot permeable crushed rock layer would be installed to prevent burrowing. Then, the berm soil would be used to construct a 2-foot soil cover. Under Option B, the berm soil would be used to construct a 6-foot soil cover over the impacted areas. Measures would be taken to control erosion.

5.1.1.1 CHARACTERIZATION SAMPLING

Characterization sampling will be performed to refine areas that may be removed if hazardous and to characterize the base of the berms, which have not been sampled previously. The samples would be analyzed for cadmium within the pond bottoms; for certain leachable metals in select locations; and for PCBs, pesticides, and metals (analytes previously reported above allowable risk levels and identified as risk drivers in samples from the pond bottoms) at the base of the berms.

For cost-estimating purposes, it was assumed that one sample would be collected at the intersection points of a 50- by 50-foot grid and analyzed for cadmium. If cadmium is reported at concentrations above background in a sample, additional samples would be collected between that location and the adjacent grid nodes (i.e., 25 feet from the original sample in four directions).

Samples would be analyzed using WET for select metals (lead, mercury, and selenium) in the areas where these metals were reported at concentrations indicating the potential for hazardous waste. (WET has already been performed on cadmium, total chromium, chromium VI, copper, and silver in areas where those metals indicated the potential for hazardous waste. But, the WET results did not indicate the presence of hazardous waste.)

5.1.1.2 CLASSIFICATION OF BERM SOIL

The berm soil would be sampled using a hand auger and/or grab method and analyzed for total metals and for contaminant STLC values using WET methods to confirm it is nonhazardous and suitable for use as backfill material.

5.1.1.3 POTENTIAL EXCAVATION

Current analytical data indicate a small potential for the presence of hazardous soil. However, leachability tests of most metals that were reported at concentrations indicating the soil was potentially hazardous showed that these metals were not present at hazardous waste levels. Excavation and removal of the contaminated soil would be performed using standard construction equipment (e.g., backhoes and front-end loaders). Although not expected to be necessary, dust monitoring would be initiated if considered necessary.

5.1.1.4 COVER CONSTRUCTION AND REVEGETATION

The cover would be constructed over the stabilization ponds. Under Option A, a half-foot crushed rock layer would be placed first followed by a 2-foot soil cover. This would bring the impacted areas up to adjacent grade. Under Option B, a 6-foot soil cover would be constructed over the impacted areas. The berm soil would be used for the covers if analytical results indicate it is suitable. The site would be allowed to return to its original condition, which is mostly bare soil and gravel, with ruderal vegetation.

5.1.1.5 SOIL PROFILING AND DISPOSAL

If it is necessary to remove any soil, excavated soil would be stockpiled on and covered with plastic sheeting (minimum 20-millimeter thickness) until it can be sampled and classified for appropriate disposal. Samples would be collected from the stockpiles using shovels to dig in and trowels to grab the samples. Approximately every 125 loose cubic yards (which is defined as a 25 percent swell factor of the soil once it is removed from the excavation) of stockpiled soil would be analyzed for total metals and leaching potential of metals using the TCLP (U.S. EPA Method 1311). This soil might also be analyzed for contaminant STLC values using WET methods. Soil would be transported and disposed at a U.S. EPA-certified disposal facility.

5.1.2 Effectiveness

Alternative 1 is considered to be reliable and effective. Specific discussion of the effectiveness of this alternative is provided in the following sections.

5.1.2.1 COMPLIANCE WITH ARARs

Alternative 1 would meet all chemical-, location-, and action-specific ARARs identified in Appendix B. The substantive provisions of the following requirements have been identified as the primary controlling ARARs for cover with institutional controls:

- RCRA hazardous waste characterization requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, including characterization of solid waste as toxic based on TCLP
- non-RCRA (California) hazardous waste characterization requirements at 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)
- Endangered Species Act of 1973 requirement at 16 U.S.C. § 1536(a), (h)(1)(B) regarding protecting listed species or critical habitat
- Migratory Bird Treaty Act of 1972 requirement at 16 U.S.C. § 703 regarding the protection of native migratory birds, including poisoning at hazardous waste sites
- *California Fish & Game Code* (Cal. Fish & Game Code) § 2080 regarding the take of endangered or threatened species

RCRA clean closure requirements for regulated waste management facilities (Cal. Code Regs. tit. 22, § 66264.111(a) and (b) and 66264.114), and for surface impoundments (Cal. Code Regs. tit. 22, §§ 66264.197, 66265.228[a], and 66264.228) in particular, are potentially relevant and appropriate in that clean closure requirements would be met by removing hazardous waste, if discovered, at the outset of the removal action. In the absence of hazardous waste, cover of targeted surface soil as necessary to protect human health and the environment would achieve clean closure. RCRA requirements for cover design, postclosure cover inspection, and maintenance would not be ARARs for these elements of the alternative. Requirements for the protection of endangered, threatened, or migratory bird species would be met by initial biological survey to identify protected

species in residence, scheduling site remedial activities for the postfledgling/prepairing period in accordance with facility policy strategy for sensitive bird species (TDS 2001). No long-term adverse effects on site habitat is anticipated if this alternative is implemented because reoccupation of cover materials would be provided for. Control of off-site migration of soil during remedial action would protect endangered or threatened species that are known to use vicinity drainage channels and would assure that requirements are met for potential stormwater discharge and wetlands protection.

5.1.2.2 LONG-TERM EFFECTIVENESS

Alternative 1 is expected to be effective over the long term. However, impacted soil would be left in place and would not be considered permanently remediated. Although implementation of Alternative 1 would temporarily disrupt the local environment, the site would be allowed to naturally revegetate. Under Option A, all or most of the site would be returned to adjacent grade.

There would be some degree of uncertainty regarding potential future liability for the impacted soil that would be left in place.

5.1.2.3 REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

In general, Alternative 1 would not reduce the toxicity, mobility, or volume of COPCs and COPECs at the site. However, it would reduce the exposure to COPCs and COPECs that could present unallowable risk to human-health and ecological receptors.

If WET results indicate the presence of hazardous waste, excavation and removal of contaminated soil would reduce the potential mobility and volume of contaminants for that portion of the site. No on-site treatment of the contaminated soil would occur; instead, it would be transferred to an approved disposal facility.

5.1.2.4 SHORT-TERM EFFECTIVENESS

According to U.S. EPA guidance, the short-term effectiveness criterion addresses the effects of the alternative during implementation before the removal objectives have been met (U.S. EPA 1988). The primary considerations of this criterion are protection of the community, protection of workers, and environmental impacts that occur during implementation.

Potential exposure and protection procedures for workers engaged in construction activities would be addressed in the site-specific safety and health plan. During soil-moving activities, measures would be taken to reduce fugitive dust emissions, if encountered, and the associated impacts on workers. All workers within the work zone would wear appropriate safety equipment and take appropriate safety measures.

Heavy equipment would conform to Occupational Safety and Health Administration (OSHA) specifications. Soil stockpile areas and other work areas would be properly delineated and covered to limit access to authorized personnel. Only authorized and trained personnel would operate the heavy equipment.

If soil transport by truck is considered necessary, some or all of the following safety measures would be implemented to limit short-term risks.

- The trucks would be covered with tarps and their load height limited.
- Truck traffic could be limited to daylight, off-peak hours.
- Emergency spill containment and cleanup contingency planning should also be incorporated into the project work plan to minimize the potential of exposure to impacted soil from traffic-related accidental spillage.

5.1.3 Implementability

This alternative can be readily implemented. The following subsections further discuss the implementability of this alternative.

5.1.3.1 TECHNICAL FEASIBILITY

Alternative 1 is technically feasible and would not require special techniques, material, permits, or labor to install the cover. Conventional earth-moving equipment could be used when soil is moved and compacted. The site is accessible and relatively flat.

Field activities would be conducted in a manner that assures worker safety.

5.1.3.2 ADMINISTRATIVE FEASIBILITY

Alternative 1 is administratively feasible. Under CERCLA, only substantive provisions of requirements identified as ARARs would apply to actions conducted on-site. Administrative or procedural requirements such as permits would not be required. However, because this alternative may involve the handling of hazardous waste off-site, administrative requirements and applicable regulations, such as Department of Transportation hazardous waste manifests, must be met.

5.1.3.3 AVAILABILITY OF SERVICES AND MATERIALS

The crushed rock for installing the permeable nonburrowing barrier (Option A) is readily available. The berm soil could be moved and compacted (Options A and B) by a variety of conventional and readily available equipment, such as backhoes and front-end loaders. This alternative could be implemented using standard transportation and disposal practices. Skilled workers, equipment, and material are readily available.

In the event it becomes necessary to dispose hazardous waste, several U.S. EPA-certified disposal facilities are located in Utah, California, and Arizona. These facilities will accept RCRA hazardous waste, Cal/EPA non-RCRA hazardous waste, nonhazardous waste, and inert material. Transportation of the contaminated soil to these facilities would be provided by an appropriately licensed waste-hauling company.

5.1.3.4 STATE AND COMMUNITY ACCEPTANCE

It is anticipated that Alternative 1 would receive acceptance from the state regulatory agencies and the local community. State and community concerns would be addressed

following the public comment period and review of the EE/CA report by DTSC, RWQCB, and other agency and public representatives. Limitations arising from public comments and state review would be considered at that time.

5.1.4 Cost

The cost estimate for Alternative 1 is based on the estimated extent and volume of soil proposed for removal in Section 3.5. A project duration of 30 years is assumed for the cost estimate. The cost evaluation is based on estimates for capital and operation and maintenance (O&M) costs. Capital costs include design, construction, equipment, and mobilization. O&M costs refer to those postconstruction items necessary to assure the continued effectiveness of a removal action. Typical O&M expenses include operating labor, consumable materials, maintenance, site inspections, annual reports, and periodic site reviews.

Tables 5-1 and 5-2 describe the major cost items and the estimated costs. Appendix C presents supporting cost information.

This cost estimate is for guidance in project evaluation and implementation. It was prepared from information available at the time of publication. The final cost of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, the company selected for final project implementation, and other variable factors. As a result, the final project cost could vary from the estimates presented herein. These costs should not be used for budgeting purposes.

5.2 ALTERNATIVE 2, EXCAVATION WITH OFF-SITE DISPOSAL

Alternative 2 involves excavation of soil containing elevated concentrations of COPCs and COPECs contributing to unallowable human-health and ecological risk, respectively. Under this alternative, it is assumed that the excavated soil would be transported and disposed at an appropriate permitted landfill. Alternative 2 contains two options. Under Option A, the excavation(s) would not be backfilled. Under Option B, the ponds would be backfilled with the berm soil to return them to surrounding grade.

5.2.1 Description

Under Alternative 2, soil would be excavated in the areas with the elevated cadmium results identified in Figure 3-1 and disposed at a permitted landfill. However, prior to excavation activities, final characterization sampling would be conducted within the top 0.5 foot of soil to refine the area requiring removal.

It is estimated that contaminated soil would be excavated approximately 1 foot below the pond bottom surfaces, although the actual excavation depth would be determined after the evaluation of confirmation sampling results. Following excavation, no backfill would be used under Option A, and the berm soil would be used as backfill under Option B to bring the site up to adjacent grade.

Table 5-1
Cost Estimate for Alternative 1, Option A
Permeable Gravel Layer With 2-Foot Cover Using Berm Soil

Description	Annual Cost	5-Year Cost	Total Cost ($)
Capital Costs			
Engineering design/removal action work plan			79,000
Construction of 2-foot soil cover with half-foot permeable, crushed rock layer			332,000
Total Capital Costs			**411,000**
O&M Costs (30 years)			
Institutional controls	$2,000/year		60,000
Periodic reviews		$5,000/5 years	30,000
Total O&M Costs			**90,000**
Contingency*			**100,000**
TOTAL COST (cost base January 2004)			**601,000**
NET PRESENT VALUE (2004 dollars)			**560,000**

Note:
* a 20 percent contingency has been added to cover cost increases that may result from unforeseen conditions and changes that typically occur on removal and remediation projects

Acronym/Abbreviation:
O&M – operation and maintenance

5.2.1.1 CHARACTERIZATION SAMPLING

Characterization sampling would be performed to refine the areas that may require removal; to identify hazardous waste that may be present; and to characterize the base of the berms, which have not been sampled previously. The samples would be analyzed for cadmium within the pond bottoms; for certain leachable metals (lead, mercury, and selenium) in select locations; and for PCBs, pesticides, and metals (analytes previously reported above allowable risk levels and identified as risk driver in samples from the pond bottoms) at the base of the berms.

For cost-estimating purposes, it was assumed that one sample would be collected at the intersection points of a 50- by 50-foot grid and analyzed for cadmium. If cadmium is reported at concentrations above background in a sample, additional samples would be collected between that location and the adjacent grid nodes (i.e., 25 feet from the original sample in four directions).

Samples would be analyzed by WET for select metals (lead, mercury, and selenium) in the areas where these metals were reported at concentrations indicating the potential for

Table 5-2
Cost Estimate for Alternative 1, Option B
6-Foot Cover Using Berm Soil

Description	Annual Cost	5-Year Cost	Total Cost ($)
Capital Costs			
Engineering design/removal action work plan			79,000
Construction of 6-foot soil cover			762,000
Total Capital Costs			**841,000**
O&M Costs (30 years)			
Institutional controls	$2,000/year		60,000
Periodic reviews		$5,000/5 years	30,000
Total O&M Costs			**90,000**
Contingency*			**186,000**
TOTAL COST (cost base January 2004)			**1,117,000**
NET PRESENT VALUE (2004 dollars)			**1,076,000**

Note:
* a 20 percent contingency has been added to cover cost increases that may result from unforeseen conditions and changes that typically occur on removal and remediation projects

Acronym/Abbreviation:
O&M – operation and maintenance

hazardous waste. (WET has already been performed on cadmium, total chromium, chromium VI, copper, and silver in areas where those metals indicated the potential for hazardous waste. But the WET results did not indicate the presence of hazardous waste.)

5.2.1.2 CLASSIFICATION OF BERM SOIL

The berm soil would be sampled and analyzed for total metals and for contaminant STLC values using WET methods to confirm it is nonhazardous and suitable for use as backfill material.

5.2.1.3 EXCAVATION

On the basis of current analytical data and interpretation of the extent of soil contamination (Section 2.3), the excavation would consist of approximately 3,400 bank cubic yards (in-place soil volume) at IR Site 10. Excavation and removal of the contaminated soil would be performed using standard construction equipment (e.g., backhoes and front-end loaders). Dust monitoring would be initiated if necessary.

5.2.1.4 CONFIRMATION SOIL SAMPLING

Confirmation sampling would be performed to establish concentrations of cadmium for soil remaining in place after excavation has been completed. The field sampling design, including proposed locations of confirmation samples, would be included in the project work plan prepared by the RAC. Final confirmation sampling locations would be recorded using surveying techniques. For cost-estimating purposes, it was assumed that 15 confirmation samples would be collected. The confirmation samples would be analyzed for total cadmium using U.S. EPA Method 6010B.

Analytical results from confirmation sampling would be compared to the concentrations used in the residual risk assessments. A decision to terminate excavation, if feasible, would be based on this comparison. Additional confirmation sampling would be required if the decision were made to continue excavation.

5.2.1.5 BACKFILLING AND REVEGETATION

When the results of the confirmation sampling analyses indicate that the soil containing lead at concentrations exceeding the proposed cleanup goal has been removed, the ponds would be backfilled with the berm soil and compacted to match adjacent grade (Option B). The site would be allowed to naturally return to its prior condition, which is mostly bare soil and gravel, with ruderal vegetation.

5.2.1.6 SOIL PROFILING AND DISPOSAL

Excavated soil would be stockpiled on and covered with plastic sheeting (minimum 20-millimeter thickness) until it could be sampled and classified for appropriate disposal. Samples would be collected from the stockpiles using shovels to dig in and trowels to grab the samples. Approximately every 125 loose cubic yards (which is defined as a 25 percent swell factor of the soil once it is removed from the excavation) of stockpiled soil would be analyzed for total metals and leaching potential of metals using TCLP (U.S. EPA Method 1311). This quantity might also be analyzed for contaminant STLC values using WET methods. Soil would be transported and disposed at a U.S. EPA-certified disposal facility.

5.2.2 Effectiveness

Alternative 2 is considered to be reliable and effective. Specific discussion of the effectiveness of this alternative is provided in the following sections.

5.2.2.1 COMPLIANCE WITH ARARs

Alternative 2 would meet all chemical-, location-, and action-specific ARARs identified in Appendix B. The substantive provisions of the following requirements have been identified as the primary controlling ARARs for excavation with off-site disposal:

- RCRA hazardous waste characterization requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, including characterization of solid waste as toxic based on TCLP

- non-RCRA (California) hazardous waste characterization requirements at 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)
- Endangered Species Act of 1973 requirement at 16 U.S.C. § 1536(a), (h)(1)(B) regarding protecting listed species or critical habitat
- Migratory Bird Treaty Act of 1972 requirement at 16 U.S.C. § 703 regarding the protection of native migratory birds, including poisoning at hazardous waste sites
- Cal. Fish & Game Code § 2080 regarding selection of remedial actions to minimize take of endangered or threatened species or their habitat

RCRA clean closure requirements for regulated waste management facilities (Cal. Code Regs. tit. 22, § 66264.111(a) and (b) and 66264.114), and for surface impoundments (Cal. Code Regs. tit. 22, §§ 66264.197, 66265.228[a], 66264.228) in particular, are potentially relevant and appropriate in that clean closure requirements would be met by the removal action. After hazardous waste, if any, has been removed, and residual surface soil removed to the extent necessary to protect human health and the environment, no further RCRA requirements would be potential ARARs for the removal action. Requirements for the protection of endangered, threatened, or migratory bird species would be met by initial biological survey to identify protected species in residence, scheduling site remedial activities for the postfledgling/prepairing period in accordance with facility policy strategy for sensitive bird species (TDS 2001). Control of off-site migration of soil during remedial action would protect endangered or threatened species that are known to use vicinity drainage channels and would assure that requirements are met for potential stormwater discharge and wetlands protection.

5.2.2.2 LONG-TERM EFFECTIVENESS

Alternative 2 would be very effective over the long term. Impacted soil would be removed, resulting in allowable residual risk to human and ecological receptors. Although implementation of Alternative 2 would temporarily disrupt the local environment, the site would be allowed to naturally revegetate. Under Option B, as a general best management practice, the berm soil would be used as backfill to restore the site to near adjacent grade. This would minimize the potential for indiscriminate waste disposal, ponding water, and hazards created by the sloping sides.

Waste handling and landfilling technology would be well developed under Alternative 2 for excavated soil disposition. However, in the unlikely event it is required, off-site disposal of soil classified as hazardous waste could not be considered permanent remediation of the contaminated material because the excavated soil would likely not be treated to reduce metals concentrations. There would be some degree of uncertainty regarding potential future liability if excavated soil were to be disposed as hazardous waste at an off-site facility.

5.2.2.3 REDUCTION OF TOXICITY, MOBILITY, AND VOLUME (THROUGH TREATMENT)

Alternative 2 would reduce toxicity at the site by physically removing soil impacted by COPCs and COPECs at concentrations that could present unallowable risk to human and ecological receptors. Excavation and removal of impacted soil would also effectively reduce the potential mobility and volume of contaminants at the site. However, no treatment of contaminated soil would occur; it would be transferred to an approved disposal facility.

5.2.2.4 SHORT-TERM EFFECTIVENESS

According to U.S. EPA guidance, the short-term effectiveness criterion addresses the effects of the alternative during implementation but before the removal objectives have been met (U.S. EPA 1988). The primary considerations of this criterion are protection of the community, protection of workers, and environmental impacts that occur during implementation.

Potential exposure and protection procedures for workers engaged in construction activities would be addressed in the site-specific safety and health plan. During excavation activities, measures would be taken to reduce fugitive dust emissions, if encountered, and the associated impacts on workers. All workers within the work zone would wear appropriate safety equipment and take appropriate safety measures.

Heavy equipment would conform to OSHA specifications. Excavation areas, soil stockpile areas, and other work areas would be properly delineated to limit access to authorized personnel. Only authorized and trained personnel would operate the heavy equipment.

If soil transport by truck is considered necessary, some or all of the following safety measures would be implemented to limit short-term risks.

- The trucks may be covered with tarps, and their load height may be limited.
- Truck traffic could be limited to daylight, off-peak hours.
- Emergency spill containment and cleanup contingency planning should also be incorporated into the project work plan to minimize the potential of exposure to impacted soil from traffic-related accidental spillage.

5.2.3 Implementability

This alternative can be readily implemented. The following subsections further discuss the implementability of this alternative.

5.2.3.1 TECHNICAL FEASIBILITY

Alternative 2 is technically feasible and would not require special techniques, material, permits, or labor for excavation. Conventional earth-moving equipment could be used during the excavation, off-site disposal activities, and backfilling of the excavation. The site is accessible and relatively flat. In addition, if subsurface utilities are encountered,

they would be temporarily rerouted during excavation and then restored after completion of the removal action.

The actual volume of soil that could be feasibly excavated would be contingent on field conditions, including utilities, pipes, and other subsurface features. Depth to groundwater, from approximately 22 to 37 feet bgs, is not expected to be a factor during excavation activities. Excavation would be conducted in a manner that assures worker safety.

5.2.3.2 ADMINISTRATIVE FEASIBILITY

Alternative 2 is administratively feasible. Under CERCLA, only substantive provisions of requirements identified as ARARs apply to actions conducted on-site. Administrative or procedural requirements such as permits are not required. However, because this alternative may involve the handling of hazardous waste off-site, administrative requirements and applicable regulations, such as Department of Transportation hazardous waste manifests, must be met.

5.2.3.3 AVAILABILITY OF SERVICES AND MATERIALS

Contaminated soil would be excavated (Options A and B) and the berm soil would be moved and compacted (Option B) using a variety of conventional and readily available equipment, such as backhoes and front-end loaders. This alternative could be implemented using standard transportation and disposal practices. Skilled workers, equipment, and material are readily available.

Several U.S. EPA-certified disposal facilities are located in Utah, California, and Arizona. These facilities will accept RCRA hazardous waste, Cal/EPA non-RCRA hazardous waste, and nonhazardous waste. An appropriately licensed waste-hauling company would provide transportation of contaminated soil to these facilities.

5.2.3.4 STATE AND COMMUNITY ACCEPTANCE

It is anticipated that Alternative 2 would receive acceptance from the state regulatory agencies and the local community. Option B would probably be preferred over Option A because it would minimize the potential for indiscriminate waste disposal, ponding water, and hazards created by the sloping sides. State and community concerns would be addressed following the public comment period and review of the EE/CA report by DTSC, RWQCB, and other agency and public representatives. Limitations arising from public comments and state review would be considered at that time.

5.2.4 Cost

The cost estimate for Alternative 2 is based on the estimated extent of soil proposed for removal in Section 3.5. Project durations of approximately 3 weeks and 2 months are assumed for the cost estimate for Options A and B, respectively. The cost evaluation is based on estimates for capital costs and includes costs for design, construction, equipment, and mobilization. There are no annual O&M costs.

Tables 5-3 and 5-4 describe the major cost items and the estimated costs. Appendix C presents supporting cost information.

This cost estimate is for guidance in project evaluation and implementation. It was prepared from information available at the time of publication. The final cost of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, the company selected for final project implementation, and other variable factors. As a result, the final project cost could vary from the estimates presented herein. The final project cost would also depend on the actual volume of soil removed. These costs should not be used for budgeting purposes.

Table 5-3
Cost Estimate for Alternative 2, Option A
Excavation With Off-Site Disposal – No Backfill

Description	Total Cost ($)
Capital costs	
Engineering design/removal action work plan	23,000
Decontamination station	37,000
Soil excavation (3,400 bcy)	109,000
Soil sampling in support of characterization and disposal	257,000
Off-site soil disposal (4,300 lcy)	310,000
Total capital costs	**736,000**
Contingency*	**147,000**
TOTAL COST (cost base January 2004)	**883,000**
PRESENT VALUE (2004 dollars)	**883,000**

Note:
* a 20 percent contingency has been added to cover cost increases that may result from unforeseen conditions and changes that typically occur on removal and remediation projects

Acronyms/Abbreviations:
bcy – bank cubic yard
lcy – loose cubic yard

Table 5-4
Cost Estimate for Alternative 2, Option B
Excavation With Off-Site Disposal – Backfill Using Berm Soil

Description	Total Cost ($)
Capital costs	
Engineering design/removal action work plan	79,000
Decontamination station	37,000
Soil excavation (3,400 bcy)	109,000
Soil sampling in support of characterization and disposal	257,000
Off-site soil disposal (4,300 lcy)	310,000
Soil sampling is support of berm classification (21,000 lcy)	333,000
Backfilling ponds with available berm soil (21,000 lcy)	233,000
Total capital costs	**1,358,000**
Contingency*	**272,000**
TOTAL COST (cost base January 2004)	**1,630,000**
PRESENT VALUE (2004 dollars)	**1,630,000**

Note:
* a 20 percent contingency has been added to cover cost increases that may result from unforeseen conditions and changes that typically occur on removal and remediation projects

Acronyms/Abbreviations:
bcy – bank cubic yard
lcy – loose cubic yard

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Section 6
COMPARATIVE ANALYSES OF REMOVAL ACTION ALTERNATIVES

In this section, the alternatives analyzed in Section 5 are compared to evaluate their relative performance in relation to each of three criteria. The criteria used in this comparison are the same as those used to analyze the alternatives: effectiveness, implementability, and cost.

6.1 EFFECTIVENESS OF ALTERNATIVES

Evaluation of effectiveness was based on the overall protection of human health and the environment (through assessment of long-term effectiveness and permanence, compliance with ARARs, and short-term effectiveness) and reduction of toxicity, mobility, or volume through treatment. Alternative 2, Option B, excavation with off-site disposal and backfill using berm soil, is expected to most effectively meet the RAOs because removal of impacted soil would be directly observed and confirmed by soil sampling and the excavation would be backfilled to near original grade.

6.2 IMPLEMENTABILITY OF ALTERNATIVES

Both alternatives are considered implementable. The technical feasibility is generally similar for both alternatives. Required materials and services would be available for both technologies.

Other implementability criteria, such as state and public acceptance of the two alternatives, tend to be more variable. Alternative 2 is expected to be more acceptable to regulatory agencies and the general public because the impacted soil would be completely removed from the site.

6.3 COST OF ALTERNATIVES

Table 6-1 summarizes the total estimated costs, including both capital and O&M costs, to implement each alternative. These costs are shown as present value. Under Alternative 2, there are no long-term O&M costs. Alternative 1, Option A, has the lowest cost followed by Alternative 2, Option A. Alternative 1, Option B has the next highest cost, and Alternative 2, Option B is the highest.

Table 6-1
Total Costs of Removal Action Alternatives for IR Site 10

Alternative	Present Value ($)
Alternative 1, Option A, permeable gravel layer with 2-foot cover using berm soil	560,000
Alternative 1, Option B, 6-foot cover using berm soil	1,076,000
Alternative 2, Option A, excavation with off-site disposal – no backfill	883,000
Alternative 2, Options B, excavation with off-site disposal – backfill using berm soil	1,630,000

Acronym/Abbreviation:
IR – Installation Restoration (Program)

Section 7
RECOMMENDED REMOVAL ACTION ALTERNATIVE

This EE/CA was performed in accordance with current U.S. EPA and Navy guidance documents for an NTCRA under CERCLA. The purpose of this EE/CA was to identify and analyze removal action alternatives to reduce the risk to human and ecological receptors from impacted soil at IR Site 10.

Because most of the potential technologies and process options were screened out, only two alternatives were identified and evaluated: Alternative 1 (cover with institutional controls) and Alternative 2 (excavation with off-site disposal).

The recommended removal action, based on comparative analyses of the removal action alternatives discussed in Section 6, is Alternative 2, Option B. Alternative 2, Option B, involves removal of soil containing elevated COPC and COPEC concentrations resulting in allowable risk levels. Impacted soil will be removed using earth-moving machinery to excavate the soil. Confirmation soil samples will be collected to verify that any COPC and COPEC concentrations remaining would result in allowable human-health and ecological residual risks, respectively. Excavated soil will be transported to a permitted landfill for disposal. The excavation will be backfilled using the berm soil. The site will then be allowed to naturally revegetate. A project work plan, which will take into consideration safety and health requirements and standard operating procedures, will be prepared by the RAC.

This alternative is recommended because it greatly reduces risks to human and ecological receptors. Following implementation of this alternative, the land use will be unrestricted. This alternative meets the RAOs, complies with ARARs and other guidance, and is technically and administratively feasible. The materials to implement this alternative are commercially available. The cost for this alternative is comparable to similar removal actions previously conducted at this facility, and, under this alternative, there will be no unforeseen future costs. This alternative is expected to be acceptable to the state and community. An action memorandum/RAW will be prepared to document the final decision.

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APPENDIX A

RESIDUAL RISK ASSESSMENT

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ACRONYMS/ABBREVIATIONS

BAF	bioaccumulation factor
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BJC	Bechtel Jacobs Company LLC
BNI	Bechtel National, Inc.
BTAG	Biological Technical Assistance Group
Cal/EPA	California Environmental Protection Agency
Cal-Modified	Cal/EPA modified
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DON	Department of the Navy
EFA-West	Engineering Field Activity, West
EPC	exposure point concentration
ERA	ecological risk assessment
ESI	extended site investigation
HI	hazard index
HQ	hazard quotient
HSDB	Hazardous Substances Data Bank
IARC	International Agency for Research on Cancer
IR	Installation Restoration (Program)
IRIS	Integrated Risk Information System
kg_{BW}	kilograms of body weight
$kg_{FOOD}dw/day$	kilograms of food on a dry weight basis per day
$kg_{SOIL}dw/kg_{BIOTA}dw$	kilograms of soil on a dry weight basis per kilograms biota on a dry weight basis
MBA	Microbiological Associates
$mg_{CHEMICAL}/kg_{SOIL}dw$	milligrams of chemical per kilograms of soil on a dry weight basis
mg/kg	milligrams per kilogram
mg/kg_{BW}-day	milligrams per kilogram of body weight per day
mg/kg-day	milligrams per kilogram per day
NAF	Naval Air Facility
NOAEL	no observed adverse effect level
NTP	National Toxicology Program
Ogden	Ogden Environmental and Energy Services Co., Inc.

PRG	preliminary remediation goal
RWQCB	(California) Regional Water Quality Control Board
TPH	total petroleum hydrocarbons
TRV	toxicity reference value
UCL	upper confidence limit
USBR	United States Bureau of Reclamation
U.S. EPA	United States Environmental Protection Agency

Appendix A
RESIDUAL RISK ASSESSMENT

Screening-level ecological and human-health risk assessments were conducted to estimate the potential impacts of chemicals remaining at Installation Restoration (IR) Program Site 10, Naval Air Facility (NAF) El Centro after the planned removal action. These risk assessments are included below. All tables are located at the end of this appendix.

A1 ECOLOGICAL RISK

This residual screening-level ecological risk assessment (ERA) is an update of the previous screening-level ERA presented as part of the extended site investigation (ESI). Complete documentation of the original screening-level ERA is presented in the ESI report (BEI 2004). Only revised information is presented in this appendix.

This risk assessment is intended to present a conservative risk characterization. Conservative assumptions are used where site-specific data are unavailable, assuring that the ecological risk is not underestimated. However, because the assessment is of a conservative nature, a potential risk identified in the ERA does not necessarily imply the existence of actual risk.

A1.1 Problem Formulation

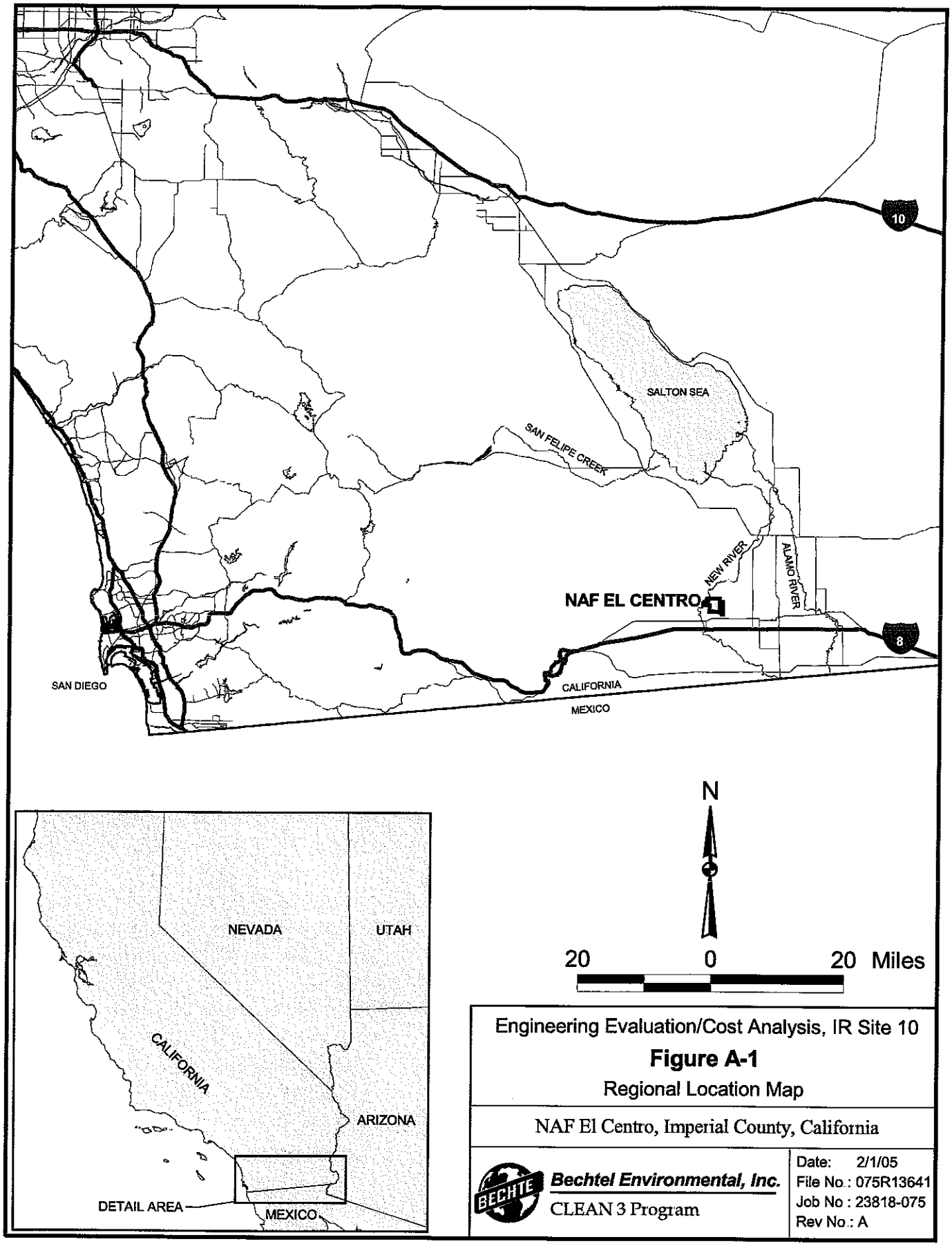
The problem formulation evaluates the site characteristics, chemicals of potential ecological concern (COPECs), fate and transport factors for the COPECs, ecological habitats and representative organisms, threatened and endangered species, and potential exposure pathways between the COPECs and the ecological receptors.

NAF El Centro is located in the Imperial Valley, California, approximately 7 miles northwest of El Centro and 85 miles east of San Diego (Figure A-1). Ground surface elevation at the facility is generally flat at 45 feet below mean sea level. Depth to groundwater at the base ranges from approximately 6 feet below ground surface (bgs) at the southeast corner to approximately 40 feet bgs at the northwest corner of the base (DON 1999).

IR Site 10 is located in the northwest corner of NAF El Centro along the facility boundary and adjacent to the current sewage treatment plant. The site includes three sewage stabilization ponds connected in sequence by pipe conduits. The stabilization ponds are each enclosed by soil berms that support a dirt road. Scattered vegetation is present in the pond bottoms and along the berms. The entire site represents approximately 8.7 acres.

Each stabilization pond has an unlined soil bottom. Pond bottoms are approximately 2 feet below grade, and the berms extend 6 to 8 feet above grade. For this risk assessment of IR Site 10 the soil of the three ponds is considered a single unit.

Pond No. 1 is 245 by 560 feet (3.1 acres [1.27 hectares]), Pond No. 2 is 126 by 248 feet (0.72 acre [0.29 hectare]), and Pond No. 3 is 126 by 256 feet (0.74 acre [0.30 hectare]). Together, the pond bottom soil represents 4.6 acres (1.86 hectares).



Engineering Evaluation/Cost Analysis, IR Site 10

Figure A-1

Regional Location Map

NAF El Centro, Imperial County, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/1/05
File No.: 075R13641
Job No : 23818-075
Rev No.: A

Agricultural fields are located in the vicinity of IR Site 10. The current sewage treatment plant is located immediately south of IR Site 10. The New River is located to the west of IR Site 10. To the southeast of IR Site 10 are runways, buildings, and roadways of NAF El Centro.

The IR Site 10 vicinity is primarily an alkali desert scrub habitat with characteristic vegetation occurring in varying densities among the surface debris. Predominant vegetation includes *Atriplex canescens* (four-wing salt bush), *Suaeda torreyana* (Torrey sea-blite, also known as "inkweed," "iodine weed," and "bush seepweed"), and *Tamarix ramosissima* (saltcedar tamarisk). Smaller herbaceous species include *Heliotropium curassavicum* ssp. *oculatum* (salt heliotrope), *Sida hederacea* (alkali mallow), and *Chenopodium* sp. (goosefoot). Desert scrub habitat, characterized by the predominance of *Larrea tridentate* (creosote bush), is likely to occur in the vicinity. Evidence of rabbits, rodents, and lizards has been reported at IR Site 10.

Barren habitat occurs on NAF El Centro as buildings, roadways, parking lots, and runways. Barren habitat generally offers little habitat value to wildlife.

Urban habitat occurs on NAF El Centro to the southeast of IR Site 10. Urban habitat generally supports few wildlife species because of limited vegetation and human disturbances. Vegetation includes grass lawns and ornamental shrubs and trees.

Cropland habitat is dominant throughout the Imperial Valley and in the regions adjacent to IR Site 10. These agricultural areas represent a habitat that is used by opportunistic and human-tolerant species. Most cropland habitat is used for production of alfalfa, hay, and Bermuda grass.

The New River, which is located to the west of IR Site 10, represents a Desert Riparian habitat. The New River consists primarily of flows from municipal and industrial wastewater and agricultural and urban runoff. Vegetation occurring along the banks of the New River includes *T. ramosissima* (saltcedar tamarisk), *Arundo donax* (giant reed), and *Prosopis glandulosa* (mesquite tree).

The screening-level ERA presented in the ESI report identified cadmium, copper, lead, selenium, and zinc as soil COPECs. The proposed removal action would remove soil from sample locations EC10-B6, EC10-B21, EC10-B22, and EC10-S23 (Pond No. 1) and from EC10-S32 (Pond No. 2). COPECs were identified from the analytical data after data were removed from the sample locations identified by the proposed removal action. Compounds not reported above the detection limit were eliminated as COPECs. Inorganic compounds for which the maximum detected concentration was not greater than background threshold value were eliminated as COPECS (antimony, arsenic, beryllium, nickel, and thallium). A summary of the soil COPECs information for IR Site 10 is presented in Table A-1.

This screening risk assessment evaluates birds and mammals of the major terrestrial trophic levels (Table A-2): cottontail rabbit, deer mouse, coyote, mourning dove, American robin, and American kestrel.

A1.2 Ecotoxicity of COPECs

Toxicity reference values (TRVs) were selected from those summarized by the Navy and the United States Environmental Protection Agency (U.S. EPA) Region 9 Biological Technical Assistance Group (BTAG) (EFA-West 1998) and recommended by the California Environmental Protection Agency (Cal/EPA) (2000). Wildlife TRVs are presented as an upper and lower estimate of effects thresholds. The TRV-low, based on no-observed-adverse-effect-level (NOAEL) data, represents a threshold below which no adverse effects are expected. The TRV-high, based on an approximate midpoint of the range of effects levels, represents a threshold above which adverse effects are likely to occur.

Metal and pesticide TRV-lows for wildlife are listed in Table A-3 for mammals and Table A-4 for birds. The literature-based TRV-lows were used to represent species-specific TRV-lows for the ecological receptors (Table A-5). If the difference between the body weights of the TRV test species (usually standard laboratory animals) and the selected ecological receptors for the site was more than two orders of magnitude, the receptor TRVs were allometrically adjusted (Sample and Arenal 1999) for the difference in sensitivity between the test species and the ecological receptors (Cal/EPA 1999).

A1.3 Exposure Estimate

Exposure estimates are presented as a daily dose for ingestion. Exposure estimates for wildlife were developed from residual (postremoval action) soil concentrations for IR Site 10 COPECs.

Exposure point concentrations (EPCs) were calculated for each COPEC (Table A-1) as the 95 percent upper confidence limit (UCL) of the average measured chemical concentration using the standard bootstrap method (Singh et al. 1997). Bioaccumulation factors (BAF) (Table A-6) were used to develop ingestion food chain models.

Exposure factors for mammals (Table A-7) and birds (Table A-8) were selected from available scientific literature, such as U.S. EPA's *Wildlife Exposure Handbook* (U.S. EPA 1993) and Cal/Ecotox database (Cal/EPA 2002).

Exposure dose was calculated with the following formula for each receptor and COPEC:

$$Dose = \frac{\sum_{k}^{i=1} [C * BAF_i * IR * FI_i * AE * SUF]}{BW}$$

where

$Dose$ = daily dose of COPEC per wildlife receptor, expressed as mg/kg_{BW}-day
C = concentration in soil using EPC, expressed as $mg_{CHEMICAL}/kg_{SOIL}dw$
BAF_i = soil-to-biota bioaccumulation factor, expressed as $kg_{SOIL}dw/kg_{BIOTA}dw$
IR = receptor-specific ingestion rate, expressed as quantity of food (weight) per day, $kg_{FOOD}dw/day$
FI_i = receptor-specific fractional intake rate for each ingested item (including soil, and plant and animal food items); dietary composition

AE = chemical-specific gastrointestinal absorption efficiency (bioavailability) for each ingested medium (including soil and food items) for each representative species; value has no units; value assumed at 1
SUF = site-use factor, receptor specific; value has no units
i,k = identifier and number of ingested media types (i.e., soil, food types)
BW = body weight of the animal, expressed as kg_{BW}

Exposure factors for the ingestion pathway for terrestrial wildlife, ingestion rate, body weight, and site-use factors are specific for each ecological receptor evaluated. Fractional intake, the dietary component, is specific for each receptor and ingested media (i.e., food type). Gastrointestinal assimilation efficiency, bioavailability, is specific to each receptor, ingested media, and chemical compound. For this screening-level risk assessment, conservative assumptions are used for assimilation efficiency (value set to 1). The receptors are assumed to experience no reduction in bioavailability.

A refined exposure estimate was prepared by using mean (or best estimate) body weight values for the representative receptors and site-use factors based on home-range values.

A1.4 Residual Risk Estimation

The risk estimation for terrestrial wildlife receptors is estimated by the hazard quotient (HQ) reported to one significant figure, obtained by dividing the exposure dose estimate by the TRV, as follows:

$$HQ = \frac{DOSE}{TRV}$$

where

HQ = hazard quotient
$DOSE$ = daily exposure dose for a COPEC, mg/kg-day
TRV = toxicity reference value, mg/kg-day

Table A-9 lists the HQ-low (based on TRV-low) for each COPEC and receptor. The majority of the HQ-low values are less than 1, indicating that those COPECs are unlikely to represent an ecological risk for the modeled terrestrial wildlife. Five compounds (cadmium, lead, selenium, zinc, and dieldrin) are presented with HQ-low values exceeding 1, indicating potential ecological risk. In addition, the hazard indices (HIs) for metals and pesticides exceed 1.

A risk estimate based on background concentrations was prepared (Table A-10) to compare the HQ-low values from IR Site 10 to background HQ-low values. The representative HQ-low values for five COPECs (cadmium, lead, nickel, selenium, and zinc) exceed 1. The HQ-low values for cadmium, lead, and zinc are greater for the background concentrations than for IR Site 10.

A1.5 Ecological Risk Assessment Conclusions

This screening-level ERA with refined exposure estimate indicates that potential risk exists for representative wildlife. The potential for ecological risk is unlikely (HQ-low

less than 1) for exposures to most of the COPECs. Potential ecological risk is indicated by the screening-level risk assessment for ecological-receptor exposure primarily to selenium. IR Site 10 HQ-low values and background HQ-low values are summarized in Table A-11.

Four metal compounds were reported with HQ-low values greater than 1, indicating the potential for ecological risk. However, all metal compounds except selenium showed an HQ-low values less than the HQ-low for the background concentration, representing an acceptable level of potential risk.

Selenium concentrations at IR Site 10 are likely related to regionwide selenium patterns and have accumulated at the site. Colorado River water is used to irrigate agriculture in the Imperial Valley. Water draining to the Colorado River from parts of Utah, Colorado, and New Mexico contains selenium. There is no local geological source of selenium in the Imperial Valley (Seiler 1995, 1997). Evaporative concentration of the irrigation water in the soil leads to accumulation of selenium in the soil (USBR 1998). Selenium contamination in the valley is due to the selenium load of the irrigation water supply, which originates in the upper reaches of the Colorado River (RWQCB 2002).

The proposed removal action reduces the soil selenium EPC from 4.2 milligrams per kilogram (mg/kg) to 1.8 mg/kg. Two thirds of the sampling areas reported undetected levels of selenium. The residual soil selenium EPC, 1.8 mg/kg, exceeds the background threshold value of 0.7 mg/kg by a factor of 2.6.

Pesticides showed a negligible potential risk, principally from dieldrin, with an HI of 2. Because of the conservative factors included in the risk estimate, it is likely that these organic compounds represent a condition of negligible ecological risk.

In summary, no unacceptable levels of potential ecological risk due to soil chemical concentrations are indicated at IR Site 10 following the proposed soil removal action.

A2 HUMAN-HEALTH RISK SCREENING

A screening risk assessment was performed to assess potential impacts to human health from contaminants at IR Site 10. The screening risk assessment documents the hazards and provides information necessary for making risk management decisions concerning the necessity for or the selection of remedial alternatives. This appendix presents the methodology used in the risk screening for the ESI at IR Site 10 and tabulates the resultant risk estimates. The human-health risk screening methodology is presented in Section A2.1. A quantitative screen was performed for the on-site soil.

This risk assessment addresses chemicals in soil within Pond Nos. 1, 2, and 3. Groundwater samples were not collected because groundwater beneath IR Site 10 has been classified "no beneficial use" by the California Regional Water Quality Control Board (RWQCB). Surface water samples were not collected because the ponds are dry. There are no buildings on the ponds, and no buildings will be constructed on the ponds in the foreseeable future.

Exposure conditions used in the risk screening were chosen to represent a maximum possible exposure. Use of these exposure conditions tends to overestimate risk. This effort to overestimate risk is deliberate; it provides risk managers a margin of safety when they make cleanup decisions.

Although IR Site 10 is screened in this report for both industrial and residential land use, land use within NAF El Centro is generally characterized as heavy industrial use. The current receptors are facility personnel.

A2.1 Human-Health Risk Screening Methodology Overview

The steps used in the risk screening include selection of the chemicals of potential concern (COPCs) and calculation of the health risks for the COPCs. The COPCs are selected from all chemicals detected in soil samples collected at 0 foot to 10 feet bgs from the areas that will remain on-site after remediation. Therefore, data from soil samples collected from EC10-B6, EC10-B21, EC10-B22, and EC10-S23 (Pond No. 1) and EC10-S32 (Pond No. 2) will not be included in determining COPCs. Chemicals that are required nutrients or have concentrations below natural background were not included as COPCs.

The health risks are calculated using preliminary remediation goals (PRGs) published by U.S. EPA Region 9 (U.S. EPA 2002) for residential and industrial soil. The PRGs account for exposure via ingestion of soil, inhalation of vapors or dust, and absorption through dermal contact with chemicals in soil. Cal/EPA PRGs are also published for some chemicals and were used as available.

Cancer and noncancer risks have been quantified separately. For carcinogenic COPCs, the risks were calculated using both U.S. EPA and Cal/EPA PRGs because there are differences between them.

The assessment of risk for lead is based on a comparison of the maximum concentration of lead at each pond to both the Cal/EPA residential PRG of 150 mg/kg and to the U.S. EPA industrial PRG of 750 mg/kg.

A2.2 Selection of Chemicals of Potential Concern

COPCs are the chemicals used to characterize the risk. They are a subset of all chemicals detected in the analytical data collected from the ponds. Inorganic chemicals that are required nutrients are not included as COPCs. Chemicals with maximum concentrations below background are not included as COPCs. This section presents an overview of the data evaluation process that was used to select the COPCs for the human-health risk screening. The results of this evaluation show that there are 44 COPCs, including 11 metals and 33 organic chemicals (Table A-12).

A2.2.1 DATA EVALUATION

Data collected during the ESI and previous investigations were used to conduct the screening human-health risk assessment. All chemical analytical data obtained during the extended site field investigation were validated (10 percent at Level IV and 90 percent at

Level III). All data were evaluated for the data quality indicators (precision, accuracy, representativeness, completeness, and comparability) as specified in the Guidance for Data Usability in Risk Assessment (U.S. EPA 1992). Data rejected during the validation process were not used in the human-health risk screening. All data used in the risk screening were analyzed by a fixed-base analytical laboratory. The samples used in the risk screening assessment are listed on Table A-13.

Following the validation process, COPCs were selected based on appropriate U.S. EPA guidance (U.S. EPA 1989). The COPC selection process began by listing all chemicals positively identified in soil. Essential nutritional elements of very low toxicity (i.e., calcium, iron, magnesium, potassium, or sodium) and tentatively identified compounds that were not identified at the structural level were eliminated as COPCs. Chemicals with maximum concentrations less than background were also eliminated as COPCs. Table A-12 presents the COPCs for IR Site 10.

Total petroleum hydrocarbons (TPH) was not identified as a risk screening COPC. TPH is an estimate of the total concentration of petroleum hydrocarbons in a sample. Depending on the type of fuel released and the degree of weathering that occurred, the TPH concentration includes different quantities of different hydrocarbons with different levels of toxicity. Because of this variability, a health-based PRG was not developed for TPH. Instead, the risk screening was conducted on the components of hydrocarbons (e.g., benzo[a]pyrene) when these were identified.

A2.2.2 BACKGROUND CONCENTRATIONS

Statistical estimates of background concentrations were used in two ways. First, the statistical background concentration was compared to the maximum concentration of the chemical detected in soil. Chemicals with concentrations below background were not included as COPCs. For IR Site 10, five chemicals (antimony, beryllium, nickel, thallium, and organolead) were detected at concentrations below background and not included as COPCs.

Second, the background concentrations for the COPCs were included in the risk calculations. Metals are natural components of the earth's crust. Some metals are considered carcinogenic and, therefore, could present a cancer risk at naturally occurring (background) concentrations. Release of a carcinogenic metal to an environment where the metal already existed does not create a potential risk but adds to any existing risk. A background risk was calculated for COPCs with background concentrations. This calculation is explained in Section A2.3.

Background concentrations for metals were identified from sample results that represent soil conditions that have not been affected by site operations. Background concentrations used to estimate human-health risk from exposure to metals in soil at background concentrations are shown in Table A-12 of this appendix.

A2.2.3 EVALUATION OF ORGANOLEAD

Resampling results and low frequency of detection indicate that organolead concentrations are not representative of site conditions. Organolead results are available for 22 samples collected from IR Site 10 at the 0- to 10-foot soil depth. Of these 22 samples, 20 did not contain concentrations of organolead above the reporting limit. The nine samples collected at soil depths greater than 10 feet also did not contain concentrations of organolead above the reporting limit.

Two samples collected during the site investigation/solid waste assessment test (Ogden 1993a,b) contained organolead concentrations of 0.21 mg/kg in the sample collected from boring EC10-B11 at 6 feet below the pond bottom and of 0.28 mg/kg in the sample collected from boring EC10-B13 at 9 feet below the pond bottom. During the resampling of these areas (EC10-B11A at 4.5 to 6.5 feet below the pond bottom and EC10-B13A at 7.5 to 9.5 feet below the pond bottom) in June 1997 (BNI 1998), the two new samples did not contain concentrations of organolead above the reporting limit of 0.2 mg/kg.

In addition, samples collected from the background sampling locations noted in Table 4-2 of the final Data Gap Study Report (BNI 1998) contained organolead concentrations of 0.42 to 0.67 mg/kg in 2 of 11 samples (18 percent). Therefore, organolead was not included as a COPC because historical results could not be reproduced, frequency of detection was low, and the reported concentrations were less than the values reported from background samples.

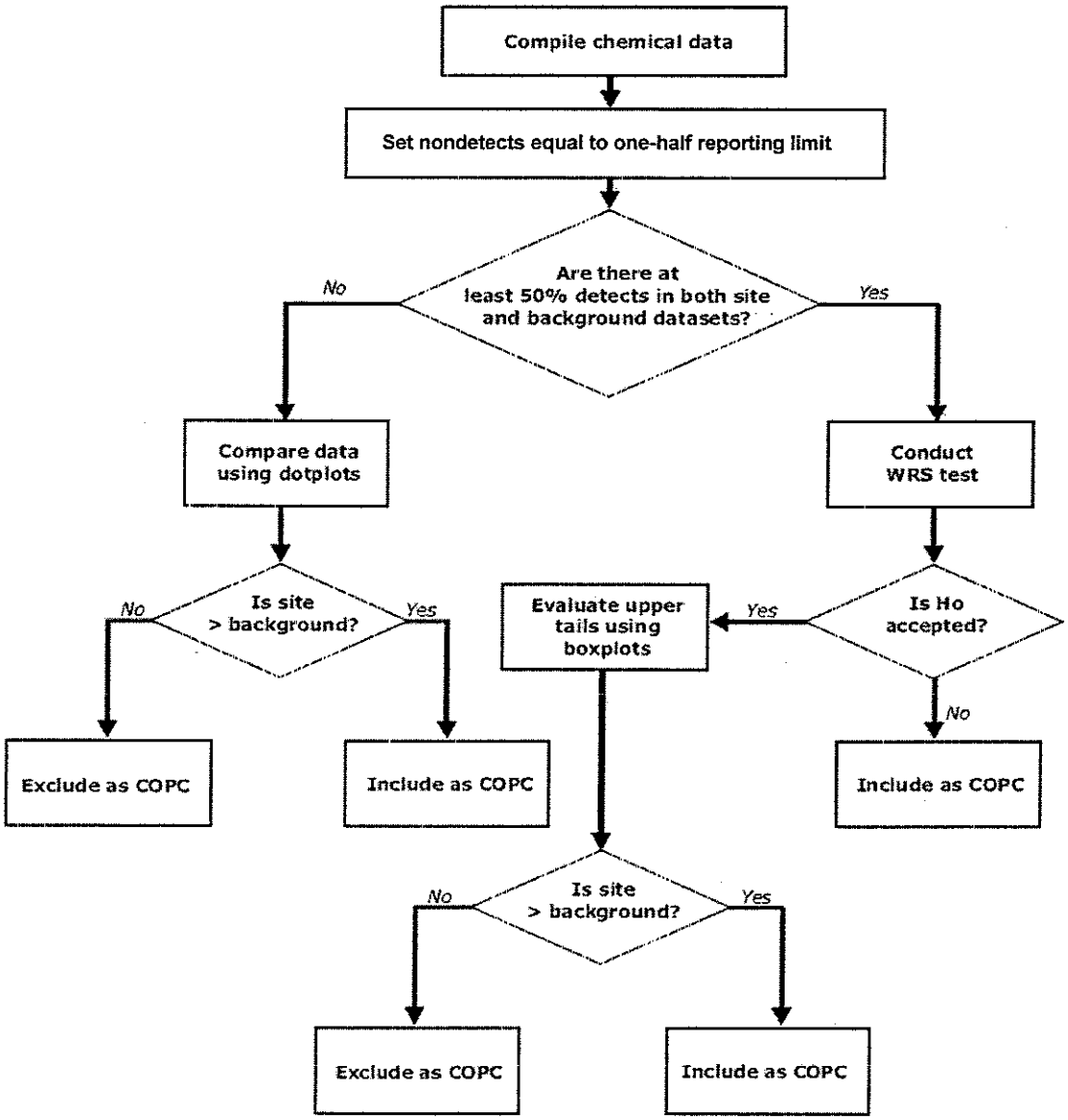
A2.2.4 EXPOSURE POINT CONCENTRATION

Because of the uncertainty associated with any estimate of exposure concentration, U.S. EPA recommends that the 95 percent UCL of the average measured chemical concentration be used to estimate the EPC. To calculate the 95 percent UCLs, the methodology presented in Figure A-2 was used. The EPC for each chemical was calculated using the bootstrap method because frequency of detection was low and sample size was small. The maximum chemical concentration was used as the EPC whenever the calculated 95 percent UCL was higher than the maximum. The final EPC for each COPC is presented in Table A-12.

A2.3 Risk Screening Procedure

The specific screening procedure used was recommended by the U.S. EPA Region 9 (U.S. EPA 2002) and is described below.

1. The COPCs were matched to the respective PRG values and were evaluated as three groups. The first group was composed of those COPCs with cancer-based PRG values; the second was composed of the COPCs with noncancer hazard-based PRG values; the third was composed of COPCs with PRGs based on saturation or ceiling limits in soil. PRGs in the third group were coded "sat" or "max" in the published table of PRGs. Note that a COPC can have both a cancer- and noncancer-based PRG.



COPC - chemical of potential concern (for human-health and ecological risk assessment)
WRS - Wilcoxon Rank Sum
Ho - null hypothesis (that on-site concentration is less than or equal to background concentration)

Figure A-2
Comparison of Site Concentrations
With Background Concentrations for Soil

2. The ratio of the EPC and cancer/noncancer-based PRG were calculated for each COPC.
3. The ratio of each carcinogen was multiplied by 1×10^{-6} to obtain a cancer risk estimate.
4. The cancer risk estimates were summed to obtain an estimate of total cancer risk.
5. The background cancer risk was calculated for COPCs detected in the background having statistical estimates of the concentration in background.
6. An incremental cancer risk was calculated by subtracting the background cancer risk from the total cancer risk. Comparing on-site and background risks provides information useful to risk managers making decisions about selection of remedies.
7. Cancer risks for each COPC are added together.
8. The ratios for the noncarcinogens were summed to obtain an estimate of total chronic toxicity. These ratios are called "HIs."

Table A-14 presents the resultant cancer and noncancer residential and industrial risk estimates from exposure to the COPCs. These tables also present the COPCs at each site with nonrisk-based PRG values (COPCs with PRGs based on saturation or ceiling limits in soil). Table A-15 presents the cancer risk estimates and HIs for background concentrations and for incremental risk.

Incremental risk was not calculated for the systemic toxicants because noncarcinogenic effects have thresholds. If the background concentration of a noncarcinogen does not produce an exposure level above the toxicity threshold, it poses no risk of adverse health effects. With noncarcinogenic effects it is necessary to estimate the likelihood of systemic effects presented by the total concentration (background plus the amount above background) and to use that estimate in decision making.

A2.4 Application of Cal/EPA PRGs for Carcinogens

The published U.S. EPA Region 9 PRG table contains PRGs developed by Cal/EPA for some chemicals. The Cal/EPA PRG for each of those chemicals is lower (and thus more stringent) than the corresponding U.S. EPA PRG by a factor of 4 or more and is referred to as a "Cal-Modified" [Cal/EPA-modified] PRG. Cal-Modified PRGs were used in addition to Region 9 PRGs when COPCs with Cal-Modified PRGs are present.

A2.5 COPCs Without Assigned PRGs

PRGs were not developed for some of the COPCs. These chemicals were assigned the PRG of another chemical of similar structure (surrogates). Table A-14 identifies the chemical surrogates for the COPCs without assigned PRGs.

A2.6 Lead Screening

The EPC of lead at IR Site 10 was compared to the Cal/EPA residential PRG of 150 mg/kg and the U.S. EPA industrial PRG of 750 mg/kg. For residential soils, the comparison is based on the residential Cal-Modified PRG instead of the U.S. EPA PRG of 400 mg/kg because the Cal-Modified PRG is lower and more stringent, rendering the approach conservative. Neither the Cal/EPA residential soil PRG or the U.S. EPA PRG for lead is exceeded at IR Site 10.

If there had been exceedances, the Cal/EPA pharmacokinetic model would have been used to estimate the blood lead concentrations for a resident child and adult, and these concentrations would have been compared to the acceptable concentration of 10 micrograms per deciliter.

A2.7 Exposure Assumptions of the Soil PRGs

The PRGs developed by U.S. EPA Region 9 for chemicals in residential and industrial soil are based on exposure by ingestion of soil, inhalation of soil particles, inhalation of chemical vapors released to the atmosphere, and dermal contact of soil with the skin. In a risk assessment these are considered to be the major routes of exposure to chemicals in soil.

PRGs were estimated by U.S. EPA Region 9 by integrating intake variables such as ingestion rate, body weight, and exposure duration with the risk level protective of human health. The intake variables used to develop the PRGs were based on U.S. EPA guidelines that assume a 90 to 95 percent upper-bound exposure scenario designed to address the behavior and activity patterns of receptor populations. The intent is to estimate the PRG on what is known as "reasonable maximum exposure." Use of PRGs, structured under these exposure conditions, tends to overestimate risk. This effort to overestimate risk is deliberate; it provides risk managers a margin of safety when they make cleanup decisions.

A2.8 Risk Summary

This section presents a summary of the risk screening results for soil at IR Site 10. For scenarios with cancer risks greater than 1×10^{-6} or HIs greater than 1, the chemicals that contribute significantly to the risk (risk drivers) are discussed in greater detail. Tables A-14 and A-15 detail these results.

The residential total cancer risks are 1×10^{-5} and 2×10^{-5} using U.S. EPA and Cal-Modified PRGs, respectively. The residential incremental cancer risks are 6×10^{-6} and 7×10^{-6} using U.S. EPA and Cal-Modified PRGs, respectively. The U.S. EPA and Cal-Modified risk drivers are the same: benzo(a)pyrene and dieldrin.

The industrial total cancer risk is 4×10^{-6} using U.S. EPA PRGs. The industrial incremental cancer risk is 2×10^{-6} using U.S. EPA PRGs. There are no risk drivers.

Sections A2.8.1 and A2.8.2 present the details of the risk screening results.

A2.8.1 IR SITE 10 RESIDENTIAL LAND USE

Under the residential scenario, the total cancer risk at IR Site 10 was estimated at 1×10^{-5} and 2×10^{-5} using U.S. EPA and Cal-Modified PRGs, respectively. Incremental cancer risk from exposure to the soil was estimated at 6×10^{-6} and 7×10^{-6} using U.S. EPA and Cal-Modified PRGs, respectively. Benzo(a)pyrene and dieldrin are identified as the principal risk drivers, contributing 46 and 21 percent, respectively, of the U.S. EPA derived incremental cancer risk. Benzo(a)pyrene and dieldrin are also the principal risk drivers, contributing 43 and 20 percent, respectively, of the incremental cancer risk estimate by use of Cal-Modified PRGs.

Under residential conditions, the HI at IR Site 10 was estimated at 0.6. The HI for background levels of metals for the residential scenario is 0.4.

Tables A-14 and A-15 present the contribution of each chemical to the total, background, and incremental cancer risk and the total and background HI.

The EPC for lead (13.5 mg/kg) was below the residential PRG of 150 mg/kg.

A2.8.2 IR SITE 10 INDUSTRIAL LAND USE

Under the industrial scenario, the total cancer risk at IR Site 10 was estimated at 4×10^{-6} using U.S. EPA PRGs. Incremental cancer risk from exposure to the soil was estimated at 2×10^{-6} using U.S. EPA PRGs. There are no risk drivers.

Under industrial conditions, the HI at IR Site 10 was estimated at 0.05. The HI for background levels of metals for the industrial scenario is 0.04.

Tables A-14 and A-15 present the contribution of each chemical to the total, background, and incremental cancer risk and the total and background HI.

The maximum reported lead concentration (13.5 mg/kg) at IR Site 10 was below the industrial PRG of 750 mg/kg.

A2.9 Uncertainty

In a screening risk assessment, there are two sources of uncertainty: the use of EPCs and the use of PRGs as screening criteria.

A2.9.1 EXPOSURE POINT CONCENTRATIONS

In risk assessment, the actual exposure concentration is usually the average concentration that an individual could be exposed to over his or her lifetime. To estimate this exposure, the 95th percentile UCL of the mean is used as the EPC. For soil at IR Site 10, the respective EPCs are likely overestimates of exposure because they are based on data collected in areas of known or suspected impact.

Additionally, if there is any dilution, degradation, or physical separation between the point of measurement and the point of exposure, this can also result in conservative estimates.

A2.9.2 CALCULATING RISKS USING PRGs

PRGs are established by U.S. EPA and Cal/EPA to represent a potential incremental cancer risk of 1×10^{-6} or an HI of 1. When these PRGs were developed, certain exposure pathways were considered to be typical. For soil, these pathways included ingestion, inhalation of particulates, inhalation of volatiles, and dermal absorption. They did not include exposure to indoor air from soil gas; exposure to groundwater contaminated by soil leachate; ingestion via plant, meat, or dairy products; or inhalation of particulates from trucks and heavy equipment. The risks may be overestimated if one or more PRG pathways are not applicable, or the risks may be underestimated if likely pathways were not considered during PRG development.

The likely exposure pathways at IR Site 10 are consistent with the typical pathways assumed by U.S. EPA and Cal/EPA when the soil PRGs were established. The likely pathways at IR Site 10 include ingestion, inhalation of particulates and volatiles, and dermal absorption.

Exposure to indoor air from soil gas is not considered a significant pathway because the ponds will be used for sewage treatment; buildings will not be constructed. Exposure to groundwater contaminated by soil leachate is not applicable at IR Site 10 because the groundwater has been designated nonbeneficial use by RWQCB.

Ingestion via plant, meat, or dairy products is not applicable because IR Site 10 is not presently used, or expected to be used in the future, for subsistence farming (i.e., where the population being assessed are subsisting on the plant, meat, or dairy products grown or raised within the exposure area).

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TABLES

Table A-1
Summary of Soil COPECs[a] for IR Site 10 (All Ponds) After Proposed Soil Removal Action
(in milligrams per kilogram)

Analyte[a]	Minimum Detection	Maximum Detection	Median	Mean	Standard Deviation	Background Threshold Value	Number of Positive Detections	Number of Samples	Frequency of Detection (percent)	EPC	Basis for EPC
antimony	0.03	0.47	0.25	0.22	0.1	0.68	4	20	20	—[b]	< Background
arsenic	0.51	5	2.7	2.6	1.1	6.3	29	29	100	—	< Background
beryllium	0.15	0.95	0.62	0.58	0.18	1.1	29	29	100	—	< Background
cadmium	0.37	5.2	1.1	1.4	1	2.2	29	29	100	1.8	Bootstrap
chromium, total	3.7	79.2	11	16	16	19	41	41	100	20	Bootstrap
hexavalent chromium	4	4	1	1.1	0.66		1	21	5	1.4	Bootstrap
copper	3.2	83.3	14	26	23	22	29	29	100	33	Bootstrap
lead	3.7	27.6	11	12	6.8	17	29	29	100	14	Bootstrap
mercury	0.02	0.46	0.05	0.26	0.92	0.05	13	29	45	0.46	Maximum
nickel	5	19.8	13	12	4.4	20	29	29	100	—	< Background
selenium	1	5	0.5	1.4	1.4	0.7	10	29	34	1.8	Bootstrap
silver	0.24	128	3.2	19	30	0.6	27	29	93	28	Bootstrap
thallium	0.18	0.22	0.14	0.15	0.035	0.3	3	12	25	—	< Background
zinc	16.5	131	42	54	32	70	29	29	100	64	Bootstrap
cyanide	0.2	0.6	0.25	0.28	0.14	—	3	24	13	0.33	Bootstrap
Aroclor 1254	0.078	0.48	0.05	0.096	0.13	—	4	12	33	0.16	Bootstrap
Aroclor 1260	0.038	0.038	0.017	0.024	0.013	—	1	12	8	0.03	Bootstrap
4,4′-DDD	0.0004	0.016	0.0017	0.0033	0.0043	—	4	12	33	0.0053	Bootstrap
4,4′-DDE	0.0036	0.100	0.018	0.022	0.025	—	12	18	67	0.031	Bootstrap
4,4′-DDT	0.0005	0.0005	0.0017	0.0022	0.0014	—	1	12	8	0.0005	Maximum
alpha-BHC	0	0	0.0009	0.0019	0.0019	—	0	12	0	0	Not detected
beta-BHC	0	0	0.0009	0.0019	0.0019	—	0	12	0	0	Not detected
alpha-chlordane	0.0024	0.063	0.0035	0.012	0.02	—	8	12	67	0.021	Bootstrap
gamma-chlordane	0.002	0.120	0.0049	0.019	0.034	—	10	12	83	0.035	Bootstrap
heptachlor	0	0	0.0009	0.0019	0.0019	—	0	12	0	0	Not detected
heptachlor epoxide	0.002	0.0069	0.0009	0.0022	0.0022	—	2	12	17	0.0032	Bootstrap

(table continues)

Table A-1 (continued)

Analyte[a]	Minimum Detection	Maximum Detection	Median	Mean	Standard Deviation	Background Threshold Value	Number of Positive Detections	Number of Samples	Frequency of Detection (percent)	EPC	Basis for EPC
aldrin	0.0033	0.0033	0.0009	0.0021	0.0019	—	1	12	8	0.003	Bootstrap
dieldrin	0.003	0.140	0.0062	0.023	0.039	—	10	12	83	0.041	Bootstrap
endosulfan sulfate	0.0008	0.002	0.0017	0.0019	0.001	—	2	12	17	0.002	Maximum
endrin	0.012	0.012	0.0017	0.0034	0.0031	—	1	12	8	0.0048	Bootstrap
endrin aldehyde	0.002	0.003	0.0017	0.0021	0.00098	—	2	12	17	0.0026	Bootstrap
endrin ketone	0.0048	0.0048	0.0017	0.0021	0.001	—	1	9	11	0.0026	Bootstrap
benz(a)anthracene	0.26	0.26	0.18	0.18	0.029	—	1	9	11	0.2	Bootstrap
benzo(a)pyrene	0.20	0.20	0.18	0.18	0.0087	—	1	9	11	0.18	Bootstrap
benzo(b)fluoranthene	0.25	0.38	0.18	0.21	0.07	—	2	9	22	0.24	Bootstrap
benzo(g,h,i)perylene	0.076	0.13	0.18	0.16	0.034	—	2	9	22	0.13	Maximum
benzo(k)fluoranthene	0.16	0.16	0.18	0.17	0.0051	—	1	9	11	0.16	Maximum
chrysene	0.15	0.35	0.18	0.19	0.06	—	2	9	22	0.22	Bootstrap
fluoranthene	0.27	0.27	0.18	0.19	0.032	—	1	9	11	0.2	Bootstrap
indeno(1,2,3-cd)pyrene	0.072	0.13	0.18	0.16	0.035	—	2	9	22	0.13	Maximum
pyrene	0.24	0.24	0.18	0.18	0.022	—	1	9	11	0.19	Bootstrap
benzoic acid	0.074	2.3	0.35	0.44	0.53	—	6	15	40	0.66	Bootstrap
2-nitrophenol	0.19	0.19	0.18	0.15	0.045	—	1	15	7	0.16	Bootstrap
4-chloroaniline	0.082	0.098	0.18	0.16	0.037	—	2	9	22	0.098	Maximum
butylbenzyl phthalate	0.12	0.23	0.18	0.18	0.028	—	2	9	22	0.19	Bootstrap
di-n-butyl phthalate	0.18	0.18	0.18	0.14	0.044	—	1	15	7	0.16	Bootstrap
acetone	0.8	0.8	0.05	0.22	0.31	—	1	7	14	0.4	Bootstrap
methylene chloride	0.05	0.05	0.055	0.043	0.019	—	1	17	6	0.05	Maximum
4-methyl-2-pentanone	0.05	0.05	0.025	0.096	0.18	—	1	7	14	0.05	Maximum
toluene	0.02	0.22	0.014	0.047	0.068	—	8	17	47	0.073	Bootstrap

Notes:
[a] list of chemicals is the same as the ESI screening-level ecological risk assessment for comparison purposes
[b] dash indicates not established

(table continues)

Table A-1 (continued)

Acronyms/Abbreviations:

alpha-BHC – alpha isomer of benzene hexachloride
beta-BHC – beta isomer of benzene hexachloride
COPEC – chemical of potential ecological concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
ESI – extended site investigation
IR – Installation Restoration (Program)

Table A-2
Representative Wildlife Receptor Species

Representative Wildlife Receptor	Body Weight (kg)	Reference
Cottontail rabbit	0 895	Ingles, L G 1941 (as cited in Cal/EPA 2002) mean adult male and female data
Deer mouse	0 0184	Hayes, J P 1989 (as cited in Cal/EPA 2002) mean adult male and female data
Coyote	11 2	Cypher, B L 1995 (as cited in Cal/EPA 2002) mean adult male and female data
Mourning dove	0.125	Cowan, J B 1952 (as cited in Cal/EPA 2002) mean adult male and female from California
American robin	0 0804	Clench and Leberman 1978, Wheelwright 1986 (as cited in U S EPA 1993) mean adult male and female, breeding and nonbreeding
American kestrel	0 111	Roest, A.I 1957 (as cited in Cal/EPA 2002) mean adult male and female data

Acronyms/Abbreviations:
IR – Installation Restoration (Program)
kg – kilogram
NAF – Naval Air Facility

Table A-3
Mammal Toxicity Reference Values, Low

Analyte	TRV (mg/kg-day)	Species	Body Weight (kg)	R[a]	Reference[a]
arsenic	0.32	Rat	0.332	R2	Schroeder et al. 1968
cadmium	0.06	Mouse	0.0322	R2	Webster 1988
chromium, total[b]	3.28	Rat	0.35	R1	MacKenzie et al. 1958
hexavalent chromium[b]	3.28	Rat	0.35	R1	MacKenzie et al. 1958
copper	2.67	Mouse	0.03	R2	Pocino et al. 1991
lead	1	Rat	0.5506	R5	Fowler et al. 1980
mercury	0.25	Rat	0.1875	R2	Khera and Trabacova 1973
nickel	0.133	Rat	0.2486	R2	Smith et al. 1993
selenium	0.05	Rat	0.1865	R2	Harr et al. 1966
silver	32.86	Rat	0.35		Matuk et al. 1981
zinc	9.6	Mouse	0.0255	R2	Aughey et al. 1977
cyanide	68.7	Rat	0.273	R1	Tewe and Maner 1981
Aroclor 1254	0.36	Mouse	0.02062	R2	Simmons and McKee 1992
Aroclor 1260[c]	0.36	Mouse	0.02062	R2	Simmons and McKee 1992
4,4′-DDD	0.8	Rat	0.32	R2	Fitzhugh 1948
4,4′-DDE	0.8	Rat	0.32	R2	Fitzhugh 1948
4,4′-DDT	0.8	Rat	0.32	R2	Fitzhugh 1948
alpha-BHC[d]	0.05	Rat	0.176	R2	Naishtein and Leibovich 1971
beta-BHC[d]	0.05	Rat	0.176	R2	Naishtein and Leibovich 1971
alpha-chlordane[e]	4.58	Mouse	0.03	R1	Keplinger et al. 1968
gamma-chlordane[e]	4.58	Mouse	0.03	R1	Keplinger et al. 1968
heptachlor	0.129	Rat	0.1	R2	Shain et al. 1977
heptachlor epoxide[f]	0.129	Rat	0.1	R2	Shain et al. 1977
aldrin	0.02	Rat	0.35	R1	Treon and Cleveland 1955
dieldrin	0.02	Rat	0.35	R1	Treon and Cleveland 1955
endosulfan sulfate[g]	0.15	Rat	0.35	R1	Dikshith et al 1984
endrin	0.092	Mouse	0.03	R1	Good and Ware 1969
endrin aldehyde[h]	0.092	Mouse	0.03	R1	Good and Ware 1969
endrin ketone[h]	0.092	Mouse	0.03	R1	Good and Ware 1969
benz(a)anthracene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
benzo(a)pyrene	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
benzo(b)fluoranthene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
benzo(g,h,i)perylene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
benzo(k)fluoranthene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
chrysene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967

(table continues)

Table A-3 (continued)

Analyte	IRV (mg/kg-day)	Species	Body Weight (kg)	R[a]	Reference[a]
fluoranthene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
indeno(1,2,3-cd)pyrene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
pyrene[i]	1.31	Mouse	0.0305	R2	Neal and Rigdon 1967
benzoic acid	4	Mouse	0.0305	R3	Shtenberg and Ignat'ev 1970
2-nitrophenol	3.34	Rat	0.35	R4	Lewis 1996
4-chloroaniline	2	Rat	0.35	R4	IARC 1993
butylbenzyl phthalate	159	Rat	0.35	R3	NTP 1985
di-n-butyl phthalate[j]	550	Mouse	0.03	R2	Lamb et al. 1987
acetone	10	Rat	0.35	R1	U.S. EPA 1986
methylene chloride	5.85	Rat	0.35	R1	NCA 1982
4-methyl-2-pentanone	25	Rat	0.35	R1	MBA 1986
toluene	26	Mouse	0.03	R1	Nawrot and Staples 1979

Notes:

[a] the sources reviewed to compile the information presented in this table are the following:
- R1 – Sample et al. 1996
- R2 – EFA-West 1998 and Cal/EPA 2000
- R3 – IRIS
- R4 – HSDB (ToxNet)
- R5 – Cal/EPA 2002

each of these sources contains the cited reference

[b] chemical surrogate hexavalent chromium was used

[c] chemical surrogate Aroclor 1254 was used

[d] chemical surrogate gamma-BHC (Lindane) was used

[e] chemical surrogate chlordane was used

[f] chemical surrogate heptachlor was used

[g] chemical surrogate endosulfan was used

[h] chemical surrogate endrin was used

[i] chemical surrogate benzo(a)pyrene was used

[j] chemical surrogate di-n-octylphthalate was used

Acronyms/Abbreviations:

alpha-BHC – alpha isomer of benzene hexachloride
beta-BHC – beta isomer of benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
gamma-BHC – gamma isomer of benzene hexachloride
kg – kilogram
mg/kg-day – milligrams per kilogram per day
R – reference
TRV – toxicity reference value

Table A-4
Avian Toxicity Reference Values, Low

Analyte	TRV (mg/kg-day)	Species	Body Weight (kg)	R[a]	Reference[a]
arsenic	5.5	Mallard	1.1722	R2	Stanley et al. 1994
cadmium	0.078	Mallard	0.7985	R2	Cain et al. 1983
chromium, total[b]	1	Black duck	1.25	R1	Haseltine et al. 1985
hexavalent chromium[b]	1	Black duck	1.25	R1	Haseltine et al. 1985
copper	2.3	Broiler chick	0.639	R2	Norvell et al. 1975
lead	0.014	Japanese quail	0.0935	R2	Edens et al. 1976
mercury	0.039	Mallard	1	R2	Heinz 1974
nickel	1.38	Mallard	0.61375	R2	Cain and Pafford 1981
selenium	0.23	Mallard	1.1077	R2	Heinz et al. 1989
silver	178	Mallard	1	R3	U.S. EPA 1997
zinc	17.2	Mallard	0.955	R2	Gasaway and Buss 1972
cyanide	0.04	American kestrel	0.12	R3	Wiemeyer et al. 1986
Aroclor 1254	0.088	Chicken	0.8	R2	Platonow and Reinhart 1973
Aroclor 1260[c]	0.088	Chicken	0.8	R2	Platonow and Reinhart 1973
4,4′-DDD	0.009	Pelican	3.5	R2	Anderson et al. 1975
4,4′-DDE	0.009	Pelican	3.5	R2	Anderson et al. 1975
4,4′-DDT	0.009	Pelican	3.5	R2	Anderson et al. 1975
alpha-BHC[d]	0.56	Quail	0.15	R1	Vos et al. 1971
beta-BHC[d]	0.56	Quail	0.15	R1	Vos et al. 1971
alpha-chlordane[e]	2.14	Blackbird	0.064	R1	Stickel et al. 1983
gamma-chlordane[e]	2.14	Blackbird	0.064	R1	Stickel et al. 1983
heptachlor	0.065	Coturnix quail	0.1[f]	R3	Hill and Carmardese 1986
heptachlor epoxide[g]	0.065	Coturnix quail	0.1[f]	R3	Hill and Carmardese 1986
aldrin[h]	0.077	Barn owl	0.466	R1	Mendenhall et al. 1983
dieldrin	0.077	Barn owl	0.466	R1	Mendenhall et al. 1983
endosulfan sulfate[i]	10	Partridge	0.4	R1	Abiola 1992
endrin	0.01	Screech owl	0.181	R1	Fleming et al. 1982
endrin aldehyde[j]	0.01	Screech owl	0.181	R1	Fleming et al. 1982
endrin ketone[j]	0.01	Screech owl	0.181	R1	Fleming et al. 1982
benz(a)anthracene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
benzo(a)pyrene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
benzo(b)fluoranthene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
benzo(g,h,i)perylene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983

(table continues)

Table A-4 (continued)

Analyte	TRV (mg/kg-day)	Species	Body Weight (kg)	R[a]	Reference[a]
benzo(k)fluoranthene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
chrysene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
fluoranthene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
indeno(1,2,3-cd)pyrene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
pyrene[k]	1.01	Blackbirds	0.074[l]		Schafer et al. 1983
benzoic acid	0.4[m]	Mouse		R4	Shtenberg and Ignat'ev 1970
2-nitrophenol	0.334[m]	Rat		R5	Lewis 1996
4-chloroaniline	0.2[m]	Rat		R5	IARC 1993
butylbenzyl phthalate[n]	0.11	Ringed dove	0.155	R1	Peakall 1974
di-n-butyl phthalate	0.11	Ringed dove	0.155	R1	Peakall 1974
acetone	52	Coturnix quail	0.1[f]	R3	Hill and Carmardese 1986
methylene chloride	0.585[m]	Rat		R1	NCA 1982
4-methyl-2-pentanone	2.5[m]	Rat		R1	MBA 1986
toluene	2.6[m]	Mouse		R1	Nawrot and Staples 1979

Notes:

[a] the sources reviewed to compile the information presented in this table are the following:
- R1 – Sample et al. 1996
- R2 – EFA-West 1998 and Cal/EPA 2000
- R3 – U.S. EPA 1999
- R4 – IRIS
- R5 – HSDB (ToxNet)

each of these sources contains the cited reference

[b] chemical surrogate trivalent chromium was used
[c] chemical surrogate Aroclor 1254 was used
[d] chemical surrogate BHC mixed isomers were used
[e] chemical surrogate chlordane was used
[f] body weight 0.1 kg assumed for coturnix quail
[g] chemical surrogate heptachlor was used
[h] chemical surrogate dieldrin was used
[i] chemical surrogate endosulfan was used
[j] chemical surrogate endrin was used
[k] chemical surrogate acenaphthene was used
[l] red-winged blackbird body weight from Beletsky 1996
[m] avian TRV estimated from mammal TRV * 0.1
[n] chemical surrogate di-n-butylphthalate was used

Acronyms/Abbreviations:
- alpha-BHC – alpha isomer of benzene hexachloride
- beta-BHC – beta isomer of benzene hexachloride
- BHC – benzene hexachloride
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- kg – kilogram
- mg/kg-day – milligrams per kilogram per day
- R – reference
- TRV – toxicity reference value

Table A-5
Receptor-Specific Toxicity Reference Values
(units in milligrams per kilogram per day)

Analyte	Cottontail Rabbit	Deer Mouse	Coyote	Mourning Dove	American Robin	American Kestrel
arsenic	3.2E-1	3.2E-1	3.2E-1	5.5E+0	5.5E+0	5.5E+0
cadmium	6.0E-2	6.0E-2	4.2E-2	7.8E-2	7.8E-2	7.8E-2
chromium, total	3.3E+0	3.3E+0	3.3E+0	1.0E+0	1.0E+0	1.0E+0
hexavalent chromium	3.3E+0	3.3E+0	3.3E+0	1.0E+0	1.0E+0	1.0E+0
copper	2.7E+0	2.7E+0	1.9E+0	2.3E+0	2.3E+0	2.3E+0
lead	1.0E+0	1.0E+0	1.0E+0	1.4E-2	1.4E-2	1.4E-2
mercury	2.5E-1	2.5E-1	2.5E-1	3.9E-2	3.9E-2	3.9E-2
nickel	1.3E-1	1.3E-1	1.3E-1	1.4E+0	1.4E+0	1.4E+0
selenium	5.0E-2	5.0E-2	5.0E-2	2.3E-1	2.3E-1	2.3E-1
silver	3.3E+1	3.3E+1	3.3E+1	1.8E+2	1.8E+2	1.8E+2
zinc	9.6E+0	9.6E+0	6.7E+0	1.7E+1	1.7E+1	1.7E+1
cyanide	6.9E+1	6.9E+1	6.9E+1	4.0E-2	4.0E-2	4.0E-2
Aroclor 1254	3.6E-1	3.6E-1	2.5E-1	8.8E-2	8.8E-2	8.8E-2
Aroclor 1260	3.6E-1	3.6E-1	2.5E-1	8.8E-2	8.8E-2	8.8E-2
4,4′-DDD	8.0E-1	8.0E-1	8.0E-1	9.0E-3	9.0E-3	9.0E-3
4,4′-DDE	8.0E-1	8.0E-1	8.0E-1	9.0E-3	9.0E-3	9.0E-3
4,4′-DDT	8.0E-1	8.0E-1	8.0E-1	9.0E-3	9.0E-3	9.0E-3
alpha-BHC	5.0E-2	5.0E-2	5.0E-2	5.6E-1	5.6E-1	5.6E-1
beta-BHC	5.0E-2	5.0E-2	5.0E-2	5.6E-1	5.6E-1	5.6E-1
alpha-chlordane	4.6E+0	4.6E+0	3.2E+0	2.1E+0	2.1E+0	2.1E+0
gamma-chlordane	4.6E+0	4.6E+0	3.2E+0	2.1E+0	2.1E+0	2.1E+0
heptachlor	1.3E-1	1.3E-1	9.7E-2	6.5E-2	6.5E-2	6.5E-2
heptachlor epoxide	1.3E-1	1.3E-1	9.7E-2	6.5E-2	6.5E-2	6.5E-2
aldrin	2.0E-2	2.0E-2	2.0E-2	7.7E-2	7.7E-2	7.7E-2
dieldrin	2.0E-2	2.0E-2	2.0E-2	7.7E-2	7.7E-2	7.7E-2
endosulfan sulfate	1.5E-1	1.5E-1	1.5E-1	1.0E+1	1.0E+1	1.0E+1
endrin	9.2E-2	9.2E-2	6.4E-2	1.0E-2	1.0E-2	1.0E-2
endrin aldehyde	9.2E-2	9.2E-2	6.4E-2	1.0E-2	1.0E-2	1.0E-2
endrin ketone	9.2E-2	9.2E-2	6.4E-2	1.0E-2	1.0E-2	1.0E-2
benz(a)anthracene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
benzo(a)pyrene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
benzo(b)fluoranthene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
benzo(g,h,i)perylene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
benzo(k)fluoranthene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
chrysene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0

(table continues)

Table A-5 (continued)

Analyte	Cottontail Rabbit	Deer Mouse	Coyote	Mourning Dove	American Robin	American Kestrel
fluoranthene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
indeno(1,2,3-cd)pyrene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
pyrene	1.3E+0	1.3E+0	9.2E-1	1.0E+0	1.0E+0	1.0E+0
benzoic acid	4.0E+0	4.0E+0	2.8E+0	4.0E-1	4.0E-1	4.0E-1
2-nitrophenol	3.3E+0	3.3E+0	3.3E+0	3.3E-1	3.3E-1	3.3E-1
4-chloroaniline	2.0E+0	2.0E+0	2.0E+0	2.0E-1	2.0E-1	2.0E-1
butylbenzyl phthalate	1.6E+2	1.6E+2	1.6E+2	1.1E-1	1.1E-1	1.1E-1
di-n-butyl phthalate	5.5E+2	5.5E+2	3.9E+2	1.1E-1	1.1E-1	1.1E-1
acetone	1.0E+1	1.0E+1	1.0E+1	5.2E+1	5.2E+1	5.2E+1
methylene chloride	5.9E+0	5.9E+0	5.9E+0	5.9E-1	5.9E-1	5.9E-1
4-methyl-2-pentanone	2.5E+1	2.5E+1	2.5E+1	2.5E+0	2.5E+0	2.5E+0
toluene	2.6E+1	2.6E+1	1.8E+1	2.6E+0	2.6E+0	2.6E+0

Acronyms/Abbreviations:
- alpha-BHC – alpha isomer of benzene hexachloride
- beta-BHC – beta isomer of benzene hexachloride
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane

Table A-6
Octanol-Water Partition Coefficient and Bioaccumulation Factors for IR Site 10 COPECs (bioaccumulation factor units in kilograms soil per kilograms biota [plant, invertebrate, small mammal] [dry weight])

Analyte	Log K_{ow}	Soil-to-Plant	R	Soil-to-Invert	R	Soil-to-Mammal	R
arsenic	NA	3.8E-2	a	2.2E-1	b	2.5E-3	c
cadmium	NA	5.9E-1	a	7.7E+0	b	3.3E-1	c
chromium, total	NA	4.1E-2	a	3.1E-1	b	8.5E-2	c
hexavalent chromium	NA	4.1E-2	a	3.1E-1	b	8.5E-2	c
copper	NA	1.2E-1	a	5.2E-1	b	2.0E-1	c
lead	NA	3.9E-2	a	2.7E-1	b	1.1E-1	c
mercury	NA	6.5E-1	a	1.7E+0	b	5.4E-2	c
nickel	NA	1.8E-2	a	1.1E+0	b	2.5E-1	c
selenium	NA	6.7E-1	a	9.9E-1	b	1.6E-1	c
silver	NA	1.4E-2	a	2.0E+0	b	4.0E-3	c
zinc	NA	3.7E-1	a	3.2E+0	b	7.7E-1	c
cyanide	NA	1.0E+0	d	1.0E+0	d	1.0E+0	d
Aroclor 1254	7.0E+0	3.6E-3	e	6.7E+0	b	1.1E+0	c
Aroclor 1260	8.3E+0	6.4E-4	e	6.7E+0	b	1.1E+0	c
4,4′-DDD	5.9E+0	1.6E-2	e	6.7E+0	b	1.1E+0	c
4,4′-DDE	6.0E+0	1.3E-2	e	6.7E+0	b	1.1E+0	c
4,4′-DDT	6.8E+0	4.6E-3	e	6.7E+0	b	1.1E+0	c
alpha-BHC	4.3E+0	1.3E-1	e	6.7E+0	b	1.1E+0	c
beta-BHC	4.3E+0	1.3E-1	e	6.7E+0	b	1.1E+0	c
alpha-chlordane	6.3E+0	9.3E-3	e	6.7E+0	b	1.1E+0	c
gamma-chlordane	6.3E+0	9.3E-3	e	6.7E+0	b	1.1E+0	c
heptachlor	5.9E+0	1.6E-2	e	6.7E+0	b	1.1E+0	c
heptachlor epoxide	4.6E+0	9.0E-2	e	6.7E+0	b	1.1E+0	c
aldrin	6.8E+0	4.9E-3	e	6.7E+0	b	1.1E+0	c
dieldrin	5.5E+0	2.7E-2	e	6.7E+0	b	1.1E+0	c
endosulfan sulfate	3.6E+0	3.0E-1	e	6.7E+0	b	1.1E+0	c
endrin	5.5E+0	2.7E-2	e	6.7E+0	b	1.1E+0	c
endrin aldehyde	4.8E+0	6.5E-2	e	6.7E+0	b	1.1E+0	c
endrin ketone	5.0E+0	5.1E-2	e	6.7E+0	b	1.1E+0	c
benz(a)anthracene	5.5E+0	2.5E-2	e	2.7E-1	f	1.1E+0	c
benzo(a)pyrene	6.1E+0	1.1E-2	e	3.4E-1	f	1.1E+0	c
benzo(b)fluoranthene	6.1E+0	1.1E-2	e	2.1E-1	f	1.1E+0	c
benzo(g,h,i)perylene	6.7E+0	5.2E-3	e	1.5E-1	f	1.1E+0	c
benzo(k)fluoranthene	6.1E+0	1.1E-2	e	2.1E-1	f	1.1E+0	c

(table continues)

Table A-6 (continued)

Analyte	Log K_{ow}	Soil-to-Plant	R	Soil-to-Invert	R	Soil-to-Mammal	R
chrysene	5.5E+0	2.5E-2	e	4.4E-1	f	1.1E+0	c
fluoranthene	4.9E+0	5.5E-2	e	3.7E-1	f	1.1E+0	c
indeno(1,2,3-cd)pyrene	6.7E+0	5.2E-3	e	4.1E-1	f	1.1E+0	c
pyrene	4.9E+0	5.5E-2	e	3.9E-1	f	1.1E+0	c
benzoic acid	1.9E+0	3.2E+0	e	1.0E+0	d	1.1E+0	c
2-nitrophenol	1.8E+0	3.6E+0	e	1.0E+0	d	1.1E+0	c
4-chloroaniline	1.8E+0	3.4E+0	e	1.0E+0	d	1.1E+0	c
butylbenzyl phthalate	4.8E+0	6.2E-2	e	1.0E+0	d	1.1E+0	c
di-n-butyl phthalate	4.6E+0	8.4E-2	e	1.0E+0	d	1.1E+0	c
acetone	-2.4E-1	5.3E+1	e	4.5E-2	g	1.1E+0	c
methylene chloride	1.3E+0	6.5E+0	e	8.9E-1	g	1.1E+0	c
4-methyl-2-pentanone	1.2E+0	8.3E+0	e	6.4E-1	g	1.1E+0	c
toluene	2.5E+0	1.3E+0	e	8.6E+0	g	1.1E+0	c

Notes:
- [a] BJC 1998
- [b] Sample et al. 1998a
- [c] Sample et al. 1998b
- [d] assumed value
- [e] Travis and Arms 1988 (eq 5)
- [f] Beyer and Stafford 1993
- [g] Southworth et al. 1978

Acronyms/Abbreviations:
- alpha-BHC – alpha isomer of benzene hexachloride
- beta-BHC – beta isomer of benzene hexachloride
- COPEC – chemical of potential ecological concern
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- IR – Installation Restoration (Program)
- K_{ow} – octanol-water partition coefficient
- NA – not applicable
- R – reference

Table A-7
Representative Mammal Wildlife Receptor Species

Exposure Factor	Cottontail Rabbit	Deer Mouse	Coyote
Body weight, kg	0.895[a]	0.0184[b]	11.2[c]
Ingestion rate, kg food/day dw	0.0808[d]	0.00321[e]	0.501[e]
Fractional intake, soil	0.02[f]	0.05[g]	0.028[h]
Fractional intake, plant	1[i]	0.25[i]	04
Fractional intake, invertebrate	0[i]	0.75[i]	0.25[i]
Fractional intake, small mammal	0[i]	0[i]	0.75[i]
Home range, hectares	3.1[j]	0.091[k]	1570[l]
Site-use factor (site area 1.86 hectares)	0.58	1.0	0.0012

Notes:

[a] Ingles, L.G. 1941 (as cited in Cal/Ecotox)
[b] Hayes, J.P. 1989 (as cited in Cal/Ecotox)
[c] Cypher, B.L. 1995 (as cited in Cal/Ecotox)
[d] Nagy 1987; allometric equation for herbivorous mammals (ingestion rate g dw/day = 0.577 * $BW^{0.727}$), BW units as g; divide by 1,000 for kg dw/day
[e] Nagy 1987; allometric equation for all mammals (ingestion rate g dw/day = 0.235 * $BW^{0.822}$), BW units as g; divide by 1,000 for kg dw/day
[f] Beyer et al. 1994; woodchuck < 2 percent
[g] Beyer et al. 1994; midpoint of two prairie dog values
[h] Beyer et al. 1994; red fox 2.8 percent
[i] assumed value
[j] U.S. EPA 1993; mean of values shown
[k] Storer et al. 1944 (as cited in Cal/Ecotox); mean adult male and female
[l] Bounds and Shaw 1997 (as cited in Cal/Ecotox)

Acronyms/Abbreviations:

BW – body weight
dw/day – dry weight per day
g – gram
kg – kilogram

Table A-8
Representative Avian Wildlife Receptor Species

Exposure Factor	Mourning Dove	American Robin	American Kestrel
Body weight, kg	0.125[a]	0.0804[b]	0.111[c]
Ingestion rate, kg food/day dw	0.0150[d]	0.01128[d]	0.0139[d]
Fractional intake, soil	0.093[e]	0.104[f]	0.0035[g]
Fractional intake, plant	1[h]	0.25[h]	0[h]
Fractional intake, invertebrate	0[h]	0.75[h]	0.25[h]
Fractional intake, small mammal	0[h]	0[h]	0.75[h]
Home range, hectares	1000[i]	1[j]	109.4[k]
Site-use factor (site area 1.86 hectares)	0.0019	0.17	0.017

Notes:
- [a] Cowan, J.B. 1952 (as cited in Cal/EPA 2002)
- [b] Clench and Leberman 1978, Wheelwright 1986 (as cited in U.S. EPA 1993)
- [c] Roest, A.I. 1957 (as cited in Cal/Ecotox)
- [d] Nagy 1987; allometric equation for all birds (ingestion rate kg dw/day= 0.0582 * $BW^{0.651}$)
- [e] Beyer et al. 1994 for wild turkey
- [f] Beyer et al. 1994 for American woodcock
- [g] Pascoe et al. 1996; 0.35 percent for bald eagle
- [h] assumed value
- [i] Tomlinson et al. 1960 (CA WHRS) 10 km^2
- [j] Weatherhead and McRae 1990, as cited in U.S. EPA 1993; Haldeman et al. 1973; Gaines 1974; Haldeman et al. 1973, as cited in Zeiner et al. 1990; Knupp et al. 1977, as cited in Sallabanks and James 1999; mean of five cited values
- [k] Balgooyen 1976 (as cited in Cal/EPA 2002); adult male and female

Acronyms/Abbreviations:
- BW – body weight
- CA WHRS – California Wildlife Habitat Relationships System
- dw/day – dry weight per day
- kg – kilogram
- km^2 – square kilometer

Table A-9
Hazard Quotients – Low

Analyte	Cottontail Rabbit (HQ)	Deer Mouse (HQ)	Coyote (HQ)	Mourning Dove (HQ)	American Robin (HQ)	American Kestrel (HQ)	Maximum (HQ)
cadmium	9E-1	**3E+1**[a]	5E-3	3E-3	**3E+0**[a]	1E-1	**3E+1**[a]
chromium, total	2E-2	3E-1	5E-5	6E-4	2E-1	6E-3	3E-1
hexavalent chromium	1E-3	2E-2	4E-6	4E-5	1E-2	4E-4	2E-2
copper	9E-2	1E+0	3E-4	7E-4	2E-1	9E-3	1E+0
lead	4E-2	7E-1	1E-4	3E-2	**8E+0**[a]	3E-1	**8E+0**[a]
mercury	6E-2	5E-1	5E-5	2E-3	4E-1	1E-2	5E-1
selenium	1E+0	**6E+0**[a]	7E-4	1E-3	2E-1	6E-3	**6E+0**[a]
silver	2E-3	2E-1	2E-5	4E-6	6E-3	2E-4	2E-1
zinc	1E-1	**3E+0**[a]	7E-4	4E-4	2E-1	1E-2	**3E+0**[a]
cyanide	3E-4	9E-4	3E-7	2E-3	2E-1	2E-2	2E-1
Aroclor 1254	5E-4	4E-1	8E-5	4E-5	2E-1	9E-3	4E-1
Aroclor 1260	9E-5	7E-2	2E-5	7E-6	4E-2	2E-3	7E-2
4,4′-DDD	1E-5	6E-3	9E-7	1E-5	7E-2	3E-3	7E-2
4,4′-DDE	7E-5	3E-2	5E-6	8E-5	4E-1	2E-2	4E-1
4,4′-DDT	8E-7	6E-4	8E-8	1E-6	7E-3	3E-4	7E-3
alpha-chlordane	7E-6	4E-3	9E-7	2E-7	1E-3	5E-5	4E-3
gamma-chlordane	1E-5	7E-3	1E-6	4E-7	2E-3	9E-5	7E-3
heptachlor epoxide	1E-4	2E-2	4E-6	2E-6	6E-3	3E-4	2E-2
aldrin	2E-4	1E-1	2E-5	8E-7	5E-3	2E-4	1E-1
dieldrin	5E-3	**2E+0**[a]	3E-4	1E-5	6E-2	3E-3	**2E+0**[a]
endosulfan sulfate	2E-4	1E-2	2E-6	2E-8	2E-5	1E-6	1E-2
endrin	1E-4	5E-2	1E-5	1E-5	6E-2	3E-3	6E-2
endrin aldehyde	1E-4	2E-2	5E-6	9E-6	3E-2	1E-3	3E-2
endrin ketone	1E-4	2E-2	5E-6	8E-6	3E-2	1E-3	3E-2
benz(a)anthracene	4E-4	7E-3	1E-5	5E-6	1E-3	4E-4	7E-3
benzo(a)pyrene	2E-4	7E-3	1E-5	4E-6	2E-3	3E-4	7E-3
benzo(b)fluoranthene	3E-4	7E-3	1E-5	6E-6	2E-3	4E-4	7E-3
benzo(g,h,i)perylene	1E-4	3E-3	6E-6	3E-6	7E-4	2E-4	3E-3
benzo(k)fluoranthene	2E-4	4E-3	8E-6	4E-6	1E-3	3E-4	4E-3
chrysene	4E-4	1E-2	1E-5	6E-6	2E-3	4E-4	1E-2
fluoranthene	6E-4	9E-3	1E-5	7E-6	2E-3	4E-4	9E-3
indeno(1,2,3-cd)pyrene	1E-4	6E-3	7E-6	3E-6	1E-3	2E-4	6E-3
pyrene	6E-4	9E-3	1E-5	6E-6	2E-3	4E-4	9E-3
benzoic acid	3E-2	5E-2	1E-5	1E-3	6E-2	4E-3	6E-2
2-nitrophenol	9E-3	1E-2	3E-6	4E-4	2E-2	1E-3	2E-2

(table continues)

Table A-9 (continued)

Analyte	Cottontail Rabbit (HQ)	Deer Mouse (HQ)	Coyote (HQ)	Mourning Dove (HQ)	American Robin (HQ)	American Kestrel (HQ)	Maximum (HQ)
4-chloroaniline	9E-3	1E-2	3E-6	4E-4	2E-2	1E-3	2E-2
butylbenzyl phthalate	5E-6	2E-4	7E-8	6E-5	4E-2	4E-3	4E-2
di-n-butyl phthalate	2E-6	4E-5	2E-8	6E-5	3E-2	3E-3	3E-2
acetone	1E-1	9E-2	2E-6	9E-5	2E-3	1E-5	1E-1
methylene chloride	3E-3	4E-3	5E-7	1E-4	5E-3	2E-4	5E-3
4-methyl-2-pentanone	9E-4	9E-4	1E-7	4E-5	1E-3	4E-5	1E-3
toluene	2E-4	3E-3	6E-7	9E-6	5E-3	2E-4	5E-3
HI[b] – metals	**3E+0**[a]	**4E+1**[a]	7E-3	4E-2	**1E+1**[a]	5E-1	**4E+1**[a]
HI[b] – PCB	6E-4	5E-1	1E-4	5E-5	3E-1	1E-2	5E-1
HI[b] – pesticide	6E-3	**2E+0**[a]	3E-4	1E-4	7E-1	3E-2	**2E+0**[a]
HI[b] – PAH	3E-3	6E-2	9E-5	4E-5	1E-2	3E-3	6E-2
HI[b] – SVOC	5E-2	7E-2	2E-5	2E-3	2E-1	1E-2	2E-1
HI[b] – VOC	1E-1	1E-1	3E-6	3E-4	1E-2	4E-4	1E-1

Notes:
[a] **boldface** indicates HQ or HI values > 1
[b] HI is the sum of the analyte-specific HQs presented for each analyte group

Acronyms/Abbreviations:
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
VOC – volatile organic compound

Table A-10
Hazard Quotients – Low for NAF El Centro Background Concentrations

Compound	Cottontail Rabbit (HQ)	Deer Mouse (HQ)	Coyote (HQ)	Mourning Dove (HQ)	American Robin (HQ)	American Kestrel (HQ)	Maximum (HQ)
arsenic	6E-2	8E-1	9E-5	3E-5	8E-3	1E-4	8E-1
cadmium	1E+0	**4E+1**[a]	6E-3	4E-3	**4E+0**[a]	1E-1	**4E+1**[a]
chromium, total	2E-2	3E-1	5E-5	6E-4	2E-1	6E-3	3E-1
copper	6E-2	7E-1	2E-4	5E-4	1E-1	6E-3	7E-1
lead	5E-2	8E-1	2E-4	4E-2	**9E+0**[a]	4E-1	**9E+0**[a]
mercury	7E-3	5E-2	5E-6	2E-4	5E-2	1E-3	5E-2
nickel	3E-1	**2E+1**[a]	4E-3	4E-4	3E-1	1E-2	**2E+1**[a]
selenium	5E-1	**2E+0**[a]	3E-4	5E-4	7E-2	2E-3	**2E+0**[a]
silver	3E-5	5E-3	5E-7	8E-8	1E-4	4E-6	5E-3
zinc	1E-1	**3E+0**[a]	8E-4	4E-4	3E-1	1E-2	**3E+0**[a]
HI[b] – metals	**2E+0**[a]	**7E+1**[a]	1E-2	4E-2	**1E+1**[a]	6E-1	**7E+1**[a]

Notes:
[a] **boldface** indicates HQs or HIs > 1
[b] HI is the sum of the analyte-specific HQs presented for each analyte group

Acronyms/Abbreviations:
HI – hazard index
HQ – hazard quotient
NAF – Naval Air Facility

Table A-11
Summary of Hazard Quotients and Hazard Indices

Analyte	Background Concentration (HQ-Low)	NAF El Centro IR Site 10 (HQ-Low)
cadmium	**4E+1**[a]	**3E+1**[a]
copper	7E-1	1E+0
lead	**9E+0**[a]	**8E+0**[a]
selenium	**2E+0**[a]	**6E+0**[a]
zinc	**3E+0**[a]	**3E+0**[a]
dieldrin	NA	**2E+0**[a]
HI[b] – metals	**7E+1**[a]	**4E+1**[a]
HI[b] – pesticides	NA	**2E+0**[a]

Notes:
[a] **boldface** indicates HQs or HIs > 1
[b] HI is the sum of the analyte-specific HQs presented for each analyte group

Acronyms/Abbreviations:
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
NA – not available
NAF – Naval Air Facility

Table A-12
Chemicals of Potential Concern

Chemical	Unit	Minimum Detection	Maximum Detection	Background Threshold Value	Number of Positive Detections	Number of Samples	Frequency of Detection (percent)	Statistical Exposure Point Concentration[a]	Final Exposure Point Concentration[b]	Basis for Final Exposure Point Concentration
Metals										
cyanide	mg/kg	0.2	0.6	—[c]	4	30	13	0.32522	0.32522	Bootstrap
antimony	mg/kg	0.03	0.52	0.68	6	26	23	NA	NA	NA
arsenic	mg/kg	0.51	8.9	6.3	35	35	100	3.2136	3.2136	Bootstrap
beryllium	mg/kg	0.15	0.99	1.1	35	35	100	NA	NA	NA
cadmium	mg/kg	0.33	5.2	2.2	35	35	100	1.6499	1.6499	Bootstrap
chromium	mg/kg	3.7	79.2	19	47	47	100	18.773	18.773	Bootstrap
chromium, hexavalent	mg/kg	4	4	—	1	21	5	1.3682	1.3682	Bootstrap
copper	mg/kg	1.9	83.3	22	35	35	100	29.569	29.569	Bootstrap
lead	mg/kg	2.5	27.6	17	35	35	100	13.533	13.533	Bootstrap
mercury	mg/kg	0.02	0.46	0.05	15	35	43	0.45157	0.45157	Bootstrap
nickel	mg/kg	4.5	19.8	20	35	35	100	NA	NA	NA
selenium	mg/kg	0.92	5	0.7	12	35	34	1.591	1.591	Bootstrap
silver	mg/kg	0.24	128	0.6	32	35	91	23.754	23.754	Bootstrap
thallium	mg/kg	0.18	0.22	0.3	3	12	25	NA	NA	NA
zinc	mg/kg	13	131	70	35	35	100	59.477	59.477	Bootstrap
Organics										
organolead	mg/kg	0.21	0.28	0.42–0.67	2	22	9	NA	NA	NA
benz(a)anthracene	mg/kg	0.26	0.26	—	1	9	11	0.1987	0.1987	Bootstrap
benzo(a)pyrene	mg/kg	0.2	0.2	—	1	9	11	0.18172	0.18172	Bootstrap
benzo(b)fluoranthene	mg/kg	0.25	0.38	—	2	9	22	0.24171	0.24171	Bootstrap
benzo(g,h,i)perylene	mg/kg	0.076	0.13	—	2	9	22	0.17614	0.13	Maximum
benzo(k)fluoranthene	mg/kg	0.16	0.16	—	1	9	11	0.1754	0.16	Maximum
chrysene	mg/kg	0.15	0.35	—	2	9	22	0.22221	0.22221	Bootstrap
fluoranthene	mg/kg	0.27	0.27	—	1	9	11	0.2015	0.2015	Bootstrap
indeno(1,2,3-cd)pyrene	mg/kg	0.072	0.13	—	2	9	22	0.17635	0.13	Maximum
pyrene	mg/kg	0.24	0.24	—	1	9	11	0.19301	0.19301	Bootstrap
Aroclor 1254	mg/kg	0.078	0.48	—	4	12	33	0.15513	0.15513	Bootstrap
Aroclor 1260	mg/kg	0.038	0.038	—	1	12	8	0.03046	0.03046	Bootstrap
4,4′-DDD	mg/kg	0.0004	0.016	—	4	12	33	0.0052599	0.0052599	Bootstrap
4,4′-DDE	mg/kg	0.0036	0.1	—	12	20	60	0.028623	0.028623	Bootstrap
4,4′-DDT	mg/kg	0.0005	0.0005	—	1	12	8	0.0027849	0.0005	Maximum
aldrin	mg/kg	0.0033	0.0033	—	1	12	8	0.0029715	0.0029715	Bootstrap
dieldrin	mg/kg	0.003	0.14	—	10	12	83	0.040524	0.040524	Bootstrap
endosulfan sulfate	mg/kg	0.0008	0.002	—	2	12	17	0.0023951	0.002	Maximum
endrin	mg/kg	0.012	0.012	—	1	12	8	0.0047926	0.0047926	Bootstrap

(table continues)

Table A-12 (continued)

Chemical	Unit	Minimum Detection	Maximum Detection	Background Threshold Value	Number of Positive Detections	Number of Samples	Frequency of Detection (percent)	Statistical Exposure Point Concentration[a]	Final Exposure Point Concentration[b]	Basis for Final Exposure Point Concentration
Organics (continued)										
endrin aldehyde	mg/kg	0.002	0.003	—	2	12	17	0.0025659	0.0025659	Bootstrap
endrin ketone	mg/kg	0.0048	0.0048	—	1	9	11	0.0025894	0.0025894	Bootstrap
heptachlor epoxide	mg/kg	0.002	0.0069	—	2	12	17	0.0031578	0.0031578	Bootstrap
alpha-chlordane	mg/kg	0.0024	0.063	—	8	12	67	0.021003	0.021003	Bootstrap
gamma-chlordane	mg/kg	0.002	0.12	—	10	12	83	0.035053	0.035053	Bootstrap
2-nitrophenol	mg/kg	0.19	0.19	—	1	17	6	0.15648	0.15648	Bootstrap
4-chloroaniline	mg/kg	0.082	0.098	—	2	9	22	0.17491	0.098	Maximum
benzoic acid	mg/kg	0.074	2.3	—	6	17	35	0.63049	0.63049	Bootstrap
butyl benzyl phthalate	mg/kg	0.12	0.23	—	2	9	22	0.18921	0.18921	Bootstrap
di-n-butyl phthalate	mg/kg	0.18	0.18	—	1	17	6	0.15564	0.15564	Bootstrap
phenols, total	mg/kg	0.2	0.2	—	2	8	25	0.15022	0.15022	Bootstrap
4-methyl-2-pentanone	mg/kg	0.05	0.05	—	1	9	11	0.1619	0.05	Maximum
acetone	mg/kg	0.8	0.8	—	1	9	11	0.32535	0.32535	Bootstrap
methylene chloride	mg/kg	0.05	0.05	—	1	23	4	0.050014	0.05	Maximum
toluene	mg/kg	0.02	0.22	—	9	23	39	0.059291	0.059291	Bootstrap

Notes:

[a] calculation of statistical exposure point concentrations was based on the methodology presented in Section A2.2.4

[b] when the statistical exposure point concentration is greater than the maximum concentration, the maximum concentration is used as the final exposure point concentration

[c] dash indicates not established

Acronyms/Abbreviations:

DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
NA – not applicable

Table A-13
Soil Samples Used in Risk Screening

Soil Sample ID and Depth (depth in feet below ground surface)		
EC10-B5 TOP: 1.5	EC10-S29 TOP: 0	EC10-B7 TOP: 5 5
EC10-B19 TOP: 0	EC10-B2 TOP: 8 5	EC10-B6 TOP: 9
EC10-S31 TOP: 0	EC10-B8 TOP: 6	EC10-B11A TOP: 4.5
EC10-S30 TOP: 0	EC10-S33 TOP: 0	EC10-B13A TOP: 7.5
EC10-B20 TOP: 0	EC10-B13 TOP: 4	EC10-B14 TOP: 0 6
EC10-S24 TOP: 0	EC10-B2 TOP: 1.5	EC10-B14 TOP: 2.6
EC10-B13 TOP: 9	EC10-B6 TOP: 3	EC10-B14 TOP: 4 1
EC10-S25 TOP: 0	EC10-B9 TOP: 1.5	EC10-B15 TOP: 0.75
EC10-B10 TOP: 4	EC10-B12 TOP: 5 5	EC10-B15 TOP: 2.75
EC10-B12 TOP: 1	EC10-S28 TOP: 0	EC10-B15 TOP: 4.25
EC10-B10 TOP: 1	EC10-B5 TOP: 5 5	EC10-B16 TOP: 0.75
EC10-B11 TOP: 1.5	EC10-B7 TOP: 1.5	EC10-B16 TOP: 2 75
EC10-B3 TOP: 1.5	EC10-B8 TOP: 1.5	EC10-B16 TOP: 4.25
EC10-B18 TOP: 0	EC10-B11 TOP: 6	EC10-B17 TOP: 0.75
EC10-S27 TOP: 0	EC10-B1 TOP: 4	EC10-B17 TOP: 2 75
EC10-B9 TOP: 6	EC10-B3 TOP: 5	EC10-B17 TOP: 4.25
EC10-S26 TOP: 0		

Table A-14
Human-Health Risk Screening Results for Soil

CAS No.	Analyte Name	Exposure Point Concentration (mg/kg)	Cancer PRG Value Residential Soil (mg/kg)	Cancer Cal-Modified PRG Value Residential Soil (mg/kg)	Residential Carcinogenic Risk	Residential Cal-Modified Carcinogenic Risk	Noncancer PRG Value Residential Soil (mg/kg)	Residential Hazard Index	Cancer PRG Value Industrial Soil (mg/kg)	Industrial Carcinogenic Risk	Noncancer PRG Value Industrial Soil (mg/kg)	Industrial Hazard Index	Comment
Metals													
57-12-5	cyanide (free)	0.32522	—[a]	—	—	—	1.2E+03	3E-04	—	—	1.2E+04	3E-05	
7440-38-2	arsenic	3.2136	3.9E-01	3.9E-01	**8E-06**[b]	**8E-06**[b]	2.2E+01	1E-01	1.6E+00	**2E-06**[b]	2.6E+02	1E-02	Bootstrap is below background
7440-43-9	cadmium[c]	1.6499	1.4E+03	1.7E+00	1E-09	**1E-06**[b]	3.7E+01	4E-02	3.0E+03	5E-10	4.5E+02	4E-03	
7440-47-3	chromium, total[d]	18.773	2.1E+02	2.1E+02	9E-08	9E-08	2.2E+02	9E-02	4.5E+02	4E-08	2.5E+03	8E-03	Chromium, hexavalent as a surrogate
18540-29-9	chromium, hexavalent	1.3682	3.0E+01	3.0E+01	5E-08	5E-08	2.2E+02	6E-03	6.4E+01	2E-08	2.5E+03	5E-04	
7440-50-8	copper	29.569	—	—	—	—	3.1E+03	1E-02	—	—	4.1E+04	7E-04	
7439-97-6	mercury	0.45157	—	—	—	—	2.3E+01	2E-02	—	—	3.1E+02	1E-03	Mercury chloride as a surrogate
7782-49-2	selenium	1.591	—	—	—	—	3.9E+02	4E-03	—	—	5.1E+03	3E-04	
7440-22-4	silver	23.754	—	—	—	—	3.9E+02	6E-02	—	—	5.1E+03	5E-03	
7440-66-6	zinc[e]	59.477	—	—	—	—	2.3E+04	3E-03	—	—	Max	—	
CLASS SUM			—	—	**8E-06**[b]	**9E-06**[b]	—	4E-01	—	**2E-06**[b]	—	3E-02	
Organics													
56-55-3	benz(a)anthracene[d]	0.1987	6.2E-01	6.2E-01	3E-07	3E-07	2.2E+04	9E-06	2.1E+00	9E-08	Max	—	Anthracene as a surrogate
50-32-8	benzo(a)pyrene[d]	0.18172	6.2E-02	6.2E-02	**3E-06**[b]	**3E-06**[b]	2.3E+03	8E-05	2.1E-01	9E-07	2.9E+04	6E-06	Pyrene as a surrogate
205-99-2	benzo(b)fluoranthene[d]	0.24171	6.2E-01	6.2E-01	4E-07	4E-07	2.3E+03	1E-04	2.1E+00	1E-07	2.2E+04	1E-05	Fluoranthene as a surrogate
191-24-2	benzo(g,h,i)perylene[d]	0.13	—	—	—	—	2.3E+03	6E-05	—	—	2.9E+04	4E-06	Pyrene as a surrogate
207-08-9	benzo(k)fluoranthene[c,d]	0.16	6.2E+00	3.8E-01	3E-08	4E-07	2.3E+03	7E-05	2.1E+01	8E-09	2.2E+04	7E-06	Fluoranthene as a surrogate
218-01-9	chrysene[c,d]	0.22221	6.2E+01	3.8E+00	4E-09	6E-08	2.2E+04	1E-05	2.1E+02	1E-09	Max	—	Anthracene as a surrogate
206-44-0	fluoranthene	0.2015	—	—	—	—	2.3E+03	9E-05	—	—	2.2E+04	9E-06	
193-39-5	indeno(1,2,3-cd)pyrene[d]	0.13	6.2E-01	6.2E-01	2E-07	2E-07	2.3E+03	6E-05	2.1E+00	6E-08	2.2E+04	6E-06	Fluoranthene as a surrogate
129-00-0	pyrene	0.19301	—	—	—	—	2.3E+03	8E-05	—	—	2.9E+04	7E-06	
11097-69-1	Aroclor 1254	0.15513	2.2E-01	2.2E-01	7E-07	7E-07	1.1E+00	1E-01	7.4E-01	2E-07	1.1E+01	1E-02	
11096-82-5	Aroclor 1260[d]	0.03046	2.2E-01	2.2E-01	1E-07	1E-07	1.1E+00	3E-02	7.4E-01	4E-08	1.1E+01	3E-03	Aroclor 1254 as a surrogate
72-54-8	4,4′-DDD[d]	0.0052599	2.4E+00	2.4E+00	2E-09	2E-09	3.6E+01	1E-04	1.0E+01	5E-10	4.3E+02	1E-05	DDT as a surrogate
72-55-9	4,4′-DDE[d]	0.028623	1.7E+00	1.7E+00	2E-08	2E-08	3.6E+01	8E-04	7.0E+00	4E-09	4.3E+02	7E-05	DDT as a surrogate
50-29-3	4,4′-DDT	0.0005	1.7E+00	1.7E+00	3E-10	3E-10	3.6E+01	1E-05	7.0E+00	7E-11	4.3E+02	1E-06	
309-00-2	aldrin	0.0029715	2.9E-02	2.9E-02	1E-07	1E-07	1.8E+00	2E-03	1.0E-01	3E-08	1.8E+01	2E-04	
60-57-1	dieldrin	0.040524	3.0E-02	3.0E-02	**1E-06**[b]	**1E-06**[b]	3.1E+00	1E-02	1.1E-01	4E-07	3.1E+01	1E-03	
1031-07-8	endosulfan sulfate[d]	0.002	—	—	—	—	3.7E+02	5E-06	—	—	3.7E+03	5E-07	Endosulfan as a surrogate
72-20-8	endrin	0.0047926	—	—	—	—	1.8E+01	3E-04	—	—	1.8E+02	3E-05	

(table continues)

Table A-14 (continued)

CAS No.	Analyte Name	Exposure Point Concentration (mg/kg)	Cancer PRG Value Residential Soil (mg/kg)	Cancer Cal-Modified PRG Value Residential Soil (mg/kg)	Residential Carcinogenic Risk	Residential Cal-Modified Carcinogenic Risk	Noncancer PRG Value Residential Soil (mg/kg)	Residential Hazard Index	Cancer PRG Value Industrial Soil (mg/kg)	Industrial Carcinogenic Risk	Noncancer PRG Value Industrial Soil (mg/kg)	Industrial Hazard Index	Note
Organics (continued)													
7421-93-4	endrin aldehyde[d]	0.0025659	—	—	—	—	1.8E+01	1E-04	—	—	1.8E+02	1E-05	Endrin as a surrogate
53494-70-5	endrin ketone[d]	0.0025894	—	—	—	—	1.8E+01	1E-04	—	—	1.8E+02	1E-05	Endrin as a surrogate
1024-57-3	heptachlor epoxide	0.0031578	5.3E-02	5.3E-02	6E-08	6E-08	7.9E-01	4E-03	1.9E-01	2E-08	8.0E+00	4E-04	
5103-71-9	alpha-chlordane[d]	0.021003	1.6E+00	1.6E+00	1E-08	1E-08	3.5E+01	6E-04	6.5E+00	3E-09	4.0E+02	5E-05	Chlordane as a surrogate
5103-74-2	gamma-chlordane[d]	0.035053	1.6E+00	1.6E+00	2E-08	2E-08	3.5E+01	1E-03	6.5E+00	5E-09	4.0E+02	9E-05	Chlordane as a surrogate
88-75-5	2-nitrophenol	0.15648	—	—	—	—			—	—	—	—	
106-47-8	4-chloroaniline	0.098	—	—	—	—	2.4E+02	4E-04	—	—	2.5E+03	4E-05	
65-85-0	benzoic acid[f]	0.63049	—	—	—	—	Max	—	—	—	Max	—	
85-68-7	butylbenzyl phthalate[g]	0.18921	—	—	—	—	1.2E+04	2E-05	—	—	Max	—	
84-74-2	di-n-butyl phthalate	0.15564	—	—	—	—	6.1E+03	3E-05	—	—	6.2E+04	3E-06	
108-95-2	phenols, total[g]	0.15022	—	—	—	—	3.7E+04	4E-06	—	—	Max	—	
108-10-1	4-methyl-2-pentanone	0.05	—	—	—	—	7.9E+02	6E-05	—	—	2.8E+03	2E-05	
67-64-1	acetone	0.32535	—	—	—	—	1.6E+03	2E-04	—	—	6.0E+03	5E-05	
75-09-2	methylene chloride	0.05	9.1E+00	9.1E+00	5E-09	5E-09	2.0E+03	3E-05	2.1E+01	2E-09	9.3E+03	5E-06	
108-88-3	toluene[h]	0.059291	—	—	—	—	Sat	—	—	—	Sat	—	
CLASS SUM			—	—	**6E-06**[b]	**7E-06**[b]	—	2E-01	—	**2E-06**[b]	—	2E-02	
Total Cancer Risk and Hazard			—	—	**1E-05**[b]	**2E-05**[b]	—	6E-01	—	**4E-06**[b]	—	5E-02	

CAS No.	Analyte Name	Exposure Point Concentration (mg/kg)	Soil Saturation Concentration PRG Value (mg/kg)	Environmental Concentration Greater Than Soil Saturation Non-Risk PRG	Soil Maximum Concentration PRG Value (mg/kg)	Environmental Concentration Greater Than Soil Maximum Non-Risk PRG
Metals						
7440-66-6	zinc[e]	59.477	—	—	1E+05	No
Organics						
65-85-0	benzoic acid[f]	0.63049	—	—	1E+05	No
85-68-7	butylbenzyl phthalate[g]	0.18921	—	—	1E+05	No
108-95-2	phenols, total[g]	0.15022	—	—	1E+05	No
108-88-3	toluene[h]	0.059291	5.2E+02	No	—	—

(table continues)

Table A-14 (continued)

Notes:

[a] dash indicates not applicable; cancer risk or hazard quotient cannot be calculated because a PRG is not available and no surrogate compound has been identified

[b] **boldface** indicates cancer risk ≥ 1E-06

[c] a Cal-Modified PRG is available for this compound

[d] surrogates were used as noted for the noncancer endpoints

[e] the noncancer industrial PRG for zinc is based on the "Max," where "Max" equals the ceiling limit

[f] the noncancer residential and industrial PRGs for benzoic acid are based on the "Max," where "Max" equals the ceiling limit

[g] the noncancer industrial PRGs for butylbenzyl phthalate and total phenols are based on the "Max," where "Max" equals the ceiling limit

[h] the noncancer residential and industrial PRGs for toluene are based on the "Sat," which equals the soil saturation limit

Acronyms/Abbreviations:

Cal-Modified – California Environmental Protection Agency modified
CAS – Chemical Abstracts Service
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
PRG – preliminary remediation goal

Table A-15
Incremental Risk – Human-Health Risk Screening Results for Soil

CAS No.	Analyte Name	Exposure Point Concentration (mg/kg)	Statistical Background Concentration (mg/kg)	Residential Carcinogenic Risk	Background Residential Carcinogenic Risk	Incremental Residential Carcinogenic Risk	Residential Cal-Modified Carcinogenic Risk	Background Residential Cal-Modified Carcinogenic Risk	Incremental Residential Cal-Modified Carcinogenic Risk	Residential Hazard Index	Background Residential Hazard Index	Industrial Carcinogenic Risk	Background Industrial Carcinogenic Risk	Incremental Industrial Carcinogenic Risk	Industrial Hazard Index	Background Industrial Hazard Index
Metals																
57-12-5	cyanide	0.32522	NE	—[a]	—	—	—	—	—	3E-04	—	—	—	—	3E-05	—
7440-38-2	arsenic	3.2136	6.3	**8E-06**[b]	**2E-05**[b]	0E+00	**8E-06**[b]	**2E-05**[b]	0E+00	1E-01	3E-01	**2E-06**[b]	**4E-06**[b]	0E+00	1E-02	2E-02
7440-43-9	cadmium[c]	1.6499	2.2	1E-09	2E-09	0E+00	**1E-06**[b]	**1E-06**[b]	0E+00	4E-02	6E-02	5E-10	7E-10	0E+00	4E-03	5E-03
7440-47-3	chromium, total[d]	18.773	19	9E-08	9E-08	0E+00	9E-08	9E-08	0E+00	9E-02	9E-02	4E-08	4E-08	0E+00	8E-03	8E-03
18540-29-9	chromium, hexavalent	1.3682	NE	5E-08	—	5E-08	5E-08	—	5E-08	6E-03	—	2E-08	—	2E-08	5E-04	—
7440-50-8	copper	29.569	22	—	—	—	—	—	—	1E-02	7E-03	—	—	—	7E-04	5E-04
7439-97-6	mercury	0.45157	0.05	—	—	—	—	—	—	2E-02	2E-03	—	—	—	1E-03	2E-04
7782-49-2	selenium	1.591	0.7	—	—	—	—	—	—	4E-03	2E-03	—	—	—	3E-04	1E-04
7440-22-4	silver	23.754	0.6	—	—	—	—	—	—	6E-02	2E-03	—	—	—	5E-03	1E-04
7440-66-6	zinc[c]	59.477	70	—	—	—	—	—	—	3E-03	3E-03	—	—	—	—	—
CLASS SUM				**8E-06**[b]	**2E-05**[b]	5E-08	**9E-06**[b]	**2E-05**[b]	5E-08	4E-01	4E-01	**2E-06**[b]	**4E-06**[b]	2E-08	3E-02	4E-02
Organics																
56-55-3	benz(a)anthracene[d]	0.1987	NE	3E-07	—	3E-07	3E-07	—	3E-07	9E-06	—	9E-08	—	9E-08	—	—
50-32-8	benzo(a)pyrene[d]	0.18172	NE	**3E-06**[b]	—	**3E-06**[b]	**3E-06**[b]	—	**3E-06**[b]	8E-05	—	9E-07	—	9E-07	6E-06	—
205-99-2	benzo(b)fluoranthene[d]	0.24171	NE	4E-07	—	4E-07	4E-07	—	4E-07	1E-04	—	1E-07	—	1E-07	1E-05	—
191-24-2	benzo(g,h,i)perylene[d]	0.13	NE	—	—	—	—	—	—	6E-05	—	—	—	—	4E-06	—
207-08-9	benzo(k)fluoranthene[c,d]	0.16	NE	3E-08	—	3E-08	4E-07	—	4E-07	7E-05	—	8E-09	—	8E-09	7E-06	—
218-01-9	chrysene[c,d]	0.22221	NE	4E-09	—	4E-09	6E-08	—	6E-08	1E-05	—	1E-09	—	1E-09	—	—
206-44-0	fluoranthene	0.2015	NE	—	—	—	—	—	—	9E-05	—	—	—	—	9E-06	—
193-39-5	indeno(1,2,3-cd)pyrene[d]	0.13	NE	2E-07	—	2E-07	2E-07	—	2E-07	6E-05	—	6E-08	—	6E-08	6E-06	—
129-00-0	pyrene	0.19301	NE	—	—	—	—	—	—	8E-05	—	—	—	—	7E-06	—
11097-69-1	Aroclor 1254	0.15513	NE	7E-07	—	7E-07	7E-07	—	7E-07	1E-01	—	2E-07	—	2E-07	1E-02	—
11096-82-5	Aroclor 1260[d]	0.03046	NE	1E-07	—	1E-07	1E-07	—	1E-07	3E-02	—	4E-08	—	4E-08	3E-03	—
72-54-8	4,4'-DDD[d]	0.0052599	NE	2E-09	—	2E-09	2E-09	—	2E-09	1E-04	—	5E-10	—	5E-10	1E-05	—
72-55-9	4,4'-DDE[d]	0.028623	NE	2E-08	—	2E-08	2E-08	—	2E-08	8E-04	—	4E-09	—	4E-09	7E-05	—
50-29-3	4,4'-DDT	0.0005	NE	3E-10	—	3E-10	3E-10	—	3E-10	1E-05	—	7E-11	—	7E-11	1E-06	—
309-00-2	aldrin	0.0029715	NE	1E-07	—	1E-07	1E-07	—	1E-07	2E-03	—	3E-08	—	3E-08	2E-04	—
60-57-1	dieldrin	0.040524	NE	**1E-06**[b]	—	**1E-06**[b]	**1E-06**[b]	—	**1E-06**[b]	1E-02	—	4E-07	—	4E-07	1E-03	—
1031-07-8	endosulfan sulfate[d]	0.002	NE	—	—	—	—	—	—	5E-06	—	—	—	—	5E-07	—

(table continues)

Table A-15 (continued)

CAS No.	Analyte Name	Exposure Point Concentration (mg/kg)	Statistical Background Concentration (mg/kg)	Residential Carcinogenic Risk	Background Residential Carcinogenic Risk	Incremental Residential Carcinogenic Risk	Residential Cal-Modified Carcinogenic Risk	Background Residential Cal-Modified Carcinogenic Risk	Incremental Residential Cal-Modified Carcinogenic Risk	Residential Hazard Index	Background Residential Hazard Index	Industrial Carcinogenic Risk	Background Industrial Carcinogenic Risk	Incremental Industrial Carcinogenic Risk	Industrial Hazard Index	Background Industrial Hazard Index
Organics (continued)																
72-20-8	endrin	0.0047926	NE	—	—	—	—	—	—	3E-04	—	—	—	—	3E-05	—
7421-93-4	endrin aldehyde[d]	0.0025659	NE	—	—	—	—	—	—	1E-04	—	—	—	—	1E-05	—
53494-70-5	endrin ketone[d]	0.0025894	NE	—	—	—	—	—	—	1E-04	—	—	—	—	1E-05	—
1024-57-3	heptachlor epoxide	0.0031578	NE	6E-08	—	6E-08	6E-08	—	6E-08	4E-03	—	2E-08	—	2E-08	4E-04	—
5103-71-9	alpha-chlordane[d]	0.021003	NE	1E-08	—	1E-08	1E-08	—	1E-08	6E-04	—	3E-09	—	3E-09	5E-05	—
5103-74-2	gamma-chlordane[d]	0.035053	NE	2E-08	—	2E-08	2E-08	—	2E-08	1E-03	—	5E-09	—	5E-09	9E-05	—
88-75-5	2-nitrophenol	0.15648	NE	—	—	—	—	—	—	—	—	—	—	—	—	—
106-47-8	4-chloroaniline	0.098	NE	—	—	—	—	—	—	4E-04	—	—	—	—	4E-05	—
65-85-0	benzoic acid[f]	0.63049	NE	—	—	—	—	—	—	—	—	—	—	—	—	—
85-68-7	butylbenzyl phthalate[g]	0.18921	NE	—	—	—	—	—	—	2E-05	—	—	—	—	—	—
84-74-2	di-n-butyl phthalate	0.15564	NE	—	—	—	—	—	—	3E-05	—	—	—	—	3E-06	—
108-95-2	phenols, total[g]	0.15022	NE	—	—	—	—	—	—	4E-06	—	—	—	—	—	—
108-10-1	4-methyl-2-pentanone	0.05	NE	—	—	—	—	—	—	6E-05	—	—	—	—	2E-05	—
67-64-1	acetone	0.32535	NE	—	—	—	—	—	—	2E-04	—	—	—	—	5E-05	—
75-09-2	methylene chloride	0.05	NE	5E-09	—	5E-09	5E-09	—	5E-09	3E-05	—	2E-09	—	2E-09	5E-06	—
108-88-3	toluene[h]	0.059291	NE	—	—	—	—	—	—	—	—	—	—	—	—	—
CLASS SUM				**6E-06**[b]	0E+00	**6E-06**[b]	**7E-06**[b]	0E+00	**7E-06**[b]	2E-01	0E+00	**2E-06**[b]	0E+00	**2E-06**[b]	2E-02	0E+00
Total Cancer Risk and Hazard				**1E-05**[b]	**2E-05**[b]	**6E-06**[b]	**2E-05**[b]	**2E-05**[b]	**7E-06**[b]	6E-01	4E-01	**4E-06**[b]	**4E-06**[b]	**2E-06**[b]	5E-02	4E-02

Notes:

[a] dash indicates not applicable; cancer risk or hazard quotient cannot be calculated because a PRG is not available and no surrogate compound has been identified
[b] **boldface** indicates cancer risk ≥ 1E-06
[c] a Cal-Modified PRG is available for this compound
[d] surrogates were used as noted for the noncancer endpoints
[e] the noncancer industrial PRG for zinc is based on the "max," where "max" equals the ceiling limit
[f] the noncancer residential and industrial PRGs for benzoic acid are based on the "max," where "max" equals the ceiling limit
[g] the noncancer industrial PRGs for butylbenzyl phthalate and total phenols are based on the "max," where "max" equals the ceiling limit
[h] the noncancer residential and industrial PRGs for toluene are based on the "sat," where "sat" equals the soil saturation limit

Acronyms/Abbreviations:

Cal-Modified – California Environmental Protection Agency modified
CAS – Chemical Abstracts Service
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
NE – not established
PRG – preliminary remediation goal

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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ACRONYMS/ABBREVIATIONS

AM	action memorandum
ARAR	applicable or relevant and appropriate requirement
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BMP	best management practices
BNI	Bechtel National, Inc.
CAA	Clean Air Act
Cal. Code Regs.	*California Code of Regulations*
Cal. Fish & Game Code	*California Fish and Game Code*
Cal/EPA	California Environmental Protection Agency
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	*Code of Federal Regulations*
ch.	chapter
CIWMB	California Integrated Waste Management Board
CWA	Clean Water Act
div.	division
DoD	(United States) Department of Defense
DON	Department of the Navy
DTSC	(Cal/EPA) Department of Toxic Substances Control
EE/CA	engineering evaluation/cost analysis
ESA	Endangered Species Act
Exec. Order No.	Executive Order Number
Fed. Reg.	*Federal Regulation*
FEMA	Federal Emergency Management Agency
FFA	Federal Facilities Agreement
HAR	Hydrogeological Assessment Report
ICAPCD	Imperial County Air Pollution Control District
ICAQMD	Imperial County Air Quality Management District
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration (Program)
lcy	loose cubic yards
LDR	land discharge requirement

mg/kg	milligrams per kilogram
MOU	memorandum of understanding
NAAQS	National Ambient Air Quality Standards
NAF	Naval Air Facility
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
Ogden	Ogden Environmental and Energy Services Co., Inc.
PCB	polychlorinated biphenyl
ppm	parts per million
pt.	part
Pub. L. No.	Public Law Number
RCRA	Resource Conservation and Recovery Act
RWQCB	(California) Regional Water Quality Control Board
§	section
SIP	state implementation plan
STLC	soluble threshold limit concentration
SWRCB	(California) State Water Resources Control Board
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TDS	Tierra Data Systems
tit.	title
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TTLC	total threshold limit concentration
U.S.C.	*United States Code*
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WET	(California) Waste Extraction Test

Section B1
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) Report.

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 action memorandum (AM) after public review as part of the response action selection process.

B1.1 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 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 removal 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
- the actions or activities regulated by the requirement and the removal action contemplated 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
- 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. ARARs must be identified 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 1988a).

Tables included in this appendix present each potential ARAR with an initial 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 removal 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 or regulation,
- an environmental or facility siting law or regulation,
- promulgated (of general applicability and legally enforceable),

- substantive (not procedural or administrative),
- more stringent than federal requirements,
- 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 Section 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-, location-, and action-specific requirements. This classification was developed to aid 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 Installation Restoration (IR) Program Site 10, Naval Air Facility (NAF) El Centro. Potential federal ARARs that have been identified for the IR Site 10 EE/CA are discussed in Section B1.2.2. Pursuant to the definition of the term *on-site* in 40 C.F.R. § 300.5, the on-station areas that are part of this action are the three unlined stabilization ponds with soil-bermed sides and adjacent access ways that separate them from local irrigation drainages and canals. The stabilization ponds are approximately 6.5 acres in size and functioned as the only sewage treatment for the base until 1976. Domestic and industrial sewage waste flowed into Pond No. 1 (approximately 245 by 560 feet wide), where the solids settled out, then into Pond No. 2 (approximately 125 by 250 feet wide), Pond No. 3 (125 by 255 feet wide), and finally into drainage channels that lead to the New River. The accumulated sludge is not reported to have been removed from these ponds. Currently, all the ponds are dry and partially covered with local vegetation. On the basis of human-health and ecological risk screening assessments, a removal action was recommended for shallow soil at the site (BNI 1998, BEI 2004). The

two removal action alternatives considered for evaluation in the IR Site 10 EE/CA are Alternative 1, cover with institutional controls, and Alternative 2, excavation with off-site disposal. Chemicals reported in groundwater at concentrations exceeding screening criteria are not expected to be present in downgradient surface water at concentrations posing an unacceptable ecological risk. Groundwater is being addressed separately under a base evaluation program for Sites 2, 7, and 10 and is not addressed in this EE/CA report (BEI 2003).

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 B1.2.3. Potential state ARARs that have been identified for IR Site 10 are discussed below.

B1.2 METHODOLOGY DESCRIPTION

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

B1.2.1 General

As the lead federal agency, the DON has primary responsibility for identification of potential ARARs for IR Site 10. In preparing this ARARs analysis, the DON undertook the following measures, consistent with CERCLA and the NCP:

- identified federal ARARs for each removal action alternative addressed in the EE/CA, taking into account site-specific information for IR Site 10
- reviewed potential 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 whether state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions
- reached a conclusion as to which federal and state ARARs are the most stringent and/or "controlling" ARARs for each alternative

The two removal action alternatives being evaluated in the Site 10 EE/CA are 1) a cover with institutional controls and 2) excavation with off-site disposal.

Depending on the removal action goals developed during the EE/CA, the area of impacted soil subject to cover under Alternative 1 may range from approximately 8,600 to 26,000 loose cubic yards (lcy) corresponding to a 2- to 6-foot cover thickness. The depth of the removal area for Alternative 2 is expected to average 1 to 2 feet below ground surface (bgs), with an associated removal volume of approximately 4,300 lcy. If backfill is included as a part of the removal action, up to 19,000 lcy of soil may be used in backfill of the excavations.

B1.2.2 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 record of decision/AM. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs either in the form of statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act, the Toxic Substances Control Act (TSCA), and their implementing regulations, to name a few. See NCP preamble at 55 *Federal Register* (Fed. Reg.) 8764–8765 (1990) for a more complete listing.

The proposed removal 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 using the CERCLA and NCP criteria and procedures for ARARs identification by lead federal agencies.

B1.2.3 Identifying and Evaluating State ARARs

The process used by the state and the DON to identify and evaluate potential state ARARs is described in this subsection.

B1.2.3.1 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 set forth in 40 C.F.R. § 300.515 and Section 7.6 of the Federal Facilities Agreement (FFA) for remedial actions in seeking state assistance in identifying state ARARs.

B1.2.3.2 CHRONOLOGY OF EFFORTS TO IDENTIFY STATE ARARs

The following chronology summarizes the DON's efforts to obtain state assistance with identification of state ARARs for the removal action at IR Site 10. Key correspondence between the DON and the state agencies relating to this effort has been included in the Administrative Record for this EE/CA.

The DON formally requested state chemical-, location-, and action-specific ARARs for IR Site 10 on 07 April 2003. Letters were sent to DTSC, California Regional Water Quality Control Board (RWQCB), California Department of Fish and Game (CDFG),

Imperial County Air Pollution Control District (ICAPCD), and California Integrated Waste Management Board (CIWMB) soliciting ARARs based on preliminary removal alternatives and process options detailed to the agencies by the DON. All of the agencies responded to the DON request, except ICAPCD; the response letters are provided in Attachment A.

The DON received a letter from CDFG on 01 May 2003 that provided a list of location- and action-specific ARARs and other *California Fish and Game Code* (Cal. Fish & Game Code) sections or policy the department deemed TBC for the proposed removal actions.

On 13 May 2003, the DON received a letter from RWQCB that provided a preliminary list of potential action-specific ARARs. The letter stated that chemical- or location-specific ARARs had not been documented for the removal actions proposed for soil and that additional ARARs and TBCs would be provided after RWQCB review of alternatives screening in the EE/CA report.

The DON received response letters from DTSC and CIWMB on 20 May 2003. The DTSC letter provided a list of chemical-, location-, and action-specific requirements that the DTSC considered applicable or relevant and appropriate to the removal actions proposed in the EE/CA report. The CIWMB letter provided a list of action-specific requirements that they considered applicable or relevant and appropriate for solid waste disposal site (landfill) closure and postclosure maintenance on the basis of the description provided of IR Site 10.

Although ICAPCD did not respond to the DON request for ARARs for IR Site 10, the DON did review an ICAPCD response letter they had received 3 months earlier for the Patrol Road Landfill (IR Site 2) for potential ARARs for the IR Site 10 EE/CA. That ICAPCD letter (Attachment A), dated 07 January 2003, provided a list of district rules that ICAPCD considered applicable to the remedial actions proposed in the IR Site 2 remedial investigation/feasibility study.

The potential state ARARs and TBCs submitted in response to the DON request were evaluated. Those considered pertinent to IR Site 10 and the removal actions proposed in the EE/CA report are listed in the potential chemical-, location-, or action-specific ARARs tables in this appendix.

This ARARs analysis addresses the potential state ARARs identified in the above correspondence from DTSC and RWQCB and in codes and regulations from the following state agencies and departments:

- CDFG (correspondence dated 23 April 2003)
- CIWMB (correspondence dated 23 May 2003)
- ICAPCD (correspondence dated 07 January 2003)

No additional potential state ARARs were submitted to the DON after 23 May 2003.

B1.3 OTHER GENERAL ISSUES

The general issue identified during the evaluation of ARARs for IR Site 10 is the approach to requirements of RCRA. 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 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 removal actions on CERCLA sites if the waste is a 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 *California Code of Regulations* (Cal. Code Regs.) Title (tit.) 22 , Division (div.) 4.5, were approved by U.S. EPA as a component of the federally authorized state of California RCRA Program. On 26 October 2001, California received final authorization of its revised State Hazardous Waste Management Program from U.S. EPA (63 Fed. Reg. 49118 [2001]).

The regulations of Cal. Code Regs. tit. 22, div. 4.5 are, therefore, a source of potential federal ARARs for CERCLA removal actions. The exception is when a state regulation is "broader in scope" 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 IR Site 10 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 B1.4.

B1.4 WASTE CHARACTERIZATION

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

B1.4.1 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 the contaminant 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 1991). 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 C.F.R. § 261.2[a][2]),
- either "off-spec" commercial products or a commercially sold grade,
- not used (i.e., soil contaminated with spilled unused wastes is a P or U waste), and
- the sole active ingredient in a formulation.

The stabilization ponds at IR Site 10 functioned as the only sewage treatment for the base from the 1940s to 1976, receiving both domestic and industrial sewage. Reviews of historical site information, manifests, and storage records during earlier phases of investigation did not identify specific sources of chemicals reported at IR Site 10. Therefore, the DON has determined that, although RCRA waste constituents may be present in soil at IR Site 10, the soil does not constitute a potential RCRA-listed hazardous waste.

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 on the basis of 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 IR Site 10 was reported to consist of metals, pesticides, and polychlorinated biphenyls (PCBs) at concentrations posing a potential threat to the environment. The highest concentrations of those analytes were predominantly found in the shallow soil from Pond No. 1. The physical properties of the chemicals and the maximum concentrations reported in the Hydrogeological Assessment Report (HAR) (Ogden 1992) and Data Gaps Study Report (BNI 1998) indicate that these soils are not ignitable, corrosive, or reactive as defined in Cal. Code Regs. tit. 22, § 66261.21–66261.23.

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. 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 leaching 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). The maximum concentrations of all constituents reported in soil samples collected in previous investigations at the site (Ogden 1992, BNI 1998) were compared to the TCLP limits at Cal. Code Regs. tit. 22, § 66261.24(a)(1). The maximum reported concentrations of four metals—cadmium, chromium (total and/or trivalent), lead, and silver—in soil exceed 20 times the TCLP concentration limits. Therefore, under the proposed removal alternatives, excavated waste soil, if generated, may require TCLP testing. Final soil characterization conducted as a part of each removal alternative will include testing to identify potential RCRA hazardous waste. Until the testing is completed, soil that would be excavated under Alternative 2 is considered to be potential hazardous waste and will be managed for off-site disposal according to RCRA requirements. Soil proposed for cover under Alternative 1 is not anticipated to be hazardous; however, if characterization results indicate hazardous waste is present, the soil will be excavated and managed as stated in Alternative 2. The TCLP testing will be performed for metals only.

B1.4.2 California-Regulated, Non-RCRA Hazardous Waste

A waste determined not to be a RCRA hazardous waste may still be considered a state-regulated non-RCRA hazardous waste. The state's RCRA Program is broader in scope in its hazardous waste determination. 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, the California Waste Extraction Test (WET), which 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 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]).

The wastes generated during remedial actions at IR Site 10 are anticipated to be managed under RCRA requirements for hazardous or nonhazardous waste as relevant and appropriate on the basis of 1) similarity of the potential contaminants to RCRA waste constituents and 2) previous soil sample results indicating that excavated soil from some locations may be potentially RCRA hazardous waste. However, final characterization sampling prior to further removal action will first determine if soil collected to be remediated is a non-RCRA hazardous waste. The maximum concentrations for contaminants reported in soil to date indicate that all are below the respective TTLC limits. The maximum concentrations reported for cadmium, chromium (total and/or trivalent), copper, lead, mercury, selenium, and silver equal or exceed 10 times the STLC. These results indicate that the waste soil generated during excavation may be classified as a non-RCRA hazardous waste on the basis of the toxicity characteristic, and the WET would be required. If encountered, non-RCRA hazardous soil will be excavated and managed for off-site disposal according to the requirements for such wastes unless it is also found to be RCRA hazardous, in which case it will be managed as a RCRA waste according to requirements identified as ARARs.

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Section B2
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, most action-specific requirements that include numerical values are included in this chemical-specific section and, if repeated in the action-specific section, the discussion refers back to this section.

This section presents ARARs determinations addressing numerical values for soil and air, a summary of the ARARs conclusions, and a more detailed discussion of the ARARs for both media.

Potential federal and state chemical-specific ARARs are summarized in Tables B2-1 and B2-2. Table B2-3 provides a comparison of the RCRA and non-RCRA hazardous waste criteria for chemicals reported in soil with the known maximum concentrations. (All three tables are at the end of this section.) These criteria will be used to determine which soils may be managed as potential hazardous waste, if excavated, until final waste characterization is performed.

B2.1 SUMMARY OF ARARs CONCLUSIONS BY MEDIUM

Conclusions for ARARs determinations that address numerical values that may be potential chemical-specific ARARs are presented by each medium: groundwater, surface water, soil, and air. The objective of the removal action is to reduce the immediate ecological risk posed by contact with contaminated soil located within the stabilization ponds present at IR Site 10. Discharges to surface water and groundwater are not anticipated or planned as a part of the removal action. A more detailed discussion of the ARARs for each medium follows.

B2.1.1 Groundwater ARARs Conclusions

Groundwater at IR Site 10 is not a medium of concern for this EE/CA. Groundwater is being monitored semiannually along with IR Sites 2 and 7 under a separate program (BEI 2003). The monitoring program results do not indicate that a release has occurred at IR Site 10; chemicals reported in groundwater are also present at upgradient well locations, are attributable to a known release at IR Site 7, or are present at levels comparable to background. No remedial action for groundwater has been recommended. Site conditions preclude soil contaminants from being a potential threat to groundwater quality, and the removal action alternatives proposed will not impact groundwater. Therefore, groundwater is not being addressed in this EE/CA report and no chemical-specific ARARs for groundwater have been identified.

B2.1.2 Surface Water ARARs Conclusions

Discharges to surface water are not anticipated or planned as a part of the proposed removal action alternatives for IR Site 10. Therefore, no chemical-specific ARARs have been identified for surface water at this time.

B2.1.3 Soil ARARs Conclusions

The substantive provisions of the following requirements are the most stringent of the potential federal and state soil ARARs identified for remedial actions at IR Site 10:

- definition of a RCRA hazardous waste (Cal. Code Regs. tit. 22, § 66261.21, 66261.22[a][1], 66261.23, 66261.24[a][1], and 66261.100)
- California Hazardous Waste Criteria (Cal. Code Regs. tit. 22, § 66261.22[a][3] and [4], 66261.24[a][2]–[a][8], 66261.101, 66261.3[a][2][C], and 66261.3[a][2][F])

The relevant and appropriate chemical-specific standards of RCRA include the maximum concentrations of contaminants for toxicity characteristics at Cal. Code Regs. tit. 22 § 66261.24(a)(1)(B). The chemical-specific standards for non-RCRA hazardous waste characterization include the maximum concentrations of contaminants for toxicity characteristics at Cal. Code Regs. tit. 22 § 66261.24(a)(2)(A). Other RCRA Subtitle C technical requirements may be relevant and appropriate to the extent that hazardous levels of RCRA waste constituents are encountered in soil and hazardous waste is generated, transported, or stored at IR Site 10.

The primary federal and state chemical-specific ARARs for the proposed removal actions consist of RCRA and non-RCRA requirements to characterize waste prior to disposal. To meet these requirements, the DON will first complete the determination of the extent of contamination in soil using the non-RCRA WET and RCRA TCLP analysis methods as necessary to define the extent of potentially hazardous waste. The proposed excavation areas will be refined on the basis of the results. If hazardous soils are identified, they will be excavated and characterized in accordance with RCRA and non-RCRA requirements for off-site disposal. Soil samples not shown to exhibit non-RCRA hazardous waste characteristics will not be analyzed for RCRA hazardous waste characteristics because the non-RCRA hazardous waste criteria are lower for the RCRA hazardous waste constituents reported at the site.

RCRA hazardous waste is not anticipated to be generated based on the results of previous phases of investigation. However, under Alternative 2, excavation of contaminated soil in Alternative 2 would generate waste that may be potentially hazardous. Soil sampling prior to excavation will complete delineation of the extent of soil contaminants, including hazardous levels of contaminants, if present.

Under Alternative 1, cover with institutional controls, no excavation is proposed and waste soils would not be generated. Therefore, chemical-specific ARARs, such as those acknowledged for Alternative 2, will not be identified for Alternative 1 until and unless soil sampling encounters hazardous levels of contaminants. Hazardous soil encountered under Alternative 1 would be removed prior to cover placement, and the excavated soil

would be managed as a hazardous waste. Removal of all hazardous soil from the site will minimize the requirements relevant and appropriate to the cover. Additionally, excavation activities associated with temporary stockpiling, which would be conducted within the site area, are exempt from land-disposal restrictions (LDRs) under RCRA.

The numerical values from RCRA and non-RCRA hazardous waste characterization criteria evaluated as potential soil ARARs are presented in Table B2-3.

Risk assessment of current site conditions indicate that, although the human-health risk may be within the generally allowable risk-management range, an unallowable risk is posed to potential ecological receptors. Because removal of soil exceeding hazardous waste criteria may not be sufficient to assure protection of the environment, cleanup to risk-based criteria will be applied at IR Site 10 to assure protectiveness.

B2.1.4 Air ARARs Conclusions

IR Site 10 is not known to be a source of emissions of regulated pollutants or volatile organic compounds, and air has not been identified as a medium of concern for this EE/CA. Therefore, federal and state chemical-specific ARARs have not been identified for air at IR Site 10. However, discharge of contaminants in soil to air in the form of fugitive dust is anticipated during excavation or cover activities planned as a part of the proposed removal alternatives. Air requirements pertaining to the generation of fugitive dust are discussed in Section B4 of this appendix as potential federal and/or state action-specific ARARs.

B2.2 DETAILED DISCUSSION OF SOIL ARARs

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

Under Alternative 2, the key threshold question for soil ARARs is whether a portion of the excavated soil or soil berm around the ponds 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. These regulations are not ARARs for Alternative 1 unless soil proposed for excavation is identified during delineation sampling as potentially hazardous. No soil ARARs are identified for Alternative 1, but those that apply to Alternative 2 could apply to Alternative 1 if similar sampling results are reported prior to capping.

B2.2.1 Federal

Federal ARARs for soil are discussed below.

B2.2.1.1 RCRA HAZARDOUS WASTE AND GROUNDWATER PROTECTION STANDARDS

The federal RCRA requirements at 40 C.F.R. Part (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 (Section B1.3). The applicability of RCRA requirements depends on whether the waste is a 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 a RCRA hazardous waste can be made by comparing the site waste to RCRA hazardous waste characteristic criteria. 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 § 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 (Section B1.4.1).

The former treatment facility at IR Site 10 was not RCRA permitted and received sewage water for treatment to 1976 and thereafter only occasionally during events exceeding capacity of the new treatment facility into the mid-1980s. A comparison of previously reported chemicals in soil to RCRA water criteria, metals in particular, indicates that, when site soils are excavated under Alternative 2, they may be classified as a characteristic RCRA hazardous waste. The final determination of whether RCRA hazardous levels of contaminants are present in the soil will be made during preexcavation soil sampling. On the basis of the information presented in this paragraph, RCRA hazardous waste requirements in Cal. Code Regs. tit. 22 are considered potentially relevant and appropriate for IR Site 10 pending analysis.

RCRA LDRs at Cal. Code Regs. tit. 22, § 66268.1(f) place restrictions on 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. Treatment standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs, but they may be relevant and appropriate state ARARs if wastes were treated on-site. The LDR and pretreatment requirements are not potentially relevant and appropriate to IR Site 10 because on-site disposal or treatment of hazardous waste is not proposed. The requirements at Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are not potentially applicable because IR Site 10 is not a regulated unit and is not known to have received hazardous waste. The purposes of the monitoring program requirements at Cal. Code Regs. tit. 22, § 66264.90(a) for which concentration limits are

required are detecting, characterizing, and responding to releases. In order to be relevant and appropriate under 40 C.F.R. § 300.400(g)(2), the purpose of the requirement and the purpose of the CERCLA action should be the same or similar. Contaminant release or migration from soil to the vadose zone, groundwater, and surface water has not been identified as a potential pathway of exposure at IR Site 10 (BEI 2004). The contributing factors limiting the potential for release or migration are:

- the distribution of contaminants primarily to near-surface soil fewer than 2 feet below ground surface (bgs);
- the lack of surface water at the site (Section 1);
- low mean annual rainfall (2.87 inches per year [Ogden 1992]);
- high mean evaporation rate (93.55 inches per year [Ogden 1992]), suggesting that natural infiltration of precipitation to groundwater occurs infrequently, if ever; and
- the presence of clay- and silt-bearing surface and subsurface soil having relatively low permeability (Section 1).

With the removal of soil that may be a characteristic hazardous waste and in the absence of sources of infiltrating water, current site conditions are anticipated to be protective of groundwater and surface water quality and, thereby, protective of potential off-site human and ecological receptors. Under these circumstances, the groundwater protection standards at Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) would not be potential ARARs.

B2.2.1.2 TOXIC SUBSTANCES CONTROL ACT

TSCA regulates the storage and disposal of PCBs. These requirements have both action- and chemical-specific aspects. The requirements address storage and disposal activities and only those activities involving PCBs. Therefore, they may be discussed in this portion of Section B2. Under TSCA, U.S. EPA has promulgated 40 C.F.R. § 761.61 PCB remediation waste requirements that provide cleanup and disposal options for PCB remediation waste. The options include 1) self-implementing on-site cleanup and disposal, 2) performance-based disposal, and 3) risk-based disposal. Generally, the self-implementing cleanup provisions are not binding on cleanups conducted under other authorities, including actions conducted under Sections 104 or 106 of CERCLA. Therefore, they are not applicable ARARs for actions at CERCLA sites. However, in the preamble of the final rule for 40 C.F.R. pt. 761, U.S. EPA indicated that it anticipates that the final rule "will be a potential ARAR at CERCLA sites where PCBs are present." U.S. EPA expects that "CERCLA cleanups would typically comply with the substantive requirements of one of the three options, provided by § 761.61, upon completion of the cleanups" (63 Fed. Reg. 35,407, 29 June 1998). Therefore, 40 C.F.R. § 761.61(a) is potentially relevant and appropriate at CERCLA sites where PCB contamination is present.

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

self-implementing on-site cleanup and disposal option requirements are based on the concentration of PCBs. The cleanup levels are based on four general waste categories and whether the wastes are in high- or low-occupancy areas. Under 40 C.F.R. § 761.61(a)(4)(i), bulk PCB remediation waste cleanup-level requirements are as follows.

- For high-occupancy areas, the cleanup level should be less than or equal to 1 part per million (ppm) without further conditions, but, where the concentration is greater than 1 and less than or equal to 10 ppm, a cap is required.
- For low-occupancy areas, the cleanup level should be less than or equal to 25 ppm unless there is an actual or proposed change in land use to high occupancy.

Up to 50 ppm of PCB remediation waste may remain if the site is secured with a fence and a sign. Up to 100 ppm may remain if the site is capped.

Under 40 C.F.R. § 761.61(a)(4)(iii), porous-surface cleanup levels, appropriate for site soils, are the same as for bulk PCB remediation waste at 40 C.F.R. § 761.61(a)(4)(i). No other types of potentially contaminated media are present at IR Site 10.

A "high-occupancy area" is defined in the regulations as any area where PCB remediation waste has been disposed on-site and where occupancy for any individual not wearing dermal and respiratory protection for a year is 335 hours or more for bulk PCB remediation waste and 840 hours or more for nonporous surfaces. Criteria for low-occupancy areas are less than 335 hours for bulk PCB remediation waste and less than 840 hours for nonporous surfaces.

PCB remediation waste is waste containing PCBs as a result of a spill, release, or other unauthorized disposal that meets the following criteria: materials disposed before 18 April 1978 that are currently greater than or equal to 50 ppm regardless of the concentration of the original spill, materials that are at any volume or concentration and whose original source was greater than or equal to 500 ppm beginning on 18 April 1978 or greater than or equal to 50 ppm beginning on 02 July 1979, and materials that are currently at any concentration if the PCBs are spilled or released from a source not authorized under this part. PCB remediation waste includes soil, rags, and other debris generated as a result of any PCB spill cleanup, including but not limited to environmental media, sewage sludge, and buildings and other man-made structures, porous surfaces, and nonporous surfaces.

The maximum concentrations of PCBs reported to date at IR Site 10 have been 0.89 milligrams per kilogram (mg/kg) and 0.278 mg/kg for Aroclor 1254 and Aroclor 1260, respectively, which equal 0.89 ppm and 0.278 ppm. Although "sewage sludge" is specifically cited by definition as PCB remediation waste, the maximum concentrations reported for the site are well below 1 ppm, the cleanup level for a high-occupancy area without further conditions. Because current site conditions meet the requirements for the self-implementing cleanup option, for a high-occupancy area, TSCA is not considered an ARAR for IR Site 10 removal actions.

B2.2.2 State

State RCRA requirements included within the U.S. EPA-authorized RCRA Program for California are considered to be potential federal ARARs. When state regulations are either broader in scope or more stringent 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. 60848). The Cal. Code Regs. tit. 22, div. 4.5 requirements that are part of the state-approved RCRA Program would be potential state ARARs for non-RCRA, state-regulated hazardous wastes.

The site waste characteristics will be compared to the criteria for non-RCRA (state-regulated) hazardous waste at Cal. Code Regs. tit. 22, § 66261.22(a)(3) and (4), 66261.24(a)(2)–(a)(8), 66261.101, 66261.3(a)(2)(C), and 66261.3(a)(2)(F). The non-RCRA waste definition requirements in these sections are potential state ARARs for determining whether other RCRA requirements are potential ARARs. All wastes generated during the IR Site 10 remedial action for soil will be characterized as to waste type. Although a waste may be identified as non-RCRA, if it is determined to be similar to RCRA waste, the federal RCRA requirements would be identified as ARARs

The comparison of previously reported chemicals in soil, metals in particular, to non-RCRA hazardous waste criteria suggests that, when soil is excavated under Alternative 2, some of it may be classified as a characteristic non-RCRA hazardous waste. The final determination of whether non-RCRA hazardous levels of contaminants are present in the soil will be made during preexcavation soil sampling. The contaminants of potential concern at IR Site 10, as indicated by human-health and ecological risk screening assessments, are metals, PCBs, and pesticides at concentrations below the criteria for characteristic non-RCRA hazardous waste.

Table B2-1
Potential Federal Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		SOIL		
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	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.
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)	Not an ARAR	IR Site 10 is not a regulated unit that received hazardous waste. The results of previous investigations indicate that surface soil contains RCRA constituents that may pose a potential threat to human health and/or the environment. Given the physical conditions of NAF El Centro and IR Site 10, however, the impacted surface soil is not considered to have the potential to migrate to the vadose zone or potentially impact groundwater. Further, if hazardous levels are encountered in soil, they will be excavated and disposed off-site, removing the potential for release to groundwater, surface water, or the unsaturated zone.
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	IR Site 10 was not used for the disposal of hazardous waste. On-site disposal of hazardous waste is not included as part of the proposed removal activities. The source of the contaminants in soil at IR Site 10 is unknown. Similarity of site soil composition to a listed waste will be determined during soil sampling and generated-waste-characterization efforts.

(table continues)

Table B2-1 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
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	IR Site 10 was not used for the disposal of hazardous waste. On-site treatment is not included in the proposed removal activities. The source of the contaminants in soil at IR Site 10 is unknown. Similarity of site soil composition to a listed waste will be determined during soil sampling and generated-waste-characterization efforts.
Toxic Substances Control Act (15 U.S.C., ch. 53, §§ 2601–2692)[c]				
Regulates storage and disposal of PCB remediation waste. There are three options: a) self-implementing on-site cleanup and disposal; b) performance-based disposal using existing approved disposal technologies; and c) risk-based disposal.	Soils, debris, sludge, or dredged materials contaminated with PCBs at concentrations greater than 50 ppm.	40 C.F.R. § 761.61(a)(4), (b), and (c)	Not an ARAR	The maximum reported concentration of PCBs at IR Site 10 was 0.278 mg/kg for Aroclor 1260 and 0.89 mg/kg for Aroclor 1254. These concentrations are below the self-implemented cleanup criteria for porous media of 1 ppm in high-occupancy areas without further conditions on use.

Notes:

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

ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
ch. – chapter
DON – Department of the Navy
IR – Installation Restoration (Program)
LDR – land disposal restriction
mg/kg – milligrams per kilogram
NAF – Naval Air Facility
PCB – polychlorinated biphenyl
POC – point of compliance
ppm – parts per million
RCRA – Resource Conservation and Recovery Act
§ – section
TCLP – toxicity characteristic leaching procedure
tit. – title
U.S.C. – *United States Code*

Table B2-2
Potential State Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		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)	Relevant and appropriate	Applicable for determining whether a waste is a non-RCRA hazardous waste.

Notes:
[a] many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARARs 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
DON – Department of the Navy
RCRA – Resource Conservation and Recovery Act
§ – section
tit. – title

Table B2-3
Hazardous Waste Criteria for Chemicals Reported in Soil[a]

	CONCENTRATIONS (per *California Code of Regulations*, Title 22, Section 66261.24)		
	RCRA	NON-RCRA (CALIFORNIA)	
Analyte	Toxicity Characteristic Leaching Procedure (mg/L)	Soluble Threshold Limit Concentration (mg/L)	Total Threshold Limit Concentration (mg/kg)
Pesticides/Polychlorinated Biphenyls			
aldrin	—[b]	0.14	1.4
Aroclor 1254	—	5	50
Aroclor 1260	—	5	50
4,4'-DDD	—	0.1	1
4,4'-DDE	—	0.1	1
4,4'-DDT	—	0.1	1
dieldrin	—	0.8	8
endrin	0.02	0.02	0.2
heptachlor	0.008	0.47	4.7
Priority Pollutant Metals			
antimony	—	15	500
beryllium	—	0.75	75
cadmium	1	1	100
chromium (total and III)	5	5	2,500
chromium (VI)	—	5	500
copper	—	25	2,500
lead	5	5	1,000
mercury	0.2	0.2	20
nickel	—	20	2,000
selenium	1	1	100
silver	5	5	500
thallium	—	7	700
zinc	—	250	5,000

Notes:
[a] only chemicals for which there are hazardous waste criteria are listed in this table; it should be noted that only metals have been previously reported at concentrations potentially exceeding characteristic RCRA and/or non-RCRA hazardous waste criteria
[b] dash indicates no value available

(table continues)

Table B2-3 (continued)

Acronyms/Abbreviations:
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- IR – Installation Restoration (Program)
- mg/kg – milligrams per kilogram
- mg/L – milligrams per liter
- NAF – Naval Air Facility
- RCRA – Resource Conservation and Recovery Act

Section B3
LOCATION-SPECIFIC ARARs

Potential location-specific ARARs are identified and discussed in this section. The discussions presented are 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 to confirm location-specific ARARs where inadequate sighting information currently exists or in the event of changes to planned facility locations.

B3.1 SUMMARY OF LOCATION-SPECIFIC ARARs

Wetlands protection, floodplain management, and biological resources are the categories of location-specific requirements potentially applicable to IR Site 10 removal actions. The conclusions for ARARs evaluation pertaining to these resources are presented in the following sections.

The federal and state requirements evaluated as potential ARARs or TBCs for IR Site 10, NAF El Centro are identified in Tables B3-1 and B3-2 (located at the end of this section), respectively. The ARARs determination of potential location-specific ARARs was based on maps, figures, or lists included in the regulation, prepared by the administering agency or recreated by others citing these documents as the source.

B3.1.1 Cultural Resources ARARs Conclusions

No cultural sites requiring protection have been identified in the vicinity of IR Site 10; therefore, federal or state requirements for this resource category were not identified as potential ARARs for IR Site 10.

B3.1.2 Wetlands Protection and Floodplain Management Conclusions

Federal requirements in Table B3-1 to avoid the adverse effects of destruction or loss of wetlands and support for new construction under Executive Order Number (Exec. Order No.) 11990 are identified below as potential ARARs for IR Site 10. Requirements for floodplain management were not identified as potential ARARs for the site. Areas of riparian habitat on the margins of the New River and associated tributary system within NAF El Centro are designated as jurisdictional wetlands under Section 404 of CWA (TDS 2001). These include a 0.3-mile portion of the tributary drainages about 600 feet west of IR Site 10. Portions of the Elder Canal have also been designated as artificial wetlands. The nearest part of the canal is about 200 feet east of IR Site 10. Neither jurisdictional nor artificial wetlands are located on or immediately adjacent to IR Site 10. The proposed removal actions do not include excavation or discharge to designated wetland areas; however, local drainages could provide a means for soil from the site to migrate to wetlands during removal activities.

Federal requirements at 40 C.F.R. § 6.302(a) state that federal agencies conducting certain activities are to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and are to avoid support of new construction in wetlands if a practicable alternative exists. Although substantive provisions of theses

requirements are not considered applicable, they are potentially relevant and appropriate to elements of the proposed removal actions. Measures will be taken to control erosion and runoff, minimizing the potential for off-site migration of contaminants in soil during excavation, regrading, and cover installation and/or transport of impacted soil.

IR Site 10 is not located within the 100-year floodplain delineated for the New River. The river channel is deeply entrenched west of IR Site 10, and the potential for overbank flow during a 100-year flood is considered unlikely (Ogden 1992). Therefore, the floodplain regulations are not potential ARARs.

B3.1.3 Hydrologic Resources Conclusions

No hydrologic resources were identified in the immediate vicinity of IR Site 10; therefore, federal or state requirements for this resource category were not identified as potential ARARs for IR Site 10.

B3.1.4 Biological Resources Conclusions

The substantive provisions of the Endangered Species Act of 1973 (16 U.S.C. § 1536[a], [h][1][B]) were identified as potentially applicable federal requirements. Substantive provisions of the Migratory Bird Treaty Act (16 U.S.C. § 703) were identified as potentially relevant and appropriate federal requirements. Substantive provisions of the California Endangered Species Act, Cal. Fish & Game Code § 2080, are identified as potentially relevant and appropriate state requirements. These requirements were identified as location-specific ARARs for the removal action at IR Site 10.

The results of biological surveys and information gathered for ecological risk evaluation between 1992 and 2004 have noted the occurrence or potential presence of special-status species at IR Site 10 or in site vicinity habitats. The site itself provides minimal habitat because of a lack of significant vegetative cover and the high degree of human disturbance related to farming or military use. Lands adjacent to IR Site 10 had until the last few years included agricultural fields (e.g., growing alfalfa), a former landfill (IR Site 1), and mostly bare undesignated areas.

A variety of special-status animal species potentially occur at NAF El Centro, visiting alkali desert scrub habitat and others in the IR Site 10 vicinity or passing through the site in route to riparian habitat of the New River (Ogden 1992). A federal- and California-listed endangered species, the desert pupfish, is reported to be present in drainages around NAF El Centro and, therefore, may be present in the drainage approximately 150 feet west of IR Site 10.

NAF El Centro is within a significant avian flyway used by many bird species, including migratory birds. Only a few bird species, such as the black-throated sparrow, are year-round residents of the desert scrub habitat represented at IR Site 10. The egg of one migratory species, the killdeer, was found during a 1997 biological survey (BEI 2004). The burrowing owl is the only listed migratory bird species noted as actively using IR Site 10 as nesting habitat (Ogden 1992). Survey results have observed that potential impacts on burrowing owl habitat from response actions could be mitigated by an initial

survey to identify active owl residence and, if present, scheduling surface disturbances such as excavation or cover placement for the postfledgling/prepairing period (Ogden 1992).

The best time for removal activities at the site was previously identified as October to November (Thompson, pers. com. 1991). This information will be used during remedial activities at IR Site 10 to assure the remedy is implemented in a manner protective of the designated protected species identified for the site vicinity habitats.

B3.1.5 Coastal Resources Conclusions

NAF El Centro is located inland and not within the coastal zone of southern California. No federal or state requirements for this resource category were identified as potential ARARs for IR Site 10.

B3.1.6 Geologic Characteristics Conclusions

No unique geologic characteristics were identified for IR Site 10; therefore, federal or state requirements for this resource category were not identified as potential ARARs for IR Site 10.

B3.2 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 IR Site 10 EE/CA.

Requirements that are determined to be ARARs or TBCs are identified in Table B3-1 (federal) and Table B3-2 (state) at the end of this section. ARARs determinations are presented in the column with the heading "ARAR Determination." Determinations of status for location-specific ARARs were generally based on 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.

B3.2.1 Cultural Resources ARARs

The following sources of potential cultural resource protection requirements were evaluated for potential ARARs for IR Site 10:

- National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. § 470–470x-6, 36 C.F.R. pt. 800, and 40 C.F.R. § 6.301[b])
- Archaeological and Historic Preservation Act (16 U.S.C. § 469–469c-1 and 40 C.F.R. § 6.301[c])
- Historic Sites, Buildings, and Antiquities Act of 1935 (16 U.S.C. §§ 461–467 and 40 C.F.R. § 6.301[a])
- Archaeological Resources Protection Act of 1979, as amended (Public Law No. [Pub. L. No.] 96-95 and 16 U.S.C. § 470aa–470mm)

No cultural sites requiring protection have been identified at NAF El Centro. Table B3-1 summarizes the federal requirements evaluated for hydrologic resources.

B3.2.1.1 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED

Pursuant to Sections 106 and 110(f) of 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 NHPA 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.

No buildings or other structures besides the three sewage ponds exist in the vicinity of IR Site 10. According to the Integrated Natural Resources Management Plan (INRMP) for NAF El Centro (TDS 2001), the Navy has determined through cultural surveys that none of the buildings or structures on the main facility meets the National Register criteria for evaluation. The State Historic Preservation Officer concurred with this determination in 1995. The requirements of NHPA are therefore not identified as potential ARARs for IR Site 10.

B3.2.1.2 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, prehistoric, or archaeological data, the act requires the agency undertaking that project to preserve the data or request the United States Department of the Interior to do so. This act differs from NHPA in that it encompasses a broader range of resources than those listed on the National Register (http://tps.cr.nps.gov/nhl/) and mandates only the preservation of the data (including analysis and publication).

Archeological surveys conducted prior to the INRMP (TDS 2001) have not identified archeological sites in the vicinity of IR Site 10. The degree of prior development in the site area further reduces the likelihood of as-yet unidentified cultural resources being present. The proposed removal actions for IR Site 10 are therefore not considered likely to cause a loss of historical or archaeological data, and Archaeological and Historic Preservation Act requirements are not considered potential ARARs for the site.

B3.2.1.3 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[c]) 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 "national historic landmarks" in California are listed in the National Register (http://tps.cr.nps.gov/nhl/). 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.

No historic or natural landmarks are present in the vicinity of IR Site 10. The Navy has determined through cultural surveys that none of the buildings or structures on the main facility meets the criteria for preservation as a historic landmark. The State Historic Preservation Officer concurred with this determination in 1995 (TDS 2001). The requirements of the Historic Sites, Buildings, and Antiquities Act are therefore not considered potential ARARs for IR Site 10 removal actions.

B3.2.1.4 ARCHAEOLOGICAL RESOURCES PROTECTION ACT OF 1979

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 § 470cc.

The proposed removal actions for IR Site 10 will be limited to the area of the stabilization ponds and are not anticipated to adversely affect archaeological resources. Archeological surveys conducted prior to the INRMP have not identified archeological sites in the vicinity of IR Site 10. The degree of prior development in the site area further reduces the likelihood of as-yet unidentified cultural resources being present. The requirements of the Archaeological Resources Protection Act are therefore not considered potential ARARs for the site.

B3.2.2 Wetlands Protection and Floodplains Management ARARs

The following wetlands protection and floodplains management regulations were evaluated for potential ARARs for IR Site 10:

- Exec. Order No. 11990, Protection of Wetlands (40 C.F.R. § 6.302[a])
- Exec. Order No. 11988, Floodplain Management (40 C.F.R. § 6.302[b])
- CWA Section 404, 33 U.S.C. § 1344
- RCRA (33 U.S.C. §§ 6901–6991[i]), Cal. Code Regs. tit. 22, § 66264.18(b)

Table B3-1 summarizes the federal requirements evaluated for wetlands and floodplains resources.

B3.2.2.1 FEDERAL

Following are discussions of federal regulations evaluated for potential ARARs.

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.

A wetlands delineation was conducted for the NAF El Centro vicinity in conjunction with the INRMP (TDS 2001) to determine jurisdictional status. According to the map of wetlands areas produced (INRMP Map I-1), some areas of riparian habitat on the margins of the New River and the associated tributary system within NAF El Centro may be regulated as jurisdictional wetlands under Section 404 of CWA. Approximately 14.4 acres of riparian habitat along the New River was identified as jurisdictional wetlands. An approximately 0.3-mile portion of the wetland area along tributary drainages is about 600 feet west of IR Site 10. Additionally, more than 1 mile of the Elder Canal extending from agricultural fields near the center of NAF El Centro to the IR Site 10 vicinity (southeastern corner) has been designated as artificial wetland areas. The northernmost extent of this wetland area is located about 200 feet east of IR Site 10. Neither jurisdictional nor artificial wetlands are located on or immediately adjacent to IR Site 10. The proposed removal actions do not include excavation of or discharge to the designated wetland areas. However, a drainage channel that leads to a jurisdictional wetland is mapped as starting about 120 feet west of the evaporation ponds.

Requirements of Exec. Order No. 11990 are not promulgated themselves and are not potential ARARs. The requirements for Exec. Order No. 11990 are codified at 40 C.F.R. § 6.302(a) but are applicable to U.S. EPA administrative actions and are not potentially applicable for the IR Site 10 removal action. However, the substantive provisions of 40 C.F.R. § 6.302(a) that federal agencies conducting certain activities avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and also avoid support of new construction in wetlands if a practicable alternative exists are potentially relevant and appropriate for the proposed removal action at IR Site 10. In order to further minimize the potential for adverse impact on neighboring wetlands by indirect discharges of contaminants, measures will be taken to control erosion and the potential for migration of contaminants in soil during excavation, regrading, cover installation, and/or transport of impacted soil for off-site disposal.

Floodplain Management, Exec. Order No. 11988

Executive orders are not promulgated requirements that could potentially be ARARs under CERCLA. Exec. Order No. 11988 is codified at 40 C.F.R. § 6.302(b) and is applicable to U.S. EPA administrative activities; therefore, it is not potentially applicable to the proposed removal action at IR Site 10. However, the substantive provisions of

40 C.F.R. § 6.302(b), which require federal agencies 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, could be potential ARARs if IR Site 10 was within the 100-year floodplain or had the potential to affect the floodplain development. NAF El Centro is not located within the 100-year floodplain of the New River, according to flood insurance rate maps reviewed for the area (FEMA 1984).

The proposed removal actions for IR Site 10 do not involve further development of the site but removal and/or cover of impacted soil. This information indicates that floodplain requirements of Exec. Order No. 11988 and 40 C.F.R. § 6.302(b) are not potential ARARs for removal actions at IR Site 10.

Clean Water Act

Section 404 of CWA of 1977 (33 U.S.C. § 1344) 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 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.

Jurisdictional wetlands exist within NAF El Centro approximately 600 feet west of IR Site 10. Discharge of dredged or fill material to a wetland is not planned as part of proposed removal actions. The requirements of CWA Section 404 that address dredged and fill material are therefore not considered potential ARARs for removal actions at IR Site 10.

Resource Conservation and Recovery Act

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.

IR Site 10 was not a hazardous waste treatment, storage, and disposal (TDS) facility. NAF El Centro is not located within the 100-year floodplain of the New River, and calculations of peak flow volumes do not indicate that overbank flow would occur. This information indicates that floodplain requirements of RCRA are not potential ARARs for IR Site 10.

B3.2.2.2 STATE

The state RCRA requirements for floodplains are evaluated above as potential federal ARARs.

B3.2.3 Hydrologic Resources ARARs

The following federal regulations for hydrologic resources were evaluated for potential ARARs:

- Wild and Scenic Rivers Act (substantive provisions of 16 U.S.C. §§ 1271–1287)
- Fish and Wildlife Coordination Act (substantive provisions of 16 U.S.C. §§ 661–666c)
- Rivers and Harbors Act of 1899 (substantive provisions of 33 U.S.C. §§ 401–413)

No state regulations for hydrologic resources were identified. None of the federal regulations evaluated were identified as sources of potential ARARs for IR Site 10. Table B3-1 summarizes the federal requirements evaluated for hydrologic resources.

B3.2.4 Biological Resources ARARs

The following federal and state biological resources regulations were evaluated for potential ARARs:

- Endangered Species Act (ESA) of 1973 (substantive provisions of 16 U.S.C. §§ 1531–1543)
- Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)
- Migratory Bird Treaty Act of 1972 (substantive provisions of 16 U.S.C. §§ 703–712)
- National Wildlife Refuge System Administration Act of 1996 (16 U.S.C. § 668dd–668ee and substantive provisions of 50 C.F.R. § 27.11–27.97)
- Wilderness Act (16 U.S.C. §§ 1131–1136 and 50 C.F.R. § 35.1–35.14)
- California Endangered Species Act (Cal. Fish & Game Code, ch. 1.5, §§ 2050–2116)

Table B3-1 summarizes the federal requirements evaluated for biological resources. The following sections discuss each of the listed requirements' ARAR status.

B3.2.4.1 FEDERAL

Following are discussions of federal regulations evaluated for potential ARARs.

Endangered Species Act of 1973

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. Under 16 U.S.C. § 1536(a)(2), federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. Federal agencies carry out conservation programs for listed species. Under 16 U.S.C. § 1536(h)(1)(B), an exemption may be granted 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 ESA.

Biological resources and sensitive habitats at NAF El Centro were identified through field surveys performed in 1991, 1994, 1996, and 1997. The 1991 survey was conducted at IR Site 10 as part of the hydrogeological assessment (Ogden 1992). The survey included a review of information regarding potential biological resources contained in the NAF El Centro Master Plan (Gillespie Delorenzo 1988) as well as facility and local environmental impact studies and reports. The 1994 DON survey and 1996 bird survey by Tierra Data Systems covered NAF El Centro; the results were reported in the INRMP (TDS 2001). The 1997 survey was conducted as part of an ecological scoping assessment (BNI 1998), which, along with an Environmental Impact Report for Imperial County (Mooney Associates 1993), provided additional information regarding potential species resources and sensitive habitat.

A variety of special-status animal species potentially occur at NAF El Centro. These species may visit alkali desert scrub habitat and others in the IR Site 10 vicinity or pass through the site in route to riparian habitat of the New River (Ogden 1992). The site itself provides minimal habitat because of a lack of significant vegetative cover and the high degree of human disturbance related to farming or military use. Lands adjacent to IR Site 10 until the last few years included agricultural fields (e.g., growing alfalfa), a former landfill (IR Site 1), and mostly bare undesignated areas.

The following special-status species are classified as threatened, endangered, or species of concern by state or federal agencies and are known to occur or have the potential to occur in habitats in the vicinity of IR Site 10 (CDFG 2002a,b,c,d):

- fish (desert pupfish potentially present in drainages)
- reptiles
  - barefoot gecko
  - desert tortoise
  - flat-tailed horned lizard
  - Colorado Desert fringe-toed lizard
- birds
  - burrowing owl
  - Swainson's hawk
  - northern harrier
  - white-tailed kite
  - willow flycatcher
  - prairie falcon

  - American peregrine falcon
  - black-tailed gnatcatcher
  - Yuma clapper rail
  - bank swallow
  - Le Conte's thrasher
- mammals
  - Nelson's bighorn sheep (or Peninsular bighorn sheep)
  - Yuma mountain lion (or puma)

The burrowing owl is the only special-status species the biological surveys noted as using IR Site 10 as nesting habitat (Ogden 1992). The burrowing owl is not a listed endangered or threatened species but a migratory bird. Separate surveys for endangered or threatened species, such as the flat-tailed horn lizard, Yuma clapper rail, and California black rail, did not report evidence of their occurrence in the IR Site 10 vicinity. A federal and California endangered species, the desert pupfish, is reported to be present in drainages around NAF El Centro and, therefore, may be present in the drainage approximately 150 feet west of IR Site 10. Special-status reptiles (the barefoot gecko, desert tortoise and Colorado Desert fringe-toed lizard) have not been reported in the vicinity of IR Site 10.

Because endangered or threatened species that may be affected by migration of soil and soil contaminants from the site during removal actions are reported in local drainages, substantive requirements of ESA at 16 U.S.C. § 1536(a)(2) and 1536(h)(1)(B) are identified as potential ARARs pertaining to the need for and the nature of removal actions at IR Site 10.

The Migratory Bird Treaty Act

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 at 50 C.F.R. § 10.13. It is the DON's position that this act is not legally applicable to DON actions; however, Exec. Order No. 13186 (dated 10 January 2001) requires each federal agency taking actions that have or are likely to have a measurable effect on migratory bird populations to develop and implement, within 2 years, a memorandum of understanding (MOU) with the United States Fish and Wildlife Service (USFWS) to promote the conservation of such populations. The United States Department of Defense (DoD) and USFWS are in the process of negotiating this MOU. In the meantime, the Migratory Bird Treaty Act will continue to be evaluated as a potentially relevant and appropriate requirement for DON CERCLA response actions.

NAF El Centro is within a significant avian flyway used by many bird species, including migratory birds. The egg of one migratory species, the killdeer, was found during a 1997

biological survey (BEI 2004). The burrowing owl was also noted as actively using IR Site 10 as nesting habitat. It was observed during a survey that potential impacts on burrowing owl habitat from response actions could be mitigated by an initial survey to identify active owl residence and, if present, scheduling surface disturbances, such as excavation or cover placement, for the postfledgling/prepairing period (Ogden 1992). On this basis, the substantive Migratory Bird Treaty Act requirements at 16 U.S.C. § 703 are not considered applicable but potentially relevant and appropriate to IR Site 10 removal actions. An initial site reconnaissance prior to removal actions may be used to determine whether migratory birds still use the site, and the removal actions could be scheduled for the least sensitive season. The best time for removal activities at the site was previously identified as October to November (Thompson, pers. com. 1991). Additional guidance that may be used to comply with requirements to protect migratory birds is provided in policy strategy for sensitive bird species at NAF El Centro in the INRMP (TDS 2001). This policy includes monitoring requirements and states the Burrowing Owl Survey Protocol and Mitigation Guidelines produced by the California Burrowing Owl Consortium in 1993 should be used as guidance for surveys and construction projects.

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.

NAF El Centro is not designated as part of the National Wildlife Refuge System; therefore, requirements of the act were not identified as potential ARARs for the site.

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.

IR Site 10 is not located in a federally owned wilderness area, and the proposed removal actions are not considered to have the potential to impact wilderness areas. For these reasons, requirements of the Wilderness Act were not identified as potential ARARs.

B3.2.4.2 STATE

General sections of the Cal. Fish & Game Code were evaluated for potential ARARs. Requirements of some sections of the California ESA were identified as potential ARARs.

California Endangered Species Act

The California ESA is codified in the Cal. Fish & Game Code §§ 2050–2116. It is the DON's position that the requisite federal sovereign immunity waiver does not exist to authorize applicability of the California ESA. Nevertheless, this act will be evaluated as a potentially relevant and appropriate requirement for the DON's CERCLA response actions.

The substantive requirements of Cal. Fish & Game Code § 2080 prohibits the take of endangered or threatened species. As discussed for the federal ESA, biological surveys of IR Site 10 and NAF El Centro indicated that the site and local drainages contain habitat that does support special-status species. The burrowing owl is noted as using IR Site 10 as nesting habitat, and the desert pupfish is reported in drainages of NAF El Centro that come close to the site. Other special-status species birds, reptiles, and mammals may also use site vicinity habitats or may visit in route to riparian habitat of the New River. Therefore, the substantive provisions of Cal. Fish & Game Code § 2080 are potentially relevant and appropriate requirements for the proposed response action. The response action will be designed to minimize potential effects on these endangered species noted for the site vicinity.

B3.2.5 Geologic Characteristics ARARs

Hazardous waste facility siting criteria for RCRA (42 U.S.C. §§ 6901–6991[I]) provided in Cal. Code Regs. tit. 22, § 66264.18(a) and (c) was evaluated as a potential geologic ARAR.

B3.2.5.1 FEDERAL

The state location-specific RCRA requirements for geologic characteristics are part of the federally approved program and are evaluated below as potential federal ARARs.

Resource Conservation and Recovery Act

Hazardous waste facilities must be cited in accordance with the following RCRA 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 that has had displacement in Holocene time.

- Salt dome formations, salt bed formations, and 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.

IR Site 10 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 (c) are not potential ARARs for this remedial action.

B3.2.5.2 STATE

No other state location-specific requirements for geologic characteristics were identified for evaluation as potential state ARARs.

Table B3-1
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	No buildings exist at IR Site 10, and the structures present are not known to be eligible for listing in the National Register of Historic Places.
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	No cultural sites requiring protection have been identified at IR Site 10 (TDS 2001). Significant prior development lessens likelihood for as yet unidentified cultural resources.
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	No buildings exist at IR Site 10, and the structures present at NAF El Centro are not considered eligible to be designated historic landmarks or other historic sites.

(table continues)

Table B3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
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	No cultural sites requiring protection have been identified in the vicinity of IR Site 10 (TDS 2001).
Exec. Order No. 11990, Protection of Wetlands[b]					
Wetland	Avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and avoid support of new construction in wetlands if a practicable alternative exists.	Wetland meeting definition of Section 7 of the cited regulation.	40 C.F.R. § 6.302(a) and 40 C.F.R. pt. 6, app. A, § 6(a)(1), (3) and (5) (at the end of § 6.1007)	Relevant and appropriate	Designated wetlands are not present at or in the immediate vicinity of IR Site 10, and discharge to surface water is not planned as part of the removal action. However, local drainages do lead to wetlands in the tributary system of the New River, and the potential for migration of soil contaminants would be present during removal actions. Measures would be taken to minimize erosion and runoff.
Exec. Order No. 11988, Floodplain Management[b]					
Within floodplain	Evaluate potential effects of actions in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.	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) and 40 C.F.R. pt. 6, app. A, § 6(a)(1), (3) and (5) (at the end of § 6.1007)	Not an ARAR	NAF El Centro is not located with the 100-year floodplain of the New River (FEMA 1984).

(table continues)

Table B3-1 (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	Designated wetlands are not present at or in the immediate vicinity of IR Site 10, and discharge of dredged material or fill to surface water is not planned as part of the removal action.
Resource Conservation and Recovery Act (42 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	IR Site 10 is not a RCRA hazardous waste TSD facility. NAF El Centro is not located with the 100-year floodplain of the New River (FEMA 1984), and peak flow volumes for the river would not cause overbank flow during periods of peak precipitation (Ogden 1992).
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	This removal action does not modify a scenic river or other local water body and will be conducted in a manner that does not have an adverse effect on them.
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	Removal activities do not include modifying a stream or any other water body. Evaporation ponds proposed for removal action are currently dry and do not provide suitable habitat for aquatic species.

(table continues)

Table B3-1 (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	The removal actions proposed will not modify a navigable water body.
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	Potentially applicable for response actions at or near threatened- or endangered-species habitats. A federal- and California-listed endangered species, the desert pupfish, may be present in the drainage channel approximately 120 feet west of IR Site 10. Ecological risk assessment has identified potential for toxic effects from soil for ecological receptors at the site. Measures will be taken to prevent off-site migration of contaminants in soil by controlling potential erosion and run-off.

(table continues)

Table B3-1 (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	The burrowing owl is the only migratory bird observed at the site. The broken egg of a killdeer was also observed at IR Site 10 in 1997. Substantive provisions are therefore applicable. Potential impacts from site response actions will be mitigated by initial survey to identify owl residence and, if present, scheduling site surface disturbances for the postfledgling/ prepairing period.
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	Not an ARAR	IR Site 10 is not part of the National Wildlife Refuge System. Additionally, no wildlife refuges or state or federal parks are located within a 10-mile radius of NAF El Centro.
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	IR Site 10 is not located in a federally owned wilderness area. Additionally, no wildlife refuges or state or federal parks are located within a 10-mile radius of NAF El Centro.

(table continues)

Table B3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Resource Conservation and Recovery Act (42 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	Removal action does not involve construction of a new hazardous waste treatment storage or disposal facility, and IR Site 10 is not located 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	NAF El Centro does not contain known salt domes, underground mines, or caves, and the removal action does not involve placement or discharge of hazardous waste but management for off-site disposal at a TSD facility.

Notes:

[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:

app. – appendix
ARAR – applicable or relevant and appropriate requirement
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
IR – Installation Restoration (Program)
NAF – Naval Air Facility
pt. – part
Pub. L. No. – public law number
RCRA – Resource Conservation and Recovery Act
§ – section
tit. – title
TSD – treatment, storage, and disposal
U.S.C. – *United States Code*

Table B3-2
Potential State 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	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 §§ 2070–2079	Not an ARAR	Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
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	Applicable	A variety of protected species potentially visit NAF El Centro and IR Site 10 in route to riparian habitat of the New River. A federal- and California-listed endangered species, the desert pupfish, may be present in the drainage channel approximately 120 feet west of IR Site 10. Ecological risk assessment has identified potential for toxic effects from soil for ecological receptors at the site. Measures will be taken to prevent off-site migration of contaminants in soil by controlling potential erosion and run-off.
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	Not an ARAR	Not effective after 01 January 1994.

(table continues)

Table B3-2 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Species habitat	Action must be taken to prevent take, possession, or destruction of any birds of prey or their eggs.	Birds of prey located on or near the site.	Cal. Fish & Game Code § 3503.5	Not an ARAR	Birds of prey may feed on species that visit or use IR Site 10. However, they are not reported to nest at the site, and the potential for take attributable to proposed removal actions is low.
Endangered species	Action must be taken to prevent the taking of fully protected birds.	Fully protected bird species or habitat.	Cal. Fish & Game Code § 3511	Not an ARAR	One fully-protected bird, the white-tailed kite, could occur in habitat reported near IR Site 10 but is not known to use the site. The removal actions proposed will be conducted in a manner protective of wildlife.
Species habitat	Action must be taken to prevent take of migratory nongame birds (as designated in the Migratory Bird Treaty Act).	Migratory nongame birds.	Cal. Fish & Game Code § 3513	Not an ARAR	Not broader in scope or more stringent than the federal Endangered Species Act of 1972, identified as a potential ARAR.

Notes:

[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. Fish & Game Code – *California Fish and Game Code*
DON – Department of the Navy
IR – Installation Restoration (Program)
NAF – Naval Air Facility
§ – section

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Section B4
ACTION-SPECIFIC ARARs

This EE/CA report evaluates removal action alternatives for IR Site 10 at NAF El Centro. This ARARs analysis is based on two removal action alternatives. Alternative 1 is a cover with institutional controls, and Alternative 2 entails excavation with off-site transportation and disposal. Detailed descriptions of the removal alternatives are provided in the main text of this EE/CA report. Soil is the only medium of concern at IR Site 10 addressed in the EE/CA report. Groundwater monitoring at IR Site 10 is being conducted semiannually along with IR Sites 2 and 7 under a different program. A complete pathway of exposure to contaminants in groundwater has not been identified at IR Site 10.

Tables B4-1 and B4-2 at the end of this section present and evaluate federal and state potential action-specific ARARs, respectively, for IR Site 10. A discussion of the requirements determined to be pertinent to each alternative being evaluated for IR Site 10 action is presented in this section. A discussion of how the alternative complies with each identified ARAR is also provided.

B4.1 ALTERNATIVE 1 – COVER WITH INSTITUTIONAL CONTROLS

Alternative 1 consists of two components: soil cover and institutional controls. The intent of the cover is to eliminate potential for human and ecological direct exposure to contaminated surface soil, including preventing burrowing through contaminated soil. The intent of institutional controls is to be protective of human health by limiting access to the site and prohibiting disturbance of the cover and excavation of the contaminated soil.

Initial soil sampling will be conducted to more closely determine the extent of soil to be covered and what portion of the soil berms around the ponds is suitable as cover material. Excavation of site soil is not proposed under this alternative except as an option to consolidate small areas of nonhazardous soil into larger ones for which cover would be applied. Hazardous waste is not anticipated to be generated in the removal activities and will not be left under the site cover. If soil sampling indicates soil with hazardous waste characteristics is present, it will be excavated and managed separately as hazardous waste until fully characterized for off-site disposal in accordance with requirements for the waste type. Additional requirements for containing and temporarily storing hazardous waste may be applicable or relevant and appropriate in the event hazardous waste is generated under Alternative 1.

Institutional controls are required to maintain the integrity of the cover by preventing excavation, limit land use that may present unacceptable risk to human health or the environment, and preserve access to the site for cover inspection by the DON and the FFA signatories. Such institutional controls would consist of land-use restrictions documented and implemented through the base master plan or its equivalent.

Regulation requirements for groundwater and vadose zone monitoring in federal corrective action (Cal. Code Regs. tit. 22) or the state equivalent (Cal. Code Regs. tits. 23 and 27) were evaluated but not determined to be potential ARARs for the proposed IR Site 10 removal actions. A release to groundwater has not been reported to date

under the separate groundwater monitoring program being conducted for NAF El Centro IR sites (BNI 2000, 2001). Current site conditions are not considered to pose a potential threat to groundwater quality and, after the impacted soil is covered, cover inspection and as-needed maintenance will be sufficient to assure protectiveness for human health and the environment. Vadose zone and air monitoring are generally performed when the contaminants of concern are volatile compounds. The contaminants of concern at IR Site 10 are not volatile or not easily volatilized and, therefore, are not likely to be present in the vadose zone or air. Emissions of particulates in the form of fugitive dust generated from soil are anticipated during excavation, backfill, grading, and/or cover of the stabilization ponds. Measures will be taken prior to ground disturbance to minimize the potential to generate dust.

B4.1.1 Site Cover

The following two options for the soil cover are proposed in this EE/CA report.

- Option 1 is to cover Pond Nos. 1 and 2 as necessary with 6 feet of compacted berm soil.
- Option 2 is to cover Pond Nos. 1 and 2 as necessary with a permeable, 6-inch layer of 1.5-inch crushed rock and 2 feet of compacted berm soil.

The risk assessments indicate that Pond No. 1 poses the highest risk to ecological receptors and is the focus of the removal action. However, metals have been reported at elevated concentrations potentially exceeding characteristic hazardous waste levels at Pond No. 2. Consolidation of nonhazardous soil exceeding the risk-based removal criteria encountered in Pond No. 2 and placement in Pond No. 1 prior to placement of the cover may be an optional component of this alternative. Hazardous waste is not anticipated to be generated in the removal activities. If soil sampling or optional excavation indicates soil with hazardous waste characteristics is present, it will be excavated and managed separately as hazardous waste until it is fully characterized for off-site disposal in accordance with requirements for the waste type. The existing drainage around the bermed stabilization ponds will be evaluated and, if necessary, additional measures will be taken to minimize surface water run-on, cover erosion, and control of runoff from the covered area. The existing fencing around the site would be maintained to delineate the area over which institutional controls would apply and may be enhanced by signage providing the limitations for land use.

Overall, the proposed cover for IR Site 10 will provide a barrier that eliminates the pathways of exposure for ecological receptors to impacted soil and yet assures site revegetation can occur such that there is no net loss of habitat for the burrowing owl and other endangered or threatened species that may use site vicinity habitat.

Cover requirements of Cal. Code Regs tit. 27 pertaining to nonhazardous waste sites would be relevant and appropriate only to the extent that the site conditions pose a potential threat to groundwater quality. Site conditions identified in the HAR (Ogden 1992) indicate that the impacted soil does not pose a threat to groundwater quality because the development of leachate is not likely to occur. Although cover of the stabilization ponds is proposed to protect potential ecological receptors from exposure to

site soils, the cover and associated drainage controls would also further minimize the potential for surface water infiltration and for impact on groundwater quality.

B4.1.1.1 FEDERAL ARARs

Federal requirements that are potential ARARs for cover actions are described in the following sections. There are no federal ARARs for institutional controls.

Resource Conservation and Recovery Act

IR Site 10 was not a RCRA-permitted facility or solid waste disposal facility, wastes were not received after the effective date of the Cal. Code Regs. tit. 22 requirements, and no RCRA or non-RCRA hazardous waste will be covered on the site. (RCRA requirements at Cal. Code Regs. tit. 22 were effective on 19 November 1980.) The stabilization ponds were part of a treatment facility, not a landfill or other solid waste disposal facility. The removal activities proposed for IR Site 10 would not include treatment, storage, or disposal as defined by RCRA for these types of facilities. RCRA surface impoundment and landfill requirements regarding capping (Cal Code Regs. tit. 22, § 66264.310 and 66264.228 [e]–[r]) and site closure where waste may be left in place (Cal Code Regs. tit. 22, § 66264.111 and 66264.228 [b]) would not be ARARs for the cover alternative at IR Site 10 because the site should already meet clean closure requirements (Cal Code Regs. tit. 22, § 66264.111 and 66264.228 [a]) with the removal of any encountered hazardous waste soil. Because the site would meet clean closure requirements, RCRA postclosure care requirements are not necessary and have not been identified as applicable or relevant and appropriate.

This alternative includes sampling prior to other actions under Cal. Code Regs. tit. 22, § 66262.10(a), 66262.11 and Cal. Code Regs. tit. 22, § 66264.13(a) and (b). In the event that, during prior sampling to determine the extent of the area to be covered or during consolidation efforts, hazardous constituents are encountered at concentrations that exceed hazardous waste characteristic criteria, they would be excavated, and RCRA requirements for temporary storage as described for the excavation alternative (Section B4.2) for off-site disposal would be potentially relevant and appropriate. These soils would be managed as potential hazardous waste for off-site disposal within 90 days at a state-certified TSD facility. The consolidation of nonhazardous soil identified for cover (optional) or regrading conducted for cover installation at IR Site 10 would not constitute placement or disposal under RCRA; therefore, the generator requirements for hazardous waste determinations would not be ARARs for these soils left on-site.

The substantive requirements for management and closure of hazardous waste in waste piles (Cal. Code Regs. tit 22, § 66264.251 and 66264.258 [a] and [b]) would also not be ARARs because hazardous waste, if generated, would be contained and managed as stated above, and the requirements would not be applicable or relevant and appropriate to the management of nonhazardous soils proposed for capping on-site.

Clean Water Act, Section 402

On 16 November 1990, U.S. EPA final regulations implementing Section 402(p) of CWA, setting forth the requirements for the Phase I Stormwater National Pollutant Discharge Elimination System (NPDES) permit requirements, were promulgated (55 Fed. Reg. 47990). U.S. EPA's Phase I Stormwater NPDES regulations require that owners/operators of construction activities obtain permit coverage and be in compliance with discharge standards.

The Phase II Stormwater Rule was promulgated on 08 December 1999. On 10 March 2003, the new Phase II regulations came into effect. The Phase II requirements effectively lowered the size limit on construction activities covered by the requirements from those disturbing 5 acres or more (Phase I) to 1 acre or more (Phase II). U.S. EPA expects states such as California with delegated NPDES Programs to take the lead in issuing permits that implement the regulations.

Despite their rulelike nature, the DON does not accept general NPDES permits directly as ARARs because of the CERCLA permit exclusion. However, the DON does not reject their substantive requirements out of hand because general NPDES permits typically do implement the substantive requirements of federal and state laws and regulations that are accepted as potential ARARs.

The CWA statutory effluent treatment requirements for stormwater discharges from small construction activity were evaluated as potential federal ARARs for removal actions at IR Site 10. These requirements are specified in Section 402(p)(3)(A) of CWA (42 U.S.C. § 1342[p][3][A]) to include a best available technology economically achievable requirement for toxic pollutants and best conventional-pollutant-control-technology requirement for conventional pollutants as well as state water quality standards.

The substantive part of U.S. EPA's CWA/NPDES Stormwater Program is the requirement to develop and implement best management practices (BMPs) to manage stormwater discharges. Although BMPs have been designated by U.S. EPA as a form of "effluent limitation," they are prescribed management practices rather than more traditional "end-of-pipe" numeric effluent limitations. A stormwater plan is a required procedural mechanism for developing BMPs and obtaining regulatory approval of BMPs in the CWA context. The substantive provisions of the general requirements for stormwater plans and BMPs set forth in 40 C.F.R. § 122.44(k)(2) and (4) are potential federal ARARs for construction activities where 1 acre or more of soil will be disturbed.

Substantive requirements at 40 C.F.R. § 122.44(k)(2) and (4) in Section 402 of CWA are considered potentially relevant and appropriate to removal actions proposed for IR Site 10. The potential for stormwater discharge to drainages within 200 feet west of IR Site 10 during grading, cover placement, and optional excavation and waste transport activities would be present under Alternative 1, and the work area for these activities is estimated to exceed 1 acre but be less than 5 acres. The substantive requirements will be addressed by erosion and run-on/runoff control measures specified as BMPs in the remedial action work plan in the remedial design phase.

Clean Air Act

The Clean Air Act (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 1990). Substantive requirements of the Imperial County Air Quality Management District (ICAQMD) rules that have been approved by U.S. EPA as part of the State Implementation Plan (SIP) under 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.

Requirements of CAA that have been incorporated into the SIP and are, therefore, considered to be federal ARARs for this action include substantive requirements of ICAQMD Rule 401 limiting visible air emissions (Table B4-1). Emissions requirements that have not been incorporated into the SIP and are therefore considered potential state requirements include Rules 403 and 800. Fugitive dust could be generated from the impacted soil or proposed cover materials during excavation, backfilling, and/or grading at the site. Dust-suppression measures, such as wetting the soil, would be used during removal actions at IR Site 10 to meet federal and state emissions requirements.

Monitoring

Portions of the RCRA groundwater protection standards contained in Cal. Code Regs. tit. 22 are generally evaluated as potential ARARs for soil where hazardous constituents are present.

Substantive provisions of the following requirements were evaluated for ARAR status:

- monitoring (Cal. Code Regs. tit. 22, § 66264.91[a][1]–[4], and [c])
- chemicals of concern (Cal. Code Regs. tit. 22, § 66264.93)
- concentration limits (Cal. Code Regs. tit. 22, § 66264.94[a][1] and [3], [c], [d], and [e])
- monitoring points and points of compliance (Cal. Code Regs. tit. 22, § 66264.95[a] and [b])
- monitoring parameters (Cal. Code Regs. tit. 22, § 66264.98[e][1]–[5], [i], [j], [k][1]–[3], [4][A] and [D],[5], [7][C]and[D],[n][1],[2][B] and [C])
- statistical method for detecting a release (Cal. Code Regs. tit. 22, § 66264.97[b][1][A], [b][1][D][1] and [2], [b][4]–[7], [e][6], [12][A] and [B], [13], and [15])
- corrective action monitoring (Cal. Code Regs. tit. 22, § 66264.100[d] and [g][1])

Although impacted soil would remain on-site and be capped under this alternative, groundwater monitoring requirements are not considered potential ARARs for the removal action at IR Site 10. Groundwater is not a medium of concern for this EE/CA but is being monitored under a basewide program designed to meet similar groundwater monitoring requirements. Evidence of a release at IR Site 10 has not been identified; the

chemicals in groundwater beneath the site are also reported present in upgradient wells and have been attributed to a known release at IR Site 7. Federal and state clean closure requirements are anticipated to be achieved by the removal action Therefore, postclosure care requirements that include monitoring would not be applicable or relevant and appropriate. The potential for a future release to groundwater is considered unlikely given the shallow depths at which contaminants are reported in soil, the low permeability of the silt- and clay-bearing soil, and the arid climate of the site location.

B4.1.1.2 STATE ARARs

Requirements identified by DTSC, RWQCB, or CIWMB as potential action-specific ARARs for the CERCLA removal actions proposed for IR Site 10 are discussed in the sections below.

Non-RCRA Wastes

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. Although not anticipated, if initial sampling indicates that some of the impacted soil in the stabilization ponds contains non-RCRA California hazardous constituents at concentrations that exceed hazardous waste characteristic criteria, they would be excavated, and state requirements for characterization (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]) would be applicable. These soils would be managed as potential hazardous waste until waste characterization is completed. Any characterized hazardous waste will be submitted for off-site disposal within 90 days at a state-certified TSD facility.

Cal. Code Regs. Tit. 27, Div. 2 Solid Waste Regulations

Under Cal. Code Regs. tit. 27, § 20080(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), to demonstrate that compliance with prescriptive standards is not feasible, the discharger must 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, RWQCB can allow any alternative final cover that it finds that will continue to isolate the waste and irrigation at least as well as would a

final cover built in accordance with applicable prescriptive standards. Cal. Code Regs. tit. 27, § 20080(b) and (c); Cal. Code Regs. tit. 23, § 2510(b) and (c); and Cal. Code Regs. tit. 27, § 21090 are not considered applicable or relevant and appropriate to the cover of risk-identified soil at IR Site 10. IR Site 10 was not a solid waste disposal facility but a treatment facility inactive and no longer receiving waste before the effective date of the requirements. Soil exhibiting characteristics of RCRA or non-RCRA hazardous waste will be removed from the site. Site conditions are already protective of groundwater quality; no release from the site soil has been indicated in modeling, and the development of leachate that may impact groundwater is unlikely. Removal of potentially hazardous soil, if encountered, will further reduce the potential for impact to groundwater

Under Cal. Code Regs. tit. 27, § 20090(d) (fully described in Section B4.2 herein), agency actions are exempt from tits. 27 and 23 if waste is not removed from the immediate area of discharge and not discharged to land. Because discharge to land is not proposed, the removal action is exempt under these requirements.

The consolidation on-site of nonhazardous soil identified by ecological risk assessment for cover or regrading conducted for cover installation would not constitute placement or waste discharged to land (disposal). Therefore, disposal site selection, design, operation, and closure requirements of Cal. Code Regs. tit. 27, §§ 20090, 20210, 20400–20600, and 20870 described in Table B4-2 would not be potential ARARs for the cover alternative.

General closure requirements for waste management units (Cal. Code Regs. tit. 27 § 20950 [a], [d], and [e]) and specific closure requirements for surface impoundments, waste piles, and land treatment facilities (Cal. Code Regs. tit. 27 §§ 21400, 21410, and 21420) are potentially applicable to facilities that received waste after 18 July 1997. IR Site 10 did not receive waste after this implementation date for the regulation, and the option for consolidation of impacted soil identified by ecological risk assessment into one pond under the cover alternative would not constitute discharge of waste to land. Groundwater monitoring to date has not shown evidence of a release to groundwater from IR Site 10, and site conditions are considered to preclude the impacted soil from being a potential threat to water quality. For these reasons the requirements are not considered potential ARARs for IR Site 10. Requirements for clean closure at Cal. Code Regs. tit. 27, § 21400 are not considered ARARs as they are expected to be met by removal of any hazardous waste, if encountered, and by implementation of Alternative 1 to the extent feasible and necessary to protect human health, the environment, and water quality.

Postclosure maintenance standards at Cal. Code Regs. tit. 27, § 20950 (a), (d), and (e) are also not considered potential ARARs. As previously discussed, the climate at NAF El Centro is arid, the soil has low permeability due to clay and silt content, and the depth of the contaminant-impacted zone is shallow (generally less than 2 feet below the pond bottom). Groundwater monitoring to date has not shown that a release of soil chemicals of potential concern to groundwater has occurred (BEI 2003). Groundwater is located several feet below the impacted soil zone and continues to decrease in elevation because less land in the vicinity is irrigated for agricultural purposes. These site

conditions are considered to preclude impacted soil from being a potential future threat to groundwater quality. Covering the impacted soil is not proposed to assure groundwater is protected but does further lessen the potential for impact from soil. Cal. Code Regs. tit. 27, § 20950 states that the period over which postclosure maintenance requirements apply shall extend as long as the wastes pose a threat to water quality.

It can be concluded on the basis of the information reviewed above that postclosure maintenance requirements of Cal. Code Regs. tit. 27, § 20950 (including those for groundwater monitoring in the postclosure period) are not ARARs for IR Site 10. Closure without the need for postclosure maintenance to protect water quality is the definition of "clean closure" under Cal. Code Regs tit 27, § 21090 (f), which states that, if clean closure is successfully completed, a facility closed as a landfill is no longer subject to California State Water Resources Control Board (SWRCB) requirements, including those for postclosure maintenance.

Cal. Code Regs. tit. 27. §§ 20510, 20530, 20540, 20630–20660, 20700, 20720 , 20730, 20760, 20790, 20800, 20820–20830, and 20919 were identified by CIWMB as potential ARARs for IR Site 10 remedial action. These regulations of Cal. Code Regs. tit. 27, div. 2 pertain to operating landfill or solid waste disposal sites. IR Site 10 was a sewage treatment plant, not a landfill or other solid waste disposal facility, and stabilization ponds did not receive waste after the implementation date of the regulations for such facilities. Because the creation of a landfill or other solid waste disposal facility is not proposed under the cover alternative, these operating requirements are considered potential ARARs for IR Site 10.

Monitoring

DTSC and RWQCB, Colorado River Basin Region identified the following requirements for the development of a corrective action monitoring program for IR Site 10 removal actions:

- monitoring program (in accordance with Cal. Code Regs. tit. 27, §§ 20380–20435) for closed, abandoned, or inactive facilities (Cal. Code Regs. tit. 27, § 20080[g])
- general monitoring (Cal. Code Regs. tit. 27, § 20415)
- detection monitoring program (Cal. Code Regs. tit. 27, § 20420)
- corrective action monitoring (Cal. Code Regs tit. 27, § 20430)

The DON has reviewed these provisions and has determined that Cal. Code Regs. tit. 27, §§ 20415–20430 are identical to the corresponding Cal. Code Regs. tit. 22 sections cited earlier as potential federal ARARs, except the generally more stringent sampling requirements at Cal. Code Regs tit. 27, § 20415(e)(12)(B). None of these state requirements are considered potential ARARs for IR Site 10 removal actions for the same reasons discussed for potential federal monitoring requirements. Cal. Code Regs. tit. 27, § 20080(g) states that sites closed, abandoned, or inactive before 27 November 1984 may have to develop and implement a detection monitoring program. Because a threat to groundwater does not exist, this requirement is not a potential ARAR. However, the site

is already in compliance with this requirement through groundwater monitoring currently being conducted under a separate program for IR Sites 2, 7, and 10, not as a part of this EE/CA. The length of continued monitoring for IR Site 10 will depend on the applicability of postclosure-period requirements discussed in this section.

The requirements discussed above for groundwater monitoring were also evaluated for the vadose zone. Identified federal and state regulations sections that specifically address vadose (unsaturated) zone monitoring are at Cal. Code Regs. tit. 22, § 66264.97(d) and Cal. Code Regs. tit. 27, § 20415(d). As discussed for groundwater, the goals of clean closure requirements would be met by the removal action; therefore, monitoring of the vadose zone after implementation of the remedy would not be required. Under present site conditions, the potential for further impact to the vadose zone by mobilized contaminants is not considered likely. Therefore, the requirements for vadose zone monitoring are not considered potential ARARs.

Clean Air Act

Emissions requirements identified by ICAQMD that have not been incorporated into the SIP and that are therefore considered potential state requirements include Rules 403 and 800, which regulate release of dust and particulate matter (Table B4-2). Fugitive dust could be generated from the impacted soil or proposed cover materials during excavation, backfilling, and/or grading at the site. Dust-suppression measures, such as wetting the soil, will be used during removal actions at IR Site 10 to meet federal and state emissions requirements.

Cal. Fish & Game Code

Cal. Fish & Game Code § 5515 requires action to prevent the take of fully protected fish species. Habitat at IR Site 10 does not support fully protected fish species, and the removal action does not propose discharge of materials or waste to waters or environments where these species may be present. However, the protected desert pupfish is known to occur in drainages to the New River (Section B3), and the potential for inadvertent discharge of impacted soil to drainages within 120 feet west of IR Site 10 could exist during excavation and transport of impacted soil for off-site disposal under this alternative. The desert pupfish is both federally and state listed as endangered. This requirement is no more stringent than the federal requirement and is not a potential ARAR.

Cal. Fish & Game Code §§ 5650 (a) and (f) and 5651 prohibit water pollution with any substance or material harmful to fish, plant, or bird life. The requirements of these sections are therefore considered potentially relevant and appropriate.

Measures to address erosion and run-on/runoff from IR Site 10 and thereby minimize the potential for impacted soil migration and discharge to local drainages will be identified during the remedial design phase and described in the remedial action work plan.

B4.1.2 Institutional Controls

NAF El Centro is an active military installation, and there are no plans to close the base. The risk assessment analyses in Section 2 of the main report indicate that an ecological risk-based removal action under Alternative 1 would allow for unlimited access and unrestricted use of the surface of the site. However, institutional controls would be necessary to assure the cover is maintained to assure land use does not jeopardize the welfare of known and potential ecological receptors. The institutional controls required under Alternative 1 would be effectively met by the land-use restrictions and access provisions administered through the NAF El Centro Master Plan and use of the site allowed through the adjacent and currently operating sewage treatment plant.

B4.1.2.1 FEDERAL

No federal regulations exist regarding institutional controls for actions taken on active military facilities; however, Cal/EPA, U.S. EPA, and the DON have developed guidance pertaining to institutional controls at active military bases that will be used as TBC guidance in implementing the controls required for a remedial alternative.

The California Military Environmental Coordination Committee has developed the Institutional Control Protocol at Open Bases for application at active military installations. This protocol is a consensus document that is intended to aid federal and state remedial project managers when institutional controls are incorporated into CERCLA response actions. The committee is made up of Cal/EPA, U.S. EPA, and the DON. The DON has agreed that the institutional control protocol for active bases should be followed for sites that require institutional controls as part of their CERCLA response action. Therefore, the Institutional Control Protocol at Open Bases may be guidance for sites that require institutional controls.

The Institutional Control Protocol at Open Bases states that the base master plan is typically the best place to record the institutional controls to assure their implementation by the DoD installation. The plan establishes land uses for the DoD installation and requirements similar to zoning. The base master plan or its equivalent is used by the installation for evaluating land-use decisions and for project planning. Depending on the installation project planning and project approval process, other documents, or more than one document, may be required to include the institutional controls in order to assure adherence to the institutional controls. At NAF El Centro, the Master Plan (Gillespie Delorenzo 1988) is the current applicable planning document. As a part of Alternative 1, institutional controls required for IR Site 10 would be included for implementation in a revision of the Master Plan.

B4.1.2.2 STATE

No requirements for institutional controls have been identified by the state as potential action-specific ARARs for CERCLA removal actions taken on open bases.

B4.1.2.3 CONCLUSIONS

The major components of Alternative 1 that trigger potential federal and state action-specific ARARs are covering soil in the stabilization ponds, land-use restrictions, and the potential for excavation as an option to remove hazardous waste if it is encountered in initial sampling. Once hazardous waste has been removed from the site, covering impacted soil that remains to the extent determined by the risk assessment, would meet the requirements for clean closure according to Cal. Code Regs. tits. 22 and 27. Although land-use restriction, drainage control, periodic inspections, and cover maintenance would be implemented as a part of the remedy, regulations regarding these elements would not be ARARs. After the site is covered, site conditions would be protective of human health, the environment, and water quality, as the pathway for exposure would be eliminated; the climate, shallow depth of impacted soil, and fine-grained nature of the soil assure that the impacted soil would not pose a threat to groundwater quality.

Alternative 2 could be designed and implemented to comply with all potential action-specific requirements identified above as potential ARARs.

B4.2 ALTERNATIVE 2 – EXCAVATION WITH OFF-SITE DISPOSAL

Alternative 2 includes excavation, optional backfilling and grading, and transportation for off-site disposal of impacted soil from the areas of the stabilization ponds identified by previous sampling. The top 1 to 2 feet of soil will be excavated from the bottom of the ponds. By removal of this soil associated with an unacceptable level of potential ecological health risk, residual site risk will be well within the risk management range for potential human receptors as well. Backfill of the excavated area, if selected, will employ either existing berm soil determined through testing to be nonhazardous and ecologically suitable for reuse or imported clean soil after the removal is complete. Institutional controls are not proposed as a part of Alternative 2 because the potential for exposure will have been eliminated.

B4.2.1 Excavation

ARARs for excavation are typically state-promulgated regulations pertaining to generated waste characterization, fugitive dust emissions, temporary storage of wastes for treatment or disposal, and/or protection of species and habitat during remedial construction activities. Section B3 addresses potential location-specific ARARs regarding protection of species and habitat; regulations regarding potential action-specific ARARs are discussed in Section B4. Tables B4-1 and B4-2 list the regulations for potential action-specific ARARs evaluated for activities proposed as a part of the excavation alternative.

B4.2.1.1 FEDERAL ARARs

Federal requirements that are potential ARARs for excavation as part of a removal action are described in the following sections.

Resource Conservation and Recovery Act Requirements

The impacted soil at IR Site 10 would not constitute a waste until it is excavated. RCRA requirements for characterization of waste would apply to all soil excavated under the alternative. Further sampling prior to excavation will determine the actual extent of soil to be removed to minimize the risk to potential ecological receptors. If some of the impacted soil sampled in the stabilization ponds or berms is shown to contain RCRA constituents at concentrations that exceed hazardous waste characteristic criteria, it would be removed and managed separately from risk-identified soil for off-site disposal. RCRA requirements for characterization (Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11) and temporary storage (Cal. Code Regs. tit. 22, §§ 66262.34, 66264.171–66264.174, and 66264.178) before off-site disposal would be relevant and appropriate. These soils would be managed as potential hazardous waste for off-site disposal within 90 days.

The proposed activities under Alternative 2 would not include treatment, storage, or disposal as defined by RCRA. U.S. EPA has determined that disposal occurs when waste is placed in a land-based unit. However, movement within a unit does not constitute disposal or placement. Also, at CERCLA sites, an area of contamination can be considered comparable to a unit. Therefore, movement within the site boundary does not constitute placement, and RCRA waste generation and LDRs would not be triggered. The substantive requirements of Cal. Code Regs. tit. 22, § 66264.258 and others (not listed) pertaining to the storage of hazardous waste and storage in waste piles are not considered potential ARARs for temporary storage of these wastes because waste piles do not exist on-site and none are planned as a part of the remedial actions proposed.

Substantive requirements of Title 49 *Code of Federal Regulations* (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) are not considered potential ARARs for transport of materials on-site. Under CERCLA, ARARs are evaluated for proposed on-site activities only, and on-site transport of hazardous materials, as defined, is not part of the proposed removal action for IR Site 10.

Clean Water Act, Section 402

Substantive requirements for control of stormwater discharges in Section 402 of the CWA are considered potentially applicable as action-specific ARARs for the proposed IR Site 10 removal actions. The substantive part of U.S. EPA's CWA/NPDES stormwater program is the requirement to develop and implement BMPs to manage stormwater discharges. Although BMPs have been designated by U.S. EPA as a form of "effluent limitation," they are prescribed management practices rather than more traditional "end-of-pipe" numeric effluent limitations. A stormwater plan is a required procedural mechanism for developing BMPs and obtaining regulatory approval of BMPs in the CWA context. The substantive provisions of the general requirements for stormwater plans and BMPs set forth in 40 C.F.R. § 122.44(k)(2) and (4) are potential federal ARARs for construction activities where 1 acre or more of soil will be disturbed.

The soil disturbance for the removal alternatives at IR Site 10 is estimated to exceed 1 acre but less than 5 acres. The substantive requirements will be addressed by erosion and run-on/runoff control measures specified as BMPs for the remedial action work plan in the remedial design phase.

Clean Air Act

Requirements of CAA that have been incorporated into the SIP and are therefore considered to be federal ARARs for this action include substantive requirements of ICAQMD Rule 401 limiting visible air emissions (Table B4-1 herein). Fugitive dust could be generated from the impacted soil or proposed cover materials during excavation, backfilling, and/or grading at the site. Dust-suppression measures, such as wetting the soil, would be used during removal actions at IR Site 10 to meet federal emissions requirements.

B4.2.1.2 STATE ARARs

Requirements identified by state and county agencies for non-RCRA state-regulated hazardous wastes and ICAPCD rules are described below.

Requirements for waste piles cited at Cal. Code Regs. tit. 27, § 20365 are not considered potential ARARs for management of excavated wastes at IR Site 10 as both hazardous waste soil and risk-identified nonhazardous waste soil will be temporarily stored in containers for off-site transport and disposal. If management of nonhazardous waste soil in this manner proves to be a technical limitation to implementability of the removal action, management of these wastes in temporary waste piles may be proposed. At that time, federal and state requirements for waste piles at 40 C.F.R. § 264.554 and Cal. Code Regs. tit. 27, § 20365 may be evaluated further as potential ARARs. Under Cal. Code Regs. tit. 27, § 20090(d), actions taken by or at the direction of public agencies to clean or abate conditions of pollution or nuisance resulting from unintentional or unauthorized releases of waste or pollutants to the environment are exempt from the tit. 27 requirements listed above, provided that wastes, pollutants, or contaminated materials removed from the immediate place of release are discharged according to the SWRCB-promulgated sections of article 2, subchapter 2, ch. 3, subdivision 1 of tit. 27 requirements and further provided that remedial actions intended to contain such wastes at the place of release shall implement applicable SWRCB-promulgated provisions of tit. 27 requirements to the extent feasible. If excavated soil is temporarily staged within the immediate place of release, the response action is exempt from the Cal. Code Regs. tit. 27 requirements. Removal of waste from the immediate place of release is not proposed other than for off-site disposal.

Because there is no threat to water quality, the disposal site selection, design, operation, and closure requirements of Cal. Code Regs. tit. 27, §§ 20090, 20210, 20240–20260, and 20870 described in Table B4-2 would not be potential ARARs for the excavation alternative.

General closure and postclosure maintenance requirements for waste management units (Cal. Code Regs. tit. 27, § 20950 [a], [d], and [e]) and specific closure requirements for

surface impoundments, waste piles, and land treatment facilities (Cal. Code Regs. tit. 27, §§ 21400, 21410, and 21420) are not considered potential ARARs for the excavation alternative because clean closure at Cal. Code Regs. tit. 27, § 21400 is expected.

Current site conditions are considered to already preclude soil from posing a potential threat to water quality. Groundwater monitoring to date has not shown evidence of a release; therefore, the potential for future release from the residual soil is not considered to exist. After removal, residual soil would have much less potential to be a source of contaminants that could leach to groundwater. Cal. Code Regs. tit 27, § 21090(f) provides that, if clean closure is successfully completed, the facility is no longer subject to SWRCB-promulgated requirements (i.e., tit. 27 requirements) for closure as a landfill, including those for postclosure maintenance. Cal. Code Regs. tit. 27, § 20950(a) states that the period over which postclosure requirements apply shall extend as long as the wastes pose a threat to water quality. In the absence of a threat to water quality from site soil, postclosure requirements for the site, including those for erosion and drainage control and groundwater monitoring, would not be ARARs.

Clean Air Act

Emissions requirements of CAA that have not been incorporated into the SIP and are therefore considered potential state requirements include Rules 403 and 800, which regulate release of dust and particulate matter (Table B4-2). The requirements of the rules would be potential ARARs for generation of fugitive dust under Alternative 2. Fugitive dust could be generated from the impacted soil during excavation and optional backfilling and grading. Dust-suppression measures, such as wetting the soil, would be used during removal actions at IR Site 10 to meet state emissions requirements.

B4.2.1.3 Conclusions

The major components of Alternative 2 that trigger potential federal and state action-specific ARARs are excavating impacted soil, the potential for hazardous waste to be generated, optional backfilling and grading, and management of waste for off-site disposal. If encountered, the removal and disposal off-site of potential RCRA and non-RCRA hazardous soil would achieve requirements for clean closure according to Cal. Code Regs. tits. 22 and 27. After removal of impacted soil identified by ecological risk assessment, site conditions would be protective of human health and the environment. Site conditions are considered already protective of water quality; the arid climate, low permeability, and shallow depth of impacted soil and no monitoring evidence of release to groundwater to date assure that the impacted soil would not pose a threat to groundwater quality. Although fugitive dust, erosion, and run-on/runoff control would be required during activities that disturbed the soil to meet CAA and CWA requirements, land-use restrictions, periodic inspections, and postclosure maintenance requirements would not be ARARs for the alternative.

Alternative 2 could be designed and implemented to comply with all potential action-specific requirements identified above as potential ARARs.

Table B4-1
Potential Federal Action-Specific ARARs

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
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	1, 2			Previous analytical results suggest some soil could be hazardous waste if it is excavated under Alternative 2. Soil characterization sampling is planned as a part of each alternative. Final determination of waste characteristics will be made when it is generated. This is not an ARAR for Alternative 1 if hazardous waste is not encountered during sampling because excavation is not proposed.
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	Cal. Code Regs. tit. 22, § 66264.13(a) and (b)	1, 2			Soil characterization sampling is planned as a part of each alternative. Final determination of waste soil characteristics will be made at the time waste is generated. Waste is not anticipated to be generated during Alternative 1; therefore, this is not an ARAR unless hazardous waste soil is encountered and excavated.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers in accordance with § 66264.171–178 or in tanks, on drip pads, inside buildings, is labeled and dated, etc.	Hazardous waste accumulation.	Cal. Code Regs. tit. 22, § 66262.34	1, 2			Applicable to Alternative 1 and 2 where potentially hazardous waste, if generated, would be excavated, temporarily stored, and transported for off-site disposal. Waste is not anticipated to be generated during Alternative 1. The final determination of whether wastes generated during removal action activities (contaminated excavated soil) are hazardous will be made at the time the wastes are generated.
Clean 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)		1, 2		Not applicable because IR Site 10 was not and is not a permitted or hazardous waste management facility and did not receive waste after the effective date of the requirements. However, this is potentially relevant and appropriate to the removal actions if hazardous waste is identified during sampling. The removal action includes removal of any identified hazardous waste that would meet these requirements.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
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		1, 2		Not applicable because IR Site 10 was not and is not a permitted or hazardous waste management facility and did not receive waste after the effective date of the requirements. However, potentially relevant and appropriate to the removal actions if hazardous waste is identified during sampling. The removal action includes removal of any identified hazardous waste that would meet these requirements.
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 before treatment, disposal, or storage elsewhere, in a container.	Cal. Code Regs. tit. 22, § 66264.171, .172, .173	1, 2			Potentially applicable to temporary storage of generated waste that testing indicates is potentially hazardous. Not an ARAR for nonhazardous waste. Soils where sampling indicated the potential for hazardous contaminants will be segregated and handled as hazardous until sampling verification or disposal off-site.
	Inspect container storage areas weekly for deterioration.		Cal. Code Regs. tit. 22, § 66264.174	1, 2			Potentially applicable to temporary storage of generated waste that testing indicates is potentially hazardous. Not an ARAR for nonhazardous waste. Soils where sampling indicated the potential for hazardous contaminants will be segregated and handled as hazardous until sampling verification or disposal off-site.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Container storage (continued)	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 before treatment, disposal, or storage elsewhere.	Cal. Code Regs. tit. 22, § 66264.175(a) and (b)	Not an ARAR			Liquid hazardous waste is not anticipated to be generated.
	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line.	Storage of ignitable or reactive waste.	Cal. Code Regs. tit. 22, § 66264.176	Not an ARAR			Potentially characteristic ignitable or reactive soil has not been identified at the site and will not be generated as waste.
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.	Storage of incompatible materials.	Cal. Code Regs. tit. 22, § 66264.177	Not an ARAR			Potentially incompatible materials in soil have not been identified at the site and will not be generated as waste.
	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.	Storage in a container of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere.	Cal. Code Regs. tit. 22, § 66264.178	1,2			Potentially applicable to generated waste that testing indicates is potentially hazardous. This is not an ARAR for nonhazardous waste. Soils where sampling indicated the potential for hazardous contaminants will be segregated and handled as hazardous until sampling verification or disposal off-site.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Excavation	Permitted surface impoundments from which materials are excavated may require cleanup to levels established by closure requirements.	RCRA hazardous waste placed at site after the effective date of the requirements.	Cal. Code Regs. tit. 22, § 66264.228, except referenced procedural requirements	Not an ARAR			IR Site 10 was not a RCRA-permitted surface impoundment known to have received hazardous waste or other waste after the effective date of the requirement. If hazardous waste is encountered, it will be removed prior to further action to remove or cover residual soil to achieve protection of human health and the environment.
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.	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)(1)	1,2			Not applicable because IR Site 10 was not and is not a permitted or hazardous waste management facility and did not receive waste after the effective date of the requirements. However, this is potentially relevant and appropriate to the removal actions if hazardous waste is identified during sampling. The removal action includes removal of any identified hazardous waste that would meet these requirements.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Capping	Specific technical requirements for capping when hazardous waste will be left in place.	RCRA-regulated landfills, tank sites, surface impoundments, and other hazardous waste land treatment, storage, or disposal facilities subject to closure requirements for landfills.	Cal. Code Regs. tit. 22, § 66264.228(e)-(r)	Not an ARAR			Not applicable to capping to achieve risk-based remedial action objectives proposed under Alternative 1 after hazardous soils encountered, if any, have been removed from the site.
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])	Not an ARAR			Wastes are not planned to be managed as waste piles as part of the proposed actions.
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)	Not an ARAR			Wastes are not planned to be managed as waste piles as part of the proposed actions.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Shipment of waste to an off-site landfill	Hazardous waste generator notification and certification requirements.	RCRA hazardous waste generator, and hazardous waste subject to LDR.	Cal. Code Regs. tit. 22, § 66268.7	Not an ARAR			Procedural, not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation." However, the requirement will be met in documentation of wastes generated during removal actions.
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 placed in another unit.	Cal. Code Regs. tit. 22, § 66268.40	Not an ARAR			Off-site actions are not addressed by ARARs. Off-site actions will comply with all applicable regulations.
Treatment of hazardous excavated soil	Establishes requirements for the owners/operators of facilities that treat hazardous waste by chemical, physical, or biological methods in other than tanks, surface impoundments, and land treatment facilities.	Hazardous waste treatment facilities other than tanks, surface impoundments, and land treatment facilities.	Cal. Code Regs. tit. 22, § 66264.600–66264.603	Not an ARAR			No treatment is proposed.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Monitoring	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 in which constituents in or derived from waste may pose a threat to human health or the environment.	Cal. Code Regs. tit. 22, § 66264.91(a)(1), (2), (3), (4), (b), and (c) (except as it cross-references permit requirements)	Not an ARAR			IR Site 10 was not and is not a RCRA-regulated unit and did not receive waste after the effective date of the requirements. If encountered, potentially hazardous soils would be excavated and removed from the site, and clean closure would be met. Therefore, monitoring is not an ARAR for this removal action for soil. Groundwater quality is being monitored under a separate program for IR Sites 2, 7, and 10, not as a part of this EE/CA. Requirement is essentially the same as state requirements at Cal. Code Regs. tit. 27, § 20385.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Groundwater monitoring	Groundwater protection standards: Owners/operators of RCRA TSD facilities must comply with conditions in this section that are designed to assure that hazardous constituents entering the groundwater from a regulated unit do not exceed in the uppermost aquifer underlying the waste management area beyond the POC the concentration limits for the COCs set forth under § 66264.94.	Discharges to the uppermost aquifer beyond the POC underlying a regulated waste management unit at a TSD facility.	Cal. Code Regs. tit. 22, §§ 66264.94(a)(1) and (3), (c), (d), and (e) and 66265.94(a)	Not an ARAR			Discharges to groundwater are not proposed or anticipated at IR Site 10. Given the physical conditions of NAF El Centro and IR Site 10, impacted surface soil is not considered to have the potential to migrate to the vadose zone and potentially impact groundwater. A complete pathway for chemicals in soil to impact groundwater is not present. If encountered, potentially hazardous soil will be excavated and removed from the site.
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	Not an ARAR			IR Site 10 was not and is not a RCRA-regulated hazardous waste facility. A complete pathway for chemicals in soil to impact groundwater is not present. Groundwater is not a medium of concern for this EE/CA. Groundwater quality beneath IR Site 10 is being addressed under a separate program for IR Sites 2, 7, and 10, not a part of this EE/CA.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 -- cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
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	Not an ARAR			IR Site 10 was not and is not a RCRA-regulated hazardous waste facility. If encountered, hazardous waste will not be left in place in soil, and it is not present in groundwater. Groundwater quality beneath IR Site 10 is being addressed under a separate program for IR Sites 2, 7, and 10, not a part of this EE/CA. Essentially the same as state requirements at Cal. Code Regs. tit. 27, § 20415.
	Requirements for a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.98(b), (c), (f), (g), and (i)	Not an ARAR			IR Site 10 was not and is not a RCRA-regulated hazardous waste facility. If encountered, hazardous waste will not be left in place in soil. A monitoring response action for groundwater is not proposed in this EE/CA. Groundwater quality beneath IR Site 10 is being addressed under a separate program for IR Sites 2, 7, and 10. Essentially the same as state requirements at Cal. Code Regs. tit. 23, § 2550.8 and tit. 27, § 20420.
	The owner or operator shall take corrective action to remediate releases from the regulated unit and to assure that the regulated unit achieves compliance with the water quality protection standard.	Hazardous waste, treatment, storage, or disposal facilities.	Cal. Code Regs. tit. 22, § 66264.100(b)	Not an ARAR			IR Site 10 was not and is not a RCRA-regulated hazardous waste facility that received wastes after the effective date of the requirements. Groundwater monitoring has not shown a release from IR Site 10 has occurred; chemicals reported are also in upgradient wells.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Clean Water Act, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)*							
Discharge to surface waters	Owners and operators of construction activities must be in compliance with discharge standards as part of a stormwater pollution-prevention plan. General requirements for stormwater plans and BMPs. All direct dischargers must meet technology-based requirements, including the best control technology and the best available technology economically achievable.	Construction projects of 1 acre or more.	CWA Section 402 (33 U.S.C. ch. 26, § 1342); Section 301(b) (33 U.S.C. ch. 26, § 1311) 40 C.F.R. § 122.44(k)(2) and (4)	1,2			Removal actions proposed do not include direct discharge but have the potential for inadvertent discharge of impacted soil to surface water through erosion and runoff. Measures will be taken during the removal action to minimize the potential for said discharge to the local drainage system and, ultimately, to surface waters of the New River or Elder Canal. These measures will be specified as BMPs for the removal action during the remedial design phase.
Toxic Substances Control Act (15 U.S.C. §§ 2601–2692)*							
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		PCBs in soil at IR Site 10 do not exceed 50 ppm. The highest PCB concentration reported in the ESI report (BEI 2004) was less than 1 ppm.
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 761.125(a)(1) and (b)(3) and record-keeping requirements in 761.125(c) such as 125(c)(1)(iii) and (c)(5), 761.130, and 761.135)		Not an ARAR		PCBs in soil at IR Site 10 do not exceed 50 ppm. The highest PCB concentration reported in the ESI report (BEI 2004) was less than 1 ppm.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	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 and portions of 40 C.F.R. § 52.220	Not an ARAR			Potentially applicable to emissions of fugitive dust during IR Site 10 removal actions. Fugitive dust may be generated during excavation, backfilling, grading, and/or cover placement. Specific pertinent rules are listed below.
	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).	Sources of air pollutants.	ICAPCD Rule 401	1,2			Substantive requirements for visible emissions are potentially applicable to IR Site 10 removal actions that may generate fugitive dust during excavation, backfilling, grading and/or cover placement. Control measures, such as preliminary soil wetting, will be used to minimize the potential for fugitive dust generation during the removal actions.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
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 and transport under contract with any department of the executive branch of the federal government.	49 C.F.R. § 171.2(f)	Not an ARAR			If generated, hazardous wastes will be managed separately for off-site transport and disposal at a state-certified TSD facility, not as part of a commercial enterprise. Nonhazardous wastes will be labeled appropriately after characterization and managed for disposal separately from hazardous wastes.
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	Not an ARAR			If generated, hazardous wastes will be managed separately for off-site transport and disposal at a state-certified TSD facility, not as part of a commercial enterprise. Nonhazardous wastes will be labeled appropriately after characterization and managed for disposal separately from hazardous wastes.

(table continues)

Table B4-1 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	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			Removal actions proposed do not involve solid waste disposal facilities. Substantive provisions of this regulation that may apply to excavated soil if used on-site as fill are not ARARs as only soil proposed for removal and off-site disposal will be excavated.

(table continues)

Table B4-1 (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
ARAR – applicable or relevant and appropriate requirement
BMP – best management practices
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
ch. – chapter
COC – chemical of concern
CWA – Clean Water Act
DON – Department of the Navy
EE/CA – engineering evaluation/cost analysis
ESI – extended site inspection
ICAPCD – Imperial County Air Pollution Control District
IR – Installation Restoration (Program)
LDR – land-disposal restriction
NAF – Naval Air Facility
NPDES – National Pollutant Discharge Elimination System
PCB – polychlorinated biphenyl
PM_{10} – particulate matter, less than 10 micrometers in diameter
POC – point of compliance
ppm – parts per million
RA – relevant and appropriate
RCRA – Resource Conservation and Recovery Act
§ – section
SIP – state implementation plan
TBC – to be considered
tit. – title
TSD – treatment, storage, and disposal
U.S.C. – *United States Code*
U.S. EPA – United States Environmental Protection Agency

Table B4-2
Potential State Action-Specific ARARs

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
State Water Resources Control Board and Regional Water Quality Control Board*							
Actions affecting water quality	Establishes policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste that 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			Discharges to groundwater are not proposed or anticipated at IR Site 10. Given the physical conditions of NAF El Centro and IR Site 10, impacted surface soil is not considered to have the potential to migrate to the vadose zone and potentially impact groundwater. No more stringent than Cal. Code Regs. tit. 22, § 66264.94, also determined not to be a potential ARAR for removal actions at IR Site 10.
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, § 25249.5–25249.13	Not an ARAR			Discharges to groundwater are not proposed or anticipated at IR Site 10. Given the physical conditions of NAF El Centro and IR Site 10, impacted surface soil is not considered to have the potential to migrate to the vadose zone and potentially impact groundwater.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
State Water Resources Control Board and California Integrated Waste Management Board*							
Landfill capping	Provides for alternatives to construction or prescriptive standards and requires maintenance as long as wastes pose a threat to water quality.	Applicable only for waste discharged after 18 July 1997 unless otherwise noted.	Cal. Code Regs. tit. 27, §§ 20080 (b) and (c) and 21090	Not an ARAR			Not applicable because the treatment facility was inactive prior to the effective date of the requirement. Requirement not relevant and appropriate in that site conditions are already protective of groundwater quality. Removal of potentially hazardous soil, if encountered, will further reduce the potential for impact to groundwater.
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)	Not an ARAR			Requirement not a potential ARAR because site conditions are already protective of groundwater quality. Removal of potentially hazardous soil, if encountered, will further reduce the potential for impact to groundwater. Groundwater monitoring currently performed under a separate program, not a part of this EE/CA, for groundwater at IR Sites 2, 7, and 10 meet these requirements.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Disposal of waste	Action taken by public agencies to clean up unauthorized releases are exempt from Title 27 and Title 23 except that wastes removed from the immediate place of release and discharged to land must be managed in accordance with classification (Cal. Code Regs. tit. 27 § 20200 and Cal. Code Regs. tit. 23 § 2520) and siting requirements of Title 27 or Title 23 and wastes contained or left in place must comply with Title 27 or Title 23 to the extent feasible.	Waste discharged to land.	Cal. Code Regs. tit. 27, § 20090(d)	Not an ARAR			Removal actions proposed for IR Site 10 do not include the on-site discharge of generated waste to land.
	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	Not an ARAR			Designated waste is not anticipated to be generated in the proposed removal actions; however, if generated, would not be treated, stored, or disposed on-site. Waste characterization will be conducted on excavated soil and other waste upon generation. If designated waste is identified, the requirement may be an ARAR, and the waste will be proposed for off-site disposal accordingly.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Disposal of waste (continued)	Requirements associated with Cal. Code Regs. tit. 27, § 20210, for regulation of siting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment, storage, or disposal, including landfills, surface impoundments, waste piles, and land treatment facilities. Wastes regulated include hazardous, designated, nonhazardous, and inert waste.	Discharges of designated waste after 18 July 1997 (nonhazardous waste that could cause degradation of surface or groundwaters) to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, §§ 20240–20260, and 20870	Not an ARAR			Discharges of generated waste to land and/or creation of landfills, surface impoundments, waste piles, and land treatment facilities is not proposed as a part of removal action for IR Site 10. Hazardous and designated waste is not anticipated to be generated as a part of the proposed removal actions. However, if generated, the wastes would be proposed for off-site disposal at an appropriate TSD facility.
Waste piles	Class I and Class II waste piles shall be covered as necessary to prevent percolation of precipitation through the waste.	Waste pile used to store hazardous or designated waste.	Cal. Code Regs. tit. 27, § 20365	Not an ARAR			Excavated soil identified as potentially hazardous or designated waste will not be managed in waste piles. Federal requirements for temporary storage of waste have been identified as potential ARARs and are similar.
Disposal of waste	General soil, surface water, and groundwater monitoring requirements.	Waste discharged to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20415	Not an ARAR			IR Site 10 did not receive wastes after the effective date of the requirement, and discharge of waste to land is not proposed as part of the removal actions. Groundwater monitoring is being conducted at IR Site 10 as part of a separate study outside this EE/CA. Essentially the same as Cal. Code Regs. tit. 23, § 2550.7, not identified as an ARAR.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Disposal of waste (continued)	Assessment of the nature and the extent of the release, including a determination of the spatial distribution and concentration of each constituent.	Unauthorized release to land.	Cal. Code Regs. tit. 27, § 20425	Not an ARAR			An unauthorized release to land has not been identified at IR Site 10; site conditions are the result of planned use of the site as a sewage treatment facility. Groundwater beneath IR Site 10 has not been identified for corrective action. Groundwater monitoring to date has not shown that there has been a release from IR Site 10. Essentially the same as Cal. Code Regs. tit. 23, § 2550.9, not identified as an ARAR.
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	Not an ARAR			Requirement is not a potential ARAR because groundwater monitoring at IR Site 10 has not shown a release has occurred and site conditions are already protective of groundwater quality. Removal of potentially hazardous soil, if encountered, will further reduce the potential for impact to groundwater. The groundwater monitoring is being addressed separately, along with groundwater of IR Sites 2 and 7. Site conditions preclude IR Site 10 soil from posing a potential future threat to groundwater. Essentially the same as Cal. Code Regs. tit. 22, § 66264.100 and Cal. Code Regs. tit. 23, § 2550.10, not identified as potential ARARs.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Site operation	Requirements for record keeping, site security, roads, unloading, spreading and compacting, grading or fill, stockpiling, intermediated cover, nonsalvageable items, volume reduction and energy recovery, leachate control, dust control, drainage and erosion control, litter control, and gas control.	Operating landfill or solid waste disposal site.	Cal. Code Regs. tit. 27, §§ 20510, 20530, 20540, 20630–20660, 20700, 20720 , 20730, 20760, 20790, 20800, 20820–20830, and 20919 (div.2, subdiv. 1, ch. 3, subch. 4 art. 1–4 and art. 6)	Not an ARAR			Substantive portions of the requirements are potentially applicable to operation of a landfill or solid waste disposal site. IR Site 10 is not a solid waste disposal site, and the creation of such a facility is not planned as a part of removal actions.
Closure of a waste management unit	General closure and postclosure maintenance standards. Include requirement that the period over which postclosure requirements apply shall extend as long as the wastes pose a threat to water quality.	Waste discharged to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20950(a), (d), and (e)	Not an ARAR			IR Site 10 did not receive wastes after the effective date of the requirement, and discharge of waste to land is not proposed as part of the removal actions. The impacted surface soil does not pose a potential threat to groundwater under current site conditions. Therefore, requirements for clean closure would be met with the removal of hazardous waste, if any, and removal or cover of impacted soil to the extent necessary to protect human health and the environment.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Closure of a waste management unit (continued)	Closure requirements for surface impoundments, waste piles, and land treatment facilities.	Waste discharged to land after 18 July 1997.	Cal. Code Regs. tit. 27, §§ 21400, 21410, and 21420	Not an ARAR			IR Site 10 did not receive wastes after the effective date of the requirement, and discharge of waste to land is not proposed as part of the removal actions. The impacted surface soil does not pose a potential threat to groundwater under current site conditions. The removal actions proposed will further minimize the potential for impact on groundwater quality.
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)	Not an ARAR			Removal actions proposed include the removal and off-site disposal of RCRA and non-RCRA hazardous waste, if present, and removal or cover of residual soil to risk-based criteria, effectively achieving clean closure per RCRA requirements. Site conditions are considered to preclude impacted soil from being a potential threat to groundwater quality. Risk assessment and ongoing groundwater monitoring results support this determination (BEI 2003). No further action would be required in postclosure to assure groundwater quality is protected.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Closure with postclosure maintenance	Requirements for emergency response, site security, structure removal, final cover and grading, slope stability, drainage and erosion control, landfill gas control, and leachate contact.	Closure and postclosure maintenance of solid waste disposal sites and landfills.	Cal. Code Regs. tit. 27, §§ 21130, 21135, 21137, 21140, 21142, 21145, 21150, 21160, 21180, and 21190 (ch.3, subch. 5, art. 2)	Not an ARAR			IR Site 10 was not a solid waste disposal site or landfill, and their creation is not proposed as a part of removal actions. IR Site 10 did not receive wastes after the effective date of the requirement. Although final cover, grading, drainage and erosion control are proposed under Alternative 2, these requirements are not potentially relevant and appropriate because impacted soil is not considered to be a potential threat to groundwater under current site conditions. Removal of potential hazardous waste and removal or cover of soil to risk-based criteria will further minimize the potential threat to quality.
Closure and postclosure	Content requirements for closure plan, postclosure maintenance plan, and closure certification for solid waste disposal sites.	Final closure of solid waste disposal sights.	Cal. Code Regs. tit. 27, §§ 21800–21880 (ch.4, subch. 4)	Not an ARAR			Procedural, not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation." IR Site 10 was not a solid waste disposal site or landfill, and the creation of such a facility is not proposed as a part of removal actions.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	RA	TBC	Comments
Gas monitoring	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 gas 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.	Active or closed solid waste disposal site.	Cal. Code Regs. tit. 27, §§ 20921–20937	Not an ARAR			IR Site 10 was not a solid waste disposal site or landfill, and the creation of such a facility is not proposed as a part of removal actions. IR Site 10 did not receive wastes after the effective date of the requirement. Methane and trace gases have not been identified as COPCs for site soil and are not expected on the basis of history of site and the current condition of the waste.
Cal/EPA Department of Toxic Substances Control*							
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			Substantive requirements are potentially applicable to disposal of non-RCRA hazardous waste if more stringent than federal ARARs. However, on-site disposal is not planned; disposal of soil at a state-certified off-site TSD facility will be subject to the facilities disposal requirements.
California Health and Safety Code*							
Remedial action plan	Except as provided in subdivision (h), the department, or, if appropriate, the regional board shall prepare or approve remedial action plans for all sites listed pursuant to Section 25356.	Removal action is planned.	Cal. Health & Safety Code § 25356.1(b)	Not an ARAR			Procedural, not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation" for the IR Site 10 removal action conducted under CERCLA.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Remedial action plan (continued)	A remedial action plan is not required if the conditions present at the site present an imminent or substantial endangerment to the public health and safety or to the environment, or if the estimated cost of the removal action is less than $1 million.	Removal action is planned.	Cal. Health & Safety Code § 25356.1(h)(1)	Not an ARAR			Procedural, not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation" for the IR Site 10 removal action conducted under CERCLA. However, the requirement will be met by removal actions taken pursuant to the findings of the EE/CA.
	"Removal action work plan" means a work plan prepared or approved by the state that is developed to carry out a removal action in an effective manner, protective of the public health and safety and the environment. The removal action work plan shall include a detailed engineering plan for the removal action, a description of on-site contamination, the goals to be accomplished by the removal action, and any alternative removal options that were considered and rejected and the basis for that rejection.	Removal action is planned.	Cal. Health & Safety Code § 25323.1	Not an ARAR			Procedural, not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation" for the IR Site 10 removal action conducted under CERCLA. However, the requirement will be met by the content of this EE/CA report and RAW or AM developed for IR Site 10.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
California Fish and Game Code*							
Fully protected fish	Actions must be taken to prevent the take or possession of any fully protected fish species.	Fully protected fish.	Cal. Fish & Game Code § 5515	Not an ARAR			Not more stringent in potential application for IR Site 10 than the federal Endangered Species Act already acknowledged as a potential ARAR. Habitat at IR Site 10 does not support fully protected fish species, and removal actions do not propose discharge. The desert pupfish, the only fully protected fish species reported to occur in local drainages, is also a recognized federal endangered or threatened species.
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) and (f) and 5651		1,2		Discharge to water is not proposed as a part of response actions; however, inadvertent discharge of impacted soil to the tributary system of the New River may occur during removal activities. Measures will be taken to minimize erosion and runoff to local drainages during removal or cover activities as specified in the remedial action plan.
	Action must be taken to assure 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.	Wetlands of the state.	Fish & Game Commission Wetlands Policy (adopted 1987, in Cal. Fish & Game Code Addenda)	Not an ARAR			State policy that provides TBC guidance for activities that could impact wetlands. Other promulgated requirements to protect wetlands and species habitat are evaluated separately as potential ARARs for response action at IR Site 10.

(table continues)

Table B4-2 (continued)

Alternative numbers in the "ARAR Determination" column indicate applicability of the requirement to the individual alternative.
The alternatives for this EE/CA are 1 – cover with institutional controls and 2 – excavation with off-site disposal.

Action	Requirement	Prerequisite	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
Discharge to waters of the state (continued)	Fisher, marten, river otter, desert kit fox, and red fox may not be taken at any time.	Fur-bearing mammals.	Cal. Code Regs. tit. 14, § 460	Not an ARAR			The referenced wildlife are not known to use IR Site 10 or adjacent NAF El Centro lands and habitats.
	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.		ICAPCD Rule 403	1,2			Fugitive dust may be generated during excavation, cover placement, and/or regrading conducted as part of the removal actions. Substantive requirements pertaining to fugitive dust emission control will be applicable. Measures will be taken to minimize fugitive dust during removal actions.
	Reduce the amount of fine Particulate Matter (PM-10) entrained in the ambient air as a result of emissions generated from man-made fugitive dust sources generated from within Imperial County by reasonably available control measures as included in the ICAPCD Non-Attainment Area Plan.		ICAPCD Rule 800	1,2			Fugitive dust may be generated during excavation, cover placement, and/or regrading conducted as part of the removal actions. Measures will be taken to minimize fugitive dust during removal actions.

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

(table continues)

Table B4-2 (continued)

Acronyms/Abbreviations:

A – applicable
AM – action memorandum
ARAR – applicable or relevant and appropriate requirement
art. – article
Cal. Code Regs. – *California Code of Regulations*
Cal/EPA – California Environmental Protection Agency
Cal. Fish & Game Code – *California Fish and Game Code*
Cal. Health & Safety Code – *California Health and Safety Code*
Cal. Water Code – *California Water Code*
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
ch. – chapter
COPC – chemical of potential concern
div. – division
DON – Department of the Navy
ICAPCD – Imperial County Air Pollution Control District
IR – Installation Restoration (Program)
NAF – Naval Air Facility
para. – paragraph
PM_{10} – particulate matter less than 10 micrometers in diameter
Prop. – proposition
RA – relevant and appropriate
RAW – removal action work plan
RCRA – Resource Conservation and Recovery Act
Res. – resolution
§ – section
subch. – subchapter
subdiv. – subdivision
SWRCB – (California) State Water Resources Control Board
TBC – to be considered
tit. – title

Section B5
SUMMARY

The purpose of the proposed removal action at IR Site 10 is to reduce the potential exposure of human and ecological receptors to contaminated soils at the stabilization ponds. Potential ARARs have been identified for each medium, location, and proposed action.

In general, the requirements of federal and state waste characterization regulations, regulations to protect endangered or threatened and migratory species and their habitat, RCRA clean closure requirements, and federal surface water discharge standards for construction activities have been identified as controlling ARARs for the proposed removal action at IR Site 10. The substantive provisions of the following requirements were identified as potential ARARs that affected the development of response action objectives and alternatives for this action:

- RCRA hazardous waste characterization requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, including characterization of solid waste as TCLP
- non-RCRA (California) hazardous waste characterization requirements at Cal. Code Regs. tit. 22, § 66261.3(a)(2)(C) or 66261.3(a)(2)(F), 66261.22(a)(3) and (4), 66261.24(a)(2)–(a)(8), and 66261.101
- Endangered Species Act of 1973 requirement at 16 U.S.C. § 1536(a) and (h)(1)(B) regarding protecting listed species or critical habitat
- Migratory Bird Treaty Act of 1972 requirement at 16 U.S.C. § 703 regarding the protection of native migratory birds, including protecting them from poisoning at hazardous waste sites
- California Endangered Species Act (Cal. Fish & Game Code § 2080) requirements to protect endangered or threatened species and habitat
- Cal. Fish & Game Code §§ 5650(a) and(f) and 5651 prohibition on discharges to waters of the state that may affect birds, fish, or plant life
- Executive Order No. 11990, Protection of Wetlands (40 C.F.R. § 6.302[a])
- Clean Water Act § 402 (33 U.S.C. ch. 26, § 1342) standards for discharge to surface waters applicable to small construction activities

Removal action is proposed for IR Site 10 to address semivolatile organic compounds, pesticides, and metals in surface and shallow subsurface soil in the bottom of the stabilization ponds that have been identified through risk assessment as associated primarily with an unallowable risk to potential ecological receptors and also with an elevated toxicity index for a potential residential human receptor. By removal or cover of these soils, the exposure pathway for ecological as well as human receptors would be eliminated. Site conditions, including low annual rainfall, high evapotranspiration potential, low permeability of the clay- and silt-bearing soil, shallow depth of soil contamination, and depth to groundwater are considered to preclude soil contaminants from posing a potential threat to groundwater quality.

Federal and state requirements have been identified as potentially applicable chemical-specific ARARs for waste characterization. Federal hazardous waste requirements have been identified as potentially applicable or relevant and appropriate for temporary storage on-site and storage in containers, if hazardous waste is generated as part of the remedial action. RCRA and

non-RCRA, California-regulated waste characterization requirements are acknowledged as potentially applicable or relevant and appropriate for all wastes generated during the removal action, including soil excavated on the basis of the results of final contaminant delineation sampling. Even though the excavation of soil is not proposed for the cover alternative, if prior sampling indicates that soil may be characteristic hazardous waste, if it is excavated, it would be excavated under either alternative and managed separately from other wastes for disposal off-site at a state-certified TSD facility.

Location-specific ARARs indicate that local drainages lead to jurisdictional wetlands in the tributary system of the New River, and the potential for site soil migration and discharge would be present during removal actions. Federal requirements for wetlands protection are, therefore, potentially relevant and appropriate federal ARARs. Measures would be taken to minimize erosion and runoff potential as a part of the cover alternative and during the removal actions for both alternatives.

Federal requirements of the Endangered Species Act and Migratory Bird Treaty Act and state requirements of the California Endangered Species Act Section 2080 are potentially applicable location-specific ARARs. A federal and California endangered species, the desert pupfish, may be present in drainage channels west of IR Site 10. A migratory bird species, the burrowing owl, is known to use IR Site 10 as nesting habitat (Ogden 1992). No other migratory birds have been observed at the site; however, the broken egg of a killdeer was found there in 1997. Potential impacts on endangered, threatened, or migratory bird species or habitat from site removal actions will be minimized by an initial biological resources survey; scheduling of construction activities for a period with the least species sensitivity, if necessary; and measures to control erosion, runoff and potential off-site discharge of site soil. These latter control measures will also address the requirement to prevent discharges to off-site waters and wetlands that may contain substances deleterious to wildlife and plants. No long-term impact is anticipated on species habitat from either alternative because each would be designed to eliminate the potential for exposure and allow the native species to reoccupy and use the site as before.

Because hazardous waste will not be left on-site, Cal. Codes Regs. tit. 22 requirements for cover, site closure, and postclosure maintenance and monitoring would not be potential ARARs for the removal actions. Requirements for clean closure at § 66264.111 and 66264.114 would be met. Covering the impacted soil and implementing land-use controls to prevent excavation would be as effective as excavation and off-site disposal at protecting human health and the environment. In the absence of a potential threat to water quality posed by soil left in place, requirements for cover, site closure, and postclosure maintenance and monitoring of Cal. Codes Regs. tit. 27 are not considered potential ARARs for the removal actions.

ICAQMD requirements to be met for fugitive dust emissions from excavation, backfill, regrading, and/or cover placement activities include a potentially applicable federal ARAR in Rule 401 that has been approved as a component of the SIP and state ARARs in Rules 403 and 800. Measures to control the generation of fugitive dust, such as wetting the soil, that are considered to be appropriate and effective control technologies would be used during the removal activities.

Section B6
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ATTACHMENT A

ARARs CORRESPONDENCE

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 5DEN.JH/3033
April 7, 2003

Ms. Victoria Lake
California Department of Fish and Game
1700 K Street, Suite 250
Sacramento, CA 95814

Dear Ms. Lake:

SUBJECT: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR AN ENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAF EL CENTRO, IMPERIAL COUNTY, CALIFORNIA

Pursuant to accomplishing the goals of Naval Air Facility El Centro's Installation Restoration (IR) program and in accordance with the National Contingency Plan (NCP) 40 CFR §300.415(j), we are hereby submitting a request that the California Department of Fish and Game (CDFG) identify potential State chemical-specific, location-specific, and action-specific "Applicable" or "Relevant and Appropriate" Requirements (ARARs) for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10, Sewage Stabilization Ponds. This ARARs request includes background information for use in identifying ARARs for the IR Site 10 EE/CA. We hope you will find the information accompanying this letter satisfactory for this purpose.

The Department of the Navy is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests to be considered for the IR Site 10 removal action. The Department of the Navy is requesting timely identification of potential State ARARs consistent with Section 121(d)(2)(A) of CERCLA and the NCP 40 CFR §300.400(g) and 300.515(d)(2) & (h)(2). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial and removal actions. To ensure timely and complete ARARs identification for IR Site 10, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) (including chapter, section, part, and subpart designations, as necessary) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the potential State ARAR is applicable or relevant, and appropriate to IR Site 10.

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April 7, 2003

3. A description of how the potential State ARAR would apply to components of potential removal action alternatives, including: specific numeric emission limitations; hazardous substance/constituent action or cleanup levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes the proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

We are requesting that you send a response via first class mail addressed to Mr. Jim Hoyle and postmarked within thirty (30) calendar days of receipt of this request. If the State determines that the information accompanying this letter is insufficient to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Please direct any technical questions that you may have concerning this request to Mr. Jim Hoyle at (619) 532-3868 and any legal questions to Mr. David Silverstein, Associate Counsel (Southwest Division Environmental), at (619) 532-4208.
Sincerely,

Sincerely,

MICHAEL J. GONZALES
Remedial Project Manager
By direction of the Commander

Enclosure: 1. Background Information, Non-Time-Critical Removal Action, IR Site 10, Sewage Stabilization Ponds, Naval Air Facility El Centro

Copy to:
Mr. Laurence Concors, Bechtel Environmental, Inc.

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 5DEN.JH/3034
April 7, 2003

Mr. Isaac Hirbawi
California Environmental Protection Agency
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Dear Mr. Hirbawi:

SUBJECT: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR AN ENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAF EL CENTRO, IMPERIAL COUNTY, CALIFORNIA

Pursuant to accomplishing the goals of Naval Air Facility El Centro's Installation Restoration (IR) program and in accordance with the National Contingency Plan (NCP) 40 CFR §300.415(j), we are hereby submitting a request that the Department of Toxic Substances Control (DTSC), identify potential State chemical-specific, location-specific, and action-specific "Applicable" or "Relevant and Appropriate" Requirements (ARARs) for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10, Sewage Stabilization Ponds. This ARARs request includes background information for use in identifying ARARs for the IR Site 10 EE/CA. We hope you will find the information accompanying this letter satisfactory for this purpose.

The Department of the Navy is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests to be considered for the IR Site 10 removal action. The Department of the Navy is requesting timely identification of potential State ARARs consistent with Section 121(d)(2)(A) of CERCLA and the NCP 40 CFR §300.400(g) and 300.515(d)(2) & (h)(2). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial and removal actions. To ensure timely and complete ARARs identification for IR Site 10, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) (including chapter, section, part, and subpart designations, as necessary) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the potential State ARAR is applicable or relevant and appropriate to IR Site 10.

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April 7, 2003

3. A description of how the potential State ARAR would apply to components of potential removal action alternatives, including: specific numeric emission limitations; hazardous substance/constituent action or cleanup levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes the proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

We are requesting that you send a response via first class mail addressed to Mr. Jim Hoyle and postmarked within thirty (30) calendar days of receipt of this request. If the State determines that the information accompanying this letter is insufficient to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Please direct any technical questions that you may have concerning this request to Mr. Jim Hoyle at (619) 532-3868 and any legal questions to Mr. David Silverstein, Associate Counsel (Southwest Division Environmental), at (619) 532-4208.

Sincerely,

MICHAEL J. GONZALES
Remedial Project Manager
By direction of the Commander

Enclosure: 1. Background Information, Non-Time-Critical Removal Action, IR Site 10, Sewage Stabilization Ponds, Naval Air Facility El Centro

Copy to:
Mr. Laurence Concors, Bechtel Environmental, Inc.

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 5DEN.JH/3035
April 7, 2003

Mr. Gaspar Torres
Imperial County Air Pollution Control District
150 South 9th Street
El Centro, CA 92243

Dear Mr. Torres:

SUBJECT: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR AN ENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAF EL CENTRO, IMPERIAL COUNTY, CALIFORNIA

Pursuant to accomplishing the goals of Naval Air Facility El Centro's Installation Restoration (IR) program and in accordance with the National Contingency Plan (NCP) 40 CFR §300.415(j), we are hereby submitting a request that the Imperial County Air Pollution Control District (ICAPCD) identify potential chemical-specific, location-specific, and action-specific "Applicable" or "Relevant and Appropriate" Requirements (ARARs) for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10, Sewage Stabilization Ponds. This ARARs request includes background information for use in identifying ARARs for the IR Site 10 EE/CA. We hope you will find the information accompanying this letter satisfactory for this purpose.

The Department of the Navy is requesting that the ICAPCD identify any other criteria, advisories, guidance, and proposed standards that the State requests to be considered for the IR Site 10 removal action. The Department of the Navy is requesting timely identification of potential State ARARs consistent with Section 121(d) (2) (A) of CERCLA and the NCP 40 CFR §300.400(g) and 300.515(d)(2) & (h)(2). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial and removal actions. To ensure timely and complete ARARs identification for IR Site 10, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) (including chapter, section, part, and subpart designations, as necessary) for the potential ARAR and the date of enactment or promulgation.

2. A brief description of why the potential ARAR is applicable or relevant and appropriate to IR Site 10.

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Ser 5DEN.JH/3035
April 7, 2003

3. A description of how the potential ARAR would apply to components of potential removal action alternatives, including: specific numeric emission limitations; hazardous substance/constituent action or cleanup levels; etc., if the ICAPCD intends to take the position that the potential ARAR includes such limitations, levels, etc.

4. If the ICAPCD believes the proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

We are requesting that you send a response via first class mail addressed to Mr. Jim Hoyle and postmarked within thirty (30) calendar days of receipt of this request. If the State determines that the information accompanying this letter is insufficient to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Please direct any technical questions that you may have concerning this request to Mr. Jim Hoyle at (619) 532-3868 and any legal questions to Mr. David Silverstein, Associate Counsel (Southwest Division Environmental), at (619) 532-4208.

Sincerely,

MICHAEL J. GONZALES
Remedial Project Manager
By direction of the Commander

Enclosure: 1. Background Information, Non-Time-Critical Removal Action, IR Site 10, Sewage Stabilization Ponds, Naval Air Facility El Centro

Copy to:
Mr. Laurence Concors, Bechtel Environmental, Inc.

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 5DEN.JH/3036
April 7, 2003

Mr. Scott Humpert
California Integrated Waste Management Board
1001 I Street
Sacramento, CA 95812-4025

Dear Mr. Humpert:

SUBJECT: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR ANENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAF EL CENTRO, IMPERIAL COUNTY, CALIFORNIA

Pursuant to accomplishing the goals of Naval Air Facility El Centro's Installation Restoration (IR) program and in accordance with the National Contingency Plan (NCP) 40 CFR §300.415(j), we are hereby submitting a request that the California Integrated Waste Management Board (CIWMB) identify potential State chemical-specific, location-specific, and action-specific "Applicable" or "Relevant and Appropriate" Requirements (ARARs) for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10, Sewage Stabilization Ponds. This ARARs request includes background information for use in identifying ARARs for the IR Site 10 EE/CA. We hope you will find the information accompanying this letter satisfactory for this purpose.

The Department of the Navy is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests to be considered for the IR Site 10 removal action. The Department of the Navy is requesting timely identification of potential State ARARs consistent with Section 121(d)(2)(A) of CERCLA and the NCP 40 CFR §300.400(g) and 300.515(d)(2) & (h)(2). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial and removal actions. To ensure timely and complete ARARs identification for IR Site 10, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) (including chapter, section, part, and subpart designations, as necessary) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the potential State ARAR is applicable or relevant and appropriate to IR Site 10.

5090
Ser 5DEN.JH/3036
April 7, 2003

3. A description of how the potential State ARAR would apply to components of potential removal action alternatives, including: specific numeric emission limitations; hazardous substance/constituent action or cleanup levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes the proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

We are requesting that you send a response via first class mail addressed to Mr. Jim Hoyle and postmarked within thirty (30) calendar days of receipt of this request. If the State determines that the information accompanying this letter is insufficient to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Please direct any technical questions that you may have concerning this request to Mr. Jim Hoyle at (619) 532-3868 and any legal questions to Mr. David Silverstein, Associate Counsel (Southwest Division Environmental), at (619) 532-4208.

Sincerely,

Michael J. Gonzales

MICHAEL J. GONZALES
Remedial Project Manager
By direction of the Commander

Enclosure: 1. Background Information, Non-Time-Critical Removal Action, IR Site 10, Sewage Stabilization Ponds, Naval Air Facility El Centro

Copy to:
Mr. Laurence Concors, Bechtel Environmental, Inc.

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 5DEN.JH/3037
April 7, 2003

Ms. Liann Chavez
California Regional Water Quality Control Board
73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92206

Dear Ms. Chavez:

SUBJECT: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR AN ENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAF EL CENTRO, IMPERIAL COUNTY, CALIFORNIA

Pursuant to accomplishing the goals of Naval Air Facility El Centro's Installation Restoration (IR) program and in accordance with the National Contingency Plan (NCP) 40 CFR §300.415(j), we are hereby submitting a request that the Regional Water Quality Control Board (RWQCB) identify potential State chemical-specific, location-specific, and action-specific "Applicable" or "Relevant and Appropriate" Requirements (ARARs) for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10, Sewage Stabilization Ponds. This ARARs request includes background information for use in identifying ARARs for the IR Site 10 EE/CA. We hope you will find the information accompanying this letter satisfactory for this purpose.

The Department of the Navy is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests to be considered for the IR Site 10 removal action. The Department of the Navy is requesting timely identification of potential State ARARs consistent with Section 121(d)(2)(A) of CERCLA and the NCP 40 CFR §300.400(g) and 300.515(d)(2) & (h)(2). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial and removal actions. To ensure timely and complete ARARs identification for IR Site 10, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) (including chapter, section, part, and subpart designations, as necessary) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the potential State ARAR is applicable or relevant and appropriate to IR Site 10.

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3. A description of how the potential State ARAR would apply to components of potential removal action alternatives, including: specific numeric emission limitations; hazardous substance/constituent action or cleanup levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes the proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

We are requesting that you send a response via first class mail addressed to Mr. Jim Hoyle and postmarked within thirty (30) calendar days of receipt of this request. If the State determines that the information accompanying this letter is insufficient to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Please direct any technical questions that you may have concerning this request to Mr. Jim Hoyle at (619) 532-3868 and any legal questions to Mr. David Silverstein, Associate Counsel (Southwest Division Environmental), at (619) 532-4208.

Sincerely,

MICHAEL J. GONZALES
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Enclosure: 1. Background Information, Non-Time-Critical Removal Action, IR Site 10, Sewage Stabilization Ponds, Naval Air Facility El Centro

Copy to:
Mr. Laurence Concors, Bechtel Environmental, Inc.

BACKGROUND INFORMATION
NON-TIME-CRITICAL REMOVAL ACTION
IR SITE 10, SEWAGE STABILIZATION PONDS
NAVAL AIR FACILITY EL CENTRO

The following information is provided to assist the Navy and state regulatory agencies in early identification of chemical-, location-, and action-specific applicable or relevant and appropriate requirements (ARARs). The ARARs will be used to support the engineering evaluation/cost analysis (EE/CA) for a non-time-critical removal action to address soil contamination at Installation Restoration Program Site 10, Naval Air Facility (NAF) El Centro. Groundwater will not be addressed in the EE/CA. Continued groundwater monitoring is being conducted to address sporadic occurrences of contaminants reported in groundwater that may be related to past site activities.

As part of the EE/CA for this site, potential removal-action alternatives will be developed to reduce human-health risk (and potentially ecological risk pending results of a screening ecological risk assessment [ERA]) to acceptable levels. The alternatives will be evaluated with consideration given to the nine criteria stipulated in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP): overall protection of human health and the environment; compliance with ARARs; long-term effectiveness; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; state acceptance; and community acceptance.

FACILITY AND SITE DESCRIPTION

NAF El Centro is an operational facility located 7 miles northwest of El Centro, 11 miles north of the Mexican border, and 85 miles east of the city of San Diego. NAF El Centro historically provided support to fleet squadrons that took advantage of the clear, dry weather and open space found in the Imperial Valley. The facility has supported a variety of activities, mostly in support of Navy parachute testing and training, and aeronautical escape system testing, evaluation, and design. In the early 1990s, the NAF El Centro mission was redefined as a support and training facility for military aviation units and activities. NAF El Centro provides services and housing to military personnel and maintains and operates facilities to support aviation activities.

Site 10 is located in the far northwest corner of NAF El Centro (Figure 1). Site 10 consists of three unlined ponds with bermed sides north of the sewage/wastewater treatment plant for the base (Figure 2). The pond floors are approximately 2 feet below surrounding ground surface. The berms surrounding the ponds are approximately 6 to 8 feet above the adjacent grade outside the ponds. The total area of Site 10 is approximately 6.5 acres. The bottom of the largest pond (No. 1) is roughly 245 by 560 feet wide. The bottoms of the two smaller ponds (Nos. 2 and 3) are roughly 125 by 250 feet wide and 125 by 255 feet wide, respectively.

The stabilization ponds functioned as the only sewage treatment for the base until 1976. Domestic and industrial sewage flowed into Pond No. 1, where most solids settled out. When Pond No. 1 was full, effluent flowed into Pond No. 2, then into Pond No. 3, and ultimately into the New River. The accumulated sludge has not been removed from these ponds. Currently, all the ponds are dry and partially covered with local vegetation.

PHYSICAL CHARACTERISTICS

The topography at NAF El Centro is relatively flat, with surface elevations ranging from approximately 45 to 50 feet below mean sea level. The climate is arid with high summer temperatures in excess of 115 degrees Fahrenheit. Average precipitation is less than 3 inches per year. Prevailing winds are westerly in the winter and spring and generally southeasterly during the summer.

Soil at NAF El Centro consists of interbedded layers of fine-grained sand, silt, clay, and sand-silt-clay mixtures. Groundwater depth at Site 10 ranges from approximately 22 to 37 feet below ground surface. Groundwater movement is generally to the northwest toward the New River. The Colorado River Basin RWQCB has designated groundwater in the Imperial Hydrologic Unit, which includes NAF El Centro, as having municipal and industrial beneficial uses (RWQCB 2002). However, shallow groundwater beneath NAF El Centro is characterized by generally poor quality (e.g., high total dissolved solids, chloride, and sulfate) and low aquifer yields. As a result, it is not designated as a potential source of drinking water (RWQCB 2003).

IR Site 10 is located primarily in an alkali desert scrub habitat with characteristic vegetation occurring in varying densities. Most of the surrounding land is airport operations or cropland. It is expected that IR Site 10 will be regularly maintained by activities such as annual disking for operational purposes. The New River, which is located west of the site, represents a Desert Riparian habitat.

No wildlife refuges or state or federal parks are located within 10 miles of NAF El Centro. With the exception of the New River and the agricultural canals, there are no year-round freshwater areas within 1 mile of the facility where waterfowl could congregate. Furthermore, no wetland areas are located within the facility perimeter (BNI 1997).

PREVIOUS INVESTIGATIONS

Previous environmental investigations conducted at Site 10 to address potential soil contamination include the following:

- preliminary assessment/site inspection (NEESA 1987)
- hydrogeological assessment (Ogden 1992)
- data gaps study (BNI 1998)
- draft extended site investigation (BNI 2001)

Soil samples were collected from 23 boreholes (EC10-B1 through EC10-B23) during the hydrogeological assessment (HA) and the data gaps study (DGS) (Figure 2). These samples were collected from Pond Nos. 1, 2, and 3, and a background location. The analyses performed at these soil sample locations are shown on Table 1. Table 2 summarizes the maximum reported concentrations for the three ponds (including results from the extended site investigation [ESI] discussed in the following paragraphs) and the background location. A human-health risk screening was performed using the maximum reported concentrations from these two investigations. The incremental cancer risk under

a residential scenario was 4×10^{-5} using California-modified preliminary remediation goals (PRGs) and the hazard index was 50. The primary risk drivers were metals, pesticides, and polychlorinated biphenyls (PCBs). The highest concentrations of these analytes were predominantly found in the shallow soil from Pond No. 1. Chemicals of potential concern (COPCs) reported in soil samples from Pond Nos. 2 and 3 were generally within established background levels and below residential PRGs (BNI 1998). The DGS report recommended a removal action for shallow soil in Pond No. 1 and additional surface soil sampling to evaluate if further action is required for Pond Nos. 2 and 3.

The ESI addressed the additional surface-soil sampling as recommended in the DGS for Pond Nos. 2 and 3. Five samples were collected from each of Pond Nos. 2 and 3 for a total of 10 samples. The sample locations within the two ponds were selected using a judgmental approach to provide data for the areas where the wastewater inlet pipes entered the ponds, the low areas (depressions) in the ponds where COPCs would be expected to accumulate, and the areas in the ponds where shallow soil had not been sampled previously. The analyses performed at the various soil sample locations are shown on Table 1. Table 2 summarizes the maximum reported concentrations.

Screening human-health risk assessments (HHRAs) were conducted for each of the two ponds and were based on the maximum reported concentrations from the HA, DGS, and ESI. There were 37 COPCs identified at Pond No. 2, including 10 metals and 27 organic chemicals. Five other chemicals reported in soil (antimony, arsenic, beryllium, thallium and organolead) were not included as COPCs because their maximum concentrations were below the established background concentrations presented in the draft ESI technical memorandum (BNI 2001). For Pond No. 2, the residential total and incremental cancer risks were estimated at 1×10^{-5} and 3×10^{-5} using U.S. EPA and California-modified PRGs, respectively. The U.S. EPA risk drivers were semivolatile organic compounds, pesticides, and PCBs. The residential hazard index was 2.

There were 26 COPCs identified at Pond No. 3, including 8 metals and 18 organic chemicals. Six other chemicals reported in soil (antimony, arsenic, beryllium, nickel, thallium, and organolead) were not included as COPCs because their maximum concentrations were below the established background concentrations (BNI 2001). For Pond No. 3, the residential total and incremental risks were estimated at 3×10^{-6} using both the U.S. EPA and California-modified PRGs. The principal risk drivers were metals, semivolatile organic compounds, pesticides, and PCBs. The residential hazard index was 0.4.

Because the results of the human-health risk estimates for Pond Nos. 2 and Pond 3 were within the generally acceptable risk range as denoted in the NCP, and the industrial risk estimates for both ponds were lower than the residential risk estimates, no further action for both ponds was recommended in the draft ESI technical memorandum (BNI 2001)

POTENTIAL REMOVAL ACTION ALTERNATIVES

The following technologies were compiled to assist the Navy and state regulatory agencies in identification of action-specific ARARs:

- institutional/engineering controls,
- placement of a cover,
- solidification/stabilization, and
- partial or complete removal of impacted soil followed by disposal.

These technologies are generally considered capable of addressing soil containing metals and some organics, similar to those reported at IR Site 10. Some, or all, of these technologies will be assembled into removal action alternatives capable of achieving the removal action objectives established in the EE/CA.

The area/volume of impacted soil subject to the removal action will depend on the cleanup goals developed in the EE/CA. The soil depth subject to the removal action could range from 2 to 10 feet below ground surface. However, it is expected that the depth of soil subject to the removal action will not exceed a couple of feet for the most of the removal action area, as the majority of the contaminants are at or near the bottom surface of the pond.

FUTURE ACTIVITIES

The EE/CA is currently planned to address potential risks to human health at Pond No. 1, as recommended in the DGS report. The draft ESI technical memorandum will be finalized to address agency comments. Revision of the screening HHRA and/or the recommendations is a possible outcome of comments resolution. In addition, a screening ERA will be conducted for all three ponds at the Site 10. All available data from the HA, DGS, and ESI will be evaluated for use in the screening ERA. The results of the screening ERA, in addition to the results of the screening HHRA, will be used to determine if Pond Nos. 2 or 3 should be included in the removal action. If Pond Nos. 2 or 3 were included in the removal action, the potential removal action alternatives discussed above would still be appropriate. The results of the screening HHRAs and the screening ERA will also be used to develop cleanup goals for the EE/CA.

REFERENCES

Bechtel National, Inc. 1997. Draft Ecological Scoping Assessment, Naval Air Facility, El Centro, California. October.

———. 1998. Final Data Gaps Study Report, Naval Air Facility, El Centro, Imperial County, California. March.

———. 2001. Draft Technical Memorandum, Extended Site Investigation, IR Site 10, Pond Nos. 2 and 3, Naval Air Facility El Centro, Imperial County, California. July.

BNI. *See* Bechtel National, Inc.

California Regional Water Quality Control Board. 2002. Water Quality Control Plan, Colorado River Basin - Region 7. May.

———. 2003. Cover letter transmitting applicable or relevant and appropriate requirements for Site 2. 24 January.

Naval Energy and Environmental Support Activity. 1987. Preliminary Assessment/Site Inspection of Naval Air Facility, El Centro, California. Naval Energy and Environmental Support Activity document 13-106, Port Hueneme, California. September.

NEESA. *See* Naval Energy and Environmental Support Activity.

Ogden. *See* Ogden Environmental Energy Services.

Ogden Environmental Energy Services. 1992. Final Hydrogeological Assessment Report (HAR), Site 10 Sewage Stabilization Ponds, Volumes I and II. May.

RWQCB. *See* California Regional Water Quality Control Board.

Table 1
Analysis by Sample Location and Depth

Analyses	VOCs	TPH	TRPH	SVOCs	Pesticides/ PCBs	Priority Pollutant Metals	Hexavalent Chromium	Soluble Metals	Cyanide	Organolead	Total phenols	EDB
U.S. EPA Method	8010, 8020, 8021, or 8240	8015 Modified	418.1	8270	8080 or 8080A	6010, 6020, or 7000 series	3060A	Cal WET	9012	CDOHS LUFT Manual	9066	504
POND 1												
EC10-B1 at 4.0 feet	X	X				X			X			
EC10-B1 at 13.0 feet	X	X				X			X			
EC10-B1 at 19.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B2 at 1.5 feet	X	X				X			X			
EC10-B2 at 8.5 feet	X	X				X			X			
EC10-B2 at 20.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B3 at 1.5 feet	X	X				X			X			
EC10-B3 at 5.0 feet	X	X				X			X			
EC10-B3 at 15.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B5 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B5 at 5.5 feet	X	X				X			X			
EC10-B5 at 21.0 feet	X	X				X			X			
EC10-B6 at 1.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B6 at 3.0 feet	X	X				X			X			
EC10-B6 at 9.0 feet	X	X				X			X			
EC10-B7 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B7 at 5.5 feet	X	X				X			X			
EC10-B7 at 15.5 feet	X	X				X			X			
EC10-B8 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B8 at 6.0 feet	X	X				X			X			
EC10-B8 at 11.5 feet	X	X				X			X			
EC10-B9 at 1.5 feet	X	X	X	X	X	X			X	X	X	X
EC10-B9 at 6.0 feet	X	X				X			X			
EC10-B9 at 14.0 feet	X	X				X			X			

(table continues)

Table 1 – Analysis by Sample Location and Depth (continued)

Analyses	VOCs	TPH	TRPH	SVOCs	Pesticides/ PCBs	Priority Pollutant Metals	Hexavalent Chromium	Soluble Metals	Cyanide	Organolead	Total phenols	EDB
U.S. EPA Method	8010, 8020, 8021, or 8240	8015 Modified	418.1	8270	8080 or 8080A	6010, 6020, or 7000 series	3060A	Cal WET	9012	CDOHS LUFT Manual	9066	504
POND 1 (continued)												
EC10-B16 at 0.75 feet						X*		X				
EC10-B16 at 2.75 feet						X*		X				
EC10-B16 at 4.25 feet						X*		X				
EC10-B17 at 0.75 feet						X*		X				
EC10-B17 at 2.75 feet						X*		X				
EC10-B17 at 4.25 feet						X*		X				
EC10-B20 at 0 feet					X	X				X		
EC10-B20 at 13.5 feet						X				X		
EC10-B21 at 0 feet					X	X				X		
EC10-B21 at 23.5 feet						X				X		
EC10-B22 at 0 feet					X	X				X		
EC10-B22 at 13.5 feet						X				X		
EC10-S23 at 0 feet					X	X				X		
EC10-B23 at 23.5 feet						X				X		
POND 2												
EC10-B12 at 1.0 feet	X	X	X	X	X	X			X	X	X	
EC10-B12 at 5.5 feet	X	X				X						
EC10-B12 at 21.5 feet	X	X				X						
EC10-B13 at 4.0 feet	X	X				X						X
EC10-B13 at 9.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B13 at 20.5 feet	X	X										X
EC10-B13A at 7.5 feet										X		
EC10-B15 at 0.75 feet						X*		X				
EC10-B15 at 2.75 feet						X*		X				
EC10-B15 at 4.25 feet						X*		X				

(table continues)

Table 1 – Analysis by Sample Location and Depth (continued)

Analyses	VOCs	TPH	TRPH	SVOCs	Pesticides/ PCBs	Priority Pollutant Metals	Hexavalent Chromium	Soluble Metals	Cyanide	Organolead	Total phenols	EDB
U.S. EPA Method	8010, 8020, 8021, or 8240	8015 Modified	418.1	8270	8080 or 8080A	6010, 6020, or 7000 series	3060A	Cal WET	9012	CDOHS LUFT Manual	9066	504
POND 2 (continued)												
EC10-B18 at 0 feet					X	X				X		
EC10-B18 at 10.5 feet						X				X		
EC10-S29 at 0.0 feet				X	X	X	X		X	X		
EC10-S30 at 0.0 feet				X	X	X	X		X	X		
EC10-S31 at 0.0 feet				X	X	X	X		X	X		
EC10-S32 at 0.0 feet				X	X	X	X		X	X		
EC10-S33 at 0.0 feet				X	X	X	X		X	X		
POND 3												
EC10-B10 at 1.0 foot	X	X				X			X			
EC10-B10 at 4.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B10 at 13.5 feet	X	X				X			X			
EC10-B11 at 1.5 feet	X	X				X			X			
EC10-B11 at 6.0 feet	X	X	X	X	X	X			X	X	X	X
EC10-B11 at 15.0 feet	X	X				X			X			
EC10-B11A at 4.5 feet										X		
EC10-B14 at 0.6 feet						X*		X				
EC10-B14 at 2.6 feet						X*		X				
EC10-B14 at 4.1 feet						X*		X				
EC10-B19 at 0.0 feet					X	X				X		
EC10-B19 at 10.5 feet						X				X		
EC10-S24 at 0.0 feet				X	X	X	X		X	X		
EC10-S25 at 0.0 feet				X	X	X	X		X	X		
EC10-S26 at 0.0 feet				X	X	X	X		X	X		
EC10-S27 at 0.0 feet				X	X	X	X		X	X		
EC10-S28 at 0.0 feet				X	X	X	X		X	X		

(table continues)

Table 1 – Analysis by Sample Location and Depth (continued)

Analyses	VOCs	TPH	TRPH	SVOCs	Pesticides/ PCBs	Priority Pollutant Metals	Hexavalent Chromium	Soluble Metals	Cyanide	Organolead	Total phenols	EDB
U.S. EPA Method	8010, 8020, 8021, or 8240	8015 Modified	418.1	8270	8080 or 8080A	6010, 6020, or 7000 series	3060A	Cal WET	9012	CDOHS LUFT Manual	9066	504
BACKGROUND												
EC10-B4 at 1.5 feet	X	X	X	X	X	X			X	X		X
EC10-B4 at 4.5 feet	X	X	X	X	X	X			X	X	X	X

Note:
* chromium only

Acronyms/Abbreviations:
Cal WET – California Waste Extraction Test
CDOHS – California Department of Health Services
EDB – ethylene dibromide
LUFT – leaking underground fuel tank
PCB – polychlorinated biphenyl
SVOCs – semivolatile organic compound
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
VOCs – volatile organic compound

Table 2
Max Concentrations for Analytes Reported Above Detection Limits in Soil

Analyte	POND 1			POND 2			POND 3		
	Max Result	Location	Depth (feet)	Max Result	Location	Depth (feet)	Max Result	Location	Depth (feet)
Volatile Organic Compounds (mg/kg)									
Acetone	0.8	EC10-B5	1.5	--	--	--	--	--	--
Methylene Chloride	0.05	EC10-B5	1.5	--	--	--	--	--	--
4-methyl-2-pentanone (MIBK)	0.05	EC10-B5	1.5	--	--	--	--	--	--
Toluene	0.07 JN	EC10-B3	1.5	0.041 JN	EC10-B12	5.5	0.22 #	EC10-B10 & EC10-B11	1 & 1.5
Petroleum Hydrocarbons (mg/kg)									
Total Fuel Hydrocarbons	240 N	EC10-B6	1	--	--	--	--	--	--
Total recoverable petroleum hydrocarbons	120	EC10-B6	1	4	EC10-B12	1	3	EC10-B10 & EC10-B11	4 & 6
Semivolatile Organic Compounds (mg/kg)									
Benz(a)anthracene	--	--	--	0.26 J	EC10-S31	0	--	--	--
Benzo(b)fluoranthene	--	--	--	0.38	EC10-S31	0	0.25 J	EC10-S24	0
Benzo(k)fluoranthene	--	--	--	0.16 J	EC10-S31	0	--	--	--
Benzoic acid	2.3	EC10-B5	1.5	0.32 J	EC10-S31	0	0.12 J	EC10-S25	0
Benzo(g,h,i)perylene	--	--	--	0.13 J	EC10-S31	0	0.076 J	EC10-S24	0
Benzo(a)pyrene	--	--	--	0.2 J	EC10-S31	0	--	--	--
Butyl benzyl phthalate	--	--	--	0.23 J	EC10-S33	0	0.12 J	EC10-S26	0
4-chloroaniline	--	--	--	0.098 J	EC10-S30	0	--	--	--
Chrysene	--	--	--	0.35 J	EC10-S31	0	0.15 J	EC10-S24	0
di-n-butyl phthalate	0.18	EC10-B5	1.5	--	--	--	--	--	--
Fluoranthene	--	--	--	0.27 J	EC10-S31	0	--	--	--
Indeno(1,2,3-c,d)pyrene	--	--	--	0.13	EC10-S31	0	0.072 J	EC10-S24	0
2-nitrophenol	0.19	EC10-B5	1.5	--	--	--	--	--	--
Pyrene	--	--	--	0.24 J	EC10-S31	0	--	--	--
Pesticides/Polychlorinated Biphenyls (mg/kg)									
Aldrin	--	--	--	0.0033	EC10-S31	0	--	--	--
Aroclor 1254	0.890 J	EC10-B21	0	0.48	EC10-S31	0	0.12	EC10-S25	0
Aroclor 1260	0.278	EC10-B21	0	--	--	--	0.038 J	EC10-B19	0
alpha-BHC	0.003 J	EC10-B21	0	--	--	--	--	--	--
beta-BHC	0.004 J	EC10-B21	0	--	--	--	--	--	--
alpha-chlordane	0.19	EC10-S23	0	0.063	EC10-S31	0	0.012	EC10-B19	0
gamma-chlordane	0.27	EC10-S23	0	0.12	EC10-S31	0	0.017	EC10-B19 & EC10-S25	0 & 0
4,4'-DDD	0.202	EC10-S23	0	0.016	EC10-S31	0	0.0056	EC10-S25	0
4,4'-DDE	0.125	EC10-B21 & EC10-S23	0 & 0	0.11	EC10-S32	0	0.071	EC10-S25	0
4,4'-DDT	0.009 J	EC10-B21	0	0.0005 J	EC10-B18	0	--	--	--
Dieldrin	0.014	EC10-S23	0	0.14	EC10-S31	0	0.032	EC10-B19	0
Endosulfan sulfate	0.0008 J	EC10-B20	0	0.002 J	EC10-B18	0	--	--	--

Table 2
Max Concentrations for Analytes Reported Above Detection Limits in Soil

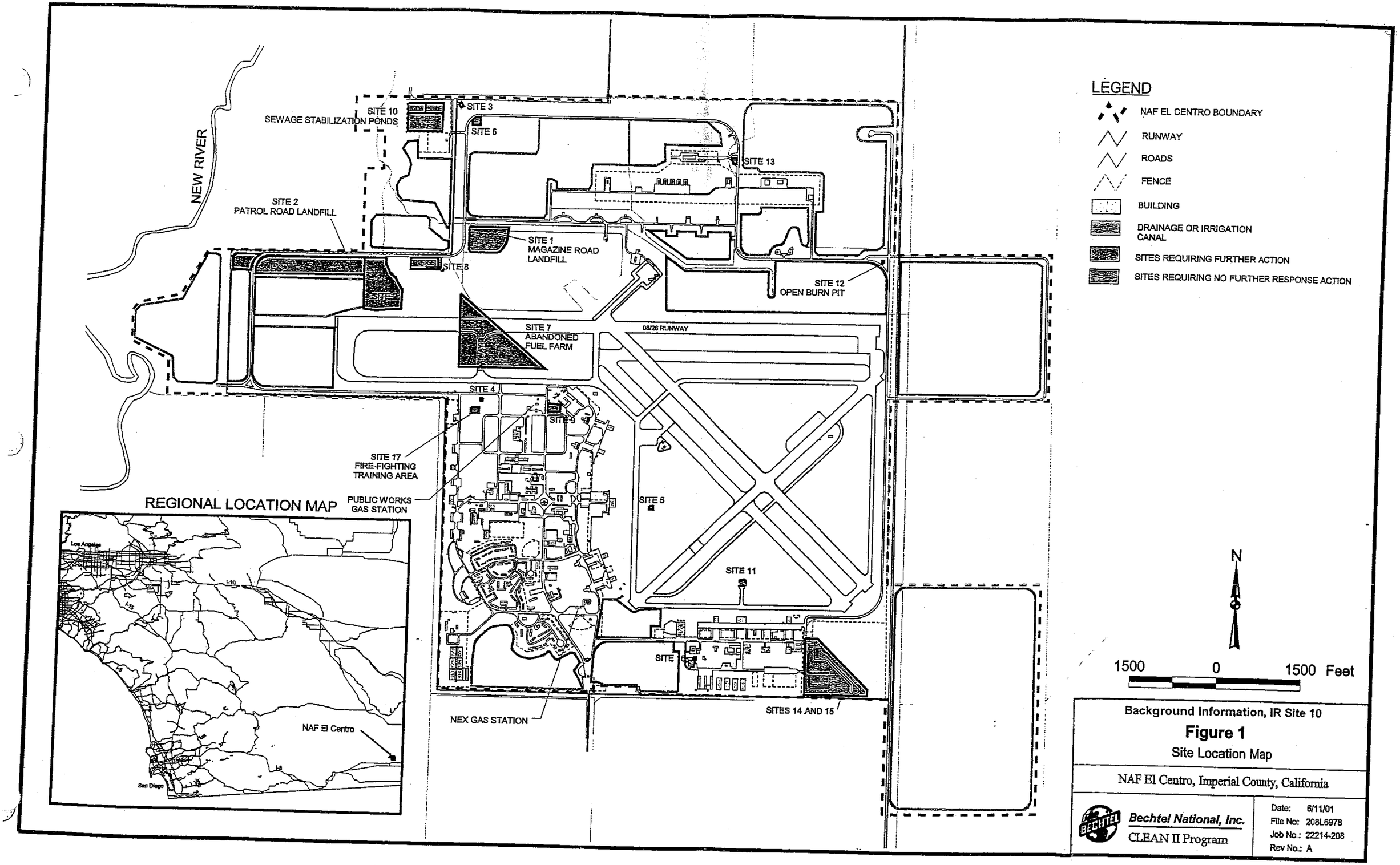
Analyte	POND 1			POND 2			POND 3		
	Max Result	Location	Depth (feet)	Max Result	Location	Depth (feet)	Max Result	Location	Depth (feet)
Pesticides/Polychlorinated Biphenyls (mg/kg) (cont.)									
Endrin	0.003 J	EC10-S23	0	0.012	EC10-S31	0	--	--	--
Endrin aldehyde	0.026	EC10-B21	0	0.002 J	EC10-B18	0	0.003 J	EC10-B19	0
Endrin ketone	--	--	--	0.0048	EC10-S31	0	--	--	--
Heptachlor	0.002 J	EC10-B22	0	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	0.0069	EC10-S31	0	0.002 J	EC10-B19	0
Priority Pollutant Metals (mg/kg)									
Antimony	0.58	EC10-B8	11.5	0.52	EC10-B13	9	0.48	EC10-B11	6
Arsenic	10	EC10-B22	0	8.7	EC10-S32	0	4	EC10-B19	0
Beryllium	0.99	EC10-B9	6	0.98	EC10-B13	9	1	EC10-B11	15
Cadmium	59	EC10-S23	0	22 J	EC10-S32	0	3.08	EC10-B19	0
Chromium	463	EC10-B22	0	41	EC10-S32	0	79.2	EC10-S25	0
Copper	696	EC10-S23	0	326 J	EC10-S32	0	52.7 J	EC10-S25	0
Hexavalent chromium	--	--	--	4 J	EC10-S30	0	--	--	--
Lead	172	EC10-B22	0	51.3	EC10-S32	0	23.7	EC10-B19	0
Mercury	2	EC10-S23	0	0.38	EC10-S31	0	0.19	EC10-S25	0
Nickel	35.6	EC10-S23	0	20.9 J	EC10-S32	0	17.7 J	EC10-S26	0
Selenium	19	EC10-B22	0	15.1	EC10-S32	0	4	EC10-B19	0
Silver	446	EC10-B22	0	84.8	EC10-S32	0	47.8	EC10-B19	0
Thallium	0.23	EC10-B22	0	0.23	EC10-B18	10.5	0.18	EC10-B19	0
Zinc	1370	EC10-S23	0	354	EC10-S32	0	105	EC10-B19	0
Soluble Metals (mg/L)									
Copper	0.01	EC10-B16	0.75	--	--	--	--	--	--
Other Analytes (mg/kg)									
Cyanide	0.6	EC10-B7	1.5	1.7 J	EC10-S32	0	0.5	EC10-B11	15
Organolead	--	--	--	0.28	EC10-B13	9	0.21	EC10-B11	6
Phenols, total	0.2	EC10-B5	1.5	--	--	--	0.2	EC10-B11	6

Acronyms/Abbreviations:

- alpha-BHC – alpha isomer of 1,2,3,4,5,6-hexachlorocyclohexane
- beta-BHC – beta isomer of 1,2,3,4,5,6-hexachlorocyclohexane
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- mg/kg – milligrams per kilogram
- mg/L – milligrams per liter

Data Qualifiers:

- J – estimated value
- N – presumptive evidence of constituent presence
- # – confirmed by gas chromatography/mass spectroscopy



Background Information, IR Site 10

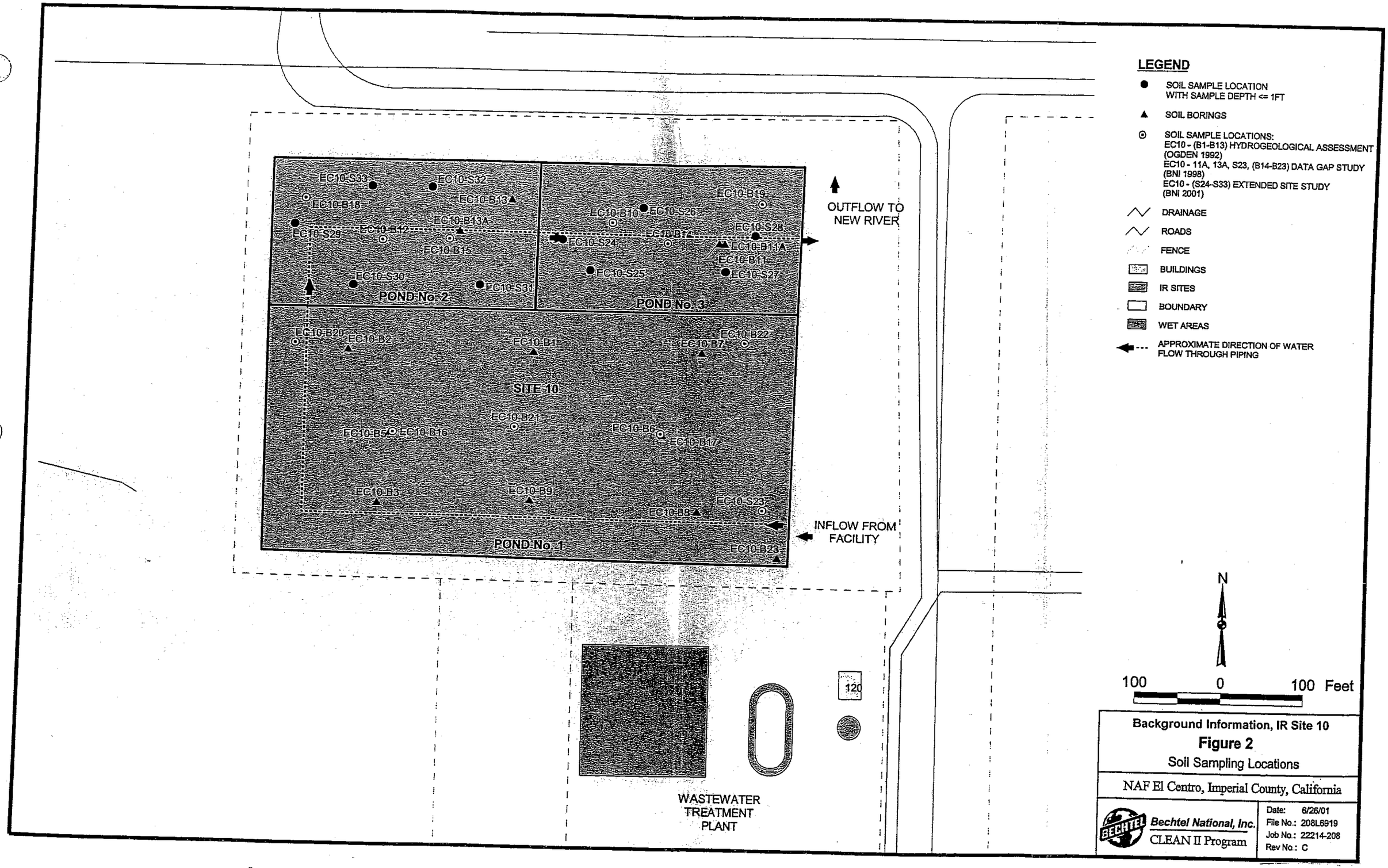
Figure 1

Site Location Map

NAF El Centro, Imperial County, California

Bechtel National, Inc.
CLEAN II Program

Date: 6/11/01
File No: 208L6978
Job No.: 22214-208
Rev No.: A


LEGEND
SOIL SAMPLE LOCATION WITH SAMPLE DEPTH <= 1FT
SOIL BORINGS
SOIL SAMPLE LOCATIONS:
EC10 - (B1-B13) HYDROGEOLOGICAL ASSESSMENT (OGDEN 1992)
EC10 - 11A, 13A, S23, (B14-B23) DATA GAP STUDY (BNI 1998)
EC10 - (S24-S33) EXTENDED SITE STUDY (BNI 2001)
DRAINAGE
ROADS
FENCE
BUILDINGS
IR SITES
BOUNDARY
WET AREAS
APPROXIMATE DIRECTION OF WATER FLOW THROUGH PIPING
EC10-S33
EC10-S32
EC10-B13
EC10-B18
EC10-B13A
EC10-S29
EC10-B12
EC10-B15
EC10-S30
EC10-S31
POND No. 2
EC10-B19
EC10-B10
EC10-S26
EC10-S28
EC10-B14
EC10-S24
EC10-B11A
EC10-B11
EC10-S25
EC10-S27
POND No. 3
OUTFLOW TO NEW RIVER
EC10-B20
EC10-B2
EC10-B1
EC10-B7
EC10-B22
SITE 10
EC10-B21
EC10-B5
EC10-B16
EC10-B6
EC10-B17
EC10-B3
EC10-B9
EC10-B8
EC10-S23
INFLOW FROM FACILITY
POND No. 1
EC10-B23
120
WASTEWATER TREATMENT PLANT
N
100 0 100 Feet
Background Information, IR Site 10
Figure 2
Soil Sampling Locations
NAF El Centro, Imperial County, California
Bechtel National, Inc.
CLEAN II Program
Date: 6/26/01
File No.: 208L6919
Job No.: 22214-208
Rev No.: C

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
Governor

Winston H. Hickox
Secretary for Environmental Protection

May 23, 2003

2003 JUN 20 PM 2:16
RECEIVED

Mr. Michael J. Gonzales
Remedial Project Manager
Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

SUBJECT: Solicitation for Applicable or Relevant and Appropriate Requirements (ARARs) for Installation Restoration (IR) Site 10, Sewage Stabilization Ponds, Naval Air Facility, El Centro (NAFEC), Imperial County, Facility No. 13-CR-0011

Dear Mr. Gonzales:

The California Integrated Waste Management Board (CIWMB) would like to thank-you for the opportunity to provide you with input for CIWMB ARARs pertaining to landfill closure and postclosure maintenance activities. Landfill closure appears applicable, based on the description of IR Site 10. Please find enclosed the ARARs pertaining to landfill closure and postclosure maintenance and excavation and consolidation activities.

If you have any questions please contact me at (916) 341-6359.

Sincerely,

Scott S. Humpert

Scott S. Humpert, P.E.
Waste Management Engineer
Permitting and Enforcement Division
California Integrated Waste Management Board

cc: Mr. Isaac Hirbawi, California EPA, Department of Toxic Substances Control
5796 Corporate Avenue, Cypress, CA 90630
Mr. Jim Hoyle, Naval Facilities Engineering Command, Southwest Division,
1220 Pacific Highway, San Diego, CA 92132-5190
Mr. David Virginia, California Regional Water Quality Control Board, Colorado River
Basin, 73-720 Fred Waring Drive, Suite 100, Palm Desert, CA 92206
Ms. Marie T. McCrink, Site Mitigation Program, Geologic Services Unit, Department of
Toxic Substances Control, 8800 Cal Center Drive, Sacramento, CA 95826-3269
Mr. Brad Poiriez, Imperial County Air Pollution Control District, 150 South 9th Street,
El Centro, CA 92243
Ms. Julie Yamamoto, Department of Fish and Game, Office of Spill Prevention and
Response, Sacramento, CA 95814
Mr. Bob Fischer, 1605 Third Street, Building 504, Code 45RF, Naval Air Facility El
Centro, El Centro, CA 92243-5001

Enclosure:

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 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 20931-20937 Ch. 3, Sub. 5, Article 6, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	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	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 21180 Ch. 3, Sub. 5, Article 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Postclosure Maintenance: the landfill must be maintained and monitored for no less than 30 years following closure.	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 21190 Ch. 3, Sub. 5, Article 2, Closure & Postclosure Maint. Standards for Disposal Sites and Landfills	Applicable or Relevant and Appropriate	Postclosure Land Use: Site Closure Design shall show one or more proposed uses 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.	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 & 43509	27 CCR 21800 Ch. 4, Subch. 4, Final Closure Plan Contents	Relevant and Appropriate	Provides the content requirements for closure plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after November 1990. Relevant and appropriate for closing sites that did not receive waste after November 1990	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43509	27 CCR 21830 Ch. 4, Subch. 4, Final Closure Plan Contents	Relevant and Appropriate	Provides the content requirements for postclosure maintenance plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after November 1990. Relevant and appropriate for closing sites that did not receive waste after November 1990.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43509	27 CCR 21880 Ch. 4, Subch. 4, Final Closure Plan Contents	Relevant and Appropriate	Provides the content requirements to obtain certification that the solid waste disposal sites has closed pursuant to state standards.	Applies to solid waste disposal sites that received waste after November 1990. Relevant and appropriate for closing sites that did not receive waste after November 1990	For closing sites

27 CCR - California Code of Regulations, Title 27 ARAR - applicable or relevant and appropriate requirement ROD - Record of Decision RD/RA - remedial design/remedial action

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. [illegible]	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 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. 8, 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

State of California

Memorandum

To: Mr. Jim Hoyle
Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, CA 92132-5190

Date: April 23, 2003

From: Victoria Lake
Staff Environmental Scientist
California Department of Fish and Game

Subject: **Applicable or Relevant and Appropriate Requirements (ARARs) for an Engineering Evaluation/Cost Analysis at IR Site 10, Sewage Stabilization Ponds, NAF El Centro, Imperial County, California**

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The California Department of Fish and Game's Office of Spill Prevention and Response (DFG-OSPR) received your request for applicable or relevant and appropriate requirements (ARARs) and any to-be-considered criteria, advisories, guidance or proposed standards that may apply in the upcoming engineering evaluation/cost analysis at IR Site 10, Sewage Stabilization Ponds, Naval Air Station (NAF) El Centro.

Site 10 consists of three unlined ponds that functioned as the only sewage treatment for the base until 1976. The accumulated sludge remains, and all ponds are currently dry and partially covered with local vegetation. IR Site 10 is located primarily in an alkali desert scrub habitat. No wetland areas are located within the facility perimeter, but the New River is located to the west of the site.

I have prepared the enclosed ARARs and TBCs with the assistance of the DFG-OSPR legal staff. If you have any questions regarding these ARARs and TBCs or require further details, please contact me by telephone at (916) 324-9811 or e-mail (vlake@ospr.dfg.ca.gov).

Reviewer: Wendy Johnson
Staff Attorney

Enclosure

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Aquatic habitat/species	Action must be taken if toxic materials are placed where they can enter waters of the State. There can be no release that would have a deleterious effect on species or habitat.	Fish and Game Code section 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)) which includes sewage. Additionally, this section makes it unlawful to permit or to place these substances where they can pass into waters of the state. 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 the site characterization and the affect on adjacent waters, such as the New River.
Wildlife Species	Action must be taken to prohibit the taking of birds and mammals, including the taking by poison	Fish and Game Code section 3005	This code section prohibits the taking of birds and mammals, including taking by poison. "Take" is defined by Fish and Game Code section 86 to include killing. "Poison" is not defined in the code, but the Contaminants of Concern may be considered poisons when present at certain levels. Although there is no state authority on this point, federal law recognizes that poison, such as Strychnine, may effect 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.

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Rare native plants	Action must be taken to conserve native plants, there can be no releases and/or actions that would have a deleterious effect on species or habitat.	Fish and Game Code section 1900 *et seq.*	These code sections make provisions concerning native plants protection, including: criteria for determining endangered plant species; designation of endangered plants by the Fish and Game Commission; research by the Department; takings by the Department for scientific or propagation purposes; other prohibitions on takings; exercise of enforcement authority; arrests and confiscation; carrying out of plant conservation programs by other state departments and agencies; and unauthorized public agency regulations pertaining to agriculture. Sections 1900, 1901, 1904, 1905, 1906, 1907, 1909, 1910, 1911, 1912, and 1913 are procedural or administrative in nature and do not impose any substantive requirements. Section 1908 imposes a substantive requirement by forbidding any "person" to take rare or endangered native plants. Fish and Game Code section 67 provides the definition of "person" as any natural person or any partnership, corporation, limited liability company, trust, or other type of association. Whether the federal government or contractors acting on behalf of the federal government would fall within that definition is a potential issue. To the extent that there are rare or endangered plants on Naval Air Facility (NAF) El Centro Site 10 and proposed activities result in direct or indirect disturbance to these species, Section 1908 would be an ARAR. A detailed botanical survey should be completed to determine the presence or absence of such species.

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Endangered Species/habitat	Criteria to be considered in Standard for Fish and Game Code section 2080	Fish and Game Code section 2050-2068; 2070-2079	These code sections comprise Article 1 and Article 2 of chapter 1.5 of the California Endangered Species Act. These sections make declarations of policy and provide definitions, and do not impose any substantive requirements. We ask that these sections be considered to the extent that Fish and Game Code section 2080 is an ARAR (as noted below).

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
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 and Game Code section 2080	This section prohibits the take, possession, purchase or sell within the state of any species (including rare native plant species), or any product thereof, that the commission determines to be an endangered or threatened species, or the attempt of any of these acts. This section is applicable and relevant to the extent that there are endangered or threatened species in the area which have the potential of being affected if actions are not taken to conserve the species. This section prohibits releases and/or actions that would have a deleterious effect on species or their habitat. This section and applicable Title 14 regulations should be considered as ARARs. *California Code of Regulations Title 14 sections 670.2* provides a listing the plants of California declared to be Endangered, Threatened or Rare. *California Code of Regulations Title 14 section 670.5* provides a listing of Animals of California declared to be endangered or threatened. *California Code of Regulations Title 14 section 783 et. seq.*, provides the implementation regulations for the California Endangered Species Act. A detailed biological survey of the area of potential effect should be completed to determine the presence of relevant species. The Yuma clapper rail, for example is listed as threatened under the California Endangered Species Act, and is known to occur within five miles of NAF El Centro. Additionally, the burrowing owl and flat-tailed horned lizard are considered California Special Concern species that are recorded as occurring in the vicinity (CDFG's California Natural Diversity Data Base 2003).

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Fully protected bird species/habitat	Action must be taken to prevent the taking of fully protected birds	Fish and Game Code section 3511	This section provides that it is unlawful to take or possess any of the following fully protected birds: (a). American peregrine falcon (b). Brown pelican (c). California black rail (d). California clapper rail (e). California condor (f). California least tern (g). Golden eagle (h). Greater sandhill crane (i). Light footed clapper rail (j). Southern bald eagle (k). Trumpeter swan (l). White-tailed kite (m). Yuma clapper rail This statute should be considered Applicable and Relevant to the extent that such fully protected birds or their habitat are detected on or near the site. Yuma clapper rail is known to occur within five miles of NAF El Centro (CDFG's California Natural Diversity Data Base 2003).
Migratory Non-game Birds	Actions must be taken to prevent the take or possession of any migratory nongame birds	Fish and Game Code section 3513	This section prohibits the take or possession of any migratory nongame bird as designated in the Migratory Bird Treaty Act, *16 U.S.C. sections 3371-3378; 50 C.F.R. section 10.13*, or any part of such migratory nongame bird, except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act. This section is Applicable and Relevant, unless one of the rules and regulations adopted by the Secretary of the Interior exempt the activity and to the extent that this code section is more stringent than the Migratory Bird Act found at *16 U.S.C. section 3371.*

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

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 that 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 wetland vegetation criteria, and requires the presence of at least one of these criteria (rather than all three) in order to classify an area as a wetland. The background information provided states that there are no wetland areas located within the facility perimeter. However, if wetlands are identified during future biological surveys, or project activities are determined to have potential to affect the New River to the west of the facility, this policy would apply. This policy is not a regulatory program and should be included as a TBC.
Birds of Prey	Action must be taken to prevent the take, possession, or destruction of any birds-of prey or their eggs	Fish and Game Code section 3503.5	This section prohibits the take, possession, or destruction of any birds in the orders of Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto. This section will be applicable and relevant to the extent that such species or their eggs are located on or near NAF El Centro.
Nongame birds	Actions must be taken to prevent the take of nongame birds.	Fish and Game Code section 3800	This section prohibits the take of nongame birds, except in accordance with regulations of the commission, or when related to mining operations with a mitigation plan approved by the department. This section further provides requirements concerning mitigation plans related to mining. This section is applicable and relevant to the extent that nongame birds or their eggs are located on or near the site and such species have not been included in the fish and wildlife conservation plan filed pursuant to the Federal Fish and Wildlife Conservation Act. Species included in the plan will be protected at the federal standard making this section an ARAR to the extent that it is more stringent than the federal standard of protection.

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Protected Ampibians and Reptiles	Action must be taken to avoid the take or possession of protected amphibians and reptiles	14 C.C.R. sections 40, 41, and 42	This section makes it unlawful to capture, collect, intentionally kill or injure, possess, purchase, propagate, sell, transport, import or export any native reptile or amphibian, or part thereof, except as provided in this chapter. Chapter 2 of this subdivision relating to sportfishing and frogging, sections 650, 670.7, or 783 of these regulations, or as otherwise provided in the Fish and Game Code or these regulations. For the purposes of this section, 'intentionally kill or injure' does not include death or injury that occurs incidental to an otherwise lawful activity. This section does not prohibit the capture, temporary collection or temporary possession of native reptiles and amphibians done to avoid mortality or injury in connection with such activities. The live capture and release of native reptiles as defined in Fish and Game Code section 5060, done to avoid such death or injury, may occur only with the department's written approval.
Furbearing Mammals	Action must be taken to avoid take	Title 14 C.C.R. section 460	Regulation makes it unlawful to take fisher, marten, river otter, desert kit fox, and red fox. NAF El Centro is within the range of desert kit fox; to the extent that any of these species are found in or near Site 10 this section is an ARAR.

CALIFORNIA DEPARTMENT OF FISH AND GAME
LOCATION AND ACTION SPECIFIC ARARs AND TBCs FOR NAVAL AIR FACILITY (NAF) EL CENTRO

LOCATION	STANDARD	SPECIFIC CITATION	ARAR/TBC EXPLANATION
Fully Protected Fish	Actions must be taken to prevent the take or possession of any fully protected fish species.	Fish and Game Code section 5515	This section prohibits the take or possession of fully protected fish or parts thereof. The following are fully protected fish: (a) Colorado River squawfish (b) Thicktail chub (c) Mohave chub (d) Lost River sucker (e) Modoc sucker (f) Shortnose sucker (g) Humpback sucker (h) Owens River pupfish (i) Unarmored threespine stickleback (j) Rough sculpin This section is applicable, relevant and appropriate to the extent that such fish species or their habitat are located near the site (e.g., in the New River), and may be affected by remedial cleanup activities.

California Regional Water Quality Control Board

Colorado River Basin Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
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Gray Davis
Governor

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May 9, 2003

Mr. James Hoyle
Remedial Project Manager, Code 5DEN.JH
Naval Facilities Engineering Command
Southwest Division
1220 Pacific Highway
San Diego, CA 92132-5190

RE: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARAR's) FOR AN ENGINEERING EVALUATION/COST ANALYSIS AT IR SITE 10, SEWAGE STABILIZATION PONDS, NAVAL AIR FACILITY, EL CENTRO, CALIFORNIA.

This letter is in response to your request to the California Regional Water Quality Control Board (CRWQCB) to identify potential State chemical-specific, action-specific, and location-specific ARAR's for a proposal to conduct a non-time critical removal action at IR site 10, as well as any other criteria, advisories, guidance, and proposed standards that the State deems as To Be Considered (TBC) at the site.

As described in your letter dated April 7, 2003, the Navy is currently preparing an Engineering Evaluation/Cost Analysis (EE/CA) for the purpose of conducting the removal action to reduce the level of contaminants in the soil. Consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, Board staff can only provide a preliminary list of potential chemical, action, and location specific ARAR's based on information previously provided. Additional ARAR's and TBC's would be provided upon submittal and review of the initial screening of alternatives, in this case the EE/CA. As the proposed removal action is not expected to address groundwater at the site, the list of ARAR's is expected to be minimal.

Enclosure 1 summarizes the initial ARAR's tentatively identified for Site 10. No chemical- or location specific ARAR's have been documented. Should you have any questions regarding this information, please contact me at (760) 776-8973.

David Virginia

DAVID VIRGINIA
Environmental Scientist (B)
DoD Program Manager

Enclosure (1)

cc: Mr. Robert Fischer, NAF El Centro
Mr. Issac Hirbawi, DTSC

DV/hs

File: DoD NAF El Centro, Site 10

POTENTIAL STATE ACTION-SPECIFIC ARAR'S

Requirement	Prerequisites	Citation	ARAR Determination	Comments
California Code of Regulations				
Regulation of siting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment, storage, or disposal, including lanfills, surface impoundments, waste piles, and land treatment facilities. Wastes regulated include hazardous waste, designated waste, nonhazardous waste, and inert waste.	Waste management unit	Title 27 CCR, Division 2, Chapter 3, Subchapter 2, Article 2, Section 20210; Article 3, Section 20240-; 20260; Subchapter 4, Article 4, Section 20870	Applicable	Applicable because Site 10 wastes are potential hazardous and/or designated waste.
New waste piles shall comply with construction standards.	Waste pile used to store hazardous or designated waste.	Title 27 CCR, Division 2, Chapter 3, Subchapter 2, Article 4.	Relevant and appropriate.	Relevant and appropriate for removal alternatives that require temporary storage of excavated soil prior to treatment and/or disposal.
Class I and Class II waste piles shall be covered as necessary to prevent percolation of precipitation through waste.	Waste pile used to store hazardous or designated waste.	Title 27 CCR, Division 2, Chapter 3, Subchapter 2, Article 4, Section 20365.	Applicable	Applicable because removal action at Site 10 potentially involves temporary storage of hazardous or designated waste in a waste pile.
Closure requirements for surface impoundments, waste piles, and land treatment facilities.	Waste pile.	Title 27 CCR, Division 2, Chapter 3, Subchapter 5, Article 3, Sections 21400, 21410, and 21420.	Not an ARAR	Less stringent than federal ARAR's at RCRA.
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 Title27/Title23 performance goals may be considered. Establishes corrective action requirements for responding to discharges to land, including spills and leaks and other unauthorized discharges.	Waste discharged to land.	Title 27, CCR, Division 2, Subdivision 1, Section 20080 et seq. Title 23, CCR, Division 3, Chapter 15, Section 2510 et seq.	Applicable	Provisions of Title 27 apply to designated and non-hazardous waste. Provisions of Title 23 apply to hazardous waste.

POTENTIAL STATE ACTION-SPECIFIC ARAR'S

Requirement	Prerequisites	Citation	ARAR Determination	Comments
Action taken by public agencies to clean up unauthorized releases are exempt from Title 27/ Title 23 except that wastes removed from immediate place of release and discharged to land must be managed in accordance with classification (Title 27 CCR, Section 20200/Title 23, CCR, Section 2520) and sitting requirements of Title 27 or Title 23 and wastes contained or left in place must comply with Title 27 or Title 23 to the extent feasible.	Waste discharged to land.	Title 27, CCR, Section 20090(d) Title 23, CCR, Section 2511(d)	Applicable	Applies to remediation and monitoring of sites.
Requires general soil, surface water, and ground water monitoring.	Waste discharged to land.	Title 27, CCR, Section 20415 Title 23, CCR, Section 2550.7	Applicable	Applies to all areas at which waste has been discharged to land.
Requires an assessment of the nature and extent of the release, including a determination of the spatial distribution and concentration of each constituent.	Unauthorized release to land.	Title 27, CCR, Section 20425 Title 23, CCR, Section 2550.9	Applicable	Applies to areas at which monitoring results show statistically significant evidence of a release.
Requires a final cover constructed in accordance with prescriptive standards, to be maintained as long as wastes pose a threat to water quality.	Waste discharged to land.	Title 27, CCR, Section 21090	Applicable	Applicable to wastes contained or left in place at the end of any remedial actions that could affect water quality. Includes closure of landfills and other areas where wastes have been discharged to land.
			Relevant and Appropriate	Relevant and appropriate for "closed, inactive, or abandoned" landfills and other areas where wastes have been discharged to land and water quality is threatened.
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 also be required. Also requires monitoring to determine the effectivness of the corrective action.	Unauthorized release to land.	Title 27, CCR, Section 20430 Title 23, CCR, Section 2550.1	Applicable	Applies to groundwater remedial actions or remedial actions that affect groundwater quality.

POTENTIAL STATE ACTION-SPECIFIC ARAR'S

Requirement	Prerequisites	Citation	ARAR Determination	Comments
State Water Resources Control Board and Regional Water Quality Control Board				
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 Title 22, CCR Section 12000 et seq.	Excavation of contaminated soil.	Safe Drinking and Toxic Enforcement Act of 1986 (Proposition 65), California Health and Safety Code, Division 20	TBD	
Establishes policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste that affect or could threaten water quality. It requires cleanup of all waste discharged and restoration of affected water to background conditions. It requires actions for cleanup and abatement to conform to Resolution 68-16 and applicable provisions of Title 27, CCR, Division 3 as feasible.	Excavation of contaminated soil.	SWRCB Resolution 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304) (Water Code Section 13307)	TBD	
California Health and Safety Code, Chapter 6.8				
Except as provided in subdivision (h), the department, or, if appropriate, the regional board shall prepare or approve remedial action plans for all sites listed pursuant to Section 25356.	Removal action is planned	Section 25356.1.(b)	Applicable	Applicable if a removal action is planned.
A remedial action plan is not required if the conditions present at the site present and imminent or substantial endangerment to the public health and safety or to the environment, or if the estimated cost of the removal action is less than $1 million.	Removal action is planned.	Section 25356.1.(h)(1)	Applicable	Applicable if removal action is projected to cost less than $1 million.

POTENTIAL STATE ACTION-SPECIFIC ARAR'S

Requirement	Prerequisites	Citation	ARAR Determination	Comments
The department or a regional board shall prepare or approve a removal action work plan for all sites where a non-emergency removal action is proposed and where a remedial action plan is not required.	Non-emergency removal action is planned.	Section 25356.(h)(1)	Applicable	Applicable if a non-emergency removal action is planned and a remedial action plan is not required.
"Removal action work plan" means a work plan prepared or approved by the department or a California Regional Water Quality Control Board which is developed to carry out a removal action in an effective manner, which is protective of the public health and safety and the environment. The removal action work plan shall include a detailed engineering plan for conducting the removal action, a description of the onsite contamination, the goals to be accomplished by the removal action, and any alternative removal options that were considered and rejected and the basis for that rejection.	Removal action is planned for which a removal action work plan is not required.	Section 25323.1	Relevant and appropriate.	Relevant and appropriate content requirements for the Engineering Evaluation/Cost Analysis.

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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May 14, 2003

Mr. Bob Fischer
Installation Restoration Program Manager
1605 Third Street, Building 504, Code 45RF
Naval Air Facility El Centro
El Centro, California 92243-5001

REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR INSTALLATION RESTORATION (IR) SITE 10, SEWAGE STABILIZATION PONDS, NAVAL AIR FACILITY EL CENTRO (NAFEC), IMPERIAL COUNTY, CALIFORNIA

Dear Mr. Fischer:

The Department of Toxic Substances Control (DTSC) received a request from the Navy to identify potential State chemical-specific, action-specific, and location-specific ARARs for an Engineering Evaluation/Cost Analysis (EE/CA) at IR Site 10 – Sewage Stabilization Ponds.

The ARARs submittal process is an open process and modifications to ARARs through out the site clean-up is possible. These ARARs need to be re-evaluated and analyzed according to the selected remedy in the FS report. Our understanding is that the Integrated Waste Management Board, Imperial County Air Pollution Control District, Department of Fish and Game and from the Regional Water Quality Control Board will submit ARARs directly to the Navy. DTSC's ARARs are attached.

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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We are looking forward to working with you to expedite the remedial activities at NAFEC. If you have any questions, please contact me at (714) 484-5445 or at *ihirbawi@dtsc.ca.gov*.

Sincerely,

Isaac Hirbawi
Hazardous Substances Engineer
Federal Facilities Unit A
Office of Military Facilities
Southern California Region

Enclosure

cc: Mr. Mike Gonzales
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Mr. Brad Poiriez
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El Centro, California 92243

Ms. Julie Yamamoto
Senior Toxicologist
Depatment of Fish and Game
Office of Spill Prevention and Response
Sacramento, CA 95814

CHEMICAL SPECIFIC ARARS

REQUIREMENT	PREREQUISITES	CITATION	ARARs DETERMINATION	COMMENTS
Resource Conservation and Recovery Act				
Definition of RCRA hazardous waste	Waste Soil	T22 CCR Sections 66262.21 Sections 66262.22 Sections 66262.23 Sections 66262.24 Sections 66262.100	Applicable	Applicable for determining waste characteristics of excavated soil.
RCRA Air Emissions Requirements				
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 by weight	T22 CCR Section 66264.1030 thru Section 66264.1034 Section 66264.1050 thru Section 66264.1063	Applicable	
Definition of non-RCRA hazardous waste.	Waste soil	T22 CCR Section 66261.22 Section 66261..24 Section 66261.101 Section 66261.3	Applicable	Applicable for determining whether excavated soil is a non-RCRA hazardous waste.
State maximum contaminant level list.	Public water system	T22 CCR Section 684435 Section 64444.5		

LOCATION SPECIFIC ARARS

LOCATION	REQUIREMENT	PREREQUISITES	CITATION	ARARs DETERMINATION	COMMENTS
Migratory Bird Treaty Act of 1972					
Migratory bird area	Protects almost all species of native birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds	16 USC Section 703		
Hazardous Waste Control Act					
Within 61 meters (200 meters) of a fault displaced in Holocene time	New treatment, storage, or disposal of hazardous waste prohibited	Treatment, storage, or disposal of hazardous wasete	T22 CCR Section 66264.18		Proximity to fault line
National Historic Preservation Act of 1992, as amended , Section 106					
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			

California Environmental Protection Agency
Department of Toxic Substances Control

ACTION-SPECIFIC ARARS

Resource Conservation and Recovery Act 42 USC 6901 et seq.

ACTION	REQUIREMENT	PREREQUISITES	CITATION	ARAR DETERMINATION A[c]	RA[d]	TBC[e]	COMMENTS
On site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generation of waste in California.	22 CCR, 66262.10(a), 66262.11				
Hazardous waste accumulation	Generator may accumulate waste on-site for 90 days or less or must comply with requirements for operating a storage facility.	Accumulation of hazardous waste.	22 CCR Section 66262.34				

ACTION	REQUIREMENT	PREREQUISITES	CITATION	ARAR DETERMINATION A[c]	RA[d]	TBC[e]	COMMENTS
Waste pile	Design and operating requirements for waste piles. Use a single liner and leachate collection system, unless exempted. Controls for run-on, runoff, and fugitive emissions required.	Noncontainerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	22 CCR 66264.251				
Closure of waste piles	At closure, owner shall remove or decontaminate all waste residues contaminated containment system components, contaminated sub soils, and structures and equipment contaminated with waste and leachate; owner shall manage all such waste as hazardous waste.	Waste pile used to store hazardous waste.	22 CCR 66264.258(a) and (b)				

Closure with no post closure care (e.g., clean closure)	General performance standard requires elimination of need for further maintenance and control; elimination of post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products; removal or decontamination of all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate; and management of all such waste as hazardous waste, as necessary.	Land-based unit containing hazardous waste. Hazardous waste placed at site after the effective date of the requirements, or placed into another unit. Cleanup to health-based standards that will not require long-term management. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated *in situ*, or consolidated within area of contamination.	22 CCR 264.111 and 22 CCR 264.114		
Treatment of hazardous excavated soil	Establishes requirements for the owners and operators of facilities that treat hazardous wastes by chemical, physical, or biological methods in other than tanks, surface impoundments, and land treatment facilities .	Hazardous waste treatment.	22 CCR 66264.600 thru 66264.603		
Placement of waste in land-disposal unit	Attain land-disposal treatment standards before putting waste into landfill in order to comply with land-ban restrictions.	Placement of hazardous waste in a landfill, surface impoundment, waste	22 CCR 66268.40; 22 CCR 66268.105		

		Pile, injection well, land treatment facility, salt dome formation, or underground mine or cave.			
Shipment of hazardous waste to off-site landfill	Generator notification and certification requirements.	Shipment of hazardous waste subject to land-disposal restrictions.	22 CCR 66268.7		
Use of equipment that contacts hazardous waste with organic concentrations greater than 10 percent by weight	Air emission standards for process equipment leaks.	Specified equipment that contains or contracts hazardous waste with organic concentrations of at least 10 percent by weight.	22 CCR 66264.1050 through 1063		
Discharge to groundwater from regulated unit	Owners/operators of hazardous waste treatment, storage, or disposal facilities must comply with groundwater protection standards designed to assure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for chemicals of potential concern in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Uppermost aquifer underlying a waste management unit beyond the point of compliance; hazardous waste, treatment, storage, or disposal.	22 CCR 66264.94(a),(b),(c),(d),(e),(f), and (g)		

150 SOUTH NINTH STREET
EL CENTRO, CA 92243-2850

AIR POLLUTION CONTROL DISTRICT

TELEPHONE: (760) 482-4606
FAX: (760) 353-9904

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January 7, 2003

Mr James S Hoyle
Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, CA 92132-5190

RE: Imperial County Air Pollution Control District (ICAPCD) Comments on Request for Application for Relevant and Appropriate Requirements for a Remedial Investigation/Feasibility Study at IR Site 2, Patrol Road Landfill, NAF El Centro, Imperial County, California

Department of the Navy is conducting a Remedial Investigation/Feasibility Study at Installation Restoration Site 2, the Patrol Road Landfill, located at Naval Air Facility (NAF) El Centro, California The objective of this project is to collect sufficient information to assess the nature and extent of contamination, evaluate risks associated with any contamination, and if the site poses unacceptable risks to human health and the environment, identify an appropriate response action

Based on our preliminary review of the Project Description and List of Potential Remedial Actions Installation Restoration Site 2, Patrol Road Landfill, submitted, the ICAPCD has identified the following District Rules that could potentially apply to your project This of course depends on the final alternative chosen by the Department of the Navy Once an application is submitted to this office, a more precise review can be conducted

REGULATION I - GENERAL PROVISIONS
RULE 101 DEFINITIONS

REGULATION II - PERMITS

RULE 201 PERMITS REQUIRED
RULE 202 EXEMPTIONS
RULE 203 TRANSFER
RULE 206 PROCESSING OF APPLICATIONS
RULE 207 NEW AND MODIFIED STATIONARY SOURCE
RULE 208 PERMIT TO OPERATE
RULE 216 CONSTRUCTION OR RECONSTRUCTION OF MAJOR STATIONARY SOURCES THAT EMIT HAZARDOUS AIR POLLUTANTS

REGULATION IV - PROHIBITIONS

RULE 400 FUEL BURNING EQUIPMENT - OXIDES OF NITROGEN
RULE 401 OPACITY OF EMISSIONS
RULE 403 GENERAL LIMITATIONS ON THE DISCHARGE OF AIR CONTAMINANTS
RULE 405 SULFUR COMPOUNDS EMISSION STANDARDS, LIMITATIONS, AND PROHIBITIONS
RULE 407 NUISANCES
RULE 426 CUTBACK ASPHALT AND EMULSIFIED PAVING MATERIALS

REGULATION VIII - FUGITIVE DUST REQUIREMENTS

RULE 800 FUGITIVE DUST REQUIREMENTS FOR CONTROL OF FINE PARTICULATE MATTER (PM-10)

REGULATION XI - NEW SOURCE PERFORMANCE STANDARDS

RULE 1101 NEW SOURCE PERFORMANCE STANDARDS (NSPS)
40 CFR Part 60, Subpart WWW, Standards of Performance for Municipal Waste Landfills (incorporated by reference).

If you have any questions regarding this letter, please contact the undersigned at (760) 482- 4606.

Sincerely,

Reyes Romero
Deputy Air Pollution Control Officer

cc: Brad Poiriez, APC Senior Manager

LIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LORADO RIVER BASIN • REGION 7
0 FRED WARING DR., SUITE 100
M DESERT, CA 92260
(760) 346-7491
(760) 341-6820

98-07-07 A07:07 IN

June 30, 1998

Mr. Fred Rivera
Installation Restoration Program Manager
Public Works Department (Code 341)
Naval Air Facility El Centro
El Centro, California 92243-5001

RE: **Beneficial Use Designation**

The Colorado River Basin Water Quality Control Plan (i.e. Basin Plan) designates beneficial uses for ground and surface waters in the Colorado River Basin Region. The Naval Air Facility at El Centro (NAFEC) is located within the Imperial hydrologic unit. The designated beneficial uses for the Imperial hydrologic unit include municipal and industrial (Table 2-5, Colorado Basin Plan). Please note that the municipal usage is limited to a small area of the Imperial hydrologic groundwater unit.

Currently, the upper aquifer at NAFEC has no known beneficial use. This is due to the poor quality of the groundwater (total dissolved solids commonly exceeds 3000 mg/l), and low aquifer yield.

For further information, please refer to the Colorado River Basin Water Quality Control Plan.

Joan Stormo
JOAN STORMO
Associate Engineering Geologist

JS/hs

File: DoD, NAFEC

cc: Mr. Richard Hubbell, DTSC, Cypress
Mr. Michael Riley, SW Div., San Diego

DUPLICATE

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To GREG CAGLE	From MIKE RILEY
Dept./Agency BNI	Phone # (619) 532-3686
Fax # 687-8787	Fax # (619) 532-1242

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

TOTAL P.01

California Regional Water Quality Control Board

Colorado River Basin Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
73-720 Fred Waring Drive, Suite 100, Palm Desert, California 92260
Phone (760) 346-7491 • FAX (760) 341-6820

Gray Davis
Governor

RECEIVED
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January 24, 2003

Mr. James Hoyle
Remedial Project Manager Code 5DEN.JH
Department of the Navy
Southwest Division, NAVFACENGCOM
1220 Pacific Highway
San Diego, CA 92132-5190

RE: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR A REMEDIAL INVESTIGATION/FEASIBILITY STUDY AT IR SITE 2, PATROL ROAD LANDFILL, NAVAL AIR FACILITY, EL CENTRO, IMPERIAL COUNTY, CALIFORNIA.

The Regional Water Quality Control Board, Colorado River Basin Region 7, received a request from the United States Navy to identify potential State chemical specific, action specific, and location specific ARAR's (Applicable or Relevant and Appropriate Requirements) for a Remedial Investigation/ Feasibility Study at IR Site 2, Patrol Road Landfill, on December 23, 2002. Board staff has reviewed the final RI/FS work plan submitted to the Regional Board office as well as ARAR's previously identified for this site.

Potential Regional Board ARAR's for this site are attached. Please note that this list is in addition to those ARAR's previously identified for IR Site 2 in conjunction with an Engineering Evaluation/Cost Analysis performed in 1998. The ARAR submittal process is an open process and modifications or additions to the list throughout the site clean up are possible. The identified ARAR's need to be re-evaluated and analyzed pursuant to the selected remedy, which is still to be determined.

Please note that in 1998, Chapter 15 and Title 14 of the California Code of Regulations (CCR) were combined and formed into Title 27, CCR. Therefore, citations that refer to Chapter 15 in the ARAR's identified during the EE/CA have been amended and included with our submission of ARAR's to reflect this change, although the requirements and prerequisites remain the same.

Additionally, on page 3 of enclosure 1, Project Description and List of Potential Remedial Actions Installation Restoration Site 2, Patrol Road Landfill, NAF El Centro, the following statement is included in the discussion of groundwater: "....the Colorado River Basin Region of the California Regional Water Quality Control Board has determined that the shallow groundwater beneath NAF El Centro is not a potential source of drinking water and has no known beneficial use". Please be aware that in the Imperial Valley Hydrologic Unit, which includes NAF El Centro, the groundwater has been designated as having municipal, industrial, and agricultural beneficial uses, although it is recognized that the groundwater located beneath NAF El Centro is generally poor due to low aquifer yields and high concentrations of total dissolved solids (TDS), and is therefore not designated as a potential source of drinking water.

Should you have any questions regarding this submission, please contact either myself, at 760-776-8945, or David Virginia, DoD Program Manager, at 760-776-8973.

FOR
LIANN CHAVEZ, R.G.
Senior Engineering Geologist

Enclosures: (1) Potential State Applicable or Relevant and Appropriate Requirements
(2) Amended State Applicable or Relevant and Appropriate Requirements

cc: Mr. Mike Gonzales, SWDIV
Mr. Robert Fischer, NAF El Centro
Mr. Issac Hirbawi, DTSC
Mr. Scott Humpert, CIWMB
Ms. Marie McCrink, DTSC GSU
Mr. Brad Poiriez, ICAPCD
Ms. Julie Yamamoto, DFG

LC/dv

File: DoD NAF El Centro (IR Site 2)

POTENTIAL STATE ACTION SPECIFIC ARAR'S

ACTION	REQUIREMENT	PREREQUISITE	CITATION	COMMENTS
Removal action	Except as provided in subdivision (h), the department, or, if appropriate, the regional board shall prepare or approve remedial action plans for all sites listed pursuant to Section 25356.	Removal action	California Health and Safety Code, Chapter 6.8 Section 25356.1.(b)	Applicable if a removal action is chosen as the selected remedy for this site.
Removal action	A remedial action plan is not required if conditions present at the site present an imminent or substantial endangerment to the public health and safety or to the environment, or if the estimated cost of the removal action is less that $ 1 million.	Removal action	California Health and Safety Code, Chapter 6.8 Section 25356.1.(h)(1)	Applicable if the removal action is projected to cost less than $1 million.
Removal action	The department or a regional board shall prepare or approve a removal action work plan for all sites where a non-emergency removal action is proposed and where a remedial action plan is not required.	Removal action	California Health and Safety Code, Chapter 6.8 Section 25356.1.(h)(1)	Applicable if a non-emergency removal action is selected remedy and a remedial action plan is not required.

ACTION	REQUIREMENT	PREREQUISITE	CITATION	COMMENTS
Removal action	"Removal Action Workplan" means a work plan prepared or approved by the department or a California Regional Water Quality Control Board which is developed to carry out a removal action in an effective manner, and which is protective of the public health and safety of the environment. The removal action work plan shall include a detailed engineering plan for conducting the removal action, a description of the onsite contamination, the goals to be achieved by the removal action, and any alternative removal options that were considered and the basis for their rejection.	Removal action planned for which a removal action work plan is required.	California Health and Safety Code, Chapter 6.8 Section 25323.1	Relevant and appropriate requirements if removal action is the selected remedy for this site.

AMENDED POTENTIAL STATE ACTION SPECIFIC ARAR'S

ACTION	REQUIREMENT	PREREQUISITE	CITATION	COMMENT
California Code of Regulations, Title 27				
Disposal of excavated soil in a land based unit	Regulates sitting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment, storage, or disposal, including landfills, surface impoundments, waste piles, and land treatment facilites. Wastes regulated include hazardous waste, designated waste, nonhazardous waste, and inert waste.	Waste management unit	Title 27 CCR, Division 2, Subdivision 1, Chapter 1 Section 20080-90, Ch. 2 Sec. 20163-64, Ch. 3 Sec. 20200-230, 20380-20435, 20950, and 21090 as appropriate.	Applicable because Site 2 waste is potentially hazardous and/or designated waste.
Post-closure maintenance of landfill	Postclosure maintenance requirements, including maintenance of final cover and slope, landfill gas and leachate mitigation (as necessary), groundwater monitoring, and site security, for a minimum of 30 years. Restriction on post closure and land use.	Closed landfill	Title 27, CCR, Division 2, Chapter 3, Subchapter 5, Article 1, Section 20950, Article 2, Section 21090 Chapter 4, Subchapter 3, Article 4, Section 21710-21769	Applicable to post closure care of Site 2.

APPENDIX C

SUPPORTING COST INFORMATION

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ACRONYMS/ABBREVIATIONS

EE/CA	engineering evaluation/cost analysis
IR	Installation Restoration (Program)
O&M	operation and maintenance
OMB	Office of Management and Budgeting
RACER™	Remedial Action Cost Engineering and Requirements
U.S. EPA	United States Environmental Protection Agency

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Appendix C
SUPPORTING COST INFORMATION

The cost estimates presented in this Engineering Evaluation/Cost Analysis (EE/CA) Report were prepared following United States Environmental Protection Agency (U.S. EPA) technical guidance (U.S. EPA 2000) and the National Oil and Hazardous Substances Contingency Plan. Remedial Action Cost Engineering and Requirements System (RACER™) 2004 was the primary source of cost data. Costs for site-specific or unique line items were based on vendor quotes, other cost estimates, or cost information from other site assessment and removal/remedial activities conducted at Naval Air Facility El Centro. Microsoft® Excel spreadsheets were used to tabulate costs on an annual basis and calculate present values in 2004 dollars. These order-of-magnitude cost estimates are solely for comparing alternatives in this EE/CA report and should not be used for budgeting or planning.

C1 DESCRIPTION OF RACER

RACER cost models are based on generic engineering solutions for environmental projects, technologies, and processes. The generic engineering solutions were derived from historical project information, government laboratories, construction management agencies, vendors, contractors, and engineering analysis. The software used for estimating cost, RACER 2004, incorporates the most up-to-date engineering practices and procedures to accurately reflect current removal/remediation processes and pricing. When an estimate is developed in RACER, generic engineering solutions are customized by adding site-specific parameters to reflect project-specific conditions and requirements. The tailored plan is then translated into specific work items, priced using the current cost data. RACER incorporates and summarizes cost by the code of accounts that was developed by the interagency Cost Estimating Group for Hazardous, Toxic, and Radiological Waste Remediation.

Included in the capital costs developed by RACER are estimates for professional labor support to the remedial action and indirect costs. Calculation of this support is based on the technology employed, and includes construction oversight and preparation of work plans (e.g., health and safety, sampling, and quality control). Indirect cost estimates for the remedial action include items such as sales tax on purchased items, contractors' overhead, contractors' profit, bonds, and insurance costs. Engineering, another indirect cost item, varies for each alternative depending on the complexity of the remedial action.

The cost estimates presented have an accuracy of -30 to +50 percent. It is important to note that costs prepared at this stage of a project can increase during final design and/or implementation. Such escalation is usually a result of scope changes that cannot be explicitly defined because complete, accurate, and detailed information is unavailable when the EE/CA report is prepared. Contingency allowances have therefore been added to the capital and operation and maintenance (O&M) costs at a rate of 20 percent to cover increases that may occur as a result of scope-related uncertainties.

C2 COST-ESTIMATE COMPONENTS

Cost estimates for the removal action alternatives include capital costs, O&M costs, and contingency allowances. A description of these cost categories is provided below.

C2.1 Capital Costs

Capital costs consist of direct and indirect costs. Direct costs include expenditures incurred for equipment, labor, and materials to develop, construct, and implement a remedial action. Indirect costs include all other expenses necessary to support the construction that cannot be directly associated with a specific equipment item or remedial activity. Indirect costs may include the following:

- health and safety items
- permitting and legal fees
- contractor overhead and profit

These indirect expenditures are included in the detailed cost analysis either as separate line items or as a percentage of the direct capital cost.

C2.2 Operation and Maintenance Costs

O&M costs refer to those postconstruction items necessary to assure the continued effectiveness of a removal action. Typical O&M expenses include power, operating labor, consumable materials, purchased services (such as laboratory services), equipment replacement, maintenance, site inspections, annual reports, and periodic site reviews.

C2.3 Contingency Allowances

Contingency allowances are assumed to be 20 percent of the cost of each alternative. As noted in Section C.1, contingency allowances have been added to the EE/CA-level cost estimates to account for uncertainties in project scope. The size of the contingency allowance would be expected to decrease as cost estimates are prepared during subsequent phases of design, after a removal alternative has been selected and is proceeding toward implementation.

C3 PRESENT VALUE

Present value is calculated using present-worth analysis, a method of evaluating alternative removal action solutions when expenditures occur over different times. The costs for the various removal action alternatives can be compared on the basis of a single figure for each alternative by discounting all future costs to a common year. This single figure—the present value—represents the amount of money which, if invested in the initial year of a remedial action and disbursed as needed, would be sufficient to cover all costs associated with that alternative.

The present worth of expenditures occurring over the life of a removal action is determined using the formula:

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where

PW = present worth
x_t = escalated expenditures for the remedial action in year t (the escalation rate is assumed to be 0 percent per year for this EE/CA)
i = annual interest or discount rate (using real discount rates [adjusted for inflation] from OMB Circular A-94 Feb 2004) (U.S. EPA 2004)
t = year in which each expenditure occurs following start of construction
n = number of years following start of construction

The present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2004 (including contingency allowances). Because the alternatives may be completed at different times, the present value was calculated for each alternative on the basis of the real discount rate.

C4 GENERAL ASSUMPTIONS

Assumptions that influence the cost of implementing removal alternatives at Installation Restoration (IR) Site 10 were based on general engineering practices and the requirements of RACER when appropriate. The following general assumptions were used to develop cost estimates for each alternative in this EE/CA report.

- Total costs were calculated using a cost base of 2004 dollars.
- O&M cost would be incurred beginning in 2004 and continue thereafter as required by each alternative.
- IR Site 10 is accessible. Specialized equipment or services will not be required to complete the work.
- All operations would be conducted using U.S. EPA Level D protective clothing.
- No disposal of hazardous materials is included unless specified.
- Work plan and safety and health plan preparation, technical oversight during planning, and implementation of work are included in the cost for professional labor.
- Contingency allowances are 20 percent of capital costs, O&M costs, and periodic costs.

C5 REFERENCES

United States Environmental Protection Agency. 2000. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. Office of Solid Waste and Emergency Response (OSWER), Directive No. 9355.0-75. Washington, DC. July.

———. 2004. Appendix C (Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses) to Revision to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis. Office of Solid Waste and Emergency Response (OSWER), Directive No. 9355. 3-20. Washington, DC. February.

U.S. EPA. *See* United States Environmental Protection Agency.

APPENDIX D

AGENCY CORRESPONDENCE

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

January 20, 2005

Mr. Bob Fischer
Installation Restoration Program Manager
1605 Third Street, Building 504, Code 45RF
Naval Air Facility El Centro
El Centro, California 92243-5001

DRAFT ENGINEERING EVALUATION/COST ANALYSIS, NON-TIME CRITICAL REMOVAL ACTION FOR INSTALLATION RESTORATION (IR) SITE 10, NAVAL AIR FACILITY EL CENTRO (NAFEC), IMPERIAL COUNTY, CALIFORNIA

Dear Mr. Fischer:

The Department of Toxic Substances Control (DTSC) reviewed the Draft Engineering Evaluation/Cost Analysis (EE/CA) for Site 10 – Sewage Stabilization Ponds dated October 2004. The report was prepared to support a non-time critical removal action at IR Site 10 and describes site characteristics, removal action objectives, screening of technologies, and removal action alternatives.

IR Site 10 consists of three unlined ponds with bermed sides. The stabilization ponds functioned as the only sewage treatment for the base from the 1940s until 1976. Investigations conducted at IR Site 10 indicated the presence of priority pollutant metals, petroleum hydrocarbons, volatile organic compounds (VOCs), semi-voloatile organic compounds (SVOCs), DDE, Polychlorinated Biphenyls (PCBs), cyanide, phenol, and organolead that pose a threat to human health and the environment.

The EE/CA identifies removal action alternatives to reduce the risk to human health and ecological receptors from chemicals of potential concern in soil at IR Site 10. The proposed alternative consists of excavation of contaminated soil, offsite disposal, and backfill with berm soil. Confirmation sampling will be collected to verify that residual concentrations of all the contaminants of concern will be below target cleanup goals.

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An Action Memorandum (AM) and a Removal Action Work Plan (RAW) will be prepared by the Navy for IR Site 10 in compliance with section 25356.1 of the California Health and Safety Code. For sites where removal actions are planned and are projected to cost less than one million dollars, DTSC shall make the local community aware of the hazardous substance release site and shall prepare, or direct the parties responsible for the removal action to prepare, a community profile report to determine the level of public interest in the removal action. Based on the level of expressed interest, DTSC shall take appropriate action to keep the community informed of project activity and to provide opportunities for public comment which may include conducting a public meeting on proposed removal actions.

DTSC will conduct an environmental analysis of the project in compliance with the California Environmental Quality Act (CEQA). Please submit the Final EE/CA, AM, and RAW in order to assist DTSC to prepare the CEQA document and public notice the CEQA, AM/RAW concurrently.

We are looking forward to working with you to expedite the remedial activities at NAFEC. If you have any questions, please contact me at (714) 484-5445 or at *ihirbawi@dtsc.ca.gov*.

Sincerely,

Isaac Hirbawi
Hazardous Substances Engineer
Federal Facilities Unit A
Office of Military Facilities
Southern California Region

cc: Mr. David Virginia
Environmental Specialist 1
California Regional Water Quality
Control Board, Colorado River Basin
73-720 Fred Waring Drive, Suite 100
Palm Desert, California 92206

Mr. Scott Humpert
Associate Waste Management Engineer
California Integrated Waste Management Board
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Sacramento, California 95812

cc: Mr. Jim Hoyle
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