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Northern and Central California, Nevada, and Utah
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Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

FINAL
INSTALLATION RESTORATION SITE 14 DIOXIN NON-TIME CRITICAL REMOVAL ACTION ACTION MEMORANDUM ALAMEDA POINT, ALAMEDA, CALIFORNIA

December 7, 2001

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

µg/kg	Microgram per kilogram
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
AM	Action memorandum
AOC	Area of Concern
ARRA	Alameda Reuse and Redevelopment Authority
ARAR	Applicable or relevant and appropriate requirement
AST	Aboveground Storage Tank
BAAQMD	Bay Area Air Quality Management District
Bay Area	The San Francisco Bay Area
Bay Plan	San Francisco Bay Plan
BCDC	San Francisco Bay Conservation and Development Commission
BCT	Base Realignment and Closure Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
BSU	Bay Sediment Unit
Ca-HSC	California Health and Safety Code
Cal-EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Chemical of concern
CTO	Contract task order
CZMA	Coastal Zone Management Act
DTSC	Cal-EPA Department of Toxic Substances Control
DOT	Department of Transportation
EE/CA	Engineering evaluation and cost analysis
EBS	Environmental baseline survey
EFW	Einarson, Fowler, and Watson
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
FS	Feasibility Study
FSP	Field Sampling Plan
FTA	Fire Training Area
Ft/ft	Foot per foot
Ft/min	Foot per minute
FWBZ	First Water Bearing Zone
HHRA	Human Health Risk Assessment
IR	Installation restoration
IT	International Technology Corporation
LDR	Land disposal restriction
MLLW	Mean lower low water
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (Continued)

NPL	National Priorities List
O&M	Operations and maintenance
OU	Operable unit
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
PRP	Potential Responsible Party
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RWQCB	San Francisco Bay Regional Water Quality Control Board
SWBZ	Second Water Bearing Zone
SWBZL	Second Water Bearing Zone Lower
SWDIV	Southwest Division, Naval Facilities Engineering Command
TBC	To be considered
TCLP	Toxicity characteristic leaching procedure
TtEMI	Tetra Tech EM Inc.
USC	U.S. Code
UST	Underground storage tank

1.0 PURPOSE

The purpose of this action memorandum (AM) is to document, for the Administrative Record, the Department of the Navy's (Navy) decision to undertake a non-time-critical removal action (removal action) for chemicals of concern (COCs) in soil at Installation Restoration (IR) Site 14, Alameda Point, Alameda, California. This removal action will reduce the mass of the COC, dioxins, in the soil at IR Site 14. Dioxin is likely present in the soil as a result of activities conducted at the former Fire Training Area location in the northwestern corner of IR Site 14. The Department of Defense has the authority to undertake Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions, including removal actions, under 42 U.S. Code (USC) Section 9604, 10 USC Section 2705 and federal Executive Order 12580. Further, this removal action is consistent with: (1) the factors set forth within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR), Part 300), and (2), to the maximum extent possible, with Chapter 6.8 of the California Health and Safety Code (Ca-HSC).

The proposed removal action is excavation of dioxin-contaminated soil, off-site disposal of the excavated contaminated soil at a permitted off-site facility, and confirmation sampling to verify removal goals. The proposed action will either eliminate or reduce the relative risk that is associated with the identified pathways of exposure to COCs for potential receptors, including future residents, site and construction workers, base personnel, and ecological receptors. This removal action is anticipated to be a final remedy for dioxin-contaminated soil at IR Site 14.

2.0 SITE CONDITIONS AND BACKGROUND INFORMATION

This section describes IR Site 14, the actions conducted at this site to date, and the respective roles of the Navy, and federal, state, and local authorities. The information presented in this section was derived from various sources, including the draft Operable Unit (OU) - 2 Remedial Investigation (RI) report (TtEMI 1999) and the Environmental Baseline Survey (EBS) (International Technology Corporation [IT] 2001). Tables and figures cited appear at the end of this section.

2.1 SITE DESCRIPTION

The following sections summarize: (1) removal site evaluation, (2) physical location, (3) site characteristics, (4) release or threatened release into the environment of contaminants of concern, and (5) National Priorities List (NPL) status of IR Site 14.

2.1.1 Removal Site Evaluation

The Navy received a Remedial Action Order on June 6, 1998, from the California Department of Toxic Substances Control (DTSC). IR Site 14 was identified, along with the other IR sites, as needing a remedial investigation/feasibility study (RI/FS) in conformance with the requirements of CERCLA. In a July 6, 2000 meeting, the Navy and regulatory agencies agreed that a non-time-critical removal action should be conducted for dioxin-contaminated soil at IR Site 14. An index of documents from the Administrative Record leading to the decision to conduct removal action at IR Site 14 is included in Appendix B. Minutes from meetings between the Navy and regulatory agencies relevant to this decision are also included in Appendix B.

2.1.2 Physical Location

IR Site 14 is located at Alameda Point (formerly NAS Alameda), part of the city and island of Alameda, located in the central portion of the eastern side of the San Francisco Bay (Bay), California. IR Site 14 consists of approximately 14 acres and is located within OU-1 (formerly located within OU-2), in the northwestern portion of Alameda Point, adjacent to the Oakland Inner Harbor (see Figure 2-1). The following sections describe the meteorology, ecology, geology, and hydrogeology for Alameda Point.

2.1.2.1 Meteorology

The San Francisco Bay Area (Bay Area) experiences a maritime climate with mild summer and winter temperatures. Prevailing winds are from the west. Because of the varied topography of the Bay area, climatic conditions vary considerably throughout the region. Heavy fog occurs on an average of 21 days per year. Rainfall occurs primarily during the months of October through April. Alameda Point averages at least 18 inches of rainfall per year (U.S. Navy 1992). No naturally occurring surface streams or ponds occur on the installation; precipitation returns to the atmosphere by evapotranspiration, runs off into the storm sewer system that discharges to San Francisco Bay, or infiltrates to the groundwater.

2.1.2.2 Ecology

The Bay Area is situated in the California coastal chaparral forest and scrub province of the Mediterranean division and includes the discontinuous coastal plains. The coastal province has a more moderate climate than the interior and receives some moisture from fog in summer. The coastal plains are characterized by sagebrush and grassland communities. Exposed coastal areas support desert-like shrub communities called coastal scrub; such communities are dominated by coyote bush, California sagebrush, and bush lupine. The area continues to be a major resource and migration route for both aquatic and terrestrial birds (Bailey 1995). Alameda Point, including contiguous and noncontiguous properties, contains the following terrestrial and aquatic wildlife habitats: open water areas, estuarine intertidal emergent wetlands, non-native grassland, ruderal upland vegetation, disturbed areas, beach, and urban and ornamental landscapes. Detailed descriptions of the wildlife habitats, soil types, and special status species encountered at Alameda Point are presented in the OU-2 RI report (TtEMI 1999).

2.1.2.3 Geology

This section provides an overview of the geology of the San Francisco Bay region and Alameda Point, and is based on the work of Trask and Rolston (1951), Treasher (1963), Radbruch (1957, 1969), Atwater and others (1977), Atwater (1979), Helley and others (1979), Rogers and Figuers (1991), and Sloan (1990, 1992). The Bay occupies a depression between two uplifted areas; the Berkeley Hills on the east and the Montara Mountains on the west. The depression and uplifted areas are formed by two sub-parallel, active faults: the San Andreas Fault to the west of the Bay and the Hayward Fault to the east. The Bay is underlain by a series of Quaternary age unconsolidated sediments, which include, in the order of youngest to oldest (top to bottom): Artificial Fill; the Holocene age Bay Sediment Unit; the Holocene/Late Pleistocene age Merritt Sand; the Holocene/Late Pleistocene San Antonio Formation, Upper Unit; the Late Pleistocene San Antonio Formation, Lower Unit (Yerba Buena Mud), and the Late Pleistocene/Pliocene Alameda Formation. These sediments are underlain by Jurassic age bedrock of the Franciscan Formation. The sedimentary units overlying the Alameda Formation are relevant to groundwater flow and contaminant migration at Alameda Point, and are described in further detail below.

Artificial Fill. Artificial fill is present over most of Alameda Point and consists of sediments that were dredged from the surrounding San Francisco Bay and the Oakland Inner Harbor in the late 1800s to the 1920s. The composition of the fill varies, but it is generally silty sand or sand with minor inclusions of clay and/or gravel. Much of the fill is similar in composition to the Merritt Sand, which in most cases served as the source for the fill. The fill ranges in thickness from 0 to 30 feet, which is a result of the natural topography of the estuary prior to filling activities. The fill is thinnest in the 1856 tidal flat area in the eastern region, and generally thickens westward across Alameda Point.

Bay Sediment Unit. The Holocene estuarine or tidal flat deposits of the Bay Sediment Unit (BSU, or Young Bay Mud) are the youngest naturally occurring sediments at Alameda Point. The BSU consists of silt and gray to black clay with laterally discontinuous, poorly graded, silty and clayey sand and gravel layers. The gravel layers contain relatively large amounts of shell fragments. A coherent clay member is present in the upper portion of the BSU, and a layer with high organic content, called the "marsh crust" typically marks the top of the unit throughout most of the installation. Marsh Crust is not present under IR Site 14. The BSU is approximately 40 feet thick in the western region of Alameda Point, and pinches out to the east. The unit is discontinuous in the eastern region, and absent in the extreme southeastern region. The BSU is encountered at approximately 25 feet below ground surface (bgs) in the western region of Alameda Point and approximately 5 feet bgs in the eastern region.

Merritt Sand. Over most of the installation, the Holocene/Late Pleistocene eolian deposits of the Merritt Sand Formation underlie the BSU; where the BSU is absent, the Merritt Sand directly underlies the artificial fill. The Merritt Sand in the vicinity of Alameda Point consists of fine-grained orange-brown, silty, clayey sand with inclusions of gray, medium-grained sand. Bivalve shells and shell hash are observed in parts of the Merritt Sand, indicating some marine reworking during the most recent sea level rise. The thickness of the Merritt Sand is 8.5 to 56 feet in the southeastern region, 19 to 60 feet in the central region, and 9.5 to 48 feet in the western region of Alameda Point. It is encountered at a depth of about 45 feet bgs in the western and central regions of Alameda Point, and outcrops in, or underlies the artificial fill layer in the southeastern region. A paleo-stream system cut an east-west trending channel through the Merritt Sand. This paleochannel was subsequently filled with low-permeability silts and clays, with discontinuous layers of poorly graded sands associated with the BSU.

San Antonio Formation, Upper Unit. The Holocene/Late Pleistocene alluvial deposits of the upper unit of the San Antonio Formation underlie the Merritt Sand. These sediments were deposited in environments ranging from alluvial fans to flood plains, lakes, and beaches, and consist of interbedded layers of medium-grained sand with varying amounts of silt and clay. A persistent layer containing shells and sand is present near the top of the formation, and a layer containing organic material (plant debris or peat) is present at the base of the formation. Greenish-gray clay layers within the unit may be locally confining. The unit ranges in thickness from 10 to 40 feet in the eastern region and 7 to at least 72 feet in the central region of Alameda Point. The unit is present over most of the installation but is absent where the paleochannel crosses the central and western regions of the installation.

San Antonio Formation, Lower Unit (Yerba Buena Mud). The Late Pleistocene estuarine deposits of the lower unit of the San Antonio Formation (Yerba Buena Mud, or Old Bay Mud) underlie the continental alluvial deposits of the upper unit of the San Antonio Formation. The Yerba Buena Mud in the vicinity of Alameda Point consists of a dark greenish-gray, silty clay. The unit ranges in thickness from 0 feet in Hayward to 125 feet on Yerba Buena Island. The unit is 55 to 90 feet thick at Alameda Point (Atwater and others, 1977; Rogers and Figuers, 1991). The Yerba Buena Mud marks the erosional surface of the Alameda Formation, and is believed to be regional, underlying the San Francisco Bay and bay margins, including Alameda Point (Rogers and Figuers, 1991). The paleochannel that crosses Alameda Point has partially eroded into the Yerba Buena Mud but does not bisect the unit.

2.1.2.4 Hydrogeology

The artificial fill and four naturally occurring geologic units described above form four hydrogeologic units at Alameda. These units include from top to bottom, the first water-bearing zone (FWBZ), the BSU Semi-Confining Layer, the second water-bearing zone (SWBZ), and the Yerba Buena Mud Aquitard. These units are described below.

FWBZ. The FWBZ is unconfined, and ranges in thickness from less than 10 feet in the central region, to over 30 feet in the western region, and up to 100 feet in the southeastern region. In the western and central regions, the FWBZ is restricted to the artificial fill overlying the BSU. The BSU pinches out from east to west and is not present in the southeastern region. In the absence of the BSU, both the artificial fill and the entire Merritt Sand unit are identified as the FWBZ. Because of a difference in the measured elevation of the piezometric surface, and the absence of a discernible confining layer, the FWBZ has been informally divided into two separate hydrogeologic intervals: the FWBZ upper and the FWBZ lower.

Groundwater in the FWBZ is encountered from about 2 to 8 feet bgs, and generally flows radially, from the center of Alameda Island toward San Francisco Bay, the Oakland Inner Harbor, and the Seaplane Lagoon. The northeast to west-trending paleochannel does not appear to influence groundwater flow within the FWBZ. Groundwater recharge to the FWBZ is attributed to vertical infiltration from precipitation; horticultural irrigation; and leaking water supply, sanitary sewer, and storm sewer pipes. Tidal inundation of wetland areas and storm water conveyance lines may also contribute recharge to the FWBZ. The FWBZ is tidally influenced on the northern, western, and southern sides of Alameda Point. Tidal influence studies indicate the region of influence extends approximately 250 to 300 feet inland on the northern and southern sides of Alameda Island and approximately 1,000 to 1,500 feet inland on the west side. Diurnal tidal fluctuations measured in the FWBZ range from 0.1 to 4 feet (PRC, 1997). Local horizontal gradients calculated at similar locations throughout the year ranged from 0.001 to 0.003 foot per foot (ft/ft) in the FWBZ. Hydraulic conductivity values for the FWBZ determined using aquifer tests are on the order of 6.3×10^{-3} foot per minute (ft/min).

BSU Semi-confining Layer. The upper portion of the BSU contains a coherent clay member that locally acts as an aquitard or confining layer, and is termed here a "semi-confining layer." Vertical hydraulic communication through the BSU (where present) appears to be minimal. This observation is supported by the presence of the coherent clay member in the upper portion of the BSU, the lack of observed drawdown in the underlying Merritt Sand (SWBZ) when pumping tests were performed in the artificial fill (FWBZ), the lack of migration of saline water from the SWBZ into the fresh to brackish water of the FWBZ, and the lack of migration of contaminants from the base of the artificial fill into the BSU and underlying Merritt Sand. Hydraulic conductivity values for the silty clays of the BSU determined using slug tests are on the order of 6.1×10^{-5} ft/min.

SWBZ. The SWBZ is present in the western and central regions of Alameda Island, where the BSU is substantive enough to retard flow to or from the overlying FWBZ. The SWBZ appears to be semi-confined, and occupies the silty sands within the lower portion of the BSU, the Merritt Sand Formation (where present), and the upper unit of the San Antonio Formation. The potentiometric elevation of the SWBZ ranges from 3 to 9 feet above the mean lower low water (MLLW) elevation. In the western region, the Merritt Sand Formation and the upper unit of the San Antonio Formation are not laterally continuous, and the SWBZ is restricted to the lower portion of the BSU, which consists mainly of poorly graded sand. The SWBZ has also been divided into two separate hydrogeologic intervals: the SWBZ upper and the SWBZ lower (SWBZL). Most of the SWBZ is in the Merritt Sand unit, while the SWBZL extends into the interbedded silty and clayey sands of the upper San Antonio Formation.

Recharge of the SWBZ is mainly by lateral flow (through the Merritt Sand) from upgradient areas on Alameda Island. Another source of recharge may be the upper unit of the San Antonio Formation, although the thickness and discontinuity of the water-bearing zones within the upper unit of the San Antonio Formation would preclude a significant contribution. The SWBZ is believed to discharge through lateral groundwater flow to San Francisco Bay, the Oakland Inner Harbor, and the Seaplane Lagoon. The northeast to west-trending paleochannel is believed to be a potential barrier to groundwater flow and contaminant migration within the SWBZ between the northern and southern portions of the central region of the installation. Local horizontal gradients calculated at similar locations throughout the year ranged from 0.001 to 0.003 ft/ft in the SWBZ. Slug test data indicate that the hydraulic conductivity of the SWBZ in the western region ranges from 1.22×10^{-3} to 3.7×10^{-3} ft/min.

Yerba Buena Mud Aquitard. The Yerba Buena Mud (San Antonio Formation, Lower Unit) is a regionally continuous clay layer, forming a regional aquitard. Beneath the southeastern region of Alameda Point, it is approximately 55 to 80 feet thick, and is encountered at 90 to 115 feet bgs. The aquitard is believed to be an effective hydraulic barrier between the SWBZ and the underlying Alameda Formation. This observation is supported by the fact that the underlying Alameda Formation yields fresh water while the overlying Merritt Sand and upper unit of the San Antonio Formation yield saline to hypersaline water (Hickenbottom 1988) and by pumping tests performed in the Alameda Formation during which no drawdown was observed in the overlying Merritt Sand or upper unit of the San Antonio Formation (Hydro-Search, Inc. 1977).

2.1.2.5 Site-Specific Geology and Hydrogeology

The geology and hydrogeology specific to IR Site 14 are discussed below.

Six geologic units, three of which are water-bearing, were identified during the RI of IR Site 14:

- Artificial fill material, which extends to approximately 15 feet bgs and contains the FWBZ
- BSU, which extends to approximately 35 to 40 feet bgs and serves as a 20-foot to 25-foot thick semi-confining layer

- Merritt Sand Formation, which extends to approximately 100 feet bgs and contains the SWBZ
- Upper San Antonio Formation, which extends to approximately 125 feet bgs and also contains the SWBZ
- Yerba Buena Mud (Lower San Antonio Formation), which extends to approximately 170 to 220 feet bgs and serves as a 55- to 90-foot-thick regional aquitard
- Alameda Formation (regional aquifer), which underlies the Yerba Buena Mud

The first geologic unit encountered at IR Site 14 consists of fill material beneath the Fire Training Area (FTA) and outlying buildings. Before the mid- to late 1930s, before the fill material was dredged and placed at IR Site 14, the entire area was submerged under San Francisco Bay. The fill material extends approximately 15 feet bgs and is composed of dredge spoils from the surrounding San Francisco Bay and Oakland Inner Harbor. The material consists primarily of silty sand and clay. Trace shell and clay fragments present throughout the fill confirm that it is composed of dredging spoils and other marine-derived material.

The second hydrogeologic unit encountered at IR Site 14 is the BSU. This unit underlies the fill material and consists of three sediment types: (1) clay, which is typically moist and stiff; (2) a clayey sand with some shell fragments; and (3) silty sand with interbedded layers of fine sand with moderate to low estimated hydraulic conductivity. These layers are discontinuous and begin at depths of approximately 15 feet bgs. These layers range from 20 to 25 feet in thickness and act as a significant flow boundary between the FWBZ and SWBZ.

The third geologic unit encountered at IR Site 14 is the Merritt Sand Formation. This formation is present beneath the bay sediments throughout IR Site 14 at depths of approximately 40 feet bgs. The Merritt Sand Formation at IR Site 14 consists of clayey sand with approximately 5 percent clay; moist, silty sand, poorly graded sand; and fine sand containing some shell fragments.

Groundwater at IR Site 14 is encountered between approximately 4 and 7 feet bgs. Local recharge from precipitation, seasonal variation in groundwater elevations, and tidal influences at IR Site 14 impact groundwater flow directions. During the rainy season, groundwater flow is generally towards the Oakland Inner Harbor. During dry periods, the hydraulic gradient can change directions, resulting in flow inland from the harbor. Two storm drain lines in the northwestern corner of the site discharge to the harbor and may also influence local groundwater elevations and flow directions. These storm drain lines may also influence local flow velocities by acting as preferential flow paths. Tidal influence studies performed at the site are discussed in the OU-2 RI report (TtEMI 1999).

2.1.3 Site Characteristics

This section describes the buildings and activities associated with IR Site 14. The current status of this site is also discussed in this section.

IR Site 14 is part of the Northwest Territories land use area as defined in the community reuse plan (Alameda Reuse and Redevelopment Authority [ARRA] 1996). Potential reuse may include building a hotel and conference center, parks, and, possibly, a golf course. No development plans have considered reuse of the area for residential housing. IR Site 14 consists of about 14 acres and the following environmental baseline survey (EBS) parcels: 3, 12A, 12B, 13, 14, 15, 16A, 17A, and 23A. IR Site 14 is surrounded by EBS parcels 12, 16B, 17, 23D, and 23H. The site is bounded to the north by the Oakland Inner Harbor.

IR Site 14 is relatively flat and is composed primarily of open space with several buildings and structures. The buildings and structures currently located within IR Site 14 include: 26, 120, 121, 122, and 388. Building 26 was used to store small arms and pyrotechnics; Buildings 120, 121, and 122 were used to store ordnance; and Building 388, recently the Naval Investigation Services Evidence Storage building, was formerly used to store explosives and flammable materials. Underground storage tank (UST) 357 FS-1, a 1,000-gallon diesel tank, was located in the northwestern corner of IR Site 14 just west of the former FTA. The Navy removed UST 357 FS-1 in 1995. The Navy removed a former aboveground storage tank (AST) from the eastern portion of IR Site 14 located west of former Building 528. The size of the former diesel AST is unknown. Two ASTs are located south of the FTA. These ASTs, S96A and S96B, stored non-potable water and were used for fire suppression activities. The two non-potable water tanks were abandoned in place by filling them with soil and possibly other materials.

The former FTA is located in the northwestern portion of IR Site 14 (see Figure 2-2). The FTA consists of a concrete pad surrounded on three sides by an earthen berm (see Figure 2-3). The containment berm was constructed between 1973 and 1979.

Waste oils and fuels from Alameda Point plane defueling operations were burned in a former aboveground steel tank located in the center of the concrete pad within the FTA berm (Canonie Environmental Services 1990). Another AST adjacent to the FTA berm was used to mix Ansulite fire-fighting foam for extinguishing the fires. Ansulite fire-fighting foam, carbon dioxide, potassium chloride, and Purple K were used to extinguish training fires at the FTA (Ecology and Environment 1983). These two ASTs were removed. The fire department stopped burning in the area in 1986 or 1987.

A sump that is about 6 feet wide, 12 feet long, and 3 feet deep is located in the northeastern corner of the concrete pad within the FTA. The sump was used for the collection of runoff from fire training activities. The runoff likely contained dioxins from the extinguished fires. Storm drain piping borders the FTA on the east and west sides and discharges to Oakland Inner Harbor. The piping may have been affected by surface water runoff in the vicinity of the FTA and may provide a preferential flow conduit for groundwater contaminants in the first water-bearing zone to reach the surface waters of San Francisco Bay.

The historical operations associated with IR Site 14 are summarized in Table 2-1.

2.1.4 Release or Threatened Release into the Environment of Contaminants of Concern

Five areas with elevated concentrations of dioxin in soil were identified at IR Site 14 and are demarcated in green on Figure 2-3. Figure 2-3 also lists the analytical results for all dioxin samples collected in the FTA. The source, nature and extent of dioxin contamination at these areas are summarized below, and discussed in further detail in the IR Site 14 engineering evaluation/cost analysis (EE/CA) report (TtEMI 2001), which is included in Appendix A. Figure 2-4 is a conceptual model for IR Site 14.

Five subsurface dioxin soil removal areas with elevated 2,3,7,8-TCDD equivalent concentrations (greater than 0.0135 µg/kg) were identified for IR Site 14. The five areas are described below.

- Sample point S14-03, located beneath the eastern portion of the FTA berm, defines the first subsurface dioxin removal area. The 2,3,7,8-TCDD equivalent concentration was 0.16 microgram per kilogram (µg/kg).

- Sample points S14-04, S14-05, and S14-06, located south of the FTA berm, define the second subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.07 µg/kg) was detected at sampling location S14-05.

- Sample points S14-08 and B14-02, located west of the FTA berm, defined the third subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.09 µg/kg) was detected at sampling location S14-08.

- Sample points SUMP-BN, -BS, -SW, and -NW, located near the sump, define the fourth subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.05 µg/kg) was detected at sampling location SUMP-BN.

- Sample point B14-01, located northeast of the sump, defines the fifth subsurface dioxin removal area. The 2,3,7,8-TCDD equivalent concentration was 0.0184 µg/kg.

The berm surrounding the FTA is likely contaminated with dioxins. However, samples have not been collected from the berm. Sampling within the berm will be conducted during the OU-1 data gap sampling. Figure 2-3 shows all of the dioxin sampling locations, sample depths, corresponding 2,3,7,8-TCDD equivalent concentrations, and preliminary dioxin removal area boundaries.

2.1.5 National Priorities List Status

NAS Alameda, including IR Site 14, was placed on the U.S. Environmental Protection Agency's (EPA's) National Priorities List (NPL) in July 1999. The site addressed in this Action Memorandum is currently being investigated as part of the OU-1 RI/FS efforts.

2.2 ACTIONS CONDUCTED TO DATE

This section summarizes investigations and removal actions previously conducted, and other decisions taken at IR Site 14 leading up to the removal action described in this AM. A copy of the administrative record index listing all decisions taken at IR Site 14 is included in Appendix B.

2.2.1 Previous Actions

Five investigations and removal actions have been conducted at the FTA of IR Site 14 and are summarized in Table 2-2. Analytical data for all soil dioxin samples collected from IR Site 14 are presented in Appendix A, which is a copy of the IR Site 14 EE/CA report (TtEMI 2001). Previous sampling locations and the analytical results as well as the proposed dioxin-contaminated soil removal areas are indicated on Figure 2-3. The RI for IR Site 14 contains analytical results for detected metals, pesticides, and PCBs in addition to dioxins in the FTA. Dioxins were the primary risk drivers for the area thus resulting in removal goals based solely on the 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) equivalent levels. The other contaminants will be addressed in the RI/FS.

2.2.2 Current Activities

Currently, the Navy is conducting data gap sampling to delineate the extent of dioxin contamination at IR Site 14. Results from the data gap sampling will be incorporated into the final action memorandum. Fieldwork associated with the data gap sampling was initiated on May 20, 2001, and is expected to be completed in August 2001. The following section describes the data gap sampling objectives and protocol for this investigation.

Data Gap Sampling

Dioxins have been detected in surface soils at the northern FTA at IR Site 14, but the horizontal and vertical extent of the dioxin contamination in soils has not been delineated. In addition, the potential for dioxins to migrate laterally into Oakland Inner Harbor via surface water run-off has not been evaluated.

Data gap sampling at IR Site 14 will assess the extent of dioxins in soil at the northern FTA and the potential for migration of dioxin-contaminated soil into Oakland Inner Harbor and assess possible preferential pathways associated with storm sewer lines that may result if contaminant plumes discharge to storm sewers that drain into Oakland Inner Harbor

2.3 NAVY, FEDERAL, STATE, AND LOCAL AUTHORITIES ROLES

This section describes current and future environmental management roles of Navy and federal, state, and local authorities at IR Site 14.

2.3.1 Navy Role

Federal Executive Order 12580 delegates to the Department of Defense the President's authority to undertake CERCLA response actions. Congress further outlines this authority in its Defense Environmental Restoration Program Amendments (10 USC Sections 2701 through 2705). Both 42 USC Section 9620(f) and 10 USC Section 2705 require Naval facilities to ensure that state and local officials are given timely opportunity to review and comment on Navy response actions. In addition, 42 USC, Section 9620(a)(4), requires the Navy to comply with state removal action requirements at its facilities; which is consistent with CERCLA and NCP requirements.

The Navy, with federal and state regulatory support, is the lead agency for the removal action. The Navy has approval authority over the recommended alternative and all public participation activities. Southwest Division, Naval Facilities Engineering Command (SWDIV), is the regional manager for Navy's CERCLA program.

2.3.2 Federal, State, and Local Authority Role

The EPA, DTSC, and RWQCB provide oversight during all phases of the execution of the recommended alternative. DTSC, RWQCB, EPA, and Navy representatives make up the BCT. The BCT provides technical advice, oversight, and assistance during this removal action and will continue to do so throughout the IR program.

TABLE 2-1

INSTALLATION RESTORATION SITE 14
HISTORICAL OPERATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 2)

Parcel	Building	Operations Conducted	Hazardous Materials Stored or Used
3	26	Building 26 was constructed in 1941 and was used to store arms and pyrotechnics. A flammable liquids storage shed was located on the western side of Building 26.	Solvents, oils, and live ammunition
12A and 12B	No buildings present	Parcels 12A and 12B consist of mostly unpaved open space that was used for aircraft storage. One diesel underground storage tank was removed from parcel 12A in 1994. A fire training area (FTA) used from 1973 to 1987 was located adjacent to Parcels 12A and 12B. The FTA consisted of a concrete pad surrounded by an earthen berm on three sides. Waste oil and fuel from Alameda Point plane defueling operations were burned and extinguished on the concrete pad during training exercises. Run-off from the pad drained to a sump located in the northeastern corner of the concrete pad.	Aviation fuel, ansulite fire-fighting foam, carbon dioxide, potassium chloride, and Purple K
13	388	Building 388 was constructed in 1950 and was used to store explosives and flammable materials.	Explosives and flammable materials
	120-122	Buildings 120 through 122, constructed in 1944, were used to store ordnance, including ammunition, bomb fins, and related equipment.	Ordnance
14	No buildings present	Parcel 14 is an unpaved open space previously used for fire training.	Chemicals used in fire training (see above for 12A and 12B)

TABLE 2-1

INSTALLATION RESTORATION SITE 14
HISTORICAL OPERATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 2 of 2)

Parcel	Building	Operations Conducted	Hazardous Materials Stored or Used
5	179	Building 179 was constructed in 1979 and was used as a groundwater well pumphouse. An abandoned aboveground storage tank is located northeast of Building 179. A suspected landfill area is located southeast of Building 179.	Petroleum products
16A	375	Building 375 was constructed in 1953 and was used as a tank truck loading stand and fueling station.	None
17A	83	Building 83 was an office building.	None
	528	Building 528 was used as a heavy equipment and vehicle maintenance shop. An aboveground storage tank used for diesel fuel was located west of Building 528.	Petroleum products and lead-acid electrolyte solutions
23A	No Buildings Present	Parcel 23A is a partially paved open space previously used for aircraft runway operations.	None

Refer to Appendix for detailed information in the EE/CA.

TABLE 2-2

INSTALLATION RESTORATION SITE 14
FIRE TRAINING AREA
PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 2)

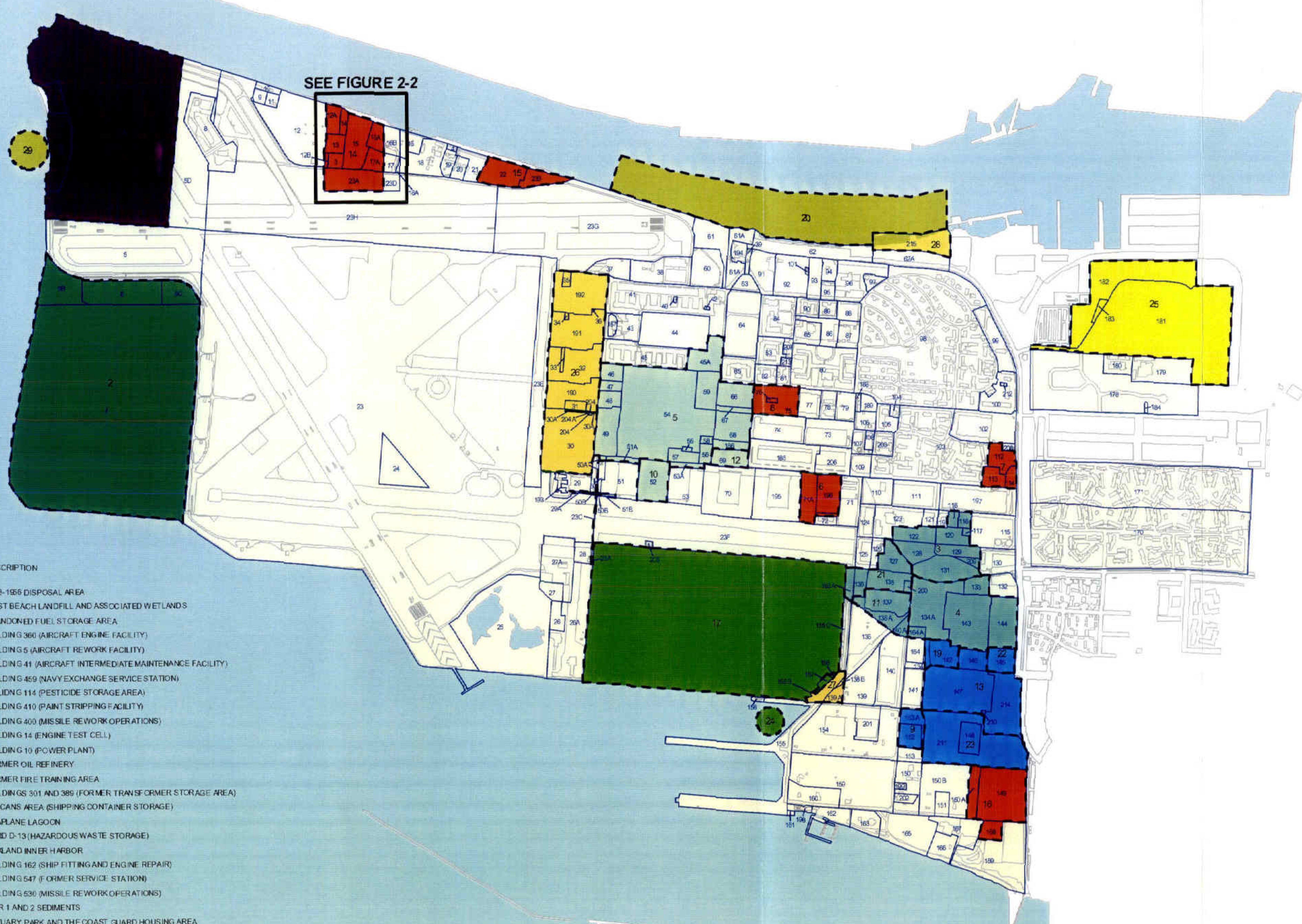
Investigation	Contractor	Date	Analyses	Field Activities
RI (CTO 121) Phase 2B and 3	PRC and James M. Montgomery (PRC & JMM 1992)	1991	Dioxins and furans, EDB, metals, pesticides and PCBs, SVOCs, TRPH, and VOCs	Soil gas survey Three soil borings Installation of three monitoring wells Soil samples Groundwater sampling
RI (CTO 260)	PRC and Montgomery Watson (PRC & MW 1996)	1994	Dioxins and furans, metals, pesticides and PCBs, SVOCs, TEPH, TPPH, VOCs, and general chemical parameters	Cone penetrometer tests Hydropunch® samples Eleven soil borings Soil samples Installation of one deep monitoring well Quarterly groundwater sampling Non-point source samples
UST FS-1 Removal	PWC (PWC 1996)	1995	Metals, pesticides and PCBs, TEPH, TPPH, TTLC, and VOCs	Eight soil samples One groundwater sample
UST Investigation Phases I, II, and III	Moju	1997-1999	SVOCs, TEPH, TPPH, and VOCs	Soil samples Groundwater sampling Installation of four groundwater monitoring wells
RI (CTO 122)	TtEMI and Uribe & Associates (TtEMi & Uribe 1998)	1998	Dioxins and furans, metals, pesticides and PCBs, SVOCs, TEPH, TPPH, and VOCs	Hydropunch® samples Four surface soil samples Six soil samples One groundwater sample

TABLE 2-2

INSTALLATION RESTORATION SITE 14
FIRE TRAINING AREA
PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes:

CTO	Contract task order
EDB	Ethylene dibromide
PCB	Polychlorinated biphenyls
PRC	PRC Environmental Management, Inc.
RI	Remedial investigation
SVOC	Semivolatile organic compound
TEPH	Total extractable petroleum hydrocarbons
TPPH	Total purgeable petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
TtEMI	Tetra Tech EM Inc.
TTLC	Total threshold concentration limit
UST	Underground storage tank
VOC	Volatile organic compound



LEGEND

BOUNDARIES
- ENVIRONMENTAL BASELINE SURVEY PARCEL
- INSTALLATION RESTORATION SITE BOUNDARY
- OPERABLE UNIT 1
- OPERABLE UNIT 2A
- OPERABLE UNIT 2B
- OPERABLE UNIT 2C
- OPERABLE UNIT 3
- OPERABLE UNIT 4A
- OPERABLE UNIT 4B
- OPERABLE UNIT 4C
- OPERABLE UNIT 5
- OPERABLE UNIT 6

SITE FEATURE
- LAND COVER

SITE	DESCRIPTION
1	1943-1956 DISPOSAL AREA
2	WEST BEACH LANDFILL AND ASSOCIATED WETLANDS
3	ABANDONED FUEL STORAGE AREA
4	BUILDING 360 (AIRCRAFT ENGINE FACILITY)
5	BUILDING 5 (AIRCRAFT REWORK FACILITY)
6	BUILDING 41 (AIRCRAFT INTERMEDIATE MAINTENANCE FACILITY)
7	BUILDING 459 (NAVY EXCHANGE SERVICE STATION)
8	BUILDNG 114 (PESTICIDE STORAGE AREA)
9	BUILDING 410 (PAINT STRIPPING FACILITY)
10	BUILDING 400 (MISSILE REWORK OPERATIONS)
11	BUILDING 14 (ENGINE TEST CELL)
12	BUILDING 10 (POWER PLANT)
13	FORMER OIL REFINERY
14	FORMER FIRE TRAINING AREA
15	BUILDINGS 301 AND 389 (FORMER TRANSFORMER STORAGE AREA)
16	C-2 CANS AREA (SHIPPING CONTAINER STORAGE)
17	SEAPLANE LAGOON
19	YARD D-13 (HAZARDOUS WASTE STORAGE)
20	OAKLAND INNER HARBOR
21	BUILDING 162 (SHIP FITTING AND ENGINE REPAIR)
22	BUILDING 547 (FORMER SERVICE STATION)
23	BUILDING 530 (MISSILE REWORK OPERATIONS)
24	PIER 1 AND 2 SEDIMENTS
25	ESTUARY PARK AND THE COAST GUARD HOUSING AREA
26	WESTERN HANGAR ZONE
27	DOCK ZONE
28	TODD SHIPYARD
29	SKEET RANGE

600 0 600 1200

SCALE: 1" = 1200'

FIGURE 2-1
OPERABLE UNITS AND INSTALLATION RESTORATION SITES

ALAMEDA POINT
ALAMEDA, CALIFORNIA
AUGUST 24, 2001

Tetra Tech EM Inc.

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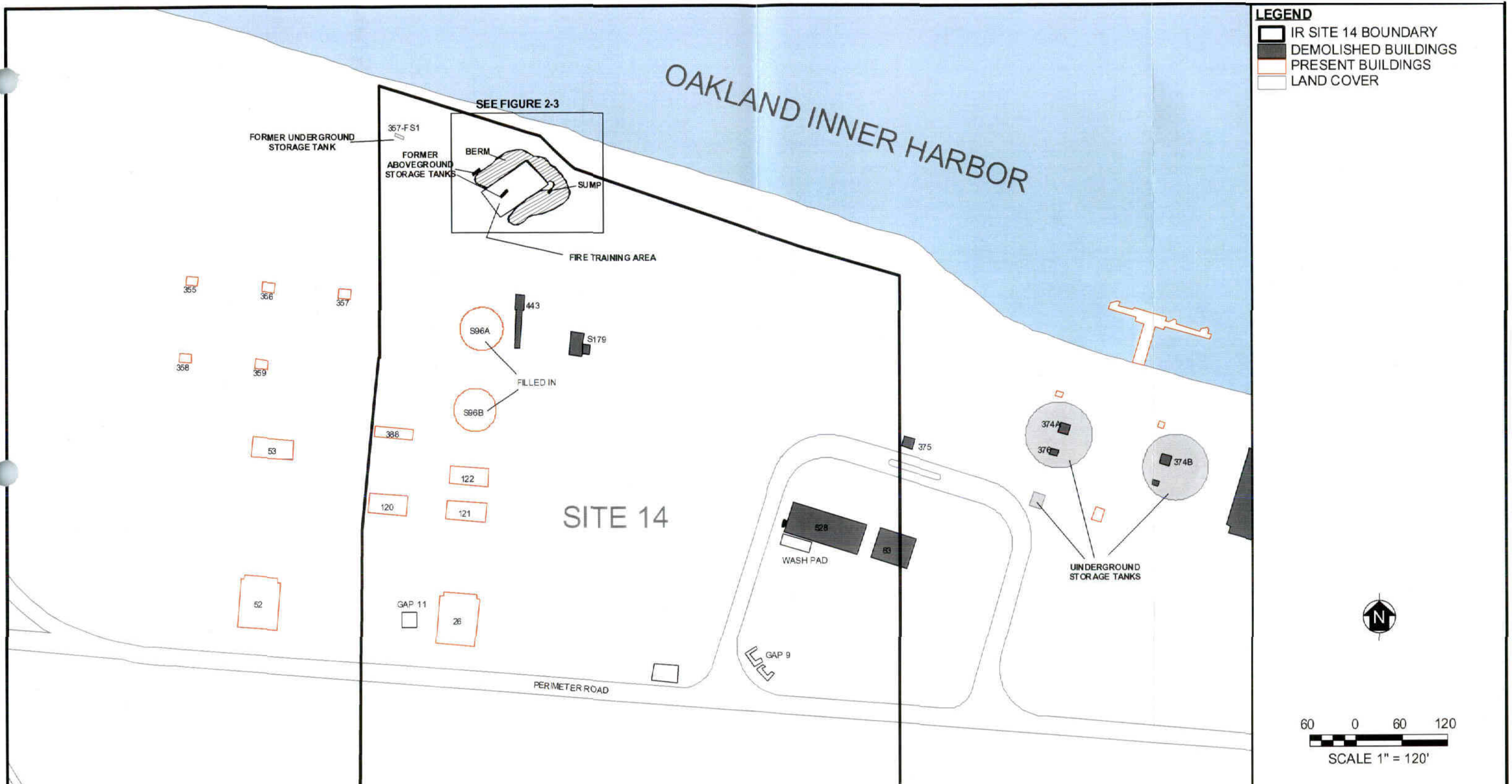
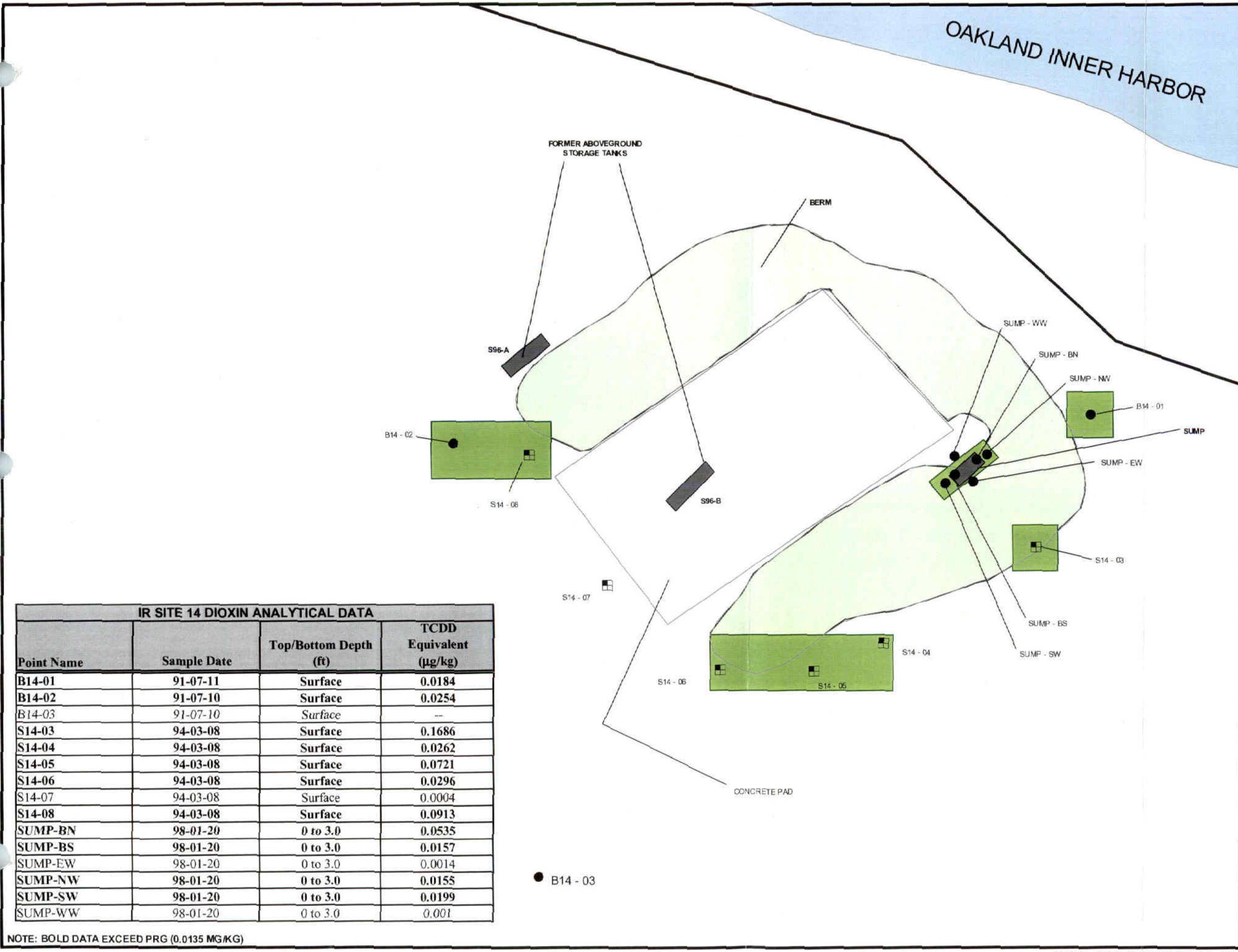


FIGURE 2-2
IR SITE 14
SITE FEATURES

ALAMEDA POINT
ALAMEDA, CALFORNIA
AUGUST 24, 2001

Tetra Tech EM Inc.

U:\ALMDA_SA\CTO386\ACTION_MEMO\SOIL_ACT_MEM_7_26_01.APR IR 14 FIGURE 2-2 LAYOUT ACEVEDJ 8/24/01



IR SITE 14 DIOXIN ANALYTICAL DATA

Point Name	Sample Date	Top/Bottom Depth (ft)	TCDD Equivalent (µg/kg)
B14-01	**91-07-11**	**Surface**	**0.0184**
B14-02	**91-07-10**	**Surface**	**0.0254**
B14-03	*91-07-10*	*Surface*	--
S14-03	**94-03-08**	**Surface**	**0.1686**
S14-04	**94-03-08**	**Surface**	**0.0262**
S14-05	**94-03-08**	**Surface**	**0.0721**
S14-06	**94-03-08**	**Surface**	**0.0296**
S14-07	94-03-08	Surface	0.0004
S14-08	**94-03-08**	**Surface**	**0.0913**
SUMP-BN	**98-01-20**	**0 to 3.0**	**0.0535**
SUMP-BS	**98-01-20**	**0 to 3.0**	**0.0157**
SUMP-EW	98-01-20	0 to 3.0	0.0014
SUMP-NW	**98-01-20**	**0 to 3.0**	**0.0155**
SUMP-SW	**98-01-20**	**0 to 3.0**	**0.0199**
SUMP-WW	98-01-20	0 to 3.0	0.001

NOTE: BOLD DATA EXCEED PRG (0.0135 MG/KG)

LEGEND

BOUNDARIES

- IR SITE 14 BOUNDARY
- SUBSURFACE DIOXIN REMOVAL AREAS
- *ABOVEGROUND DIOXIN* REMOVAL AREA

POINT TYPES

- SOIL BORING
- SURFACE LOCATION

N

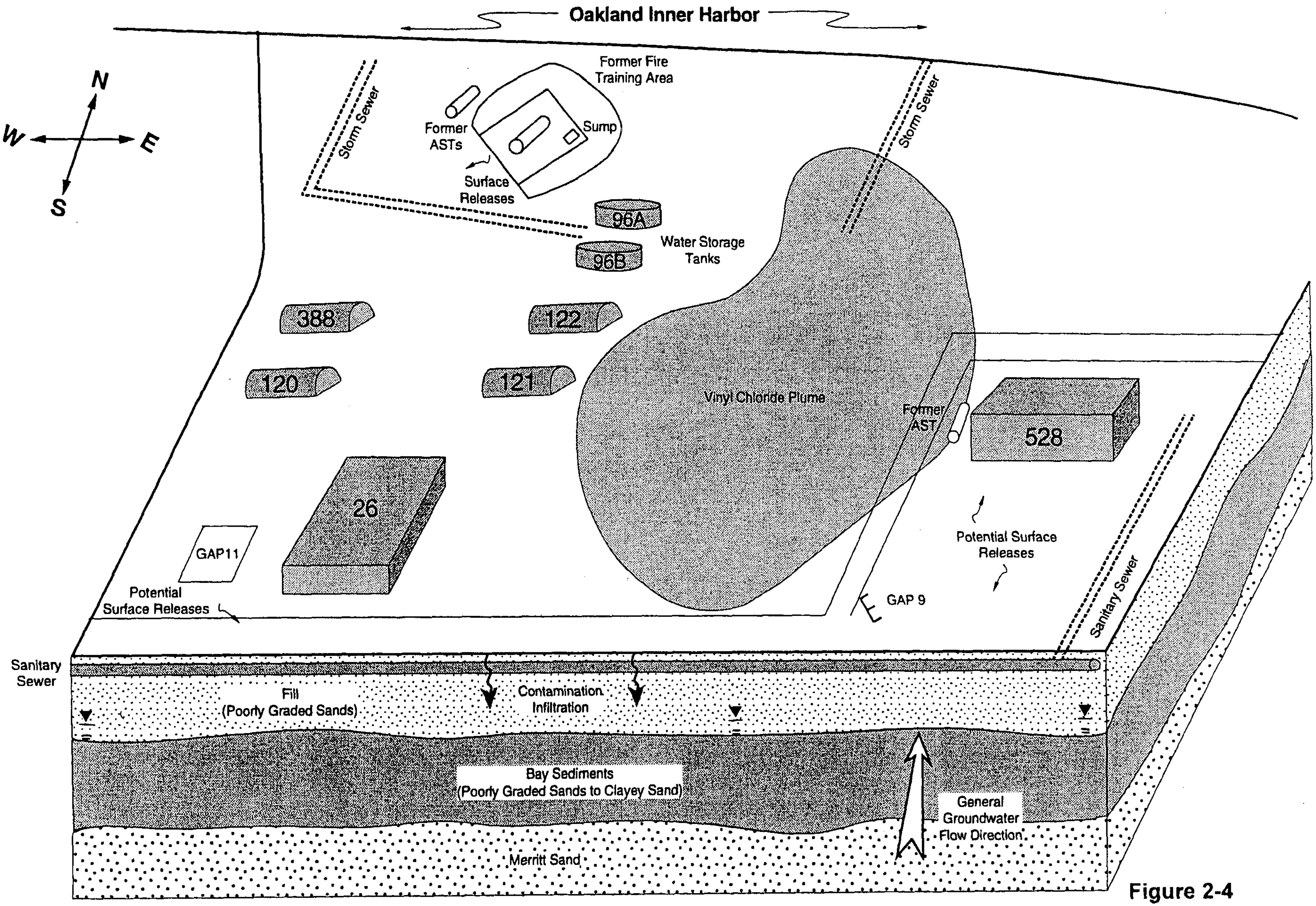
10 0 10 20

SCALE 1" = 20'

FIGURE 2-3
INSTALLATION RESTORATION SITE 14
FIRE TRAINING AREA
SAMPLING LOCATIONS AND DIOXIN SOIL REMOVAL AREAS

ALAMEDA POINT
ALAMEDA, CALIFORNIA
AUGUST 24, 2001

Tetra Tech EM Inc.



Not to Scale

▼ = Water table elevation

AST Above Ground Storage Tanks

UST Underground Storage Tanks

Figure 2-4
Conceptual Site Model
IR Site 14

ALAMEDA POINT
ALAMEDA, CALIFORNIA

G0069-16750302 SITE14C.DSF GAS 6/14/99

3.0 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were completed during the OU-2 RI for IR Site 14. The HHRA and ERA identified dioxins as COCs for soil at IR Site 14 (TtEMI 1999). A summary of the IR Site 14 HHRA and ERA and a streamlined risk evaluation based on 2,3,7,8-TCDD equivalent concentrations calculated for each of the 13 dioxins analyzed at IR Site 14 are presented in Section 2.4 of the EE/CA report, which is included in Appendix A.

In accordance with the NCP, 40 CFR, Section 300.415(b)(2), the Navy evaluated the potential for the following threats to determine the appropriateness of a removal action:

(1) Actual or potential exposure to hazardous substances, pollutants, or contaminants of nearby populations, animals, and food chains

(2) Actual or potential contamination of drinking water supplies and sensitive ecosystems

(3) Hazardous substances, pollutants, or contaminants in drums, barrels, tanks, and other bulk storage containers that may pose a threat of release

(4) High levels of hazardous substances or pollutants or contaminants in soils largely at, or near, the surface, that may migrate

(5) Weather conditions that may cause hazardous substances, pollutants, or contaminants to migrate or be released

(6) Threat of fire or explosion

(7) Other situations or factors that may pose threats to human health or the environment

3.1 THREATS TO PUBLIC HEALTH OR WELFARE

Three of the threat factors listed above apply to public health or welfare at IR Site 14.

(1) Actual or potential exposure to nearby populations, animals, or food chain from hazardous substances or pollutants or contaminants

There is a potential for exposure of human populations to contaminated soil through dermal contact, ingestion, and inhalation.

(4) **High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface that may migrate**

Soil contamination at IR Site 14 occurs at or near the surface and migration could occur through entrainment of contaminated soil in storm water runoff and wind. The concentrations of the contaminants in soil at IR Site 14 are potentially toxic to people as indicated by a hazard index greater than 1.0.

(5) **Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released**

Soil contamination at IR Site 14 occurs at or near the surface and migration could occur through entrainment of contaminated soil in storm water runoff and wind. During rainstorms, storm water runoff may transport contaminated soil from IR Site 14. In addition, arid weather conditions and strong winds may cause dioxin-containing particulate matter in soil to become airborne on fugitive dust.

3.2 THREATS TO THE ENVIRONMENT

Four of the threat factors listed above apply to the environment at IR Site 14:

(1) **Actual or potential exposure to nearby populations, animals, or food chains from hazardous substances or pollutants or contaminants**

Terrestrial and marine flora and fauna that inhabit the site are potential receptors to dioxin contamination.

(2) **Actual or potential contamination of drinking water supplies and sensitive ecosystems**

IR Site 14 is considered a non-beneficial drinking water zone (TtEMI 2000). However, there is a potential for exposure of nearby animal and plant populations to contaminants carried by water or wind to surrounding areas, including the Oakland Inner Harbor.

(4) **High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface that may migrate**

COCs in shallow soil may be transported in storm water runoff or with particulate matter to other areas that support floral or faunal species, such as the harbor.

(5) **Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released**

During heavy rains, dioxin-contaminated soil may be transported by storm water runoff. Strong winds may transport COCs with particulate matter to other areas, such as the harbor, that support floral or faunal species.

4.0 ENDANGERMENT DETERMINATION

A summary of the IR Site 14 HHRA and ERA and a streamlined risk evaluation based on 2,3,7,8-TCDD equivalent concentrations calculated for each of the 13 dioxins analyzed at IR Site 14 are presented in Section 2.4 of the EE/CA, attached as Appendix A of this document. The potential risk to human health and to ecological receptors was evaluated using the 2,3,7,8-TCDD equivalents.

For human health, two sets of assumptions went into the calculation of the total dioxin carcinogenic risk, DTSC and Navy (based on federal EPA guidance). The total dioxin carcinogenic risk for an industrial exposure scenario is calculated to be 1.3×10^{-5} based on DTSC assumptions and 7.2×10^{-6} based on EPA assumptions. The total dioxin carcinogenic risk for a residential exposure scenario is calculated to be 7.6×10^{-5} based on DTSC assumptions and 7.3×10^{-5} based on EPA assumptions (see Table 4-1).

The NCP, 40 CFR Section 300.430(e)(2)(i)(A)(2), states "For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure".

In the EE/CA, the industrial EPA Region IX preliminary remediation goal (PRG) (0.027 µg/kg) was evaluated as the human health screening level for 2,3,7,8-TCDD equivalent concentrations based on the potential reuse of IR Site 14, which may include building a hotel and conference center, parks, and, possibly, a golf course. No development plans have considered reuse of the area for residential housing. The industrial EPA Region IX PRG is a human health-based level that considers potential exposure scenarios, including inhalation of contaminated particulates, inhalation of volatile contaminants, and ingestion and dermal absorption of contaminants in soil.

For ecological receptors that were represented by the red-tail hawk and California ground squirrel, a screening level was calculated for 2,3,7,8-TCDD equivalent concentrations (0.0135 µg/kg) using conservative exposure parameters and considerations adapted from the ERA of the OU-2 RI. Based on the streamlined risk evaluation in the EE/CA, the ecological screening level was chosen as the removal goal for this removal action because it is more stringent than the industrial exposure human health screening level.

When the ecological screening level (0.0135 μg/kg) is compared to the residential EPA Region IX PRG (0.0039 μg/kg), the ecological screening level is equivalent to a residential cancer risk of about 3.5 x 10^{-6}. Equivalent 2,3,7,8-TCDD concentrations in soil at IR Site 14 that exceed the ecological screening level were determined to pose a risk to both human and ecological receptors, warranting a removal action.

The three 2,3,7,8-TCDD levels are listed below:

Type of Exposure	Cancer Risk	Concentration of TCDD-eq (μg/kg)
Residential (PRG)	1 x 10^{-6}	0.0039
Industrial (PRG)	1 x 10^{-6}	0.0270
Ecological Risk = IR Site 14 Removal Goal	Equivalent to: 3.5 x 10^{-6} (residential)	0.0135

The removal action will reduce potential exposures to dioxins of potential current and future receptors to acceptable levels considered protective of human health. These receptors include on- and off-site human and ecological receptors. Thus, this removal action will result in site conditions protective of human health under a residential scenario.

After completion of the removal action, confirmation samples will be collected to evaluate the residual dioxins in soil at IR Site 14. The residential and industrial cancer risks for residual dioxins at IR Site 14 will be evaluated in the OU-1 RI report. It is anticipated that by meeting the removal action goal based on ecological receptors that the resulting human health risk will be acceptable for residential exposures.

According to the streamlined risk evaluation presented in Section 2.4.3 of the IR Site 14 EE/CA report, if the removal action described in this AM is delayed or not implemented, actual or threatened releases of dioxins from the site may present an imminent and substantial danger to public health, welfare, or the environment through dermal contact, ingestion, and inhalation

TABLE 4-1

INSTALLATION RESTORATION SITE 14
DIOXIN CARCINOGENIC RISKS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Exposure Scenario	Assumption[1]	Total Dioxin Carcinogenic Risk
Residential	Navy	7.3×10^{-5}
	DTSC	7.6×10^{-5}
Industrial	Navy	7.2×10^{-6}
	DTSC	1.3×10^{-5}

Notes:

(1) Navy assumptions are based on federal EPA guidance. DTSC assumptions are based on DTSC guidance. Technical differences between the two sets of assumptions are related to toxicity reference values, the dermal risk assessment, and exposure pathways.

DTSC California Environmental Protection Agency's Department of Toxic Substances Control
EPA U.S. Environmental Protection Agency

5.0 PROPOSED ACTION AND ESTIMATED COSTS

The following sections describe the proposed removal action and its estimated costs.

5.1 PROPOSED REMOVAL ACTION

The following sections describe the proposed removal action, its expected contribution toward remediation of the site, the alternatives that were evaluated during the EE/CA process, the EE/CA, ARARs, and the project schedule.

5.1.1 Proposed Removal Action Description

Figure 2-3 presents the approximate area to be treated under this removal action based on the ecological risk screening level, and on information obtained from previous investigations (TtEMI and Einarson, Fowler, and Watson [EFW] 1998; and TtEMI 1999). The shape and size of the proposed removal areas will be finalized after completion of the data gap sampling events occurring in summer 2001.

The proposed removal action is excavation and off-site disposal of hazardous and nonhazardous soil. This alternative reduces the threat of exposure to contaminants on and off-site based on the target screening level and meets ARARs. This alternative includes excavation of five subsurface dioxin removal areas using conventional earth-moving equipment and backfilling the excavation with clean soil. The contaminated soil will be tested to determine if it is hazardous or non hazardous. Disposal of the soil will be conducted at an appropriate off-site permitted facility, either Class I for hazardous or Class II for nonhazardous. Confirmation sampling will also be conducted during the removal action to ensure that dioxin-contaminated soil is removed from the site and to verify cleanup goals.

There are two scenarios for dioxin-removal at IR Site 14 based on the results of data gap sampling to be conducted in summer 2001:

- Scenario 1- Excavate five subsurface areas for a total volume of approximately 123 cubic yards. This scenario would occur if the analytical results from data gap sampling of the berm area do not exceed the screening level (0.0135 μg/kg), calculated for ecological receptors
- Scenario 2 - Excavate five subsurface areas and the extent of contaminated soil in the berm based on the analytical results from data gap sampling of the berm area exceeding the screening level (0.0135 μg/kg), calculated for ecological receptors.

This option is readily implementable since it uses standard construction methods modified for use at hazardous waste sites. Utility clearance will be required for electrical, gas, sanitary and storm sewer, and water lines. Construction practices will meet applicable air quality and health and safety standards. A qualified hauler will transport excavated soil for disposal at a commercial facility. Administratively, issues, such as site access and availability, safety procedures, and other issues concerning implementability, should be addressed.

Regulatory acceptance is considered excellent because the affected soil will be removed from the site. There are no requirements for easements or right-of-way and zoning variances to perform this work because the site is federal property. Overall, this option is administratively feasible.

Two months for the regulatory review and one month for the procurement is estimated for this alternative. The actual field activities can be completed in approximately 3 to 4 weeks and will be followed by the preparation of a closure report.

The total estimated cost for implementing the proposed alternative at IR Site 14 is $204,650 (for Scenario 1 with hazardous soil), $123,818 (for Scenario 1 with nonhazardous soil), $284,102 (for Scenario 2 with hazardous soil) and $146,642 (for Scenario 2 with nonhazardous soil). These costs include markups and escalation. Costs for scenario 2 are based on the assumption that the top 0.5-foot of the berm will be removed following data gap sampling results. The following conditions may affect costs for this option:

- The presence of subsurface obstructions may complicate excavation.
- The presence of groundwater in the excavation may require dewatering.
- Dioxin-affected soil volumes may vary significantly from estimated volumes, thus affecting both excavation requirements and disposal costs.

No further information is needed before the recommended response action can be implemented.

5.1.2 Contribution to Remedial Performance

Excavation and off-site disposal of contaminated soil will permanently remove known sources of dioxin from IR Site 14 and reduce risks of human and ecological exposure to acceptable levels. The removal action is anticipated to be the final action necessary to remediate soil contamination at the defined area of IR Site 14. No long-term monitoring or operation and maintenance are anticipated.

5.1.3 Description of Alternatives

Four removal alternatives were developed to meet the removal goal for IR Site 14. The alternatives are summarized in Tables 5-1A and 5-1B. The tables highlight the long-term and short-term effectiveness, compliance with ARARs, implementability, feasibility, and cost of the technologies. More detailed identification, analysis, and comparison of the removal action alternatives are provided in Sections 4.0 and 5.0 of the EE/CA report. The comparative analytical treatment alternatives for nonhazardous and hazardous soil removal actions are listed below.

Alternative 1: No Action (nonhazardous and hazardous soil removal)

Alternative 2: Excavation and On-site Disposal (nonhazardous soil removal)

Alternative 3: Excavation and Off-site Disposal (Class II Landfill Facility-nonhazardous soil removal; Class I Landfill Facility-hazardous soil removal))

Alternative 4: Excavation, *Ex Situ* Solidification/Stabilization, and Disposal (hazardous soil removal Options 1 through 3, listed below)

Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal
Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II Landfill Facility)

5.1.4 Engineering Evaluation and Cost Analysis

A draft EE/CA report, dated January 5, 2001, was prepared in accordance with current EPA and Navy guidance documents for a non-time-critical removal action under CERCLA and Chapter 6.8 of the Ca-HSC. The EE/CA has been included as Appendix A. The purpose of the EE/CA was to identify, analyze, and compare four remedial alternatives for dioxin-contaminated soil at IR Site 14 and recommend the best alternative for the removal of dioxin-contaminated soil. The alternatives listed in Section 5.1.3 were evaluated.

A comparative analysis of these alternatives was conducted according to the SWDIV guidance for preparing EE/CAs. The Navy analyzed these alternatives based on general principles of effectiveness, implementability and cost, and the specific evaluation criteria set forth in 40 CFR 300.430(e)(9). Based on the evaluation of the alternatives contained within the EE/CA, the Navy recommended Alternative 3 excavation and off-site disposal (both hazardous and non-hazardous) for contaminated soil at IR Site 14.

5.1.5 Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA (42 USC 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 EPA has promulgated a requirement in the 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" (40 CFR § 300.415[j]) (40 CFR § 300.415[j]). Certain specified waivers may be used for removal actions, as is the case with remedial actions.

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

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed response action and are well suited to the conditions of the site (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 CFR § 300.400(g)(2) and include the following:

- The purpose of the requirement and the purpose of the CERCLA action
- The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site
- The substances regulated by the requirement and the substances found at the CERCLA site
- Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site
- The type of place regulated and the type of place affected by the release or CERCLA action
- The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action
- 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 (EPA 1988a), a requirement may be "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involve a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1988b).

Tables 5-2, 5-3 and 5-4 present each potential ARAR with a determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or response action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria.

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

- A state law,
- An environmental or facility siting law,
- Promulgated (of general applicability and legally enforceable),
- Substantive (not procedural or administrative),
- More stringent than the federal requirement,

- Identified in a timely manner, and
- Consistently applied.

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or non-environmental, including permit requirements, are not considered to be ARARs. CERCLA 121(e)(1), 42 USC § 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 CFR § 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 CFR § 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 EPA guidance (EPA 1988a), ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific requirements. Chemical-specific ARARs set limits on concentrations of specific hazardous substances, contaminants, and pollutants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. Location-specific requirements set restrictions on certain types of activities based on site characteristics. These include restrictions on activities in wetlands, floodplains, and historic sites. Action-specific requirements are technology-based restrictions, which are triggered by the type of action under consideration. This classification was developed to aid in the identification of ARARs; some ARARs do not fall precisely into one group or another. ARARs must be identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as removal actions.

As the lead federal agency, the Navy has primary responsibility for identifying federal ARARs for IR Site 14. The Navy has identified ARARs for the proposed removal action. State ARARs were solicited by the Navy in a letter to DTSC on December 27, 2000. In a letter dated February 8, 2001, DTSC responded to the Navy, stating that DTSC was reviewing the original ARARs provided in 1996, and would provide any changes to the Navy. The results of this analysis are pending. A copy of this correspondence is included in Appendix C. These ARARs and TBC criteria are presented in the discussion below and in the tables at the end of this section. Table 5-2 summarizes chemical-specific ARARs and TBC criteria, Table 5-3 summarizes location-specific ARARs, and Table 5-4 describes action-specific ARARs. More detailed information on the ARARs is provided in Section 3.4 of the EE/CA report.

5.1.5.1 Chemical-Specific ARARs and TBCs

The chemical-specific ARARs and TBCs are discussed in the following sections.

5.1.5.1.1 Chemical-Specific ARARs

For this removal action, the only chemical-specific ARARs are those requirements under the Resource, Conservation and Recovery Act (RCRA) relating to the identification of hazardous waste. Any waste generated as a result of the excavation activities will be analyzed to determine if it is a hazardous waste. The applicability of RCRA hazardous waste management requirements depends on whether the activity generates a waste; whether the waste is a RCRA hazardous waste; whether the waste initially underwent treatment, storage, or disposal after the 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 the definition of RCRA hazardous waste. The RCRA requirements at 22 California Code of Regulations (CCR) § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1) and 66261.100 are ARARs because they define RCRA hazardous waste. In particular, a waste can meet the definition of hazardous waste if it meets the criteria at 22 CCR §66261.24(a)(1)(b) for the toxicity characteristic of hazardous waste. This determination is made by using the toxicity characteristic leaching procedure (TCLP). If the site has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste. If site waste is found to contain hazardous waste, it will be managed in accordance with all applicable federal and state requirements, as described below in Section 5.1.5.3.

5.1.5.1.2 Chemical-Specific TBCs

The Navy identified potential chemical-specific TBC criteria for dioxins for human health and ecological receptors. The TBC criterion for human health is the industrial EPA Region IX PRG (0.027 μg/kg). The TBC criterion for ecological receptors is a protective soil concentration (0.0135 μg/kg) calculated for 2,3,7,8-TCDD equivalent concentrations (see Section 4). The industrial EPA Region IX PRG is a human health-based level that considers potential exposure scenarios, including inhalation of contaminated particulates, inhalation of volatile organic compounds, and ingestion and dermal absorption of contaminants in soil. The protective soil concentration calculated for ecological receptors is based on considerations adapted from the ERA of the OU-2 RI and conservative exposure parameters that would result in a hazard quotient of 1.0. Since the ecological-based screening level is the most protective, it will be used as the removal goal (see Section 3.5 in the EE/CA).

5.1.5.2 Location Specific ARARs

Location-specific ARARs are restrictions on the concentrations of hazardous substances or on the conduct of activities solely because they are in specific locations. Specific locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats. Several site conditions at Alameda Point are associated with location-specific ARARs. Requirements such as the Endangered Species Act, the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), the Migratory Bird Treaty Act, the National Historic Preservation Act, the Archeological Resources Protection Act, and the Coastal Zone Management Act (CZMA) were considered as potential location-specific ARARs. IR Site 14 does not provide any habitat for threatened or endangered species, and no endangered species have been observed at the site, thus the Endangered Species Act is not an ARAR. Additionally, IR Site 14 does not encompass any historic properties included or eligible for inclusion on the National Register of Historic Places. No scientific, prehistoric, or archeological data have been identified at the sites. Also, EPA and the Navy have determined that the requirements of NEPA and CEQA are no more stringent than the requirements for environmental review under CERCLA and the NCP. Hence, NEPA and CEQA were not considered ARARs for CERCLA actions.

Canada geese have been observed at IR Site 14, thus IR Site 14 does contain habitat for at least one migratory bird. The Migratory Bird Treaty Act (16 USC § 703) and its implementing regulations (50 CFR § 10, 14 and 20) prohibit at any time using any means or manners for the pursuit, hunting, capturing and killing or attempting to take, capture, or kill any migratory bird. Because of the presence of the Canada geese, the Migratory Bird Treat Act is an ARAR.

Section 307 (c)(1) of the CZMA (16 USC §1456(c)(1)) and the implementing regulations in 15 CFR §930 and 923.45 require that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with the approved state coastal zone management programs. A state coastal zone management program (developed under state law and guided by the CZMA) sets forth objectives, policies, and standards to guide public and private uses of lands and water in the coastal zone.

California's approved coastal management program includes the San Francisco Bay Plan (Bay Plan) developed by the San Francisco Bay Conservation and Development Commission (BCDC). The BCDC was formed under authority of the McAteer-Petris Act (California Government Code §66600 and the following sections), which authorizes the BCDC to regulate activities within San Francisco Bay and the shoreline (100 feet landward from the shoreline) in conformity with the policies of the Bay Plan (BCDC 1968). The Bay Plan's policies include limiting Bay filling, maintaining marshes and mudflats to the fullest extent possible to conserve wildlife and abate pollution, and protect the beneficial uses of the Bay. IR Site 14 is located adjacent to the coastal zone such that this removal action could affect the coastal zone. Therefore, all removal action alternatives will be consistent with the goals of the Bay Plan and will conform to the substantive requirements of the state management program.

The location-specific ARARs are summarized in Table 5-3.

5.1.5.3 Action-Specific ARARs

Action-specific ARARs are technology- or activity-based requirements or limitations for activities conducted during remedial and removal actions. These requirements are triggered by the particular remedial activities selected and suggest how a selected removal alternative should be achieved. These action-specific requirements do not in themselves determine the removal alternative; rather, they indicate how a selected alternative must be conducted. Therefore, because action-specific ARARs depend on the action selected, they are identified after an alternative has been selected.

Any hazardous waste generated during excavation activities is subject to the RCRA requirements identified as chemical-specific ARARs to determine whether such waste would be classified as hazardous. Any hazardous waste accumulated on-site must comply with the RCRA requirements set forth at 22 CCR § 66262.32. This section permits on-site hazardous waste accumulation for up to 90 days as long as the waste is properly stored and labeled.

If hazardous waste is generated as a result of the excavation, the Navy will identify the removal site as an area of contamination (AOC) if the site meets the definition of an AOC as stated in the preamble to the NCP (55 FR 8758). With respect to activities conducted within the AOC, the Navy will examine the applicability of RCRA regulations in accordance with existing EPA rules and policies regarding the management of remediation wastes in AOCs. As long as the excavated material remains inside of the area of contamination, it is not newly generated and will not be subject to RCRA generator, treatment, or other waste management requirements. Should excavated soil or groundwater from dewatering operations be moved outside of the area of contamination, the substantive RCRA requirements of 22 CCR for managing hazardous waste would be applicable.

For hazardous waste sent off site for disposal at a disposal facility (such as excavated soil or dewatering water), the Navy will comply with the EPA Off-Site Disposal Policy. In addition, the following RCRA requirements are ARARs: the RCRA pre-transport regulations at 22 CCR §§ 66262.30 (packaging), 66262.31(labeling), 66262.32 (marking) and 66262.33 (placarding); and RCRA manifest requirements at 22 CCR §§ 66262.20, 66262.21, 66252.22 and 66262.23. The regulations implementing the RCRA land disposal restrictions (LDR), including applicable LDR treatment standards at 22 CCR §66268.7 are also ARARs. Prior to sending any waste off-site, the Navy will determine whether the waste is subject to LDR and will provide the required notices and certifications of 22 CCR § 66268.7. In addition, the Department of Transportation (DOT) hazardous materials regulations at 49 CFR 171-172 are also ARARs for transporting hazardous materials on-site.

If no hazardous waste is generated as a result of the removal action, the Navy will analyze RCRA requirements to determine if they are relevant and appropriate. The Navy may determine that certain RCRA regulations are relevant and appropriate because the excavated soil may be similar to a RCRA hazardous waste.

In addition to the above RCRA and DOT requirements, Bay Area Air Quality Management District (BAAQMD) regulations 6-301, 6-302 and 6-305 which specify standards for particulates and visible emissions for excavations are ARARs for excavation activities. Regulation 8, Rule 40 is also an ARAR and sets forth standards for maintaining, covering, and stockpiling soil.

5.1.6 Project Schedule

The Action Memorandum, Removal Action Work Plan, and Field Sampling Plan / Quality Assurance Project Plan (FSP/QAPP) for the post-removal action confirmation sampling are scheduled for completion in August 2001, with the removal action itself scheduled to begin in September 2001 and the closeout report to be prepared by Spring 2002. Figure 5-1 shows the projected schedule for the IR Site 14 removal action.

5.2 ESTIMATED COSTS

The chosen alternative for this removal action is Alternative 3. Data gap sampling in June 2001 will determine whether portions of the berm area and the five removal areas need to be excavated (Scenario 2) or whether just the five removal areas need to be excavated (Scenario 1). Furthermore, costs for this alternative will vary depending on whether or not the soil removed is characterized as hazardous or nonhazardous. The major components of this alternative are: (1) excavation of contaminated soil, (2) disposal of the contaminated soil at a permitted off-site facility, and (3) backfilling the excavated area with imported material and site restoration. The estimated volume of soil to be removed from each removal area is listed after the estimated costs.

A summary of the total capital cost, annual operations and maintenance (O&M) cost, estimated duration of removal, and present worth are presented below for Scenarios 1 and 2. Detailed cost estimates are included in Appendix B of the EE/CA, presented in Appendix A of this AM.

Scenario 1 (Total 123 Cubic Yards)

Since this alternative applies to both nonhazardous and hazardous soil removal actions, costs for both Class I (hazardous soil) and Class II (nonhazardous soil) disposal are presented below.

Class I Landfill Disposal

Estimated Capital Cost ($):	123,973
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	204,650 (with markups and escalation)

Class II Landfill Disposal

Estimated Capital Cost ($):	71,258
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	123,818 (with markups and escalation)

Scenario 2 (Total 203 Cubic Yards)

Since this alternative applies to both nonhazardous and hazardous soil removal actions, costs for both Class I and II disposal are presented below.

Class I Landfill Disposal

Estimated Capital Cost ($):	173,154
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	284,102 (with markups and escalation)

Class II Landfill Disposal

Estimated Capital Cost ($):	84,844
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	146,642 (with markups and escalation)

The estimated volume of contaminated soil for the five areas is described below.

- Sample point S14-03, located beneath the eastern portion of the FTA berm, defines the first subsurface dioxin removal area. The estimated removal dimensions are 10 feet by 10 feet by 2 feet deep, with a total volume of about 7 cubic yards. An additional 10 cubic yards of berm material covers the subsurface removal area.

- Sample points S14-04, S14-05, and S14-06, located south of the FTA berm, define the second subsurface dioxin removal area. The estimated removal dimensions are 40 feet by 12 feet by 2 feet deep, with a total of volume about 35 cubic yards. An additional 30 cubic yards of berm material covers the removal area.

- Sample points S14-08 and B14-02, located west of the FTA berm, define the third subsurface dioxin removal area. The estimated removal dimensions are 26 feet by 12 feet by 2 feet deep, with a total volume of about 23 cubic yards.

- Sample points SUMP-BN, -BS, -SW, and -NW, located near the sump, define the fourth subsurface dioxin removal area. The estimated removal dimensions are 15 feet by 5 feet by 4 feet deep, with a total volume of about 11 cubic yards.

- Sample point B14-01, located northeast of the sump, defines the fifth subsurface dioxin removal area. The estimated removal dimensions are 10 feet by 10 feet by 2 feet deep, with a total volume of about 7 cubic yards.

TABLE 5-1A

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 2: Excavation and On-site Disposal		Alternative 3: Excavation and Off-site Disposal (Class II Landfill)	
	Comment	Score	Comment	Score	Comment	Score
Effectiveness						
1. Overall Protection of Human Health and the Environment	No protection is given. Potential for exposure remains.	N/A	This will decrease exposure and direct contact with dioxin-contaminated soil. Engineering controls for IR Site 1 landfill containment will be required to protect human health and the environment.	5	This will decrease exposure and direct contact with dioxin-contaminated soil. Engineering controls are already in place at a permitted off-site landfill to protect human health and the environment.	10
2. Compliance with ARARs	There are no chemical-specific or action-specific ARARs with which this alternative must comply. It complies with location-specific ARARs because it is consistent with the BCDC's Bay Plan and will not interfere with any migratory birds.	N/A	This will comply with chemical-specific ARARs for determining whether excavated soil is hazardous. This will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so as to avoid interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10	This will comply with chemical-specific ARARs for determining whether excavated soil is hazardous. This will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so as to avoid interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10
3. Long-Term Effectiveness and Permanence	It does not provide long-term effectiveness or permanence.	N/A	This will be permanently effective with proper landfill cover maintenance at IR Site 1.	8	This will be permanently effective with proper landfill cover maintenance at a permitted Class II landfill.	8

TABLE 5-1A

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 2: Excavation and On-site Disposal		Alternative 3: Excavation and Off-site Disposal (Class II Landfill)	
	Comment	Score	Comment	Score	Comment	Score
4. Reduction in Toxicity, Mobility, and Volume through Treatment	No treatment is proposed.	N/A	Use of excavated soil as a foundation layer for the IR Site 1 landfill cap will reduce mobility. Toxicity and volume would not be reduced.	5	Mobility will more effectively be reduced at a Class II landfill because a bottom liner will be in place. Toxicity and volume will not be reduced.	8
5. Short-term Effectiveness	It will cause no disturbance.	N/A	Disturbances will occur during excavation activities.	8	Disturbances will occur from excavation activities. Increase in risk will be possible due to increase in truck traffic during transportation of soil to an off-site landfill.	5
Implementability						
6. Technical Feasibility	This is implementable since no action will be taken.	N/A	This is readily implementable; however, soil staging will be required for a period of at least 2 years. Standard construction techniques will be used, and limited O&M will be required during soil staging at IR Site 1.	5	This is readily implementable. Standard construction techniques will be used, and Altamont landfill, a Class II facility, is located nearby.	8
Comparative Cost	Scenario 1: $0 Scenario 2: $0	N/A	Scenario 1: $207,427 Scenario 2: $256,057	5	Scenario 1: $123,818 Scenario 2: $146,642	8
Overall Ranking	**Total Score**	N/A	**Total Score**	**46**	**Total Score**	**59**

TABLE 5-1A

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes:

Effectiveness Criteria

1	=	ineffective
5	=	moderately effective
10	=	highly effective

Implementability Criteria

1	=	implementable with difficulty
5	=	implementable
10	=	easily implementable

Cost

1	=	high cost
5	=	moderate cost
10	=	low cost

ARAR	Applicable or relevant and appropriate requirement
BCDC	San Francisco Bay Conservation and Development Commission
	Installation Restoration
N/A	Not applicable
IR	Installation Restoration
O&M	Operation and maintenanceIR

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
Effectiveness						
1. Overall Protection of Human Health and the Environment	No protection will be provided. Potential for exposure will remain.	N/A	This alternative will decrease exposure and direct contact with dioxin-contaminated soil. Excavated soil will be treated to meet land disposal requirements prior to disposal at a Class I landfill. Engineering controls are in place at a Class I landfill to protect human health and the environment.	8	**Disposal Option 1.** This option will reduce, but will not eliminate, the potential for dermal contact with or ingestion of contaminated soil or the potential for future leaching to groundwater of treated backfill.	4
					Disposal Option 2. This option will eliminate the potential for dermal contact with or ingestion of contaminated soil and future release to groundwater if proper engineering controls are implemented for containment at the IR Site 1 landfill.	6
					Disposal Option 3. This option will eliminate the potential for dermal contact with or ingestion of contaminated soil and future release to groundwater since engineering controls are in place at a Class II landfill to protect human health and the environment.	8

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
2. Compliance with ARARs	There are no chemical-specific or action-specific ARARs with which this alternative must comply. This alternative will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will not interfere with any migratory birds.	N/A	This alternative will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at a Class I landfill. This alternative will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10	**Disposal Option 1.** This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to backfilling with treated soil and disposal at IR Site 1. This option will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10
					Disposal Option 2. This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at IR Site 1. This option will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 3 of 7)

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
2. Compliance with ARARs (Continued)					**Disposal Option 3.** This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at an off-site Class II landfill facility. This option complies with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10
3. Long-term Effectiveness and Permanence	It will not provide long-term effectiveness or permanence.	N/A	Long-term effectiveness will be achievable with proper landfill maintenance at a permitted Class I landfill.	8	**Disposal Option 1.** Under this option, continued monitoring of leaching and conditions of the backfill may be required since long-term effectiveness has not been demonstrated for many contaminant and S/S process combinations.	4
					Disposal Option 2. This option will be permanently effective if proper engineering controls are implemented at IR Site 1.	6
					Disposal Option 3. This option will be permanently effective since engineering controls are in place at an off-site landfill facility.	8

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
4. Reduction in Toxicity, Mobility, and Volume through Treatment	No treatment will be proposed.	N/A	Mobility will effectively be reduced at a Class I landfill because of treatment to LDRs and landfill liner and final cover requirements. Toxicity and volume will not be reduced.	8	**Disposal Option 1.** Mobility will be reduced if S/S processes are effective. However, the mobility of dioxins in treated backfill may be affected by environmental conditions. Toxicity and volume will not be reduced.	4
					Disposal Option 2. Mobility will be reduced if S/S processes are effective. The mobility of dioxins will be further reduced under this option if proper engineering controls are implemented at the IR Site 1 landfill. Toxicity and volume will not be reduced.	6
					Disposal Option 3. Mobility will be reduced if S/S processes are effective. This option will provide the best reduction of mobility because engineering controls are already in place at an approved off-site landfill facility. Toxicity and volume will not be reduced.	8
5. Short-term Effectiveness	No disturbance will occur.	N/A	Disturbances will occur from excavation activities. Short-term risk may be increased due to increase in truck traffic during transportation of soil to an off-site landfill.	6	**Disposal Option 1.** Disturbances will occur from excavation and S/S process activities.	8
					Disposal Option 2. Disturbances will occur from excavation and S/S process activities.	8

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
5. Short-term Effectiveness (Continued)					**Disposal Option 3.** Disturbances will occur from excavation and S/S process activities. Short-term risk may be increased due to increase in truck traffic during transportation of soil to an off-site landfill.	6
Implementability						
6. Technical Feasibility	Readily implementable	N/A	This is readily implementable. Standard construction techniques will be used, and Kettleman Hills, a Class I facility, is located within 300 miles.	8	**Disposal Option 1.** The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques are used and limited O&M will be required during soil staging at IR Site 1 for a period of at least 2 years.	6
					Disposal Option 2. The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques will be used, and limited O&M will be required during soil staging at IR Site 1 for a period of at least 2 years.	6

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3 [1])	
	Comment	Score	Comment	Score	Comment	Score
					Disposal Option 3. The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques will be used, and Altamont Landfill, a Class II facility, is located within 45 miles	8
Cost						
Comparative Cost	Scenario 1: $0 Scenario 2: $0	N/A	Scenario 1: $204,650 Scenario 2: $284,102	8	**Disposal Option 1** Scenario 1: $821,989 Scenario 2: $1,028,265	2
					Disposal Option 2 Scenario 1: $444,706 Scenario 2: $636,895	4
					Disposal Option 3 Scenario 1: $325,631 Scenario 2: $465,836	6
Overall Ranking						
	Total Score	N/A	**Total Score**	**56**	**Total Score Disposal Option 1**	38
					Total Score Disposal Option 2	**46**
					Total Score Disposal Option 3	**54**

TABLE 5-1B

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes:

Effectiveness Criteria

1 = ineffective
5 = moderately effective
10 = highly effective

Implementability Criteria

1 = implementable with difficulty
5 = implementable
10 = easily implementable

Cost

1 = high cost
5 = moderate cost
10 = low cost

ARAR	Applicable or relevant and appropriate requirement
BCDC	San Francisco Bay Conservation and Development Commission
IR	Installation Restoration
LDR	Land disposal restriction
N/A	Not applicable
O&M	Operation and maintenance
S/S	Solidification and stabilization

Note 1: Alternative 4 Disposal Options:
Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal
Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II Landfill Facility)

TABLE 5-2

INSTALLATION RESTORATION SITE 14 POTENTIAL CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

tation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Federal Requirements					
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 14, §§§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1) and 66261.100	Soil and water	Criteria for classifying excavated material	Applicable	The requirements of 22 CCR, Division 4.5, Chapter 14 are applicable for determining whether excavated material contains hazardous waste. These requirements may be relevant and appropriate to excavated material that is similar or identical to RCRA hazardous waste or non-RCRA hazardous waste
Hazardous Waste Control Law (California Health and Safety Code § 25100-25249)	22 CCR § 66261.24(a)(2)	Water and soil	This criterion is for identifying characteristics of non-RCRA hazardous waste.	Applicable	Applicable for determining whether excavated media contain non-RCRA waste.
N/A	N/A	Soil	EPA Region IX PRG	To be considered	EPA guidance is useful for setting cleanup goals for protecting human health from dioxin-contaminated soil.

Notes:

RAR	Applicable or relevant and appropriate requirement	IR	Installation Restoration
BCDC	San Francisco Bay Conservation and Development Commission	N/A	Not Applicable
CCR	California Code of Regulations	PRG	Preliminary Remediation Goal
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
EPA	Environmental Protection Agency	USC	U.S. Code

TABLE 5-3

INSTALLATION RESTORATION SITE 14 POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Federal Requirements					
Migratory Bird Treaty Act (16 USC703)	50 CFR 10, 14, and 20	Water and soil	This act protects almost all native birds and certain migratory birds, their nests, and eggs from unregulated "take," which can include poisoning from hazardous waste sites.	Applicable	Canada geese have been observed at IR Site 14; therefore, this requirement is relevant and appropriate to any response actions taken there.
Coastal Zone Management Act (16 USC §1456(c)(1)) and McAteer-Petris Act (Government Code Section 66600-66682)	15 CFR 930 and 923.45	Water and soil	Federal actions that affect land or water use in coastal zones should be conducted in a manner that is consistent with state coastal zone management programs. The state management program for San Francisco Bay is described in the BCDC's San Francisco Bay Plan, enacted under authority of the McAteer-Petris Act of 1965.	Applicable	IR Site 14 is located adjacent to the coastal zone. The excavation will be implemented in a manner that is consistent with the BCDC's San Francisco Bay Plan.

Notes:

ARAR Applicable or relevant and appropriate requirement
BCDC San Francisco Bay Conservation and Development Commission
CFR Code of Federal Regulations
IR Installation Restoration
USC U.S. Code

TABLE 5-4

INSTALLATION RESTORATION SITE 14 POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Federal Requirements					
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 14, §§§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1) and 66261.100	Soil and water	Criteria for classifying excavated material	Applicable	The requirements of 22 CCR, Division 4.5, Chapter 14 are applicable for determining whether excavated material contains hazardous waste. These requirements may be relevant and appropriate to excavated material that is similar or identical to RCRA hazardous waste or non-RCRA hazardous waste
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 14 § 66262.34	Soil and water	Requirements for accumulation of hazardous waste	Applicable	These requirements are applicable if hazardous waste is generated and accumulated on-site before transport.
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 12 § 66262.30	Soil and water	Requires that hazardous waste be packaged in accordance with DOT regulations prior to transporting	Applicable	These requirements are applicable if hazardous waste is to be transported.

TABLE 5-4

INSTALLATION RESTORATION SITE 14 POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 12 § 66262.31	Soil and water	Requires that hazardous waste be labeled in accordance with DOT regulations prior to transporting	Applicable	These requirements are applicable if hazardous waste is to be transported.
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 12 § 66262.32	Soil and water	Requires that hazardous waste be marked in accordance with DOT regulations prior to transporting	Applicable	These requirements are applicable if hazardous waste is to be transported.
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 12 § 66262.33	Soil and water	Requires transport vehicle be placarded in accordance with DOT regulations prior to transport of hazardous waste.	Applicable	These requirements are applicable if hazardous waste is to be transported.
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 12 § 66262.20-66262.23	Soil and water	Requires preparation of a manifest for transport of hazardous waste off-site.	Applicable	These requirements are applicable if hazardous waste is to be transported.

TABLE 5-4

INSTALLATION RESTORATION SITE 14 POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 et seq.)	22 CCR, Division 4.5, Chapter 18 § 66268.7	Soil and water	Requires generators of hazardous waste to determine if waste has to be treated before it can be land disposed. Requires generators to notify treatment facility if a waste is subject to land disposal restrictions and does not meet applicable treatment standards. If the waste meets treatment standards, generators must sign a certification.	Applicable	These requirements are applicable if hazardous waste is to be land disposed.
Transportation of hazardous material 49 USC §§ 5101-5127	49 CFR § 171.2(f), 171.2(g), 172.300, 172.301,172.302, 172.303172.304, 172.312, 172.400, 172.504	Soil and water	Sets forth requirements for transporting hazardous waste including representations that containers are safe, prohibitions on altering labels, marking requirements, labeling requirements and placarding requirements.	Relevant and appropriate	Relevant and appropriate for transporting hazardous materials on-site.
BAAQMD Regulations 6	Regulations 6-301 and 6-302	Air	Prohibits emissions which are as dark or darker than No.1 on the Ringelmann Chart and sets forth opacity limitations.	Applicable	These requirements are applicable to excavation activities.
BAAQMD Regulation 8	Regulation 8, Rule 40	Air	Provides requirements for maintaining, covering and stockpiling excavated soil.	Applicable	These requirements are applicable to excavation activities.

TABLE 5-4

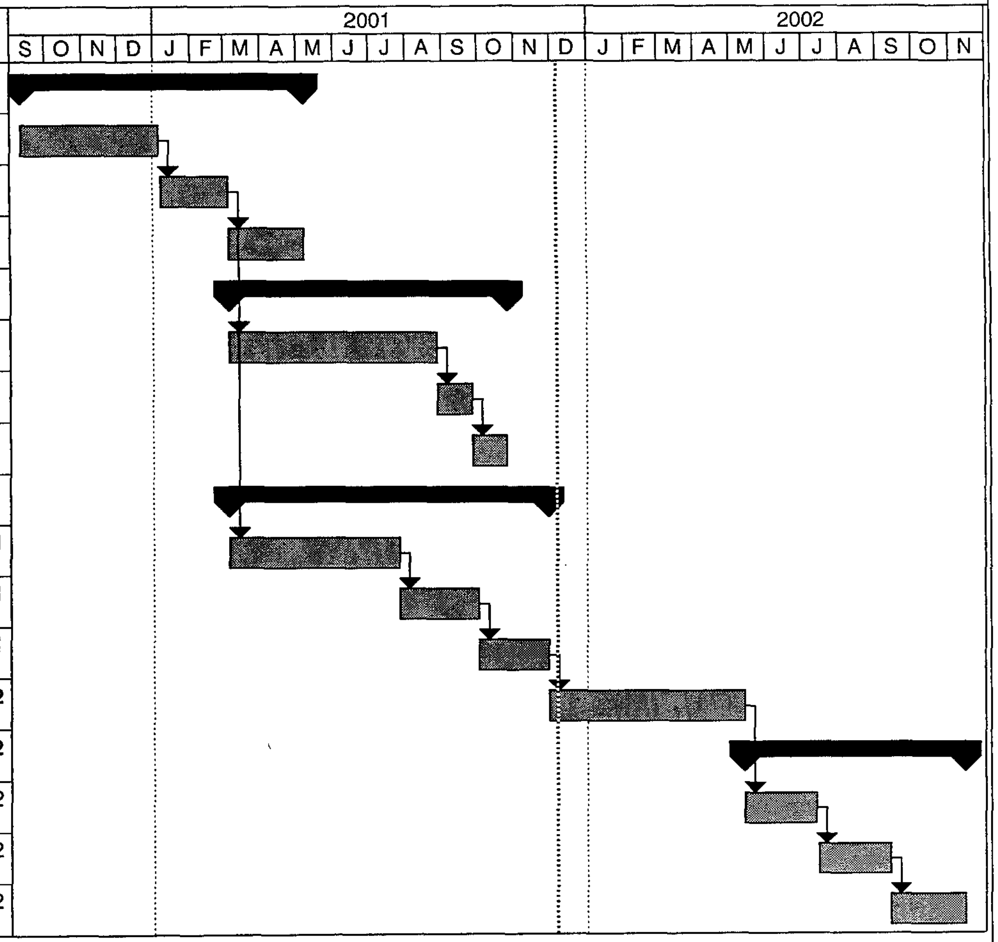
INSTALLATION RESTORATION SITE 14 POTENTIAL ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes:

ARAR	Applicable or relevant and appropriate requirement
BCDC	San Francisco Bay Conservation and Development Commission
CFR	Code of Federal Regulations
IR	Installation Restoration
USC	U.S. Code

Figure 5-1. IR Site 14 - Removal Action Schedule

Task Name	Duration	Start	Finish
Engineering Evaluation/Cost Analysis	**171 d**	**Mon 9/11/00**	**Mon 5/7/01**
Draft EE/CA	85 d	Mon 9/11/00	Fri 1/5/01
Regulatory Agency Review	41 d	Mon 1/8/01	Mon 3/5/01
Navy Responses to Comments	45 d	Tue 3/6/01	Mon 5/7/01
Action Memorandum	**168 d**	**Tue 3/6/01**	**Thu 10/25/01**
Draft Action Memo	125 d	Tue 3/6/01	Mon 8/27/01
Regulatory Agency Review	22 d	Tue 8/28/01	Wed 9/26/01
Navy Responses to Comments	21 d	Thu 9/27/01	Thu 10/25/01
Removal Action Workplan	**193 d**	**Tue 3/6/01**	**Thu 11/29/01**
Draft Workplan	103 d	Tue 3/6/01	Thu 7/26/01
Regulatory Agency Review	47 d	Fri 7/27/01	Mon 10/1/01
Navy Responses to Comments	43 d	Tue 10/2/01	Thu 11/29/01
Removal Action	**117 d**	**Fri 11/30/01**	**Mon 5/13/02**
Closeout Report	**133 d**	**Tue 5/14/02**	**Thu 11/14/02**
Draft Closeout Report	44 d	Tue 5/14/02	Fri 7/12/02
Regulatory Agency Review	44 d	Mon 7/15/02	Thu 9/12/02
Navy Responses to Comments	45 d	Fri 9/13/02	Thu 11/14/02



6.0 EXPECTED CHANGE SHOULD REMOVAL ACTION BE DELAYED OR NOT TAKEN

If the proposed removal action is delayed or not taken, elevated dioxin levels would remain in soil and removal action objectives stated in the AM would not be achieved. Risk of human health and ecological receptor exposure to dioxin-contaminated soil would still remain. Inhalation of vapors from soil in indoor and outdoor air, dermal contact with soil, ingestion of soil, and inhalation of chemicals sorbed to particulates would pose significant risk to public health and the environment. Soil contamination at IR Site 14 occurs at or near the surface and migration of dioxins could occur through entrainment of contaminated soil in storm water runoff and wind. In addition, subsurface excavation as a result of future land-use could present significant exposure and risk to construction personnel and other transient maintenance workers.

7.0 PUBLIC INVOLVEMENT

The results of the engineering evaluation and cost analysis were presented to the public and to the Alameda Point Restoration Advisory Board (RAB) at the February 6, 2001 RAB meeting. The Draft EE/CA report was completed on January 5, 2001 and placed in the Administrative Record. A public notice announcing the availability of the Draft EE/CA for review was published in Alameda area newspapers on March 13, 2001, and a public comment period extended through April 13, 2001. No comments were received from the public. Comments received from the regulatory agencies and the Navy's response to those comments for the EE/CA for IR Site 14 dioxin soil removal were completed on July 6, 2001 and included in the Administrative Record.

8.0 OUTSTANDING POLICY ISSUES

No outstanding policy issues exist for this removal action.

9.0 RECOMMENDATIONS

The Action Memorandum was prepared in accordance with current EPA and Navy guidance documents for non-time critical removal actions under CERCLA. The purpose of this Action Memorandum was to identify and analyze removal actions to address dioxin contamination in soil at IR Site 14, Alameda Point. Four alternatives were identified, evaluated, and ranked: (1) no action, (2) excavation and on-site disposal, (3) excavation and off-site disposal, and (4) excavation, *Ex Situ* solidification/stabilization, and disposal.

Based on the comparative analysis of the removal action alternatives as summarized in Sections 5.1.3 and 5.1.4 and Tables 5-1A and 5-1B, the Navy recommends Alternative 3, excavation and off-site disposal for both hazardous and nonhazardous soil conditions, because this alternative will most effectively meet the removal goal, is technically and administratively feasible, and is cost-effective. The action will lower risks by reducing the potential for exposure of human and ecological receptors to COCs in soil. Excavation of contaminated soil will also reduce the potential for migration of COCs in wind-borne particulates and storm water runoff. After completion of the removal action, confirmation samples will be collected to evaluate the residual dioxins in soil at IR Site 14. The residential and industrial cancer risks for IR Site 14 will be evaluated in the OU-1 RI report. It is anticipated that by meeting the removal action goal based on ecological receptors that the resulting human health risk will be acceptable for residential use.

This decision document represents the selected removal action for IR Site 14, Alameda Point, Alameda, California developed in accordance with CERCLA as amended and is not inconsistent with the NCP. This decision is based on the Administrative Record for the site.

Michael E. McClelland ______________________ 12/03/01 ______________

Michael E. McClelland, P.E.
Base Realignment and Closure Environmental Coordinator
Southwest Division, Naval Facilities Engineering Command

Date

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APPENDIX A

ENGINEERING EVALUATION/COST ANALYSIS

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
Contract No. N62474-94-D-7609
Contract Task Order No. 386

Prepared For

DEPARTMENT OF THE NAVY
Navy Remedial Project Manager, Glenna Clark
Engineering Field Division, Southwest

Naval Facilities Engineering Command
San Diego, California

INSTALLATION RESTORATION SITE 14
DIOXIN REMOVAL ACTION
ENGINEERING EVALUATION AND COST ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

DRAFT

January 5, 2001

Document Control No. DS.0386.15534

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ARAR	Applicable or relevant and appropriate requirement
AVGAS	Aviation Gasoline
Bay Plan	San Francisco Bay Plan
BCDC	San Francisco Bay Conservation and Development Commission
BCT	Base Realignment and Closure Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
Ca-HSC	California Health and Safety Code
Cal-EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Canonie Environmental Services
CFR	Code of Federal Regulations
CGS	California ground squirrel
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Chemical of concern
COPC	Chemical of potential concern
CPT	Cone penetrometer test
CTO	Contract task order
CZMA	Coastal Zone Management Act
DERP	Defense Environmental Restoration Program
DTSC	California Department of Toxic Substances Control
EBS	Environmental baseline survey
EDB	1,2-Dibromoethane
EE/CA	Engineering evaluation and cost analysis
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
FTA	Fire training area
FWBZ	First water-bearing zone
HI	Hazard index
HHRA	Human health risk assessment
HQ	Hazard quotient
IR	Installation restoration
IT	International Technology Corporation

LDR	Landfill disposal restrictions
µg/kg	Microgram per kilogram
MTBE	Methyl tert-butyl ether
N/A	Not applicable
NARA	National Archives and Records Administration
NAS	Naval Air Station
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
O&M	Operations and maintenance
OU	Operable unit
OU-2	Operable Unit 2
PCB	Polychlorinated biphenyl
POTW	Publicly owned treatment works
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
PWC	Public Works Center
RACER©	Remedial Action Cost Engineering and Requirements
RAO	Removal action objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RTH	Red-tailed hawk
RWQCB	San Francisco Bay Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
S/S	Solidification and stabilization
STLC	Soluble threshold limit concentration
SVOC	Semivolatile organic compound
SWBZ	Second water-bearing zone
SWRCB	California State Water Resources Control Board
TBC	To be considered
TCDD	Tetrachlorodibenzo-p-dioxin
TCLP	Toxicity characteristic leaching procedure
TEF	Toxic equivalency factor
TEPH	Total extractable petroleum hydrocarbons
TOC	Total organic compounds
TPPH	Total purgeable petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
TRV	Toxicity reference value
TtEMI	Tetra Tech EM Inc.
TTLC	Total threshold limit concentration

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (Continued)

UST	Underground storage tank
USC	U.S. Code
VOC	Volatile organic compound
WDR	Waste discharge regulations
WWII	World War II

EXECUTIVE SUMMARY

This engineering evaluation and cost analysis (EE/CA) was performed in accordance with current U.S. Environmental Protection Agency (EPA) and U.S. Department of the Navy guidance documents for a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and in accordance with Chapter 6.8 of the California Health and Safety Code (Ca-HSC). CERCLA and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300) and Ca-HSC §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. This EE/CA summarizes the results of the EE/CA process, characterizes the site, identifies removal action objectives (RAO), describes removal action alternatives, contains an analysis of these alternatives, and describes the recommended removal action alternative.

In 1936, the Navy began building Naval Air Station (NAS) Alameda in response to the military buildup in Europe before World War II (WWII). During WWII, NAS Alameda's primary mission was to provide facilities and support for fleet aviation activities and provide berthing for Pacific Fleet ships. These activities involved the use of industrial chemicals, including fuels, cleaning solvents, acids, paint strippers, degreasers, caustic cleaners, and metals from plating operations.

The Navy received a remedial action order from the California Department of Health Services, now overseen by the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), in 1988. The remedial action order identified Installation Restoration (IR) sites within NAS Alameda to be targeted for remedial action. NAS Alameda was designated for closure in 1993. As part of the Base Realignment and Closure (BRAC) strategy for station-wide investigation and cleanup, the IR sites have been grouped into six operable units (OU), OU-1 to OU-6. Removal actions for dioxin-contaminated soil at IR Site 14 located within OU-1 (formerly located within OU-2) are the focus of this EE/CA.

Dioxin-contaminated soil at IR Site 14 is likely a result of combustion by-products from activities conducted at the former fire training area (FTA) located in the northwestern portion of the site. The FTA consisted of a concrete pad surrounded on three sides by an earthen berm. The containment berm was constructed between 1973 and 1979. A sump that is about 3 feet wide, 8 feet long, and 3 feet deep is located in the northeastern corner of the concrete pad within the FTA berm. Ansulite fire-fighting foam, carbon dioxide, potassium chloride, and Purple K were used to extinguish training fires (Ecology and Environment, Inc., 1983). An aboveground storage tank located adjacent to the FTA berm was used to mix the Ansulite fire-fighting foam for extinguishing the fires. Waste oils and fuels, which may have contained chlorinated constituents, from Alameda Point plane defueling operations were also burned in a former steel aboveground storage tank located in the center of the concrete pad (Canonie Environmental Services [CES], 1990). Run-off likely carrying residue containing dioxins from extinguished fires drained towards the sump. The FTA berm and surface grade currently confine the dioxins to the sump area and prevent migration of the surface soil to nearby storm drain catch basins. The fire department stopped burning in the area in 1986 or 1987.

A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were conducted for IR Site 14 as part of a remedial investigation (RI) for OU-2. Risks from inhalation of vapors from soil and groundwater in indoor and outdoor air, dermal contact with soil, ingestion of soil, and inhalation of chemicals sorbed to particulates were evaluated in the HHRA. Residential, occupational/industrial, recreational, and construction worker scenarios were evaluated for each soil exposure pathway. Specific chemicals or chemical classes that have calculated carcinogenic risks greater than 1×10^{-6} or noncarcinogenic risks with a hazard index (HI) greater than 1 indicate the potential for unacceptable risks to human receptors. The total carcinogenic risk calculated for dioxins at IR Site 14 is greater than 1×10^{-6} for both residential and occupational exposure scenarios. The HI associated with the noncarcinogenic hazard due to dioxins is less than 1 for both residential and occupational exposure scenarios.

The potential risk to the California ground squirrel (CGS) and the red-tailed hawk (RTH) were evaluated during the ERA. The CGS and the RTH were used as surrogates in the ERA to represent the small mammal population and the raptor population associated with IR Site 14, respectively. An estimate of the exposure and daily dose of dioxins to the CGS and RTH was developed using life history, site contaminant concentration, and environmental fate data. This exposure information was then compared with toxicity reference values (TRV) for the CGS and the RTH to evaluate potential risk. A TRV is a daily dose level at which a particular biological effect may occur in an organism based on laboratory toxicological investigations. Five hazard quotients (HQ) were calculated to encompass the theoretical range of risk estimates based on the range of biological and toxicological data published in available peer-reviewed literature for the CGS and the RTH. HQs were developed by dividing the daily dose by the appropriate TRV. HQs greater than 1.0 indicated the potential for unacceptable risk. All five HQs calculated for dioxins at IR Site 14 exceeded 1.0 indicating a potential risk to both the CGS and the RTH, with the exception of the HQ_1 calculated for RTH.

The potential risk to human health and to ecological receptors from dioxin-contaminated soil at IR Site 14 is addressed in a streamlined risk evaluation within this EE/CA. For the streamlined risk evaluation, dioxin concentrations detected in soil samples collected from the IR Site 14 FTA were evaluated in terms of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalents. The total 2,3,7,8-TCDD equivalent concentrations for IR Site 14 were then compared to a screening level that was determined to be protective of human health and of ecological receptors. For human health, the industrial EPA Region IX EPA preliminary remediation goal (PRG) (0.027 micrograms per kilogram [µg/kg]) was chosen as the screening level for 2,3,7,8-TCDD equivalent concentrations based on the potential reuse of IR Site 14, which may include the building of a hotel and conference center, parks, and, possibly, a golf course. No development plans have considered reuse of the area for residential housing. The industrial EPA Region IX EPA PRG is a human health-based level that considers potential exposure scenarios, including inhalation of contaminated particulates, inhalation of volatile contaminants, and ingestion and dermal absorption of contaminants in soil. For ecological receptors, a screening level was calculated for 2,3,7,8-TCDD equivalent concentrations (0.0135 µg/kg) using conservative exposure parameters and considerations adapted from the ERA of the OU-2 RI. The ecological screening level was chosen as the screening level for the streamlined risk evaluation because it is more stringent than the human health screening level. Equivalent 2,3,7,8-TCDD concentrations in soil at IR Site 14 that exceed the ecological screening level were determined to pose a risk, warranting a removal action.

The purpose of this EE/CA is to identify and analyze alternative removal actions for permanently addressing the dioxin-contaminated soil at IR Site 14. The general objectives of the removal action are to minimize (1) actual or potential exposure to human and ecological receptors from dioxin-contaminated soil and (2) actual or potential contamination of sensitive ecosystems due to dioxins. In order to meet these general objectives, the specific RAO is to remove soil at IR Site 14 with 2,3,7,8-TCDD equivalent concentrations greater than the ecological screening level (0.0135 µg/kg).

During scoping meetings conducted between June and October 2000, the BRAC Cleanup Team (BCT) concluded that dioxins in IR Site 14 soil posed a sufficient threat to public health, welfare, and the environment to warrant a prompt response in the form of a removal action, rather than a decision to wait to address the threat as part of a final remedial action. The BCT also discussed multiple *in situ* and *ex situ* treatment technologies capable of removing dioxins in soil. An EE/CA is similar to a streamlined feasibility study, so the BCT agreed to evaluate three technologies for removing dioxin-contaminated soil: (1) excavation and on-site disposal; (2) excavation and off-site disposal; and (3) excavation, *ex situ* solidification and stabilization (S/S), and on-site disposal. These technologies were selected to ensure that the RAO would be met. For on-site disposal options, the BCT discussed using excavated soil from cleanup sites at Alameda Point as a foundation layer for the IR Site 1 landfill cap if the excavated soil is not classified as hazardous, as set forth in 22 California Code of Regulations (CCR) §66261. During the removal action, sampling will be conducted to determine if dioxin-contaminated soil at IR Site 14 is classified as hazardous. If excavated soil is classified as hazardous, it will be treated to meet land disposal restrictions (LDR) prior to on-site disposal.

A comparative analysis for both nonhazardous and hazardous soil removal actions was conducted to evaluate the relative performance of each alternative. The removal alternatives for nonhazardous and hazardous soil removal actions used in the comparative analysis are listed below.

Nonhazardous Soil Removal Action Alternatives

The Navy evaluated the following alternatives for excavated soil determined to be nonhazardous under Title 22:

Alternative 1: No Action
Alternative 2: Excavation and On-site Disposal
Alternative 3: Excavation and Off-site Disposal (Class II Landfill Facility)

Hazardous Soil Removal Action Alternatives

The Navy evaluated the following alternatives for excavated soil determined to be hazardous under Title 22:

Alternative 1: No Action
Alternative 3: Excavation and Off-site Disposal (Class I Landfill Facility)
Alternative 4: Excavation, *Ex Situ* Solidification/Stabilization, and Disposal (Options 1 through 3, listed below)

Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal
Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II landfill facility)

Based on this evaluation and factors contained in the NCP and Chapter 6.8 of the Ca-HSC, the Navy recommends Alternative 3 for both hazardous and nonhazardous soil removal actions. This alternative best meets the NCP criteria of overall protectiveness of human health; compliance with applicable relevant and appropriate requirements; long-term effectiveness; reduction of mobility, toxicity, or volume through treatment; short-term effectiveness; implementability; and cost. State and community acceptance will be evaluated after the EE/CA is published for public comment and will be discussed in an action memorandum documenting the response action decision.

1.0 INTRODUCTION

Tetra Tech EM Inc. (TtEMI) prepared this engineering evaluation and cost analysis (EE/CA) for the U.S. Department of the Navy (Navy) under contract N62474-94-D-7609, Contract Task Order 386. This EE/CA identifies proposed removal action alternatives for dioxin-contaminated soil at Installation Restoration (IR) Site 14 at Alameda Point, Alameda, California (formerly Naval Air Station [NAS] Alameda). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Nation Oil and Hazardous Substances Pollution Contingency Plan (NCP) (National Archives and Records Administration [NARA] 1980, 1990) define removal actions to include the following:

> ...the cleanup or removal of released hazardous substances from the environment, such actions as may necessarily be taken in the event of the threat of release of hazardous substance into the environment, such action as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removal material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

The U.S. Environmental Protection Agency (EPA) has classified removal actions into three types based on the circumstance surrounding the release or threat of release: emergency, time-critical, and nontime-critical. The removal action for IR Site 14 has been determined to be nontime-critical, since on-site action will be taken more than 6 months after commencement of the planning period.

This EE/CA addresses the implementability, effectiveness, and cost for the IR Site 14 soil removal action and addresses applicable regulatory requirements. This EE/CA will be used as the basis for a future CERCLA removal action. The Navy is the lead agency for the IR Site 14 soil removal action. As the lead agency, the Navy has final approval authority of the recommended alternative selected and overall public participation activities. The Navy is working in cooperation with EPA, the California Environmental Protection Agency's (Cal-EPA) Department of Toxic Substance Control (DTSC), and Regional Water Quality Control Board (RWQCB) in the implementation of this removal action.

This EE/CA is being issued to facilitate public involvement in the decision-making process. The public is encouraged to review and comment on the proposed removal activities described in this EE/CA. To gain a more thorough understanding of the activities associated with this removal action, the public is encouraged to review the administrative record for this activity available at the following locations:

Alameda Public Library
2264 Santa Clara Avenue
Alameda, California

Alameda Point Information Repository
950 West Mall Square
Main Office Building (Building 1)
Alameda Point, Alameda, California

2.0 SITE CHARACTERIZATION

The information for this site characterization discussion was taken from various sources, including the draft Operable Unit (OU) 2 (OU-2) remedial investigation (RI) report (TtEMI, 1999) and the environmental baseline survey (EBS) (International Technology Corporation [IT], 1998). Tables cited appear at the end of this section.

2.1 SITE DESCRIPTION AND BACKGROUND

The following sections summarize (1) site location and operations conducted, (2) surrounding land use and proposed reuse, (3) site geology and hydrogeology, (4) regional ecology, and (5) climate and meteorology.

2.1.1 Site Location and Operations Conducted

IR Site 14 consists of approximately 14 acres and is located within OU-1 (formerly located within OU-2), in the northwestern portion of Alameda Point, adjacent to the Oakland Inner Harbor. IR Site 14 includes EBS Parcels 3, 12A, 12B, 13, 14, 15, 16A, 17A, and 23A. The location of IR Site 14 and associated parcels is shown on Figure 2-1. Buildings and operations conducted within IR Site 14 are summarized in Table 2-1.

2.1.2 Surrounding Land Use and Proposed Reuse

IR Site 14 is surrounded by parcels 12, 16, 17, and 23 (see Figure 2-1). IR Site 14 and the surrounding parcels are part of the Northwest Territories designated in the community reuse plan (Alameda Reuse and Redevelopment Authority 1996). Potential reuse may include building of a hotel and conference center, parks, and, possibly, a golf course. No development plans have considered reuse of the area for residential housing.

2.1.3 Site Geology and Hydrogeology

Six geologic units, three of which are water-bearing, were identified at IR Site 14 during the RI. A more complete description of the geological units, the geologic cross section, the location of the cross section, soil boring logs and cone penetrometer test (CPT) logs for IR Site 14 are located in the RI report. Table 2-2 describes the six hydrogeologic units found beneath IR Site 14.

Groundwater at IR Site 14 is encountered between approximately 4 and 7 feet below ground surface (bgs). Local recharge from precipitation, seasonal variation in groundwater elevations, and tidal influences at IR Site 14 impact groundwater flow directions. During the rainy season, groundwater flow is generally towards the Oakland Inner Harbor. During dry periods, the hydraulic gradient can change directions, resulting in flow inland from the harbor. Two storm drain lines in the northwestern corner of the site discharge to the harbor and may also influence local groundwater elevations and flow directions. These storm drain lines may also influence local flow velocities by acting as preferential flow paths. Tidal influence studies performed at the site are discussed in the OU-2 RI report (TtEMI, 1999). Table 2-3 summarizes the hydrogeologic data for the first water bearing zone (FWBZ) beneath IR Site 14.

2.1.4 Regional Ecology

The Bay Area is situated in the California coastal chaparral forest and scrub province of the Mediterranean division and includes the discontinuous coastal plains. The coastal province has a more moderate climate than the interior and receives some moisture from fog in summer. The coastal plains are characterized by sagebrush and grassland communities. Exposed coastal areas support desert-like shrub communities called coastal scrub; such communities are dominated by coyote bush, California sagebrush, and bush lupine. Most of the coastal plains have been converted to urban use, which is evident in the Bay Area. The area continues to be a major resource and migration route for both aquatic and terrestrial birds (Bailey, 1995). Alameda Point, including contiguous and noncontiguous properties, contains the following terrestrial and aquatic wildlife habitats: open water areas, estuarine intertidal emergent wetlands, paved runway areas, non-native grassland, ruderal upland vegetation, disturbed areas, beach, urban and ornamental landscapes, and riprap. Detailed descriptions of the wildlife habitats, soil types, and special status species encountered at Alameda Point are presented in the OU-2 RI report (TtEMI, 1999).

2.1.5 Climate and Meteorology

The Bay Area experiences a maritime climate with mild summer and winter temperatures. Prevailing winds in the Bay Area are from the west. Because of the varied topography of the Bay Area, climatic conditions vary considerably throughout the region. Heavy fog occurs on an average of 21 days per year. Rainfall occurs primarily during the months of October through April. The installation averages approximately 18 inches of rainfall per year (Air Traffic Control, NAS Alameda, 1992). There are no naturally occurring surface streams or ponds on the installation, so precipitation returns to the atmosphere by evapotranspiration, runs off in the storm sewer system that discharges to the San Francisco Bay, or infiltrates to groundwater.

2.2 HISTORY OF PREVIOUS REMOVAL ACTIONS, INVESTIGATIONS, AND ACTIVITIES

Table 2-4 summarizes previous investigations and removal actions conducted at IR Site 14. Activities conducted during three of the investigations listed in Table 2-4 and findings associated with dioxins are summarized below.

RI (CTO 121) Phase 2B and 3. Three soil borings were drilled near the former fire training area (FTA), and monitoring wells were installed. Analysis of dioxins (only heptachlorodibenzo-p-dioxin and octachlorodibenzo-p-dioxin) was conducted for surface samples collected from the soil borings. Dioxins were detected in two of the surface samples.

RI (CTO 260). Nine surface samples were collected outside of the FTA berm. Six of the nine surface samples were analyzed for dioxins. Dioxins were detected in all six surface samples.

RI (CTO 122). Investigation activities included pumping and containment of 3,200 gallons of accumulated water from the concrete pad and sump located within the FTA, excavation and containment of 444 gallons of sludge from the sump, and advancement of six hand-augered soil borings (four locations around the sump and two locations through the floor of the sump). Samples were collected from the six soil borings and analyzed for dioxins. Dioxins were detected in all six samples.

2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were completed during the OU-2 RI for IR Site 14. The HHRA and ERA identified dioxins as chemicals of concern (COC) for soil at IR Site 14 (TtEMI, 1999). A summary of the IR Site 14 HHRA and ERA and a streamlined risk evaluation based on 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalent concentrations calculated for each of the 13 dioxins analyzed at IR Site 14 are presented in Section 2.4. This section identifies the source of dioxin contamination and discusses the distribution of dioxins detected in soil samples collected from IR Site 14. Appendix A presents analytical data for all IR Site 14 dioxin soil samples and 2,3,7,8-TCDD equivalence calculations.

Dioxin-contaminated soil at IR Site 14 is likely a result of combustion by-products from activities conducted at the FTA located in the northwestern portion of the site (see Figure 2-2). The FTA consisted of a concrete pad surrounded on three sides by an earthen berm. The containment berm was constructed between 1973 and 1979. A sump that is about 3 feet wide, 8 feet long, and 3 feet deep is located in the northeastern corner of the concrete pad within the FTA berm. Ansulite fire-fighting foam, carbon dioxide, potassium chloride, and Purple K were used to extinguish training fires (Ecology and Environment, Inc., 1983). An aboveground storage tank located adjacent to the FTA berm was used to mix the Ansulite fire-fighting foam for extinguishing the fires. Waste oils and fuels, which may have contained chlorinated constituents from Alameda Point plane defueling operations, were also burned in a former steel aboveground storage tank located in the center of the concrete pad (Canonie Environmental Services [CES], 1990). Run-off likely carrying residue containing dioxins from extinguished fires drained towards the sump. The FTA berms and surface grade currently confine the dioxins to the sump area and prevent migration of the surface soil to nearby storm drain catch basins. The fire department stopped burning in the area in 1986 or 1987.

During previous investigations, dioxins were detected at eight surface sampling locations just outside the bermed area of the FTA and at six soil boring locations around the sump. Samples analyzed for dioxins were not collected at depth intervals greater than 3 feet bgs. Based on an evaluation of dioxins in terms of 2,3,7,8-TCDD equivalents and a comparison with the screening level (0.0135 micrograms per kilogram [μg/kg]) calculated for ecological receptors (see Section 2.4.3), six subsurface dioxin soil removal areas are present at IR Site 14. The removal area boundaries were drawn within close proximity (5 to 10 feet) of sample points where dioxins were detected at elevated concentrations. The depths of the removal areas were defined based on the sample depths where elevated concentrations of dioxins were detected. Because of the low mobility of dioxins in soil, elevated concentrations of dioxins are unlikely to be present at depths greater than those included in the removal areas. However, because of the limited distribution of sample points at IR Site 14, removal area boundaries may not encompass the extent of dioxin-contaminated soil warranting a removal action. Removal area boundaries identified for IR Site 14 are estimates that will be revised based on OU-1 data gap sampling that is scheduled for May 2001.

Confirmation sampling will also be conducted during the removal action to ensure that dioxin-contaminated soil is removed from the site. The six subsurface removal areas are discussed below. Figure 2-3 shows dioxin sampling locations, sample depths, corresponding 2,3,7,8-TCDD equivalent concentrations, and preliminary dioxin removal area boundaries.

Sample point S14-03, located beneath the eastern portion of the FTA berm, defines the first subsurface dioxin removal area. The 2,3,7,8-TCDD equivalent concentration was 0.16 μg/kg. The estimated removal dimensions are 10 feet by 10 feet by 2 feet deep, with a total volume of about 7 cubic yards. An additional 10 cubic yards of berm material covers the subsurface removal area. The berm material will require removal to reach the subsurface. No samples with dioxin concentrations below the ecological screening level were collected near sampling location S14-03, thus the actual removal dimensions will be contingent upon OU-1 data gap sampling and confirmation sampling conducted during the removal action.

Sample points S14-04, S14-05, and S14-06, located south of the FTA berm, define the second subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.07 μg/kg) was detected at sampling location S14-05. The estimated removal dimensions are 40 feet by 12 feet by 2 feet deep, with a total of volume about 35 cubic yards. An additional 30 cubic yards of berm material covers the removal area. The berm material will require removal to reach the subsurface. No samples with dioxin concentrations below the ecological screening level were collected near sampling locations S14-04, S14-05, and S14-06, thus the actual removal dimensions will be contingent upon OU-1 data gap sampling and confirmation sampling conducted during the removal action.

Sample points S14-08 and B14-02, located west of the FTA berm, defines the third subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.09 μg/kg) was detected at sampling location S14-08. The estimated removal dimensions are 26 feet by 12 feet by 2 feet deep, with a total volume of about 23 cubic yards. No samples with dioxin concentrations below the ecological screening level were collected near sampling locations S14-08 and B14-02, thus the actual removal dimensions will be contingent upon OU-1 data gap sampling and confirmation sampling conducted during the removal action.

Sample points SUMP-BN, -BS, -SW, and –NW, located near the sump, define the fourth subsurface dioxin removal area. The maximum 2,3,7,8-TCDD equivalent concentration (0.05 μg/kg) was detected at sampling location SUMP-BN. The estimated removal dimensions are 15 feet by 5 feet by 4 feet deep, with a total volume of about 11 cubic yards. Samples collected north and south of the sump from borings SUMP-WW and SUMP-EW had 2,3,7,8-TCDD equivalent concentrations below the ecological screening level. No samples with dioxin concentrations below the ecological screening criteria were collected east or west of the sump, thus the actual removal dimensions will be contingent upon confirmation sampling conducted during the removal action. OU-1 data gap sampling will not be conducted near the sump.

Sample point B14-01, located northeast of the sump, defines the fifth subsurface dioxin removal area. The 2,3,7,8-TCDD equivalent concentration was 0.0184 μg/kg. The estimated removal dimensions are 10 feet by 10 feet by 2 feet deep, with a total volume of about 7 cubic yards. No samples with dioxin concentrations below the ecological screening level were collected near sampling location B14-01, thus the actual removal dimensions will be contingent upon OU-1 data gap sampling and confirmation sampling conducted during the removal action.

The berm surrounding the FTA is likely contaminated with dioxins. However, samples have not been collected from the berm. Sampling within the berm will be conducted during the OU-1 data gap sampling. Contingent on the data gap sampling results, two possible removal action scenarios are anticipated at IR Site 14:

> **Scenario 1.** If samples collected from the berm have equivalent dioxin concentrations below the ecological screening level, the dioxin removal action would comprise the six subsurface removal areas described above and berm areas directly above the subsurface removal areas. This scenario would include an estimated total removal volume of about 123 cubic yards.
>
> **Scenario 2.** If samples collected from the berm have equivalent dioxin concentrations above the ecological screening level, the dioxin removal action would comprise the 123 cubic yards in Scenario 1 and removal of 0.5-foot-thick layer of the entire berm. The removal of a 0.5-foot-thick layer is estimated based on the low mobility of dioxins in soil. This scenario would include an estimated total removal volume of about 203 cubic yards.

2.4 RISK EVALUATIONS

The HHRA and ERA conducted during the OU-2 RI identified dioxins as COCs for soil at IR Site 14. This section briefly summarizes the results of the HHRA and the ERA and presents a streamlined risk evaluation for human and ecological receptors.

2.4.1 Previous Human Health Risk Assessment

The HHRA for IR Site 14 was completed in accordance with EPA's risk assessment guidance for human health evaluations (EPA, 1989). An exposure assessment was completed to evaluate possible human exposures and identify receptors that were in current contact with or could come in contact with soil contaminants at Alameda Point in the future. Risks from inhalation of vapors from soil and groundwater in indoor and outdoor air, dermal contact with soil, ingestion of soil, and inhalation of chemicals sorbed to particulates were evaluated. Residential, occupational/industrial, recreational, and construction worker scenarios were evaluated for each soil exposure pathway. Two sets of risk calculations were performed for each chemical, one using Navy assumptions (based on EPA guidance) and one using DTSC assumptions (based on DTSC guidance). Specific chemicals or chemical classes that have calculated carcinogenic risks greater than 1×10^{-6} or noncarcinogenic risks with a hazard index (HI) greater than 1 indicate the potential for unacceptable risks to human receptors. A detailed explanation of the assumptions used in the HHRA is presented in Chapter 5 of the OU-2 RI report (TtEMI, 1999).

Under both Navy and DTSC assumptions, the total carcinogenic risk calculated for dioxins at IR Site 14 is greater than 1×10^{-6} for both residential and occupational exposure scenarios. Table 2-5 summarizes the total carcinogenic risk calculated during the HHRA due to dioxins after risk management considerations. A detailed description of the risk management considerations for IR Site 14 is presented in Chapter 9 of the OU-2 RI report (TtEMI, 1999). The HI associated with the noncarcinogenic hazard due to dioxins is less than 1.0 for both residential and occupational exposure scenarios.

2.4.2 Previous Ecological Risk Assessment

The ERA for IR Site 14 was completed using methods consistent with DTSC guidance (DTSC, 1996) and those of a screening-level risk assessment, as described in EPA Superfund guidance (EPA, 1997). Potential risks to ecological receptors were quantified based on the following criteria: (1) identification of habitats and biota that may be affected by contaminants detected at IR Site 14; (2) identification of exposure pathways; (3) development of ecological chemicals of potential concern (COPC) based on existing soil and groundwater data; (4) assessment and measurement endpoints; and (5) ecological effects evaluation, including development of chemical-specific terrestrial risk values (TRV) and corresponding hazard quotients (HQ).

The potential risk to the California ground squirrel (CGS) and the red-tailed hawk (RTH) was evaluated during the ERA. The CGS and the RTH were surrogates in the ERA to represent the small mammal population and the raptor population, respectively, associated with IR Site 14. An estimate of the exposure and daily dose of dioxins to the CGS and RTH was developed using life history, site contaminant concentration, and environmental fate data. This exposure information was then compared with toxicity reference values (TRV) for the CGS and the RTH to evaluate potential risk. A TRV is a daily dose level at which a particular biological effect may occur in an organism based on laboratory toxicological investigations. TRVs were developed by the Navy in consultation with the EPA Region IX Biological Technical Advisory Group (Navy, 1998). Five HQs were calculated to encompass the theoretical range of risk estimates based on the range of biological and toxicological data published in available peer-reviewed literature for the CGS and the RTH. HQs greater than 1.0 indicated the potential for unacceptable risk. HQs were developed by dividing the daily dose by the appropriate TRV. HQ_1 compares a low daily dose estimate to a high TRV. HQ_2 and HQ_3 compare a high daily dose estimate to a low and high TRV, respectively. HQ_4 and HQ_5 compare "typical" or average daily dose estimates to low and high TRVs, respectively. Based on the developed nature and urban setting of IR Site 14, HQ_5 was considered the most representative HQ of site conditions and represents the most appropriate set of criteria for evaluating potential risks to ecological receptors. A detailed explanation of the assumptions used in the ERA is presented in Chapter 5 of the OU-2 RI report (TtEMI, 1999).

All five HQs calculated for dioxins at IR Site 14 exceeded 1.0, indicating a potential risk to both the CGS and the RTH, with the exception of the HQ_1 calculated for RTH. A summary of all five HQs calculated for dioxins for both the CGS and the RTH is presented in Table 2-6.

2.4.3 Streamlined Risk Evaluation

For this streamlined risk evaluation, dioxin concentrations detected in soil samples collected from the IR Site 14 FTA were evaluated in terms of 2,3,7,8-TCDD equivalents according to the protocol outlined by DTSC. Toxic equivalency factors (TEF) for dioxins defined by the Cal-EPA (Cal-EPA, 1994) were used to calculate 2,3,7,8-TCDD equivalent values for each of the 13 dioxins analyzed at IR Site 14. The sum of these equivalents for each sample provided total equivalent concentrations at each sampling location. IR Site 14 dioxin sampling locations are shown on Figure 2-3. Total equivalent dioxin concentrations for all sampling locations and are presented in Appendix A. The total 2,3,7,8-TCDD equivalent concentrations for IR Site 14 were then compared to a screening level that was chosen to protect both human health and ecological receptors.

For human health, the industrial EPA Region IX EPA preliminary remediation goal (PRG) (0.027 μg/kg) was chosen as the screening level for 2,3,7,8-TCDD equivalent concentrations. The industrial EPA Region IX EPA PRG is a human health-based level that considers potential exposure scenarios, including inhalation of contaminated particulates, inhalation of volatile organic compounds (VOC), and ingestion and dermal absorption of contaminants in soil. The industrial EPA Region IX EPA PRG was chosen as the human health screening level based on the potential reuse of IR Site 14, which may include construction of a hotel and conference center, parks, and, possibly, a golf course. No development plans have considered reuse of the area for residential housing.

An ecological screening level was developed for IR Site 14 by calculating the 2,3,7,8-TCDD soil concentration that would result in a hazard quotient of 1.0 for the CGS and the RTH based on considerations adapted from the ERA conducted during the OU-2 RI and conservative exposure parameters. The minimum reported body weights of the CGS and the RTH were used in conjunction with average ingestion rates and the TRV. The receptors were assumed to feed in the contaminated area at all times. The diet of the CGS was assumed to consist entirely of invertebrates, while the RTH was assumed to feed exclusively on the CGS. Based on the exposure assumptions used, the protective soil concentration calculated for the CGS was the most conservative (0.0135 μg/kg). Screening levels based on this concentration are believed to be protective of ecological receptors based on the limited habitat in the area and the conservative exposure assumptions used in the calculations.

The ecological screening level (0.0135 μg/kg) was chosen as the screening level for this streamlined risk evaluation because it is more stringent than the human health screening level (the industrial EPA Region IX PRG [0.027 μg/kg]). Equivalent 2,3,7,8-TCDD concentrations exceed the ecological screening level at 11 of the 15 dioxin sampling locations at IR Site 14. Equivalent 2,3,7,8-TCDD concentrations that exceed the ecological screening level were determined to pose a risk, warranting a removal action.

TABLE 2-1

INSTALLATION RESTORATION SITE 14
HISTORICAL OPERATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 2)

Parcel	Building	Operations Conducted	Hazardous Materials Stored or Used
3	26	Building 26 was constructed in 1941 and was used to store arms and pyrotechnics. A flammable liquids storage shed was located on the western side of Building 26.	Solvents, oils, and live ammunition
12A and 12B	No buildings present	Parcels 12A and 12B consist of mostly unpaved open space that was used for aircraft storage. One diesel underground storage tank was removed from parcel 12A in 1994. A fire training area (FTA) used from 1973 to 1987 was located adjacent to Parcels 12A and 12B. The FTA consisted of a concrete pad surrounded by an earthen berm on three sides. Waste oil and fuel from Alameda Point plane defueling operations were burned and extinguished on the concrete pad during training exercises. Run-off from the pad drained to a sump located in the northeastern corner of the concrete pad.	Aviation fuel, ansulite fire-fighting foam, carbon dioxide, potassium chloride, and Purple K
13	388	Building 388 was constructed in 1950 and was used to store explosives and flammable materials.	Explosives and flammable materials
	120-122	Buildings 120 through 122, constructed in 1944, were used to store ordnance, including ammunition, bomb fins, and related equipment.	Ordnance
14	No buildings present	Parcel 14 is an unpaved open space previously used for fire training.	Chemicals used in fire training (see above for 12A and 12B)

TABLE 2-1

INSTALLATION RESTORATION SITE 14
HISTORICAL OPERATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 2 of 2)

Parcel	Building	Operations Conducted	Hazardous Materials Stored or Used
15	179	Building 179 was constructed in 1979 and was used as a groundwater well pumphouse. An abandoned aboveground storage tank is located northeast of Building 179. A suspected landfill area is located southeast of Building 179.	Petroleum products
16A	375	Building 375 was constructed in 1953 and was used as a tank truck loading stand and fueling station.	None
17A	83	Building 83 was an office building.	None
	528	Building 528 was used as a heavy equipment and vehicle maintenance shop. An aboveground storage tank used for diesel fuel was located west of Building 528.	Petroleum products and lead-acid electrolyte solutions
23A	No Buildings Present	Parcel 23A is a partially paved open space previously used for aircraft runway operations.	None

TABLE 2-2

INSTALLATION RESTORATION SITE 14
HYDROGEOLOGIC UNITS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Depth below ground surface	Description
0 to 15 feet	Artificial fill and first water-bearing zone
15 to 40 feet	Bay sediment unit
40 to about 70 to 100 feet	Merritt Sand Formation and second water-bearing zone
About 70 to about 100 to 125 feet	Upper San Antonio Formation and second water-bearing zone
About 80 to about 170 to 220 feet	Lower San Antonio Formation (Yerba Buena Mud); regional aquitard
About 170 to 220 feet bgs	Top of Alameda Formation; regional aquifer

TABLE 2-3

INSTALLATION RESTORATION SITE 14
GROUNDWATER FLOW CHARACTERISTICS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Characteristics	Hydrogeologic Data for FWBZ
General horizontal flow direction	Northwest
Horizontal hydraulic gradient	0.0053 foot per foot (average)
Estimated horizontal flow velocity	27 feet per year (varies with proximity to storm water conveyance lines)
Vertical hydraulic gradient	0.068 foot per foot (downward)

Note:

FWBZ First water bearing zone

TABLE 2-4

INSTALLATION RESTORATION SITE 14
PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 2)

Investigation	Contractor	Date	Analyses	Field Activities
RI (CTO 121) Phase 2B and 3	PRC and James M. Montgomery	1991	VOCs, SVOCs, TRPH, EDB Pesticides and PCBs, dioxins and furans, metals	Soil gas survey Three soil borings Installation of three monitoring wells Soil samples Groundwater sampling
RI (CTO 260)	PRC and Montgomery Watson	1994	VOCs, SVOCs, TEPH, TPPH, pesticides and PCBs, dioxins and furans, metals, general chemical parameters	Cone penetrometer tests Hydropunch® samples Eleven soil borings Soil samples Installation of one deep monitoring well Quarterly groundwater sampling Non-point source samples
RI (CTO 280)	PRC and Montgomery Watson	1994	VOC, TEPH, TPPH, TOC, pesticides and PCBs, radionuclides, metals, general chemical parameters	Installation of two monitoring wells Soil samples collected
EBS Phase IIa	IT	1995	TPPH, pesticides and PCBs, metals	Twenty-six surface soil samples
UST FS-1 Removal	PWC	1995	VOCs, TEPH, TPPH, TTLC, pesticides and PCBs, metals	Eight soil samples One groundwater sample
RI (CTO 122)	TtEMI and Uribe &	1998	VOCs, SVOCs, TEPH, TPPH,	Hydropunch® samples

TABLE 2-4

INSTALLATION RESTORATION SITE 14
PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 2 of 2)

Investigation	Contractor	Date	Analyses	Field Activities
	Associates		pesticides and PCBs, dioxins and furans, metals	Four surface soil samples Six soil samples One groundwater sample
UST Investigation Phase I and II	Moju	1997-1999	VOCs, SVOCs, TEPH, TPPH	Twenty-two soil samples near UST FS-1 Twenty-three groundwater samples near UST FS-1
UST Investigation Phase III	Moju	1999	VOCs, SVOCs, TEPH, TPPH	Installation of four groundwater monitoring wells near UST FS-1 Soil samples Groundwater monitoring
Floating Product Investigation	TtEMI	1999	Floating product	Three monitoring wells near former UST FS-1 checked for floating product with an interface probe No floating product found

Notes:

CTO	Contract task order
EDB	1,2-Dibromoethane
IT	International Technology Corporation
PCB	Polychlorinated biphenyl
PRC	PRC Environmental Management Inc.
PWC	Public Works Center
RI	Remedial investigation
SVOC	Semivolatile organic compound
TEPH	Total extractable petroleum hydrocarbons
TOC	Total organic compounds
TPPH	Total purgeable petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
TtEMI	Tetra Tech EM Inc.
UST	Underground storage tank
VOC	Volatile organic compound

Bolded investigation descriptions are discussed in the text.

TABLE 2-5

INSTALLATION RESTORATION SITE 14
DIOXIN CARCINOGENIC RISKS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Exposure Scenario	Assumption[1]	Total Dioxin Carcinogenic Risk
Residential	Navy	7.3×10^{-5}
	DTSC	7.6×10^{-5}
Occupational	Navy	7.2×10^{-6}
	DTSC	1.3×10^{-5}

Notes:

(1) Navy assumptions are based on federal EPA guidance. DTSC assumptions are based on DTSC guidance. Technical differences between the two sets of assumptions are related to toxicity reference values, the dermal risk assessment, and exposure pathways.

DTSC California Environmental Protection Agency's Department of Toxic Substances Control

EPA U.S. Environmental Protection Agency

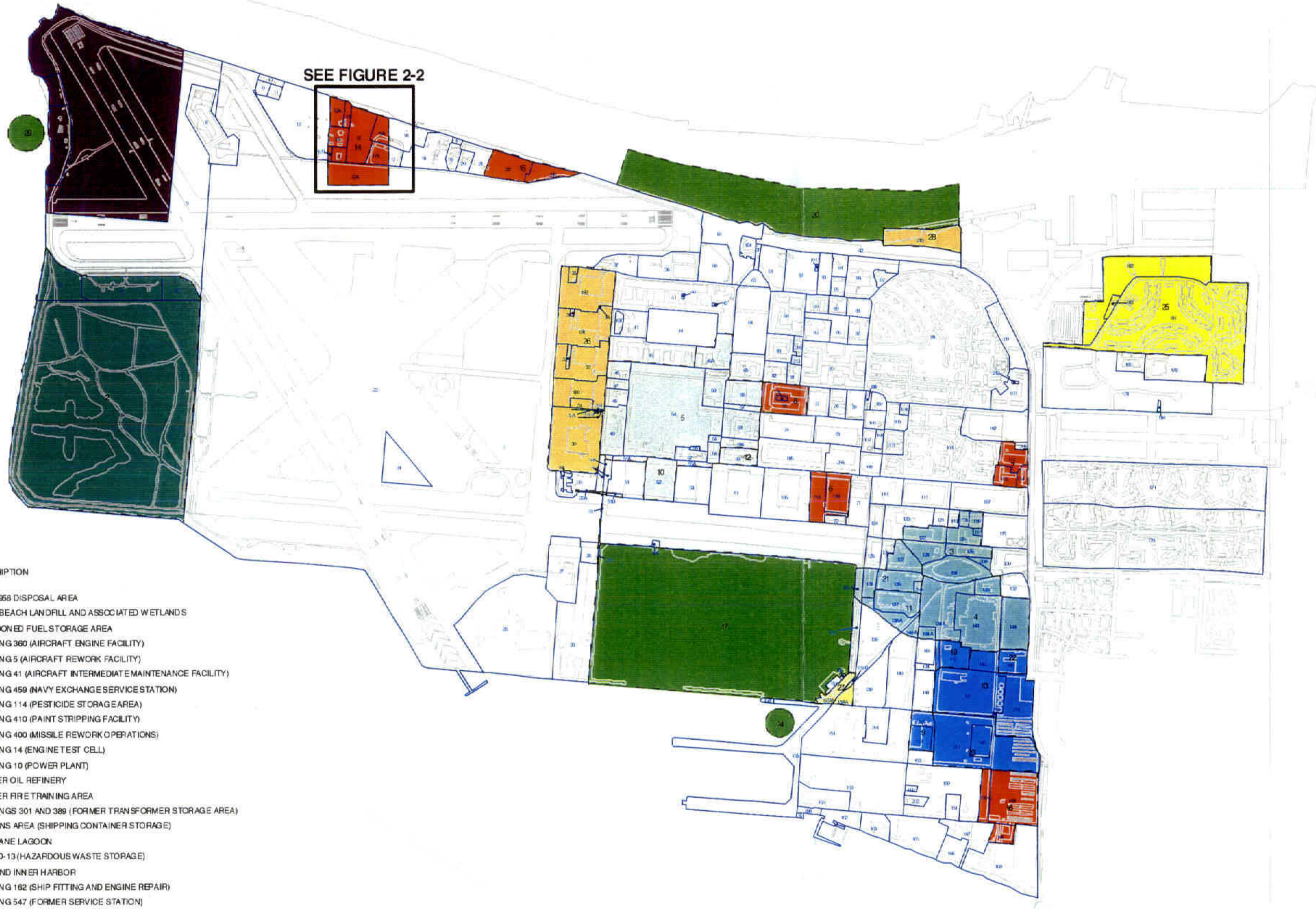
TABLE 2-6

INSTALLATION RESTORATION SITE 14
DIOXIN HAZARD QUOTIENTS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Receptor	HQ_1	HQ_2	HQ_3	HQ_4	HQ_5
California ground squirrel	$8.62 \times 10^{+1}$	$2.00 \times 10^{+4}$	$2.00 \times 10^{+3}$	$1.38 \times 10^{+4}$	$1.38 \times 10^{+3}$
Red-tailed hawk	1.66×10^{-2}	$1.90 \times 10^{+3}$	$1.90 \times 10^{+2}$	$1.48 \times 10^{+1}$	1.52

Note:

HQ Hazard quotient



LEGEND

BOUNDARIES

- OPERABLE UNIT 1
- OPERABLE UNIT 2A
- OPERABLE UNIT 2B
- OPERABLE UNIT 2C
- OPERABLE UNIT 3
- OPERABLE UNIT 4A
- OPERABLE UNIT 4B
- OPERABLE UNIT 5
- OPERABLE UNIT 6
- ENVIRONMENTAL BASELINE SURVEY PARCEL
- IR SITE BOUNDARY

SITE FEATURES

- LAND COVER

SITE	DESCRIPTION
1	1943-1956 DISPOSAL AREA
2	WEST BEACH LANDFILL AND ASSOCIATED WETLANDS
3	ABANDONED FUEL STORAGE AREA
4	BUILDING 360 (AIRCRAFT ENGINE FACILITY)
5	BUILDING 5 (AIRCRAFT REWORK FACILITY)
6	BUILDING 41 (AIRCRAFT INTERMEDIATE MAINTENANCE FACILITY)
7	BUILDING 459 (NAVY EXCHANGE SERVICE STATION)
8	BUILIDNG 114 (PESTICIDE STORAGE AREA)
9	BUILDING 410 (PAINT STRIPPING FACILITY)
10	BUILDING 400 (MISSILE REWORK OPERATIONS)
11	BUILDING 14 (ENGINE TEST CELL)
12	BUILDING 10 (POWER PLANT)
13	FORMER OIL REFINERY
14	FORMER FIRE TRAINING AREA
15	BUILDINGS 301 AND 389 (FORMER TRANSFORMER STORAGE AREA)
16	C-2 CANS AREA (SHIPPING CONTAINER STORAGE)
17	SEAPLANE LAGOON
19	YARD D-13 (HAZARDOUS WASTE STORAGE)
20	OAKLAND INNER HARBOR
21	BUILDING 162 (SHIP FITTING AND ENGINE REPAIR)
22	BUILDING 547 (FORMER SERVICE STATION)
23	BUILDING 530 (MISSILE REWORK OPERATIONS)
24	PIER 1 AND 2 SEDIMENTS
25	ESTUARY PARK AND THE COAST GUARD HOUSING AREA
26	WESTERN HANGAR ZONE
27	DOCK ZONE
28	TODD SHIPYARD
29	SKEET RANGE

600 0 600 1200

SCALE: 1" = 1200'

FIGURE 2-1
OPERABLE UNITS AND INSTALLATION RESTORATION SITES

ALAMEDA POINT
ALAMEDA, CALIFORNIA
JANUARY 5, 2001

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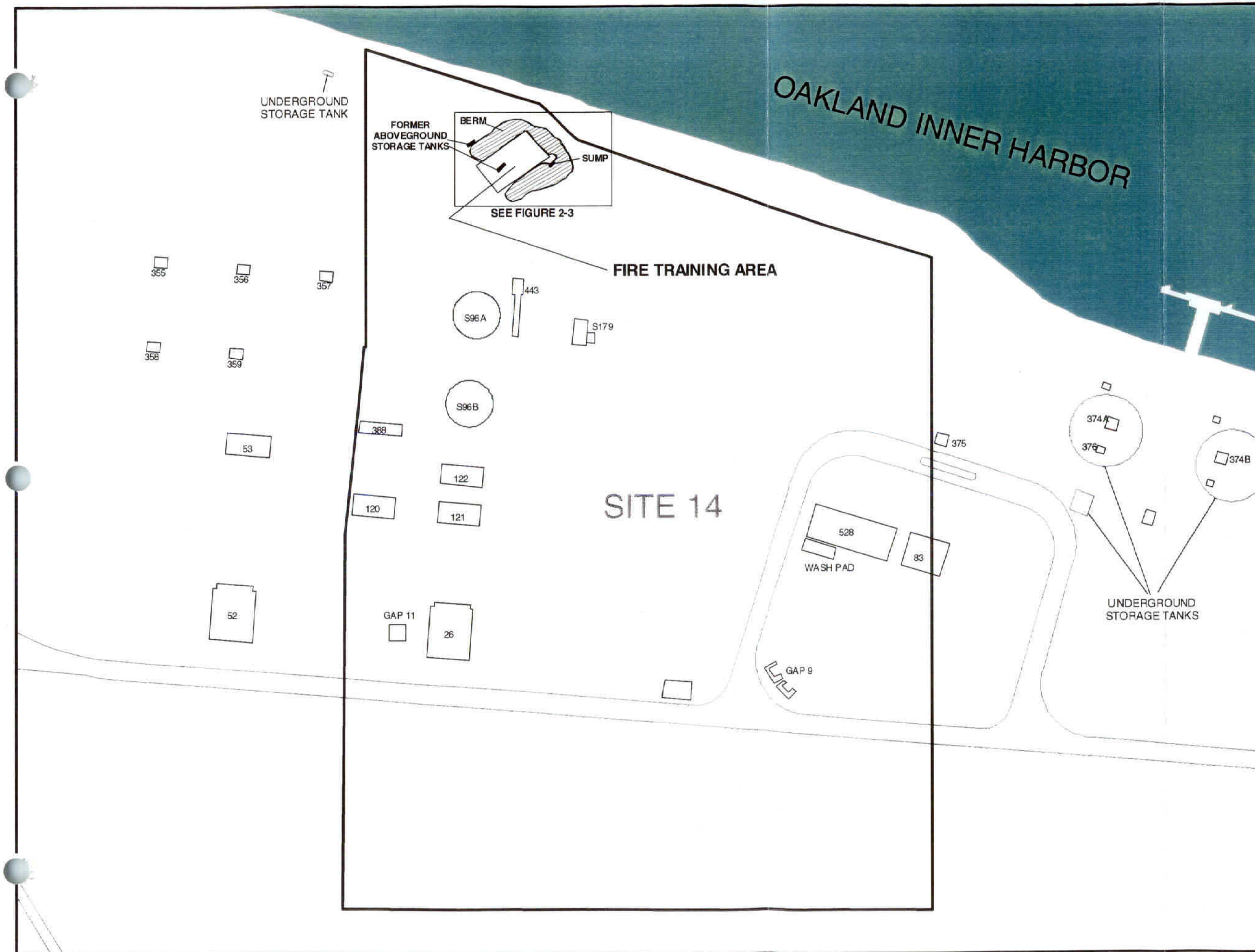

LEGEND
IR SITE 14 BOUNDARY
BUILDINGS
LAND COVER

N

55 0 55 110

SCALE 1" = 110'

FIGURE 2-2
INSTALLATION RESTORATION
SITE 14
SITE FEATURES

ALAMEDA POINT
ALAMEDA, CALFORNIA
JANUARY 5, 2001

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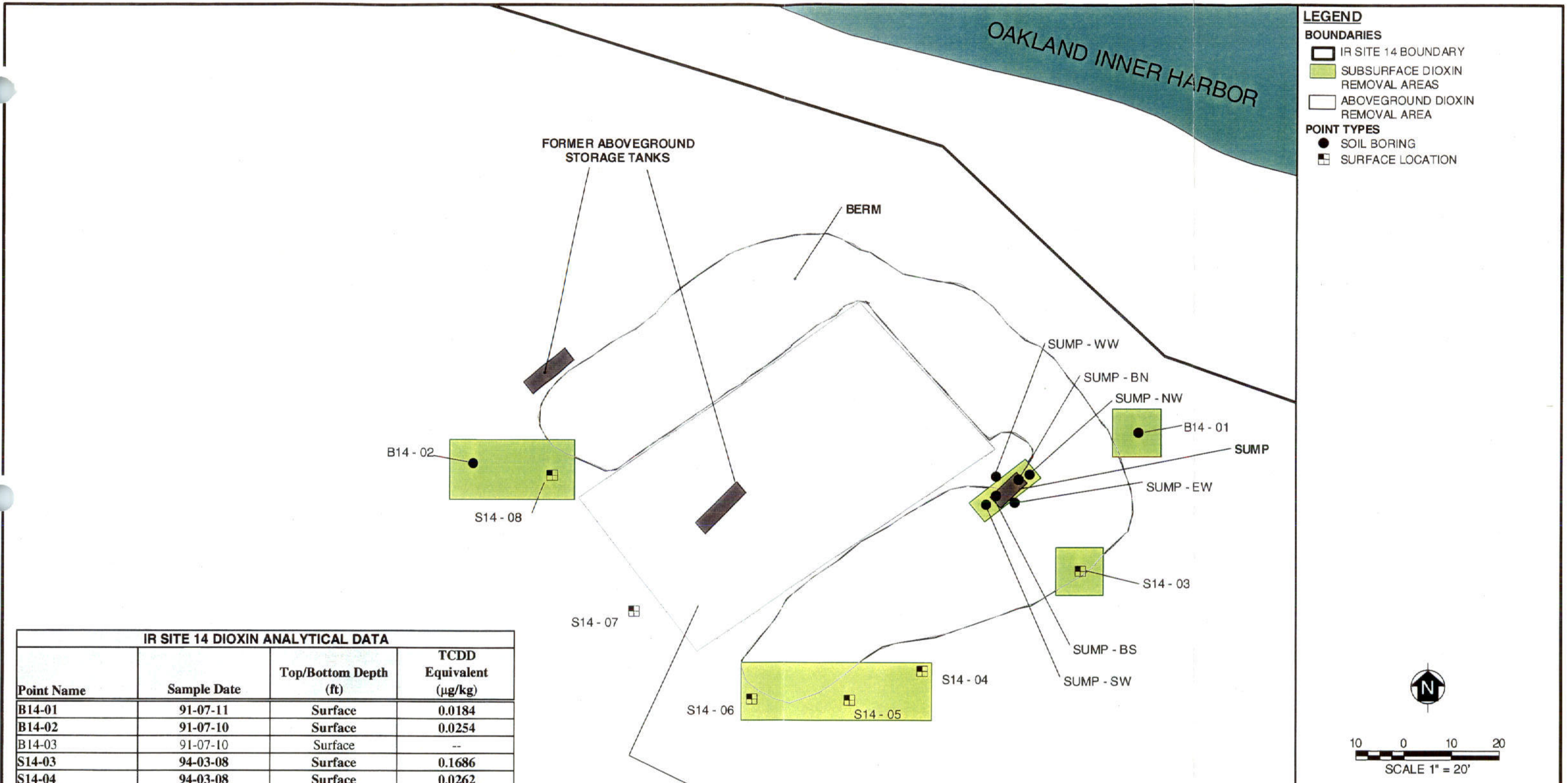
U:\ALMDA SA\CTO386\SOIL EECA\DRAFT SOILEECA.APR IR SITE 14 SOIL LAYOUT ACEVEDJ 1/5/(



IR SITE 14 DIOXIN ANALYTICAL DATA

Point Name	Sample Date	Top/Bottom Depth (ft)	TCDD Equivalent (µg/kg)
B14-01	**91-07-11**	**Surface**	**0.0184**
B14-02	**91-07-10**	**Surface**	**0.0254**
B14-03	91-07-10	Surface	--
S14-03	**94-03-08**	**Surface**	**0.1686**
S14-04	**94-03-08**	**Surface**	**0.0262**
S14-05	**94-03-08**	**Surface**	**0.0721**
S14-06	**94-03-08**	**Surface**	**0.0296**
S14-07	94-03-08	Surface	0.0004
S14-08	**94-03-08**	**Surface**	**0.0913**
SUMP-BN	**98-01-20**	**0 to 3.0**	**0.0535**
SUMP-BS	**98-01-20**	**0 to 3.0**	**0.0157**
SUMP-EW	98-01-20	0 to 3.0	0.0014
SUMP-NW	**98-01-20**	**0 to 3.0**	**0.0155**
SUMP-SW	**98-01-20**	**0 to 3.0**	**0.0199**
SUMP-WW	98-01-20	0 to 3.0	0.001

FIGURE 2-3
INSTALLATION RESTORATION SITE 14
FIRE TRAINING AREA
SAMPLING LOCATIONS AND DIOXIN SOIL REMOVAL AREAS

ALAMEDA POINT
ALAMEDA, CALFORNIA
JANUARY 5, 2001

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3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section considers the criteria influencing development of removal action objectives (RAO). Specifically, this section discusses (1) statutory framework, (2) determination of removal scope, (3) determination of removal schedule, (4) ARARs, and (5) removal action objectives.

3.1 STATUTORY FRAMEWORK

This removal action is taken pursuant to CERCLA and the NCP under the delegated authority of the Office of the President of the United States by Executive Order (EO) 12580. This order provides the Navy with authorization to conduct and finance removal actions. This removal action is a non-time-critical removal action because a 6-month planning period was available from the time the removal action was determined to be necessary before the initiation of removal actions. The requirements for this EE/CA and its mandated public comment period provide opportunity for public input to the cleanup process.

The Navy 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. The Southwest Division, Naval Facilities Engineering Command is the regional manager of the Navy's CERCLA program and is, therefore, providing technical expertise 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 of 1986 (SARA); the NCP at Title 40 of the Code of Federal Regulations (40 CFR) 300; Defense Environmental Restoration Program (DERP) at 10 U.S. Code (USC) §2701, et seq.; and EO 12580. This EE/CA is being pursued under 40 CFR 300.415(b)(2).

3.2 DETERMINATION OF REMOVAL SCOPE

This removal action is intended to reduce (1) human exposure to dioxin-contaminated soil that poses a carcinogenic risk of greater than 1×10^{-6} and (2) ecological exposure to dioxin-contaminated soil that has an HQ greater than 1.0. Verification sampling will be performed to confirm that the goals of the removal action have been accomplished. This removal action is intended to serve as the final remedy for dioxin-contaminated soil.

3.3 DETERMINATION OF REMOVAL SCHEDULE

This EE/CA identifies and recommends alternatives. This EE/CA will be available for public review and comment for 30 days. The Navy will review the comments and incorporate responses to public comments into the final EE/CA as necessary.

The removal action and site restoration activities are expected to be completed less than 1 year after award of the removal contract.

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 CFR 300.415(i)).

The following sections provide an overview of the process of identifying applicable or relevant and appropriate requirements (ARAR) and a summary of those ARARs that potentially affect the development of RAOs.

3.4.1 ARARs Overview

Identification of ARARs is a site-specific determination and involves a two-part analysis: part one is a determination of whether a given requirement is applicable; then if it is not applicable, part two is a determination of whether it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the chemical of concern, remedial action, or place involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the site's circumstances are sufficiently similar to circumstances in which the law otherwise applies and it is well-suited to the conditions of the site. An evaluation of the relevance and appropriateness of a requirement is site specific, and must be based on best professional judgment. A requirement may be relevant, but not appropriate, for the specific site. In 40 CFR 300.400(g)(2), the NCP lists factors to consider in evaluating relevance and appropriateness. Only requirements that are determined to be both relevant and appropriate must be followed. Portions of a requirement may be relevant and appropriate even if a requirement in its entirety is not.

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

In addition to ARARs, the NCP provides that where ARARs do not exist, agency advisories, criteria, or guidance may be considered (termed "to-be-considered" [TBC] criteria) if 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 the primary responsibility for the identification of federal ARARs at Alameda Point. As the lead state agency, DTSC has the responsibility for identifying state ARARs. For a state requirement to qualify as an ARAR, the requirement must be (1) a state law, (2) promulgated, (3) a substantive requirement, (4) from an environmental or facility siting law, (5) more stringent than the federal requirement, (6) identified in a timely manner, and (7) consistently applied. In a letter dated September 12, 1996, the Navy requested that DTSC identify State of California ARARs for the RI and feasibility study (FS) of the Alameda NAS. DTSC identified generally applicable state ARARs in a letter to the Navy dated November 13, 1996. However, since identification of ARARs must be site specific, the Navy will solicit site-specific state ARARs concurrently with issuance of the draft EE/CA to the regulatory agencies. Accordingly, the Navy is listing only potential federal ARARs below.

3.4.2 ARARS Affecting Removal Action Objectives

ARARs and TBCs are generally divided into three categories: chemical specific, location specific, and action specific. ARARs and TBCs affecting the development of the RAOs are discussed below. Chemical-specific and location-specific ARARs are summarized in Tables 3-1 and 3-2 at the end of this section.

Chemical-Specific ARARs and TBCs

Chemical-specific ARARs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical cleanup values. These values establish the acceptable amount or concentration of a chemical found in, or discharged to, the ambient environment that is protective of human health or ecological receptors.

The Navy identified potential chemical-specific ARARs for characterizing hazardous waste in soil pursuant to the Resource Conservation and Recovery Act (RCRA). Whenever contaminated media are being excavated, activities may generate waste materials such as excavated soil and groundwater. The applicability of RCRA hazardous waste management requirements depends on whether the activity generates a waste; whether the waste is a RCRA hazardous waste; whether the waste initially underwent treatment, storage, or disposal 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. If this removal action generates contaminated media that meet the definition of RCRA hazardous waste, then RCRA requirements are potentially applicable. The RCRA requirements at 22 California Code of Regulations (CCR) §66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. In particular, a waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the toxicity characteristic leaching procedure (TCLP). The California regulation at 22 CCR §66261.24(a)(1)(B) lists the maximum concentrations allowable for the TCLP and is a potential federal ARAR 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. If site waste is found to contain hazardous waste, it will be managed in accordance with EPA's contained-in policy until it no longer contains hazardous waste.

Site waste may also contain non-RCRA hazardous waste under California law. Therefore, non-RCRA, state-regulated waste definition requirements at 22 CCR §66261.24(a)(2) are potential state ARARs for determining whether other RCRA requirements are potential state ARARs.

RCRA land disposal restrictions (LDR) at 22 CCR §66268.1(f) are also potential federal ARARs for any removal alternatives that discharge hazardous waste to land on site. This requirement prohibits the disposal of hazardous waste to land unless it is treated in accordance with the treatment standards of

§66268.40 and meets the Universal Treatment Standards at §66268.48 or meets alternative treatment standards at §66268.49 or receives a treatability variance pursuant to §66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program.

No federal action levels have been promulgated for contaminant concentrations of dioxins in soil; therefore, there are no chemical-specific ARARs for dioxins. In the absence of ARARs, the Navy identified potential chemical-specific TBC criteria for dioxins for human health and ecological receptors. The TBC criteria for human health is the industrial EPA Region IX PRG (0.027 μg/kg). The TBC for ecological receptors is a protective soil concentration (0.0135 μg/kg) calculated for 2,3,7,8-TCDD equivalent concentrations (see Section 2.4.3). The industrial EPA Region IX PRG is a human health-based level that considers potential exposure scenarios, including inhalation of contaminated particulates, inhalation of VOCs, and ingestion and dermal absorption of contaminants in soil. The protective soil concentration calculated for ecological receptors is based on considerations adapted from the ERA of the OU-2 RI and conservative exposure parameters that would result in an HQ of 1.0. Since the ecological-based screening level is the most protective, it will be used as the RAO (see Section 3.5).

Location-Specific ARARs

Location-specific ARARs are restrictions on the concentrations of hazardous substances or on the conduct of activities solely because they are in specific locations. Special locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

Several site conditions at Alameda Point are associated with location-specific ARARs. Requirements such as the Endangered Species Act, the National Environmental Policy Act (NEPA), the Guidelines for Implementation of the California Environmental Quality Act (CEQA), the Migratory Bird Treaty Act, the National Historic Preservation Act, the Archeological Resources Protection Act, and the Coastal Zone Management Act (CZMA) were considered as potential location-specific ARARs. IR Site 14 does not provide any suitable habitat for threatened or endangered species, and no endangered species have been observed at the site, thus the Endangered Species Act has not been identified. Additionally, IR Site 14 does not encompass any historic properties included or eligible for inclusion on the National Register of Historic Places. No scientific, prehistoric, or archeological data have been identified at the site. Also, the EPA and Navy have determined that the requirements of NEPA and CEQA are no more stringent than the requirements for environmental review under CERCLA and the NCP. Hence, NEPA and CEQA are not considered ARARs for CERCLA actions.

Canada geese have been observed at IR Site 14, thus IR Site 14 does contain habitat for at least one migratory bird. The Migratory Bird Treaty Act (16 USC 702) and its implementing regulations (50 CFR 10, 14, and 20) prohibit at any time using any means or manners for the pursuit, hunting, capturing, and killing or attempting to take, capture, or kill any migratory bird. Therefore, this action would be an applicable location-specific requirement.

Section 307(c)(1) of the CZMA (16 USC 1456(c)(1)) and the implementing regulations in 15 CFR 930 and 923.45 require that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with the approved state coastal zone management programs. A state coastal zone management program (developed under state law and guided by the CZMA) sets forth objectives, policies, and standards to guide public and private uses of lands and water in the coastal zone.

California's approved coastal management program includes the San Francisco Bay Plan (Bay Plan) developed by the San Francisco Bay Conservation and Development Commission (BCDC). The BCDC was formed under authority of the McAteer-Petris Act (California Government Code Section 66600 *et seq.*), which authorizes the BCDC to regulate activities within San Francisco Bay and the shoreline (100 feet landward from the shoreline) in conformity with the policies of the Bay Plan. The Bay Plan's policies include limiting Bay filling, maintaining marshes and mudflats to the fullest extent possible to conserve wildlife and abate pollution, and protecting the beneficial uses of the Bay. IR Site 14 is located adjacent to the coastal zone such that this removal action could affect the coastal zone. Therefore, all removal action alternatives will be consistent with the goals of the Bay Plan and will conform to the substantive requirements of the state management program. This ARAR is summarized in Table 3-2.

Action-Specific ARARs

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities selected and suggest how a selected removal alternative should be achieved. These action-specific requirements do not in themselves determine the removal alternative; rather, they indicate how a selected alternative must be conducted. Therefore, since action-specific ARARs depend on the action selected, they are identified after an alternative has been selected. The following discussion addresses potential action-specific ARARs for the alternatives under consideration in this EE/CA.

Any on-site management activities of hazardous waste that are based on the chemical-specific ARARs discussed above for classifying hazardous waste that is generated as a result of the removal action must meet the appropriate, substantive RCRA requirements codified in 22 CCR, Division 4.5, Chapter 14. However, as long as the excavated material remains inside the area of contamination, it is not newly generated and will not be subject to RCRA generator, treatment, or other waste management requirements. Therefore, there are not federal action-specific ARARs for the alternatives under consideration in this EE/CA. Should excavated soil or groundwater from de-watering operations be moved outside of the area of contamination, the substantive RCRA requirements of 22 CCR would be applicable.

3.5 REMOVAL ACTION OBJECTIVES

Based on CERCLA and the NCP, the general RAOs are the following:

- Minimize actual or potential exposure to human and ecological receptors from dioxin-contaminated soil.

- Minimize actual or potential contamination of sensitive ecosystems due to dioxins.

In order to meet these general objectives, and based on the risk assessment and ARARs, the specific RAO is the following:

- Remove soil at IR Site 14 with 2,3,7,8-TCDD equivalent concentrations greater than the ecological screening level (0.0135 μg/kg).

TABLE 3-1

INSTALLATION RESTORATION SITE 14 POTENTIAL CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA

(Page 1 of 2)

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Federal Requirements					
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 *et seq.*)	22 CCR §§ 66261.21 66262.22(a)(1) 66261.23 66261.24(a)(1) 66261.100	Water and Soil	Criteria for identifying characteristics of RCRA hazardous waste	Applicable	These requirements would be applicable to Alternatives 2, 3, and 4 for determining whether excavated media contain hazardous waste.
Resource Conservation and Recovery Act (42 USC, Chapter 82, 6901 *et seq.*)	22 CCR §§ 66268.1(f) 66268.7(a) 66264.40 66268.44 66268.48 66268.49	Soil and Water	LDRs prohibiting disposal of hazardous waste unless treatment standards are met	Applicable	Disposal of soil and water generated pursuant to Alternative 4 may not be conducted on site unless LDR treatment standards are met, alternative treatment standards are met, or a treatability variance is granted by the Cal-EPA DTSC.
State Requirements					
Hazardous Waste Control Law (California Health and Safety Code § 25100 - 25249)	22 CCR § 66261.24(a)(2)	Water and Soil	Criteria for identifying characteristics of non-RCRA hazardous waste	Applicable	These requirements would be applicable to Alternatives 2, 3, and 4 for determining whether excavated media contains hazardous waste.
To Be Considered					
N/A	N/A	Soil	EPA Region IX PRG	To be considered	EPA guidance is useful for setting cleanup goals for protecting human health from dioxin-contaminated soil.

Notes:

ARAR Applicable or relevant and appropriate requirement
Cal-EPA California Environmental Protection Agency
CCR California Code of Regulations

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TABLE 3-1

INSTALLATION RESTORATION SITE 14 POTENTIAL CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes (continued):

DTSC	Cal-EPA Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
LDR	Land disposal restriction
N/A	Not applicable
PRG	Preliminary remediation goal
RCRA	Resource Conservation and Recovery Act
USC	United States Code

TABLE 3-2

INSTALLATION RESTORATION SITE 14 POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Statutory Citation	Regulatory Citation	Medium	Description	Preliminary ARAR Determination	Comments
Federal Requirements					
Migratory Bird Treaty Act (16 USC §702 *et seq.*)	50 CFR 10, 14, and 20	Water and soil	This act protects almost all native birds and certain migratory birds, their nests, and eggs from unregulated "take," which can include poisoning from hazardous waste sites.	Relevant and appropriate	Canada geese have been observed at IR Site 14; therefore, this requirement is relevant and appropriate to any response actions taken there.
Coastal Zone Management Act (16 USC §1456(c)(1)) and McAteer-Petris Act (Government Code Section 66600 *et seq.*)	15 CFR 930 and 923.45	Water and soil	Federal actions that affect land or water use in coastal zones should be conducted in a manner that is consistent with state coastal zone management programs. The state management program for San Francisco Bay is described in the BCDC's San Francisco Bay Plan, enacted under authority of the McAteer-Petris Act of 1965.	Applicable	IR Site 14 is located adjacent to the coastal zone. Removal action alternatives may affect the coastal zone. These alternatives will be implemented so that they are consistent with the BCDC's San Francisco Bay Plan.

Notes:

ARAR Applicable or relevant and appropriate requirement
BCDC San Francisco Bay Conservation and Development Commission
CFR Code of Federal Regulations
IR Installation Restoration
USC U.S. Code

4.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The purpose of this EE/CA is to identify and analyze alternative removal actions to address the dioxin-contaminated soil at IR Site 14. During scoping meetings conducted between June and October 2000, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) discussed multiple *in situ* and *ex situ* treatment technologies capable of removing dioxins in soil. An EE/CA is similar to a focused FS; therefore, the BCT agreed to evaluate three technologies for removing dioxin-contaminated soil: (1) excavation and on-site disposal; (2) excavation and off-site disposal; and (3) excavation, *ex situ* solidification/stabilization (S/S) with three disposal options; backfilling with treated soil and on-site disposal of excess soil, backfilling with imported material and on-site disposal of treated soil, or backfilling with imported material and off-site disposal of treated soil. These technologies were selected to ensure that RAOs would be met (see Section 3.5). For on-site disposal options, the BCT discussed using excavated soil from cleanup sites at Alameda Point as a foundation layer for the IR Site 1 landfill cap if the excavated soil is not classified as hazardous, as set forth in 22 CCR §66261. During the removal action, sampling will be conducted to determine if dioxin-contaminated soil at IR Site 14 is classified as hazardous. If excavated soil is classified as hazardous, on-site disposal will not be implementable without further treatment (see Section 4.4).

The three technologies listed above are broken into nonhazardous and hazardous removal action alternatives as listed below. The no-action alternative is also included for both nonhazardous and hazardous soil removal actions, as required under the NCP.

<u>Nonhazardous Soil Removal Action Alternatives</u>

Alternative 1: No Action
Alternative 2: Excavation and On-site Disposal
Alternative 3: Excavation and Off-site Disposal (Class II Landfill Facility)

<u>Hazardous Soil Removal Action Alternatives</u>

Alternative 1: No action
Alternative 3: Excavation and Off-site Disposal (Class I Landfill Facility)
Alternative 4: Excavation, *Ex Situ* Solidification/Stabilization, and Disposal (Options 1 through 3, listed below)

Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal

Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II landfill facility)

These four alternatives are described in the following sections and are evaluated based on effectiveness, implementability, and cost.

To evaluate effectiveness, consideration was given to the overall protection of human health and the environment, compliance with ARARs and other guidance, and both the long- and short-term effectiveness of the alternative. Evaluation of implementability of each alternative included consideration of the technical feasibility, commercial availability, and administrative feasibility. Public acceptance will be evaluated based on community input during the public comment period.

The cost evaluation was based upon estimates for direct capital costs, indirect capital costs (markups), and annual operation and maintenance (O&M) costs. Direct capital costs include labor, design, equipment, and disposal costs. Indirect capital costs include engineering expenses, license and permit costs, and contingency allowances. Annual O&M costs include maintenance and materials, labor, and sampling and analytical costs. Cost estimates for each removal action were completed using the Remedial Action Cost Engineering and Requirements (RACER©) 99 cost-estimating software (U.S. Air Force, 1999). The estimate of indirect costs was based on default percentages of direct costs provided in RACER© 99. For this analysis, it was assumed that all operations would be conducted at labor costs of $14.37 per hour for operators and technicians and $26 to $32 per hour for engineers and supervisors, before markups. Because the alternatives have differing durations to completion, a present worth has been calculated for each. The present worth analysis provides a single figure representing the amount of money that, if invested in the base year and dispersed as needed, would cover all cost associated with the alternative. The present worth calculation normalizes alternatives that have differing operating durations to facilitate comparisons. All "total project durations" start at the time capital equipment is delivered to the site. It is assumed that procurement and design for all systems considered will be similar. Thus, this delay, usually 6 to 8 months, was not included in any of the project duration numbers. Estimates do not include administrative project costs (such as project management, health and safety oversight, quality control, and a superintendent); therefore, although these costs provide a relative analysis among alternatives, they are likely to be lower than the actual construction cost.

4.1 ALTERNATIVE 1: NO ACTION

Alternative 1 is evaluated for both nonhazardous and hazardous soil removal actions. A description of this alternative and an evaluation of its effectiveness, implementability, and cost are provided in the following sections.

4.1.1 Description

Under this alternative, no removal action will be implemented. Contaminated soil will be left at the site "as is," without implementation of any institutional control, containment, removal, treatment, or other mitigative actions.

4.1.2 Effectiveness

This alternative is evaluated against five criteria to evaluate its effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short–term effectiveness. Each of these criteria is discussed below.

Overall Protection of Human Health and the Environment

This alternative will not eliminate, reduce, or control the potential human health and environmental risk presented by dermal contact with, ingestion of, or inhalation of dust originating from contaminated soil.

Compliance with ARARs

There are no chemical-specific or action-specific ARARs under this alternative. This alternative complies with the CZMA because no action is consistent with the BCDC's Bay Plan.

Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include (1) the magnitude of residual risks and (2) adequacy of reliability of controls. Each of these factors is discussed below.

Magnitude of Residual Risks. Because no removal action would be conducted, risk would remain from contaminated soil.

Adequacy of Reliability of Controls. No engineering control would be implemented to prevent exposure to contaminated soil; therefore, this analysis does not review the adequacy or reliability of the controls.

Reduction of Toxicity, Mobility, or Volume through Treatment

The toxicity, mobility, and volume of contamination will not be reduced through treatment because contaminated soil will not be contained, removed, or treated.

Short-Term Effectiveness

Four factors are considered when assessing the short-term effectiveness: (1) protection of the community during removal actions, (2) protection of workers during removal actions, (3) environmental impacts resulting from construction and implementation of the alternative, and (4) time required to complete the removal action. Each of these factors is discussed below.

Protection of the Community During Removal Actions. This alternative will not present any new health risks to the community because no removal action will be taken.

Protection of Workers During Removal Actions. This alternative will not pose any health risks to removal action workers because no removal action will be taken.

Environmental Impacts Resulting From Construction and Implementation. No adverse environmental impacts will result from the construction and implementation of this alternative because no removal action will be taken.

Time Required to Complete the Removal Action. This alternative will not require any time to complete because no removal action will be conducted.

4.1.3 Implementability

This alternative is evaluated against two criteria to evaluate its implementability: (1) technical feasibility and (2) commercial availability. Both of these criteria are discussed below.

Technical Feasibility

This alternative is easily implemented and is technically feasible because no action will be conducted.

Commercial Availability

No construction, operation, or resources are required to implement this alternative.

4.1.4 Cost

No capital or O&M costs are associated with this alternative.

4.2 ALTERNATIVE 2: EXCAVATION AND ON-SITE DISPOSAL

Alternative 2 is evaluated for nonhazardous soil removal actions. A description of this alternative and an evaluation of its effectiveness, implementability, and cost are provided in the following sections.

4.2.1 Description

The major components of this alternative are (1) excavation of contaminated soil, (2) disposal of contaminated soil at an approved on-site location, and (3) backfilling with imported material and site restoration. Each of these components is described below.

Excavation

Excavation involves preparing the excavation area, excavating soil containing dioxins at concentrations that exceed the RAO, and sampling soil to confirm that the RAO has been met.

Excavation area preparation involves clearing vegetation, providing utility clearance, removing portions of the berm that overlie subsurface dioxin removal areas, removing necessary portions of site fencing, securing the site, constructing run-on and run-off controls for surface drainage (if necessary during the rainy season), and constructing a decontamination area. Utility clearance will be required for electrical, gas, sanitary and storm sewer, and water lines. Material from the berm (about 40 cubic yards) will be stockpiled near excavated soil and sampled (see below). The site will be secured by constructing a temporary chain-link fence with gates around the FTA to prevent unauthorized access to the work area. If the removal action occurs during the rainy season, run-on and run-off would be controlled by constructing berms, diverting run-on, and collecting run-off. Collected run-off from the excavation area would be stored in an on-site tank, sampled, and discharged to the local publicly owned treatment works (POTW) or shipped off-site for disposal. A centralized decontamination area for equipment and personnel will be constructed. The decontamination area can be constructed of a high-density polyethylene (HDPE) liner and bermed to capture all water used to decontaminate excavation equipment and vehicles. Wastewater generated from the decontamination area will be sampled and, if acceptable, transported for disposal to the wastewater collection system operated by the local POTW. Wastewater failing to meet the disposal requirements will require off-site disposal at an appropriate permitted facility.

The six subsurface dioxin removal areas will be excavated mechanically using standard construction equipment such as loaders, bulldozers, and backhoes. Excavation dimensions for each subsurface dioxin removal area were summarized in Section 2.3. Under Scenario 1 (removal of subsurface dioxin-contaminated soil and overlying berm material), a total volume of about 123 cubic yards will be excavated. Under Scenario 2 (same as Scenario 1 plus removal of a 0.5-foot-thick layer of the entire berm), a total volume of about 203 cubic yards will be excavated. Dioxin-contaminated soil will be placed in open-top roll-off bins until confirmation sampling (see below). Subsurface excavations will be sloped to avoid the need for shoring. Air monitoring will be conducted to determine if airborne dust poses a hazard. Dust control will be accomplished by spraying the dioxin-contaminated soil with a mobile water source during excavation, staging, and loading. The water for dust control will be taken from Oakland Inner Harbor or obtained from the on-site supply of city water or purchased from an off-site source and brought on site by tank truck. If groundwater is encountered during excavation, the excavation will require dewatering. Pumping will be used to dewater the excavation. Groundwater will be pumped and stored on site in a tank before sampling, analysis, and appropriate disposal. Given the heterogeneous nature of the fill materials being excavated, provisions to segregate large debris (such as wood, rocks, and concrete) will be provided. The concrete sump will be removed and stockpiled separately. Debris that is physically separated will be stockpiled separately from excavated soil, sampled, analyzed, and taken for disposal to an appropriate facility. A centralized area at the site will be used for temporary soil storage, segregation, and characterization sampling. Excavated dioxin-contaminated soil and soil from the berm will be stored in open-top roll-off bins within the area of contamination.

Confirmation sampling includes screening-level and final confirmation sampling. Screening-level sampling will be conducted after the agreed-upon extent of excavation has been attained to assess if additional excavation is required. On completion of the excavation, final confirmation sidewall samples will be collected and analyzed to verify that adequate soil removal was completed. Sidewall confirmation sampling will be performed using approximately 50-foot centers along the excavation perimeter (one per sidewall, based on estimated excavation dimensions summarized in Section 2.3). The total number of samples will vary depending upon the size of the actual excavation. Samples will be collected at the maximum unsaturated excavation depth. Soil samples will also be obtained from the bottom of excavations (using approximately 50-foot centers) where groundwater is not encountered but will not be taken in saturated conditions because saturated soil sample results are not considered representative. Samples will also be collected from the open-top roll-off bins (about three per bin) to characterize the excavated soil.

On-site Disposal

On-site disposal includes transporting and placing excavated soil on IR Site 1 (1943 through 1958 landfill). For on-site disposal options, the BCT discussed using excavated soil from cleanup sites at Alameda Point as a foundation layer for the IR Site 1 landfill cap if the excavated soil is not classified as hazardous, as set forth in 22 CCR §66261. During the removal action, sampling will be conducted to determine if dioxin-contaminated soil at IR Site 14 is classified as hazardous. If excavated soil is classified as hazardous, on-site disposal will not be implementable without further treatment (see Section 4.4).

Since the removal action will be implemented before construction of the IR Site 1 landfill cap, a staging area would be required for excavated soil. This evaluation assumes that staging will be necessary for a period of 2 years. A centralized staging area will be constructed and secured with a temporary chain-link fence. Weatherproof containers will be required for storing excavated soil to prevent infiltration of rainwater.

Backfilling and Site Restoration

Imported fill will be brought on site and used to backfill the excavation. Imported fill will be properly compacted and placed at an elevation suitable for use as a sub-base for the replaced surface soil. The original surface soil-gravel will be replaced with soil-gravel. Original grading will be maintained and, if appropriate, increased to facilitate surface run-off.

4.2.2 Effectiveness

This alternative is evaluated against five criteria to evaluate its effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness. Each of these criteria is discussed below.

Overall Protection of Human Health and the Environment

This alternative will protect human health and the environment because it will involve excavating and removing dioxin-contaminated soil from the site, thereby eliminating the potential for dermal contact with, ingestion of, or inhalation of dust originating from contaminated soil. However, the overall protectiveness of this alternative depends on the engineering controls implemented for containment at the IR Site 1 landfill.

Compliance with ARARs

The Navy will chemically analyze representative samples of excavated material suspected of containing hazardous waste. Should any soil or groundwater be classified as hazardous, this alternative will not be implemented. Nonhazardous waste will be stored on site in weatherproof containers for up to 2 years. Since this alternative is limited to nonhazardous soil, there will be no federal action-specific ARARs with which this alternative must comply. Removal of dioxin-contaminated soil is consistent with the BCDC's Bay Plan. Excavation and stockpiling of soil will be conducted so as to avoid interference with any migratory birds. This alternative will comply with location-specific ARARs.

Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include (1) the magnitude of residual risks and (2) adequacy of reliability of controls. Each of these factors is discussed below.

Magnitude of Residual Risks. The dioxin-contaminated soil will be permanently removed from the site so that residual risk to future residents, workers, or terrestrial ecological receptors will remain only at acceptable levels.

Adequacy of Reliability of Controls. Technology performance specifications, long-term management, and technical component replacement are not required under this alternative because dioxin-contaminated soil will be removed and undergo disposal at IR Site 1. However, the long-term adequacy and reliability of controls will depend on the engineering controls of the IR Site 1 landfill.

Reduction of Toxicity, Mobility, or Volume through Treatment

Implementation of this alternative will not reduce the volume or toxicity of dioxins present in the excavated soil. This alternative relies on engineering controls of the IR Site 1 landfill to limit mobility of dioxins. Engineered controls at the IR Site 1 landfill will potentially include interim covers, final caps, and liners that will prevent water from contacting the dioxin-contaminated soil and prevent dioxins from migrating to the environment.

Short-Term Effectiveness

Four factors are considered when assessing the short-term effectiveness: (1) protection of the community during removal actions, (2) protection of workers during removal actions, (3) environmental impacts resulting from construction and implementation of the alternative, and (4) time required to complete the removal action. Each of these factors is discussed below.

Protection of the Community During Removal Actions. The community may face short-term risks during excavation and removal activities resulting from inhalation of fugitive dusts and direct contact with excavated soil; however, measures will be taken while excavating, staging, and loading contaminated soil to reduce and control short-term risks. For example, dust suppression measures will be used to reduce the generation of fugitive dusts. Furthermore, site access will be controlled during excavation activities and at the IR Site 1 soil staging area to reduce the potential for direct contact with contaminated soil. The local community may also be faced with additional short-term impacts resulting from increased truck traffic during excavation and backfilling. Trucks will be decontaminated to avoid spreading of contamination off site.

Protection of Workers During Removal Actions. Worker safety considerations associated with implementation of this alternative can be grouped in two categories: (1) general site hazards and (2) potential chemical hazards.

General site hazards include heavy equipment hazards; occupational noise exposure; potential slip, trip, or fall hazards; potential contact with underground or overhead mechanical and electrical hazards or utility lines; and airborne dust hazards. Exposure to general site hazards will be reduced by providing (1) appropriate safety equipment to minimize noise and dust exposure and (2) awareness training to orient personnel with the physical hazards at the site.

Potential chemical hazards include inhalation of, absorption of, ingestion of, and contact with hazardous substances in contaminated soil. On-site removal workers will wear Level D protection during excavation activities. Level C or greater levels of protection are not anticipated because dust generation will be kept to a safe level by dust control measures and continuous air monitoring will be performed. The specific protection worn will be determined by the level of dermal and inhalation protection necessary. Air monitoring will be conducted to assist in determining the required level of protection. The level of protection may be upgraded if high contaminant concentrations are detected during excavation.

Environmental Impacts Resulting From Construction and Implementation. During excavation activities, dust suppression measures and engineering controls will be used to minimize any environmental impacts. Air monitoring will assist in determining if dust control measures are effective. In addition, surface drainage controls and appropriate equipment decontamination procedures will be used to prevent transport of contaminated soil to uncontaminated areas at Alameda Point.

Weatherproof containers will be used to store soil until construction of the IR Site 1 landfill cap to prevent infiltration of groundwater, thereby eliminating the leaching potential of the contaminated soil. Soil staging containers will be kept on an asphalt or concrete pad area.

Time Required to Complete the Removal Action. Approximately 3 to 4 weeks will be required to mobilize necessary equipment, excavate contaminated soil, transport this soil to the IR Site 1 staging area, restore the site, and demobilize. The length of time required to excavate and remove contaminated soil may be affected by (1) the time required to analyze screening level confirmation samples, (2) the amount of dewatering required during excavation, and (3) the number of unanticipated obstructions during excavation.

Since the removal action will be implemented before construction of the IR Site 1 landfill cap, it is assumed that soil staging will be required for a period of 2 years.

4.2.3 Implementability

This alternative is evaluated against two criteria to evaluate its implementability: (1) technical feasibility and (2) commercial availability. Both of these criteria are discussed below.

Technical Feasibility

This alternative is technically easy to implement. This alternative will use standard construction methods modified for use at hazardous waste sites. Some difficulties may be encountered with excavation below the water table; however, these difficulties can be overcome using proper excavation, shoring, and dewatering techniques. After excavation and transportation of the contaminated soil and site restoration, only limited O&M will be necessary (maintenance of soil staging containers).

Commercial Availability

Many contractors are readily available and have the equipment and specialists necessary to excavate contaminated soil. Weatherproof containers for soil staging are also readily available.

4.2.4 Cost

A summary of the total capital cost, annual O&M cost, estimated duration of removal, and present worth are presented below for Scenarios 1 and 2. Detailed cost estimates are included in Appendix B.

Scenario 1 (Total 123 Cubic Yards)

Estimated Capital Cost ($):	112,610
Estimated Annual O&M Cost ($):	3,689
Estimated Duration of Removal:	3 to 4 weeks (not including 2-year staging period for on-site disposal)
Estimated Present Worth ($):	207,427 (with markups and escalation)

Scenario 2 (Total 203 Cubic Yards)

Estimated Capital Cost ($):	145,787
Estimated Annual O&M Cost ($):	3,689
Estimated Duration of Removal:	3 to 4 weeks (not including 2-year staging period for on-site disposal)
Estimated Present Worth ($):	256,057 (with markups and escalation)

4.3 ALTERNATIVE 3: EXCAVATION AND OFF-SITE DISPOSAL

Alternative 3 is evaluated for both nonhazardous and hazardous soil removal actions. A description of this alternative and an evaluation of its effectiveness, implementability, and cost are provided in the following sections.

4.3.1 Description

The major components of this alternative are (1) excavation of contaminated soil, (2) disposal of the contaminated soil at a permitted off-site facility, and (3) backfilling the excavated area with imported material and site restoration. Each of these components is described below.

Excavation

Excavation involves preparing the excavation area, excavating soil containing dioxins at concentrations that exceed the RAO, and sampling soil to confirm that the RAO is met. These activities were discussed in detail in Section 4.2.1. If excavated material is determined to contain hazardous waste, debris and soil will be managed according to action-specific ARARs (see Section 3.4.2).

Off-site Disposal

Disposal at a permitted off-site facility includes loading the excavated soil into trucks and transporting this soil to the appropriate disposal facility. Off-site disposal facilities include Class I, II, and III landfills.

The actual wastes accepted at each landfill are specified by site-specific waste discharge requirements (WDR) issued by the appropriate RWQCB; however, waste acceptance is generally determined by the following criteria for the three classes of landfills in the State of California.

Class I Landfills. Class I landfills generally accept hazardous waste as defined in 22 CCR Division 4.5 Chapter 11, which lists characteristics of ignitability, corrosivity, reactivity, and toxicity. A waste is considered hazardous if it exhibits any of these four characteristics.

Class II Landfills. Class II landfills generally accept designated waste as defined in 23 CCR §2522, as specified in its WDR. Acceptance criteria generally vary from landfill to landfill, depending on the provisions of its WDRs. A Class II landfill, such as the Altamont Landfill and Resource Recovery (Altamont) facility in Livermore, California, which is owned and operated by Waste Management, Inc., has the following acceptance criteria:

- Waste below the standards that indicate it is hazardous under California law (22 CCR Division 4.5 Chapter 11)
- Hazardous waste that has been granted a variance from the state hazardous waste management requirements
- Dioxin concentrations with the following limits:
  - Soluble threshold limit concentration (STLC): 0.001 milligram per liter
  - Total threshold limit concentration (TTLC): 0.01 milligram per kilogram
  - **Note:** TTLC results may be used in lieu of STLC if results are less than 10 times STLC.

Class III Landfills. Class III landfills generally accept nonhazardous solid waste, defined in 23 CCR §2523 as waste that is not hazardous and does not contain soluble pollutants in concentrations that could pose a threat to water quality.

Backfilling and Site Restoration

Backfilling and site restoration were discussed in detail in Section 4.2.1.

4.3.2 Effectiveness

This alternative is evaluated against five criteria to evaluate its effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness. Each of these criteria is discussed below.

Overall Protection of Human Health and the Environment

This alternative will protect human health and the environment because it will involve excavating and removing contaminated soil from the site, thereby eliminating the potential for dermal contact with, ingestion of, or inhalation of dust originating from contaminated soil. However, the overall protectiveness of this alternative will depend on the protectiveness of the permitted off-site disposal facility.

Compliance with ARARs

This alternative will comply with chemical-specific ARARs for determining whether excavated media contain hazardous waste, as discussed in Section 3.4.2. Material determined to be hazardous will be stored within the area of contamination prior to off-site disposal, and thus will not be subject to RCRA hazardous waste management requirements. This alternative must comply with ARARs identified for on-site actions only. Off-site disposal must comply with all applicable requirements, including, as appropriate, U.S. Department of Transportation requirements at 49 CFR 171. However, since off-site disposal is not an on-site action, applicable requirements will not be addressed as ARARs. Off-site disposal of dioxin-contaminated soil is consistent with the BCDC's Bay Plan, and will be managed so as not to interfere with the behavior of any migratory birds. Therefore, this alternative will comply with location-specific ARARs.

Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include (1) the magnitude of residual risks and (2) adequacy of reliability of controls. Each of these factors is discussed below.

Magnitude of Residual Risks. The dioxin-contaminated soil will be permanently removed from the site so that residual risk to future residents, workers, or terrestrial ecological receptors will remain only at acceptable levels.

Adequacy of Reliability of Controls. Technology performance specifications, long-term management, O&M requirements, and technical component replacement are not required under this alternative because contaminated soil will be removed and transported for disposal to a permitted off-site disposal facility. However, the long-term adequacy and reliability of controls will depend on the controls of the off-site disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment

Implementation of this alternative will not reduce the volume or toxicity of dioxins present in the excavated soil. This alternative relies on engineering controls of the permitted off-site disposal facility to limit mobility of dioxins instead of treatment. In addition, engineered controls at the off-site disposal facility, including interim covers, final caps, liners, and leachate collection systems, will prevent water from contacting the dioxin-contaminated soil and prevent dioxins from migrating to the environment.

Short-Term Effectiveness

Four factors are considered when assessing the short-term effectiveness: (1) protection of the community during removal actions, (2) protection of workers during removal actions, (3) environmental impacts resulting from construction and implementation of the alternative, and (4) time required to complete the removal action. Each of these factors is discussed below.

Protection of the Community During Removal Actions. The community may face short-term risks during excavation and removal activities resulting from inhalation of fugitive dusts and direct contact with excavated soil; however, measures will be taken during excavation, staging, and loading of contaminated soil to reduce and control short-term risks. For example, dust suppression measures will be used to reduce the generation of fugitive dusts. Furthermore, site access will be controlled to reduce the potential for direct contact with contaminated soil. The local community may also be faced with additional short-term impacts resulting from increased truck traffic during excavation, backfilling, and off-site disposal activities. Trucks will be decontaminated to avoid spreading of contamination off site.

Protection of Workers During Removal Actions. Worker safety considerations associated with implementation of this alternative can be grouped in two categories: (1) general site hazards and (2) potential chemical hazards.

General site hazards include heavy equipment hazards; occupational noise exposure; potential slip, trip, or fall hazards; potential contact with underground or overhead mechanical and electrical hazards or utility lines; and airborne dust hazards. Exposure to general site hazards can be reduced by providing (1) appropriate safety equipment to minimize noise and dust exposure and (2) awareness training to orient personnel with the physical hazards at the site.

Potential chemical hazards include inhalation of, absorption of, ingestion of, and contact with hazardous substances in contaminated soil. On-site removal workers will wear Level D protection during excavation activities. Level C or greater levels of protection are not anticipated because dust generation will be kept to a safe level by dust control measures and continuous air monitoring will be performed. The specific protection worn will be determined by the level of dermal and inhalation protection necessary. Air monitoring will be conducted to assist in determining the required level of protection. The level of protection will be upgraded if high contaminant concentrations are detected during excavation.

Environmental Impacts Resulting From Construction and Implementation. During excavation activities, dust suppression measures and engineering controls will be used to minimize any environmental impacts. Air monitoring will assist in determining if dust control measures are effective. In addition, surface drainage controls and appropriate equipment decontamination procedures will be used to prevent transport of contaminated soil to uncontaminated areas at Alameda Point.

Time Required to Complete the Removal Action. Approximately 3 to 4 weeks will be required to mobilize necessary equipment, excavate contaminated soil at the site, transport this soil to a permitted off-site disposal facility, restore the site, and demobilize. The length of time required to excavate and remove contaminated soil may be affected by (1) the time required to analyze screening level confirmation samples, (2) the amount of dewatering required during excavation, and (3) the number of unanticipated obstructions during excavation.

4.3.3 Implementability

This alternative is evaluated against two criteria to evaluate its implementability: (1) technical feasibility and (2) commercial availability. Both of these criteria are discussed below.

Technical Feasibility

This alternative is technically easy to implement. This alternative will use standard construction methods modified for use at hazardous waste sites. Some difficulties may be encountered with excavation below the water table; however, these difficulties can be overcome using proper excavation, shoring, and dewatering techniques. After excavation and transportation of the contaminated soil and site restoration, no O&M will be necessary.

Commercial Availability

Many contractors are readily available and have the equipment and specialists necessary to excavate contaminated soil. Several Class II disposal facilities are located close to Alameda Point and a Class I disposal facility is located within 300 miles. The capacity of the off-site disposal facilities is adequate to handle the volume of excavated soil.

4.3.4 Cost

A summary of the total capital cost, annual O&M cost, estimated duration of removal, and present worth are presented below for Scenarios 1 and 2. Detailed cost estimates are included in Appendix B.

Scenario 1 (Total 123 Cubic Yards)

Since this alternative applies to both nonhazardous and hazardous soil removal actions, costs for both Class I and II disposal are presented below.

Class I Landfill Disposal

Estimated Capital Cost ($):	123,973
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	204,650 (with markups and escalation)

Class II Landfill Disposal

Estimated Capital Cost ($):	71,258
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	123,818 (with markups and escalation)

Scenario 2 (Total 203 Cubic Yards)

Since this alternative applies to both nonhazardous and hazardous soil removal actions, costs for both Class I and II disposal are presented below.

Class I Landfill Disposal

Estimated Capital Cost ($):	173,154
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	284,102 (with markups and escalation)

Class II Landfill Disposal

Estimated Capital Cost ($):	84,844
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	3 to 4 weeks
Estimated Present Worth ($):	146,642 (with markups and escalation)

4.4 ALTERNATIVE 4: EXCAVATION AND *EX SITU* SOLIDIFICATION AND STABILIZATION

Alternative 4 is evaluated for hazardous soil removal actions. A description of this alternative and an evaluation of its effectiveness, implementability, and cost are provided in the following sections.

4.4.1 Description

The major components of this alternative are (1) excavation of contaminated soil, (2) *ex situ* S/S of contaminated soil, (3) backfilling the excavation and disposal of treated soil, and (4) site restoration. Each of these components is described below.

Excavation

Excavation involves preparing the excavation area, excavating soil containing chemicals at concentrations that exceed RAOs, and sampling soil to confirm that RAOs are met. These activities were discussed in detail in Section 4.2.1. Excavated soil will be sampled and tested for characteristic hazardous waste. Soil exceeding thresholds for classifying soil as characteristic hazardous waste will be stockpiled within the area of contamination. Under this alternative, excavated soil will contain hazardous waste; therefore, debris and soil will be managed according to action-specific ARARs for hazardous wastes (see Section 3.4.2).

Ex Situ S/S

During the S/S treatment process, chemical reagents are mixed with waste to reduce contaminant solubility, toxicity, and mobility (as applicable). In solidification, a reagent is added to immobilize the contaminants within the crystalline structure of the excavated soil, thereby reducing contaminant leaching potential. In stabilization, a reagent is added to transform the contaminants so that they are in their least mobile or least toxic form. S/S processes are commonly used to solidify or immobilize inorganic compounds, volatile and nonvolatile metals, polychlorinated biphenyls (PCB) (depending on concentration), asbestos, and radionuclides. Most S/S technologies have limited effectiveness in immobilizing organic compounds, except vitrification (see below), which destroys most organic contaminants.

For organic compounds (such as dioxins), a vitrification, or molten glass, process can be used. Vitrification processes are S/S methods that employ heat up to 1,200 degrees Celsius to melt and convert waste materials into glass or other glass crystalline products. The high temperatures destroy any organic constituents with very few byproducts. Borosilicate and soda-lime are the principal glass formers and provide the basic matrix of the vitrified product. Additionally, S/S treatment processes are known to result in significant increases in volume of the immobilized end-product.

A treatability study is generally required before field work begins to evaluate (1) the effectiveness of the treatment process ability to remove all characteristics of a hazardous waste from dioxin-contaminated soil and to meet LDRs, (2) the appropriate chemical reagents to use, (3) the optimum concentration of chemical reagents used and curing time, and (4) the final condition of treated soil and volume increase.

LDR treatment standards for soil may be satisfied in one of three ways: (1) meet the treatment standards in 22 CCR §66268.40, (2) meet the alternative soil treatment standards of 22 CCR §66268.49, or (3) obtain a treatability variance under 22 CCR §66268.44.

S/S treatment processes will be conducted in the area of contamination so dioxin-contaminated soil will not be subject to RCRA generator, treatment, or other waste management requirements. Should excavated soil or groundwater from de-watering operations be moved outside of the area of contamination, the substantive RCRA requirements of Title 22 CCR would be applicable.

Backfilling and Disposal of Treated Soil

Three soil disposal options are proposed under alternative 4: (1) backfilling with treated soil and on-site disposal of excess treated soil, (2) backfilling with imported material and on-site disposal of treated soil, and (3) backfilling with imported material and off-site disposal of treated soil. Each of these options is discussed in the following sections.

Disposal Option 1. Treated soil from the S/S system that meets LDRs and no longer exhibits hazardous characteristics will be used to backfill the excavation. Chemical analysis will be required after treatment to establish whether treated soil is acceptable for use as backfill. If treated soil exceeds LDRs or if treated soil is classified as a hazardous waste, this alternative will not be implementable.

S/S processes result in an increase in volume that will require disposal in addition to excavation backfilling. Excess treated soil that meets LDRs and no longer exhibits hazardous characteristics will be transported and used as a foundation layer for the IR Site 1 landfill cap. On-site disposal at IR Site 1 was discussed in detail in Section 4.2.1.

Disposal Option 2. Imported fill will be brought on site and used as backfill. The imported fill will be properly compacted. Treated soil that meets LDRs and no longer exhibits hazardous characteristics will be transported and used as a foundation layer for the IR Site 1 landfill cap. On-site disposal at IR Site 1 was discussed in detail in Section 4.2.1.

Disposal Option 3. Imported fill will be brought on site and used as backfill. Treated soil that meets LDRs and no longer exhibits hazardous characteristics will be transported to an off-site Class II landfill facility for disposal. Disposal at an off-site Class II landfill facility was discussed in detail in Section 4.3.1.

Site Restoration

Treated or imported fill will be properly compacted and placed at an elevation suitable for use as a sub-base for the replaced surface. The original surface soil-gravel will be replaced with soil-gravel. Original grading will be maintained and, if appropriate, increased to facilitate surface run-off.

4.4.2 Effectiveness

This alternative is evaluated against five criteria to evaluate effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness. Each criterion is discussed below.

Overall Protection of Human Health and the Environment

S/S treatment processes have demonstrated capability to reduce the mobility of contaminated soil. Overall protection of human health and the environment is discussed below for the three disposal options under Alternative 4.

Disposal Option 1. Backfilling the treated soil into the excavation will reduce, but will not eliminate, the potential for dermal contact with or ingestion of contaminated soil or the potential for any future releases to groundwater. The overall protectiveness of this option will also depend on the engineering controls implemented for containment at the IR Site 1 landfill.

Disposal Option 2. This option will protect human health and the environment because it will involve excavating and removing contaminated soil at IR Site 14, thereby eliminating the potential for dermal contact with or ingestion of contaminated soil. However, the overall protectiveness of this option will depend on the engineering controls implemented at the IR Site 1 landfill.

Disposal Option 3. This option will provide a level of protection at IR Site 14 comparable to that provided by option 2. However the overall protection provided will depend on the engineering controls implemented at the off-site landfill facility.

Compliance with ARARs

Excavated waste material will be sampled and analyzed for characteristic hazardous waste. Excavated material will be kept in the area of contamination, and S/S treatment processes will be conducted in the area of contamination so dioxin-contaminated soil will not be subject to RCRA generator and waste management requirements. If excavated soil or groundwater from de-watering operations is moved outside of the area of contamination, the substantive RCRA requirements of Title 22 CCR will be applicable.

Contaminated soil will be treated to meet the RCRA alternative soil treatment standards of 22 CCR §66268.49 and to remove all characteristics of a hazardous waste as determined by 22 CCR §66261.24(a)(1) (TCLP) and §66261.24(a)(2) (STLC and TTLC). Treatment of contaminated soil will be consistent with the BCDC's Bay Plan. Treated soil will be analytically tested to ensure that these standards are met.

Once compliance with the above-listed standards is confirmed, the treated soil will be backfilled into the excavation, used as foundation layer for the IR Site 1 landfill cap, or taken for to an off-site landfill as required. Compliance with ARARs is evaluated below for the three disposal options under Alternative 4.

Disposal Option 1. Backfilled areas will not need to meet RCRA monitoring requirements because the treated soil will no longer contain hazardous waste. Nevertheless, if treated soil is used as backfill, groundwater beneath the backfilled areas will be monitored for 10 years to ensure that there is no leaching of hazardous constituents. On-site disposal of contaminated soil will be consistent with BCDC's Bay Plan; therefore, this option will comply with location-specific ARARs.

Disposal Option 2. On-site disposal of contaminated soil will be consistent with BCDC's Bay Plan; therefore this option will comply with location-specific ARARs.

Disposal Option 3. Off-site disposal must comply with applicable requirements, including, as appropriate, the U.S. Department of Transportation's requirements at 49 CFR 171. Since off-site disposal is not an on-site action, applicable requirements will not be addressed as ARARs. Off-site disposal of contaminated soil is consistent with the BCDC's Bay Plan; therefore, this alternative will comply with location-specific ARARs.

Long-Term Effectiveness and Permanence

The factors evaluated under the long-term effectiveness and permanence include (1) the magnitude of residual risks and (2) adequacy of reliability of controls. These factors are discussed below.

Magnitude of Residual Risks

The magnitude of residual risks is discussed below for the three disposal options under Alternative 4.

Disposal Option 1. Environmental conditions may affect the long-term immobilization of contaminants present in treated backfill. In addition, long-term effectiveness has not been demonstrated for many contaminant and process combinations. Backfilled areas will be monitored to assess residual risk from potential leaching of backfill.

Disposal Option 2. The dioxin-contaminated soil will be permanently removed so that no residual risk to future residents, workers, or terrestrial ecological receptors will remain at IR Site 14.

Disposal Option 3. The dioxin-contaminated soil will be permanently removed so that no residual risk to future residents, workers, or terrestrial ecological receptors will remain at IR Site 14.

Adequacy and Reliability of Controls

The adequacy and reliability of controls is discussed below for the three disposal options under Alternative 4.

Disposal Option 1. The long-term adequacy and reliability of controls will depend on the number and placement of groundwater monitoring wells installed near the backfilled excavations (using treated soil) and engineering controls implemented for containment at the IR Site 1 landfill.

Disposal Option 2. Technology performance specifications, long-term management, and technical component replacement are not required under option 2 because removal and disposal of dioxin-contaminated soil will be employed at IR Site 1. However, the long-term adequacy and reliability of controls will depend on engineering controls of the IR Site 1 landfill.

Disposal Option 3. Technology performance specifications, long-term management, O&M requirements, and technical component replacement are not required under this option because contaminated soil will be removed and transported for disposal to a permitted off-site disposal facility. However, the long-term adequacy and reliability of controls will depend on controls of the off-site disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment

Implementation of this alternative will not reduce the volume or toxicity of dioxins present in the excavated soil. S/S processes have demonstrated capability to reduce the mobility of contaminated waste. However, backfilling the treated soil into the excavation (Disposal Option 1) will reduce, but will not eliminate, the potential for any future releases to groundwater. Engineering controls of the IR Site 1 landfill and at the off-site disposal facility will provide reduced mobility of contaminants in treated soil.

Short-Term Effectiveness

Four factors are considered when assessing the short-term effectiveness: (1) protection of the community during removal actions, (2) protection of workers during removal actions, (3) environmental impacts resulting from construction and implementation of the alternative, and (4) time required to complete the removal action. Each factor is discussed below.

Protection of the Community During Removal Actions. The community may face short-term risks during excavation and S/S process activities resulting from inhalation of fugitive dusts and direct contact with excavated soil; however, measures will be taken during excavation, staging, and S/S treatment processes to reduce and control short-term risks. For example, dust suppression measures will be used to reduce the generation of fugitive dusts. Furthermore, site access will be controlled to reduce the potential for direct contact with contaminated soil. The local community may also be faced with additional short-term impacts resulting from increased truck traffic during excavation and backfilling activities. Trucks will be decontaminated to avoid spreading of contamination off site.

Protection of Workers During Removal Actions. Worker safety considerations associated with implementation of this alternative can be grouped in two categories: (1) general site hazards and (2) potential chemical hazards.

General site hazards include heavy equipment hazards; occupational noise exposure; potential slip, trip, or fall hazards; potential for contact with underground or overhead mechanical and electrical hazards or utility lines; and airborne dust hazards. Exposure to general site hazards can be reduced by providing (1) appropriate safety equipment to minimize noise and dust exposure and (2) awareness training to orient personnel with the physical hazards at the site.

Potential chemical hazards include inhalation of, absorption of, ingestion of, and contact with hazardous substances in contaminated soil. On-site removal workers will wear Level D protection during excavation and S/S treatment process activities. The need for Level C or greater levels of protection is not anticipated because dust generation will be kept to a safe level by dust control measures and continuous air monitoring will be performed. The specific protection worn will be determined by the level of dermal and inhalation protection necessary. Air monitoring will be conducted to assist in determining the required level of protection. The level of protection will be upgraded if high contaminant concentrations are detected during excavation or S/S treatment processes.

Environmental Impacts Resulting From Construction and Implementation. During excavation and S/S treatment process activities, dust suppression measures and engineering controls will be used to minimize any environmental impacts. Air monitoring will assist in determining if dust control measures are effective. In addition, surface drainage controls and appropriate equipment decontamination procedures will be used to prevent transport of contaminated soil to uncontaminated areas at Alameda Point.

Time Required to Complete the Removal Action. Approximately 8 to 12 weeks will be required for mobilizing necessary equipment, excavating contaminated soil at the site, S/S of contaminated soil, backfilling and restoration of the site, transporting excess treated soil to the IR Site 1 landfill staging area, and demobilizing. The length of time required to excavate and remove contaminated soil may be affected by (1) the time required to analyze screening level confirmation samples, (2) the amount of dewatering required during excavation, and (3) the number of unanticipated obstructions during excavation. S/S treatment process times may be affected by (1) high moisture and organic content and (2) chemical processes of adsorption, complexation, precipitation, and nucleation.

4.4.3 Implementability

This alternative is evaluated against two criteria to evaluate its implementability: (1) technical feasibility and (2) commercial availability. Both criteria are discussed below.

Technical Feasibility

This alternative is technically easy to implement. This alternative will use standard construction methods modified for use at hazardous waste sites. Some difficulties may be encountered with excavation below the water table; however, these difficulties can be overcome using proper excavation, shoring, and dewatering techniques. After excavation and transportation of the affected soil and site restoration, only minimal O&M will be necessary (maintenance of soil staging containers).

Commercial Availability

Many contractors are readily available and have the equipment and specialists necessary to excavate contaminated soil. S/S is relatively simple and is a commonly applied technology. Chemical reagents and equipment used in the S/S treatment process are also readily available.

4.4.4 Cost

A summary of the total capital cost, annual O&M cost, estimated duration of removal, and present worth are presented below for scenarios 1 and 2. Detailed cost estimates are included in Appendix B.

Scenario 1 (Total 123 Cubic Yards)

Since there are three disposal options under Alternative 4, costs for each option are presented below.

Disposal Option 1

Estimated Capital Cost ($):	295,942
Estimated Annual O&M Cost ($):	23,395
Estimated Duration of Removal:	8 to 12 weeks (not including 2-year staging period for on-site disposal)
Estimated Present Worth ($):	821,989 (with markups and escalation)

Disposal Option 2

Estimated Capital Cost ($):	261,990
Estimated Annual O&M Cost ($):	4,300
Estimated Duration of Removal:	8 to 12 weeks (not including 2-year staging for on-site disposal)
Estimated Present Worth ($):	444,706 (with markups and escalation)

Disposal Option 3

Estimated Capital Cost ($):	200,796
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	8 to 12 weeks
Estimated Present Worth ($):	325,631 (with markups and escalation)

Scenario 2 (Total 203 Cubic Yards)

Since there are three disposal options under Alternative 4, costs for each option are presented below.

Disposal Option 1

Estimated Capital Cost ($):	675,835
Estimated Annual O&M Cost ($):	23,395
Estimated Duration of Removal:	8 to 12 weeks (not including 2-year staging period for on-site disposal)
Estimated Present Worth ($):	958,904

Disposal Option 2

Estimated Capital Cost ($):	382,055
Estimated Annual O&M Cost ($):	4,300
Estimated Duration of Removal:	8 to 12 weeks (not including 2-year staging for on-site disposal)
Estimated Present Worth ($):	636,895 (with markups and escalation)

Disposal Option 3

Estimated Capital Cost ($):	290,451
Estimated Annual O&M Cost ($):	0
Estimated Duration of Removal:	8 to 12 weeks
Estimated Present Worth ($):	465,836 (with markups and escalation)

5.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

During removal actions, sampling will be conducted to determine if the dioxin-contaminated soil at IR Site 14 is classified as hazardous waste as set forth in 22 CCR §66261. In this section, the alternatives analyzed in Section 4.0 are compared against each other for both nonhazardous and hazardous soil removal actions to evaluate the relative performance of each alternative in relation to each of the criteria. The criteria used in this comparison are the same as in Section 4.0, namely effectiveness, implementability, and cost. The comparative analytical treatment alternatives for nonhazardous and hazardous soil removal actions are listed below.

Nonhazardous Soil Removal Action Alternatives

Alternative 1: No Action
Alternative 2: Excavation and On-site Disposal
Alternative 3: Excavation and Off-site Disposal (Class II Landfill Facility)

Hazardous Soil Removal Action Alternatives

Alternative 1: No action
Alternative 3: Excavation and Off-site Disposal (Class I Landfill Facility)
Alternative 4: Excavation, *Ex Situ* Solidification/Stabilization, and Disposal (Options 1 through 3, listed below)

Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal
Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II Landfill Facility)

5.1 NONHAZARDOUS SOIL REMOVAL ACTION ALTERNATIVES

This section presents a comparative analysis of Alternatives 1, 2, and 3 for treatment of nonhazardous soil. A summary of the comparative analysis is provided in Table 5-1 at the end of this section.

5.1.1 Effectiveness of Alternatives

Each alternative is evaluated against five criteria to evaluate effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness. Each of these criteria is discussed below.

Overall Protection of Human Health and the Environment

Alternative 1 will provide the lowest overall protection of human health and the environment because the potential for exposure will not be reduced. Alternative 2 will provide increased protection to human health from contact and exposure if engineering controls are implemented under the final containment design for the IR Site 1 landfill. The highest overall protection to human health and the environment will be achieved under Alternative 3 because contaminated soil will be removed and transported for disposal to a permitted off-site disposal facility where engineering controls are already in place.

Compliance with Applicable or Relevant Appropriate Requirements

There are no action-specific ARARs for all three nonhazardous soil removal alternatives. There are no chemical-specific ARARs for Alternative 1, and both Alternatives 2 and 3 will comply with hazardous waste identification ARARs. All three alternatives are consistent with the BCDC's Bay Plan and will therefore comply with location-specific ARARs.

Long-Term Effectiveness and Permanence

Alternative 1 will not reduce the magnitude of residual risks and will not provide long-term effectiveness. Alternative 2 will provide long-term and permanent treatment if engineering controls are implemented under the final containment design for the IR Site 1 landfill cap. Alternative 3 will provide the best long-term and permanent treatment because dioxin-contaminated soil will be removed and transported for disposal to a permitted off-site disposal facility where engineering controls are already in place.

Reduction in Toxicity, Mobility, and Volume through Treatment

Alternative 1 will not reduce toxicity, mobility, or volume through treatment because no treatment will be implemented. Under Alternatives 2 and 3, the volume and toxicity of dioxin-contaminated soil will not be reduced through treatment. The use of excavated soil as a foundation layer for the IR Site 1 cap under Alternative 2 will reduce the mobility of dioxins. Disposal of excavated soil at a permitted off-site facility with engineering controls, such as impermeable liners, interim covers, final caps, and leachate collection systems, will be the most effective approach for reducing the mobility of dioxins.

Short-Term Effectiveness

Short-term effectiveness will be greatest under Alternative 1 because adverse short-term risks from construction and transportation will not occur. Under Alternatives 2 and 3, the community and workers may face short-term risks during excavation activities; however, measures, such as controlling site access and providing protective equipment and awareness training to workers, will be taken to reduce risks. Under Alternative 3, the local community may also be faced with additional short-term impacts resulting from increased truck traffic while transporting contaminated soil to an off-site disposal facility.

5.1.2 Implementability of Alternatives

Alternative 1 is technically easy to implement because no action will be conducted. Alternatives 2 and 3 are also technically easy to implement and many contractors are readily available and have the equipment and specialists necessary to excavate contaminated soil. Alternative 3 is more implementable than Alternative 2 because soil staging will be required under Alternative 2 for a period of at least 2 years. Under Alternative 3, contaminated soil will be transported for disposal to a permitted off-site facility following excavation. Class II off-site disposal facilities are located close to Alameda Point.

5.1.3 Cost of Alternatives

The estimated present worth of each alternative is listed below for Scenarios 1 and 2.

Scenario 1 (Total 123 Cubic Yards)

Alternative 1:	$0
Alternative 2:	$207,427
Alternative 3:	$123,818

Scenario 2 (Total 203 Cubic Yards)

Alternative 1:	$0
Alternative 2:	$256,057
Alternative 3:	$146,642

For both scenarios, Alternative 1 will have the lowest cost because no removal action will be implemented. Alternative 2 will have the highest cost because of the costs associated with staging soil until construction of the IR Site 1 landfill cap. Alternative 3 will have a lower cost than Alternative 2.

5.2 HAZARDOUS SOIL REMOVAL ACTION ALTERNATIVES

This section presents a comparative analysis of Alternatives 1, 3, and 4 for treatment of hazardous soil. A summary of the comparative analysis is provided in Table 5-2 at the end of this section.

5.2.1 Effectiveness of Alternatives

Each alternative is evaluated against five criteria to evaluate effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness. Each of these criteria is discussed below.

Overall Protection of Human Health and the Environment

Alternative 1 will provide the lowest overall protection of human health and the environment because the potential for exposure will not be reduced. Alternative 4 with Disposal Option 1 will provide increased protection to human health; however, due to potential leaching of backfilled treated soil, this option will potentially be less protective than either Alternative 3 or Alternative 4 with Disposal Options 2 or 3. Disposal Option 2 will be more protective than Disposal Option 1 under Alternative 4, if engineering controls are implemented under the final containment design for the IR Site 1 landfill. Alternative 3 and Alternative 4 with Disposal Option 3 will provide the highest overall protection of human health because excavated soil will be transported for disposal at an off-site facility. At the off-site facility, treated soil will be placed into a lined landfill cell with containment systems in place to protect human health and the environment.

Compliance with Applicable or Relevant Appropriate Requirements

Alternative 1 involves no action, thus ARARs are not triggered. Alternatives 3 and 4 could be conducted to comply with location-specific ARARs. Federal chemical-specific requirements will be met for Alternatives 3 and 4 because representative sampling of all excavated media will be performed in compliance with 22 CCR §66261. Under Alternative 4, LDRs will be met for treatment prior to backfilling with treated soil, disposal at IR Site 1, or disposal at an off-site facility. In summary, all the alternatives would comply with pertinent federal requirements.

Long-Term Effectiveness and Permanence

Alternative 1 will have the lowest long-term effectiveness. Alternative 4 with Disposal Option 1 will provide some long-term permanence; however, potential for groundwater contamination will remain due to potential leaching of treated backfill. Under Disposal Option 1, a groundwater monitoring plan may be required to ensure that chemicals are not leaching from treated soil used as backfill. Alternative 4 with Disposal Option 2 will provide long-term and permanent effectiveness provided that engineering controls are implemented under the final containment design for the IR Site 1 landfill cap. Alternative 3 and Alternative 4 with Disposal Option 3 will provide the best long-term and permanent treatment, because S/S process will be enhanced by engineering controls already in place at an off-site disposal facility. Closure and post-closure monitoring requirements will also ensure long-term effectiveness at an off-site disposal facility.

Reduction in Toxicity, Mobility, and Volume Through Treatment

Alternative 1 will not reduce toxicity, mobility, or volume through treatment because no treatment will occur. Neither Alternative 3 nor Alternative 4 will reduce toxicity or volume through treatment. Under Alternative 3, Class I landfill disposal will include S/S treatment of contaminated soil; therefore, both Alternatives 3 and 4 will reduce the mobility of dioxins. However, mobility will be more greatly reduced under Alternative 3 and Alternative 4 with Disposal Option 3 because containment systems at an off-site facility will more effectively limit mobility, than backfilling with treated soil under Disposal Option 1 or disposing of soil at IR Site 1 under Disposal Option 2.

Short-Term Effectiveness

Short-term effectiveness will be greatest under Alternative 1 because adverse short-term risks from construction will not occur. Under Alternatives 3 and 4, the community and workers may face short-term risks during excavation and treatment activities; however, measures, such as controlling site access and providing protective equipment and awareness training to workers, will be taken to reduce risks. Under

Alternative 3 and Alternative 4 with Disposal Option 3, the community and workers may also be faced with additional risks due to increase in truck traffic during transportation of soil to the off-site landfill.

5.2.2 Implementability of Alternatives

Alternative 1 is technically easy to implement because no action will be conducted. Alternatives 3 and 4 are also technically easy to implement, and many contractors are readily available and have the equipment and specialists necessary to excavate contaminated soil. Alternative 3 and Alternative 4 with Disposal Option 3 are more implementable than Alternative 4 with Disposal Options 1 and 2 because soil staging will be required for a period of at least 2 years. Under Alternative 3 and Alternative 4 with Disposal Option 3, contaminated soil will be transported for disposal to a permitted off-site facility following excavation. Off-site disposal facilities are located relatively close to Alameda Point.

5.2.3 Cost of Alternatives

The estimated present worth of each alternative is listed below for Scenarios 1 and 2.

Scenario 1 (Total 123 Cubic Yards)

Alternative 1:	$0
Alternative 3:	$204,650
Alternative 4 with Disposal Option 1:	$821,989
Alternative 4 with Disposal Option 2:	$444,706
Alternative 4 with Disposal Option 3:	$325,631

Scenario 2 (Total 203 Cubic Yards)

Alternative 1:	$0
Alternative 3:	$284,102
Alternative 4 with Disposal Option 1:	$1,028,265
Alternative 4 with Disposal Option 2:	$636,895
Alternative 4 with Disposal Option 3:	$465,836

For both scenarios, Alternative 1 will have the lowest cost because no removal action will be implemented. Alternative 4 with Disposal Option 1 will have the highest cost because groundwater monitoring will be conducted to ensure long-term effectiveness of S/S treatment processes. Alternative 4 with Disposal Option 3 will have a lower cost than with Disposal Option 2 because soil staging would be required for a period of at least 2 years. Alternative 3 will have a lower cost than any of the options under Alternative 4.

TABLE 5-1

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 3)

Criteria	Alternative 1: No Action		Alternative 2: Excavation and On-site Disposal		Alternative 3: Excavation and Off-site Disposal (Class II Landfill)	
	Comment	**Score**	**Comment**	**Score**	**Comment**	**Score**
Effectiveness						
1. Overall Protection of Human Health and the Environment	No protection Potential for exposure remains.	1	This will decrease exposure and direct contact with dioxin-contaminated soil. Engineering controls for IR Site 1 landfill containment will be required to protect human health and the environment.	5	This will decrease exposure and direct contact with dioxin-contaminated soil. Engineering controls are already in place at a permitted off-site landfill to protect human health and the environment.	10
2. Compliance with ARARs	There are no chemical-specific or action-specific ARARs with which this alternative must comply. It complies with location-specific ARARs because it is consistent with the BCDC's Bay Plan and will not interfer with any migratory birds.	10	This will comply with chemical-specific ARARs for determining whether excavated soil is hazardous. This will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so as to avoid interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10	This will comply with chemical-specific ARARs for determining whether excavated soil is hazardous. This will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so as to avoid interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10
3. Long-Term Effectiveness and Permanence	None	1	This will be permanently effective with proper landfill cover maintenance at IR Site 1.	8	This will be permanently effective with proper landfill cover maintenance at a permitted Class II landfill.	8

TABLE 5-1

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 2 of 3)

Criteria	Alternative 1: No Action		Alternative 2: Excavation and On-site Disposal		Alternative 3: Excavation and Off-site Disposal (Class II Landfill)	
	Comment	**Score**	**Comment**	**Score**	**Comment**	**Score**
4. Reduction in Toxicity, Mobility, and Volume through Treatment	No treatment is proposed.	1	Use of excavated soil as a foundation layer for the IR Site 1 landfill cap will reduce mobility. Toxicity and volume would not be reduced.	5	Mobility will more effectively be reduced at a Class II landfill because a bottom liner will be in place. Toxicity and volume will not be reduced.	8
5. Short-term Effectiveness	No disturbance	10	Disturbances will occur during excavation activities.	8	Disturbances will occur from excavation activities. Increase in risk will be possible due to increase in truck traffic during transportation of soil to an off-site landfill.	5
Implementability						
6. Technical Feasibility	This is implementable since no action will be taken.	10	This is readily implementable; however, soil staging will be required for a period of at least 2 years. Standard construction techniques will be used, and limited O&M will be required during soil staging at IR Site 1.	5	This is readily implementable. Standard construction techniques will be used, and Altamont landfill, a Class II facility, is located nearby.	8
Cost						
Comparative Cost	Scenario 1: $0 Scenario 2: $0	10	Scenario 1: $207,427 Scenario 2: $256,057	5	Scenario 1: $123,818 Scenario 2: $146,642	8
Overall Ranking	**Total Score**	**43**	**Total Score**	**46**	**Total Score**	**59**

TABLE 5-1

INSTALLATION RESTORATION SITE 14
NONHAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Notes:

Effectiveness Criteria

1	=	ineffective
5	=	moderately effective
10	=	highly effective

Implementability Criteria

1	=	implementable with difficulty
5	=	implementable
10	=	easily implementable

Cost

1	=	high cost
5	=	moderate cost
10	=	low cost

ARAR	Applicable or relevant and appropriate requirement
BCDC	San Francisco Bay Conservation and Development Commission
IR	Installation Restoration
O&M	Operation and maintenance

TABLE 5-2

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	Score	Comment	Score	Comment	Score
Effectiveness						
1. Overall Protection of Human Health and the Environment	No protection Potential for exposure will remain.	1	This alternative will decrease exposure and direct contact with dioxin-contaminated soil. Excavated soil will be treated to meet land disposal requirements prior to disposal at a Class I landfill. Engineering controls are in place at a Class I landfill to protect human health and the environment.	8	**Disposal Option 1.** This option will reduce, but will not eliminate, the potential for dermal contact with or ingestion of contaminated soil or the potential for future leaching to groundwater of treated backfill.	4
					Disposal Option 2. This option will eliminate the potential for dermal contact with or ingestion of contaminated soil and future release to groundwater if proper engineering controls are implemented for containment at the IR Site 1 landfill.	6
					Disposal Option 3. This option will eliminate the potential for dermal contact with or ingestion of contaminated soil and future release to groundwater since engineering controls are in place at a Class II landfill to protect human health and the environment.	8

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	**Score**	**Comment**	**Score**	**Comment**	**Score**
2. Compliance with ARARs	There are no chemical-specific or action-specific ARARs with which this alternative must comply. This alternative will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and and will not interfere with any migratory birds.	10	This alternative will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at a Class I landfill. This alternative will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this alternative must comply.	10	**Disposal Option 1.** This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to backfilling with treated soil and disposal at IR Site 1. This option will comply with location-specific ARARs because it is consistent with the BCDC's San FranciscoBay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10
					Disposal Option 2. This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at IR Site 1. This option will comply with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10

TABLE 5-2

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	Score	Comment	Score	Comment	Score
2. Compliance with ARARs (Continued)					**Disposal Option 3.** This option will comply with chemical-specific ARARs for determining whether excavated soil is hazardous, and LDRs will be met for treatment prior to disposal at an off-site Class II landfill facility. This option complies with location-specific ARARs because it is consistent with the BCDC's San Francisco Bay Plan and will be conducted so that it avoids interference with any migratory birds. There are no action-specific ARARs with which this option must comply.	10
3. Long-term Effectiveness and Permanence	None	1	Long-term effectiveness will be achievable with proper landfill maintenance at a permitted Class I landfill.	8	**Disposal Option 1.** Under this option, continued monitoring of leaching and conditions of the backfill may be required since long-term effectiveness has not been demonstrated for many contaminant and S/S process combinations.	4
					Disposal Option 2. This option will be permanently effective if proper engineering controls are implemented at IR Site 1.	6
					Disposal Option 3. This option will be permanently effective since engineering controls are in place at an off-site landfill facility.	8

TABLE 5-2

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	Score	Comment	Score	Comment	Score
4. Reduction in Toxicity, Mobility, and Volume through Treatment	No treatment is proposed.	1	Mobility will effectively be reduced at a Class I landfill because of treatment to LDRs and landfill liner and final cover requirements. Toxicity and volume will not be reduced.	8	**Disposal Option 1.** Mobility will be reduced if S/S processes are effective. However, the mobility of dioxins in treated backfill may be affected by environmental conditions. Toxicity and volume will not be reduced.	4
					Disposal Option 2. Mobility will be reduced if S/S processes are effective. The mobility of dioxins will be further reduced under this option if proper engineering controls are implemented at the IR Site 1 landfill. Toxicity and volume will not be reduced.	6
					Disposal Option 3. Mobility will be reduced if S/S processes are effective. This option will provide the best reduction of mobility because engineering controls are already in place at an approved off-site landfill facility. Toxicity and volume will not be reduced.	8
5. Short-term Effectiveness	No disturbance	10	Disturbances will occur from excavation activities. Short-term risk may be increased due to increase in truck traffic during transportation of soil to an off-site landfill.	6	**Disposal Option 1.** Disturbances will occur from excavation and S/S process activities.	8
					Disposal Option 2. Disturbances will occur from excavation and S/S process activities.	8

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	Score	Comment	Score	Comment	Score
5. Short-term Effectiveness (Continued)					**Disposal Option 3.** Disturbances will occur from excavation and S/S process activities. Short-term risk may be increased due to increase in truck traffic during transportation of soil to an off-site landfill.	6
Implementability						
6. Technical Feasibility	Readily implementable	10	This is readily implementable. Standard construction techniques will be used, and Kettleman Hills, a Class I facility, is located within 300 miles.	8	**Disposal Option 1.** The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques are used and limited O&M will be required during soil staging at IR Site 1 for a period of at least 2 years.	6
					Disposal Option 2. The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques will be used, and limited O&M will be required during soil staging at IR Site 1 for a period of at least 2 years.	6
					Disposal Option 3. The S/S process will be relatively simple and is a commonly applied technology. Standard construction techniques will be used, and Altamont Landfill, a Class II facility, is located within 45 miles	8

TABLE 5-2

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARATIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 6 of 7)

Criteria	Alternative 1: No Action		Alternative 3: Excavation and Off-site Disposal (Class I Landfill)		Alternative 4: Excavation, *Ex Situ* Solidification and Stabilization, and Disposal (Options 1 through 3)	
	Comment	Score	Comment	Score	Comment	Score
Cost						
Comparative Cost	Scenario 1: $0 Scenario 2: $0	10	Scenario 1: $204,650 Scenario 2: $284,102	8	**Disposal Option 1** Scenario 1: $821,989 Scenario 2: $1,028,265	2
					Disposal Option 2 Scenario 1: $444,706 Scenario 2: $636,895	4
					Disposal Option 3 Scenario 1: $325,631 Scenario 2: $465,836	6
Overall Ranking						
	Total Score	**43**	**Total Score**	**56**	**Total Score Disposal Option 1**	38
					Total Score Disposal Option 2	46
					Total Score Disposal Option 3	54

Notes:

Effectiveness Criteria

1 = ineffective
5 = moderately effective
10 = highly effective

Implementability Criteria

1 = implementable with difficulty
5 = implementable
10 = easily implementable

Cost

1 = high cost
5 = moderate cost
10 = low cost

TABLE 5-2

INSTALLATION RESTORATION SITE 14
HAZARDOUS SOIL REMOVAL ACTION COMPARITIVE ANALYSIS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 7 of 7)

ARAR	Applicable or relevant and appropriate requirement
BCDC	San Francisco Bay Conservation and Development Commission
IR	Installation Restoration
LDR	Land disposal restriction
O&M	Operations and maintenance
S/S	Solidification and stabilization

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

This EE/CA was performed in accordance with current EPA and Navy guidance documents for a non-time-critical removal action under CERCLA. The purpose of this EE/CA was to identify and analyze alternative removal actions to address dioxin-contaminated soil at IR Site 14. During removal actions, sampling will be conducted to determine if the dioxin-contaminated soil at IR Site 14 is classified as hazardous waste as set forth in 22 CCR §66261. Three alternatives were evaluated for nonhazardous and hazardous soil removal actions:

Nonhazardous Soil Removal Action Alternatives

Alternative 1: No Action
Alternative 2: Excavation and On-site Disposal
Alternative 3: Excavation and Off-site Disposal (Class II Landfill Facility)

Hazardous Soil Removal Action Alternatives

Alternative 1: No action
Alternative 3: Excavation and Off-site Disposal (Class I Landfill Facility)
Alternative 4: Excavation, *Ex Situ* Solidification/Stabilization, and Disposal (Options 1 through 3, listed below)

Disposal Option 1: Backfill with Treated Soil and On-site Disposal
Disposal Option 2: Backfill with Imported Material and On-site Disposal
Disposal Option 3: Backfill with Imported Material and Off-site Disposal (Class II Landfill Facility)

Based on the comparative analyses of the removal action alternatives completed in Section 5.0, the recommended removal action is Alternative 3 for both hazardous and nonhazardous soil removal actions. This alternative best meets the NCP criteria of overall protectiveness of human health; compliance with ARARs; long-term effectiveness; reduction of mobility, toxicity, or volume through treatment; short-term effectiveness; implementability; and cost. State and community acceptance will be evaluated after the EE/CA is published for public comment and will be discussed in an action memorandum documenting the response action decision.

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N00236.000305
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX A – ANALYTICAL DATA AND DIOXIN EQUIVALENCE CALCULATIONS

APPENDIX A – ENGINEERING EVALUATION/COST ANALYSIS FOR INSTALLATION RESTORATION SITE 14

FINAL INSTALLATION RESTORATION SITE 14 DIOXIN NON-TIME CRITICAL REMOVAL ACTION ACTION MEMORANDUM

DATED 7 DECEMBER 2001

TABLE A-1

INSTALLATION RESTORATION SITE 14
DIOXIN EQUIVALENCE CALCULATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 4)

Point Name	Compound	Concentration (µg/kg)	Qual	TEF	2,3,7,8-TCDD Equivalent Concentration (µg/kg)
B14-01	HPCDD	1.3		0.01	0.0130
	OCDD	5.4		0.001	0.0054
	Total TCDD Equivalent				**0.0184**
B14-02	HPCDD	1.6		0.01	0.0160
	OCDD	9.4		0.001	0.0094
	Total TCDD Equivalent				**0.0254**
B14-03	HPCDD	0.029	U	0.01	--
	OCDD	0.14	U	0.001	--
	Total TCDD Equivalent				**--**
S14-03	Total HPCDD	5.36		0.01	0.0536
	Total HPCDF	1.33		0.01	0.0133
	Total HXCDD	0.54		0.1	0.0540
	Total HXCDF	0.29		0.1	0.0290
	Total OCDD	17.6		0.001	0.0176
	Total OCDF	1.13		0.001	0.0011
	Total TCDD Equivalent				**0.1686**
S14-04	Total HPCDD	0.9		0.01	0.0090
	Total HPCDF	0.11		0.01	0.0011
	Total HXCDD	0.1		0.1	0.0100
	Total HXCDF	0.03		0.1	0.0030
	Total OCDD	3.13		0.001	0.0031
	Total OCDF	0.23		0.001	--
	Total TCDD Equivalent				**0.0262**
S14-05	Total HPCDD	2.35		0.01	0.0235
	Total HPCDF	0.29	U	0.01	--
	Total HXCDD	0.26		0.1	0.0260
	Total HXCDF	0.12		0.1	0.0120
	Total OCDD	10.6		0.001	0.0106
	Total OCDF	0.4	U	0.001	--
	Total TCDD Equivalent				**0.0721**
S14-06	Total HPCDD	1.13		0.01	0.0113
	Total HPCDF	0.18	U	0.01	--
	Total HXCDD	0.14		0.1	0.0140
	Total HXCDF	0.07	U	0.1	--
	Total OCDD	4.27		0.001	0.0043
	Total OCDF	0.22	U	0.001	--
	Total TCDD Equivalent				**0.0296**

TABLE A-1

INSTALLATION RESTORATION SITE 14
DIOXIN EQUIVALENCE CALCULATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 2 of 4)

Point Name	Compound	Concentration (µg/kg)	Qual	TEF	2,3,7,8-TCDD Equivalent Concentration (µg/kg)
S14-07	Total HPCDD	0.14	U	0.01	--
	Total HPCDF	0.05	U	0.01	--
	Total HXCDD	0.06	U	0.1	--
	Total HXCDF	0.05	U	0.1	--
	Total OCDD	0.43		0.001	0.0004
	Total OCDF	0.13	U	0.001	--
	Total TCDD Equivalent				**0.0004**
S14-08	Total HPCDD	3.05		0.01	0.0305
	Total HPCDF	0.27	U	0.01	--
	Total HXCDD	0.43		0.1	0.0430
	Total HXCDF	0.07		0.1	0.0070
	Total OCDD	10.8		0.001	0.0108
	Total OCDF	0.21	U	0.001	--
	Total TCDD Equivalent				**0.0913**
SUMP-BN	1,2,3,4,6-HPCDD	1.89		0.01	0.0189
	1,2,3,4,6-HPCDF	0.1	J	0.01	0.0010
	1,2,3,4,7-HPCDF	0.01	J	0.01	0.0001
	1,2,3,4,7-HXCDD	0.03	J	0.1	0.0030
	1,2,3,6,7-HXCDD	0.08	J	0.1	0.0080
	1,2,3,7,8-HXCDD	0.08	J	0.1	0.0080
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.04	J	0.1	0.0040
	1,2,3,6,7-HXCDF	0.01	J	0.1	0.0010
	1,2,3,7,8-HXCDF	0.35	UJ	0.1	--
	2,3,4,6,7-HXCDF	0.01	J	0.1	0.0010
	Total OCDD	8.43		0.001	0.0084
	Total OCDF	0.1	J	0.001	0.0001
	Total TCDD Equivalent				**0.0535**
SUMP-BS	1,2,3,4,6-HPCDD	0.47		0.01	0.0047
	1,2,3,4,6-HPCDF	0.03	J	0.01	0.0003
	1,2,3,4,7-HPCDF	0.32	UJ	0.01	--
	1,2,3,4,7-HXCDD	0.32	UJ	0.1	--
	1,2,3,6,7-HXCDD	0.03	J	0.1	0.0030
	1,2,3,7,8-HXCDD	0.03	J	0.1	0.0030
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.01	J	0.1	0.0010
	1,2,3,6,7-HXCDF	0.32	UJ	0.1	--
	1,2,3,7,8-HXCDF	0.01	J	0.1	0.0010
	2,3,4,6,7-HXCDF	0.32	UJ	0.1	--
	Total OCDD	2.65		0.001	0.0027
	Total OCDF	0.03	UJ	0.001	--
	Total TCDD Equivalent				**0.0157**

TABLE A-1

INSTALLATION RESTORATION SITE 14
DIOXIN EQUIVALENCE CALCULATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 3 of 4)

Point Name	Compound	Concentration (µg/kg)	Qual	TEF	2,3,7,8-TCDD Equivalent Concentration (µg/kg)
SUMP-EW	1,2,3,4,6-HPCDD	0.04	J	0.01	0.0004
	1,2,3,4,6-HPCDF	0.36	U	0.01	--
	1,2,3,4,7-HPCDF	0.36	UJ	0.01	--
	1,2,3,4,7-HXCDD	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDD	0.36	U	0.1	--
	1,2,3,7,8-HXCDD	0.36	UJ	0.1	--
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDF	0.36	U	0.1	--
	1,2,3,7,8-HXCDF	0.01	J	0.1	0.0010
	2,3,4,6,7-HXCDF	0.36	UJ	0.1	--
	Total OCDD	0.1	UJ	0.001	--
	Total OCDF	0.72	U	0.001	--
	Total TCDD Equivalent				**0.0014**
SUMP-NW	1,2,3,4,6-HPCDD	0.55		0.01	0.0055
	1,2,3,4,6-HPCDF	0.05	J	0.01	0.0005
	1,2,3,4,7-HPCDF	0.36	UJ	0.01	--
	1,2,3,4,7-HXCDD	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDD	0.04	J	0.1	0.0040
	1,2,3,7,8-HXCDD	0.02	J	0.1	0.0020
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDF	0.36	U	0.1	--
	1,2,3,7,8-HXCDF	0.36	UJ	0.1	--
	2,3,4,6,7-HXCDF	0.36	UJ	0.1	--
	Total OCDD	3.37		0.001	0.0034
	Total OCDF	0.12	J	0.001	0.0001
	Total TCDD Equivalent				**0.0155**
SUMP-SW	1,2,3,4,6-HPCDD	0.73		0.01	0.0073
	1,2,3,4,6-HPCDF	0.04	J	0.01	0.0004
	1,2,3,4,7-HPCDF	0.36	UJ	0.01	--
	1,2,3,4,7-HXCDD	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDD	0.05	J	0.1	0.0050
	1,2,3,7,8-HXCDD	0.04	J	0.1	0.0040
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.36	UJ	0.1	--
	1,2,3,6,7-HXCDF	0.36	U	0.1	--
	1,2,3,7,8-HXCDF	0.36	UJ	0.1	--
	2,3,4,6,7-HXCDF	0.36	UJ	0.1	--
	Total OCDD	3.23		0.001	0.0032
	Total OCDF	0.05	UJ	0.001	--
	Total TCDD Equivalent				**0.0199**

TABLE A-1

INSTALLATION RESTORATION SITE 14
DIOXIN EQUIVALENCE CALCULATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 4 of 4)

Point Name	Compound	Concentration (µg/kg)	Qual	TEF	2,3,7,8-TCDD Equivalent Concentration (µg/kg)
SUMP-WW	1,2,3,4,6-HPCDD	0.07	J	0.01	0.0007
	1,2,3,4,6-HPCDF	0.38	U	0.01	--
	1,2,3,4,7-HPCDF	0.38	UJ	0.01	--
	1,2,3,4,7-HXCDD	0.38	UJ	0.1	--
	1,2,3,6,7-HXCDD	0.38	U	0.1	--
	1,2,3,7,8-HXCDD	0.38	UJ	0.1	--
	Total HXCDF	0		0.1	0.0000
	1,2,3,4,7-HXCDF	0.38	UJ	0.1	--
	1,2,3,6,7-HXCDF	0.38	U	0.1	--
	1,2,3,7,8-HXCDF	0.38	UJ	0.1	--
	2,3,4,6,7-HXCDF	0.38	UJ	0.1	--
	Total OCDD	0.3	J	0.001	0.0003
	Total OCDF	0.76	U	0.001	--
	Total TCDD Equivalent				**0.0010**

Notes:

µg/kg	Microgram per kilogram
HPCDD	Heptachlorodibenzo-p-dioxin
HPCDF	Heptachlorodibenzofuran
HXCDD	Hexachlorodibenzo-p-dioxin
HXCDF	Hexachlorodibenzofuran
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
TCDD	Tetrachlorodibenzo-p-dioxin
TEF	Toxicity equivalence factor
Qual	Qualifier
U	Nondetection
J	Estimated quantity
UJ	Estimated nondetection

TABLE A-2

INSTALLATION RESTORATION SITE 14
TOTAL 2,3,7,8-TCDD CONCENTRATIONS
ALAMEDA POINT, ALAMEDA, CALIFORNIA
(Page 1 of 1)

Point Name	Sample Date	Top/Bottom Depth (ft)	Total 2,3,7,8-TCDD Equivalent Concentration (µg/kg)
B14-01	**91-07-11**	**Surface**	**0.0184**
B14-02	**91-07-10**	**Surface**	**0.0254**
B14-03	91-07-10	Surface	--
S14-03	**94-03-08**	**Surface**	**0.1686**
S14-04	**94-03-08**	**Surface**	**0.0262**
S14-05	**94-03-08**	**Surface**	**0.0721**
S14-06	**94-03-08**	**Surface**	**0.0296**
S14-07	94-03-08	Surface	0.0004
S14-08	**94-03-08**	**Surface**	**0.0913**
SUMP-BN	**98-01-20**	**0 to 3.0**	**0.0535**
SUMP-BS	**98-01-20**	**0 to 3.0**	**0.0157**
SUMP-EW	98-01-20	0 to 3.0	0.0014
SUMP-NW	**98-01-20**	**0 to 3.0**	**0.0155**
SUMP-SW	**98-01-20**	**0 to 3.0**	**0.0199**
SUMP-WW	98-01-20	0 to 3.0	0.001

Notes:

ft	Foot
µg/kg	Microgram per kilogram
TCDD	Tetrachlorodibenzo-p-dioxin

Total 2,3,7,8-TCDD concentrations greater than the ecological screening value are bolded.

N00236.000305
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX B – DETAILED COST ESTIMATES

APPENDIX A – ENGINEERING EVALUATION/COST ANALYSIS FOR INSTALLATION RESTORATION SITE 14

FINAL INSTALLATION RESTORATION SITE 14 DIOXIN NON-TIME CRITICAL REMOVAL ACTION ACTION MEMORANDUM

DATED 7 DECEMBER 2001

APPENDIX B

COST ESTIMATE ASSUMPTIONS

The assumptions used in the cost analysis for Alternatives 2, 3, and 4 for the Installation Restoration (IR) Site 14 dioxin removal action are listed in the following sections.

B1 ALTERNATIVE 2: EXCAVATION AND ON-SITE DISPOSAL

The major components of this alternative are (1) excavation of contaminated soil, (2) disposal of contaminated soil at an approved on-site location, and (3) backfilling with imported material and site restoration. The assumptions used in the cost analysis for each of these components are summarized below.

B1.1 Excavation

Five subsurface dioxin soil removal areas are present at IR Site 14. The removal area boundaries were drawn within close proximity (5 to 10 feet) of sample points where dioxins were detected at elevated concentrations. Definition of the depths of the removal areas was based on the sample depths where elevated concentrations of dioxins were detected. Because of the low mobility of dioxins in soil, it is unlikely that elevated concentrations of dioxins are present at depths greater than those included in the removal areas. However, because of the limited distribution of sample points at IR Site 14, removal area boundaries may not encompass the extent of dioxin-contaminated soil warranting a removal action. Removal area boundaries identified for IR Site 14 are estimates that will be revised based on Operable Unit 1 (OU-1) data gap sampling that is scheduled for May 2001. Confirmation sampling will also be conducted during the removal action to ensure that dioxin-contaminated soil is removed from the site. The berm surrounding the former fire training area (FTA) is likely contaminated with dioxins. However, samples have not been collected from the berm. Sampling within the berm will also be conducted during the OU-1 data gap sampling. Contingent on the data gap sampling results, two possible removal action scenarios are anticipated at IR Site 14. Scenario 1 would include removal of the subsurface dioxin-contaminated soil and overlying berm material. Scenario 2 is the same as Scenario 1 but also includes the removal of a 0.5-foot-thick layer of the entire berm. The assumptions used in the cost analysis for both scenarios are summarized below.

Scenario 1

- Five subsurface dioxin removal areas will be excavated. Dimensions of the removal areas are 15 feet by 5 feet by 4 feet deep for the sump, 10 feet by 10 feet by 2 feet deep for sampling location S14-03, 10 feet by 10 feet by 2 feet deep for sampling location B14-01, 26 feet by 12 feet by 2 feet deep for sampling locations B14-02 and S14-08, and 40 feet by 12 feet by 2 feet deep for sampling locations S14-04, -05, and -06.

- Two of the removal areas are overlapped by the earthen berm. The volume of the berm material at these removal areas is 11 cubic yards at sampling location S14-03 and 27 cubic yards at sampling locations S14-04, -05, and -06.

- The total volume of the combined dioxin subsurface removal areas and berm material that overlies the subsurface removal areas, after a 10 percent volume increase due to expansion, is 135 cubic yards.

- Forty confirmatory samples will be taken from the excavation pits. This number provides for five samples (one from each sidewall and one from the pit floor) each from the excavation pits at sampling locations S14-03, B14-01, and the sump, eight samples from the pit at sampling locations S14-04, -05, and -06 (two from each long sidewall, one from each short sidewall, and two from the pit floor), and eight samples from the pit at sampling locations S14-08 and B14-02 (two from each long sidewall, one from each short sidewall, and two from the pit floor), plus nine samples of the stockpile of excavated soil (one sample every 15 cubic yards).

- Soil samples will be analyzed for dioxins. Dioxin analysis costs approximately $700 per sample.

- Excavated soil will be stored in open-top, roll-off containers at the excavation site until it is sampled. The cost of the containers is a 1-month rental cost.

- Each container will hold a volume of 30 cubic yards. Five containers will be required.

- The soil type is a sand-silt and sand-clay mixture.

- Operations will be conducted at safety Level D.

- The excavation area and work area around it will be fenced with 400 feet of security fencing.

- A decontamination trailer with showers will be provided.

- A crew of five people will work one, 8-hour shift per day, 5 days per week.

- Excavation operations will require 1 week to complete.

- The level of complexity for professional labor is designated "low."

Scenario 2

- Assumptions regarding the five subsurface removal areas and the portions of the berm that overlie the subsurface removal areas are identical to those listed under Scenario 1.

- A layer of soil will be removed from the surface of the entire berm. This layer will be a uniform 0.5-foot thickness across the whole berm. The area of this layer will be about 4,300 square feet. The volume of soil removed from the berm will be about 80 cubic yards.

- The total volume of the combined removal areas, after a 10 percent volume increase due to expansion, is 223 cubic yards.

- Eight open-top, roll-off containers will be required to store soil until confirmation sampling is performed.

- In addition to the 40 samples that will be collected from the excavation pits and from the soil removed from the excavation pits, six samples will be collected from the material removed from the surface of the berm (one sample every 15 cubic yards).

- All other assumptions relating to excavation are identical to those listed above for Scenario 1.

B1.2 On-site Disposal

The assumptions used in the cost analysis for on-site disposal are listed below.

- The total volume of excavated soil, 135 cubic yards for Scenario 1 and 223 cubic yards for Scenario 2, will be loaded and hauled 1 mile to an interim storage site.

- The storage site will be fenced with 160 feet of security fencing for Scenario 1 and 200 feet of security fencing for Scenario 2.

- The soil will be stored in closed-top, roll-off containers.

- Each container will hold a volume of 20 cubic yards. Seven containers will be required for Scenario 1, and twelve containers will be required for Scenario 2.

- All soil will be staged for 2 years, until construction of the IR Site 1 landfill cap is complete.

- Monthly inspections of the stored soil will be conducted during the 2-year staging period to ensure the integrity of the containers.

- One field technician working one, 8-hour shift will be required to perform monthly inspections.

- One site visit per year by a professional will be required.

- Travel distance for the field technician and professional will be 50 to 100 miles.

- After being stored for 2 years, the soil will be hauled 1 mile to the IR Site 1 landfill.

B1.3 Backfilling and Site Restoration

The assumptions used in the cost analysis for backfilling and site restoration are listed below.

- The ground surface cover is soil-gravel. Surface replacement cover will also be soil-gravel.
- All fill materials will be imported from off site.
- General area cleanup of the excavation site will extend across 0.25 acre.

B2 ALTERNATIVE 3: EXCAVATION AND OFF-SITE DISPOSAL

The major components of this alternative are (1) excavation of contaminated soil, (2) disposal of the contaminated soil at a permitted off-site facility, and (3) backfilling with imported material and site restoration. The assumptions used in the cost analysis for each of these components are summarized below.

B2.1 Excavation

The assumptions used in the cost analysis for excavation under Alternative 3 are identical to those listed for Alternative 2.

B2.2 Off-site Disposal

This alternative applies to both nonhazardous and hazardous soil removal actions, so costs were evaluated for Class I and II landfill disposal. The assumptions used in the cost analysis for Class I and II landfill disposals are listed below.

Class I Landfill Disposal

- The total volume of excavated soil, 135 cubic yards for Scenario 1 and 223 cubic yards for Scenario 2, will be loaded and hauled to a Class I landfill.
- The distance to the Class I Kettleman Hills landfill is 280 miles.
- Stabilization of soil will be required for disposal at a Class I landfill.
- The cost of the Class I landfill will be designated as "High."

Class II Landfill Disposal

- The total volume of excavated soil, 135 cubic yards for Scenario 1 and 223 cubic yards for Scenario 2, will be loaded and hauled to a Class II landfill.
- The distance to the Class II Altamont landfill is 45 miles.
- Stabilization of soil is not required for disposal at a Class II landfill.
- The cost of the Class II landfill is designated as "Average."

B2.3 Backfilling and Site Restoration

The assumptions used in the cost analysis for backfilling and site restoration under Alternative 3 are identical to those listed for Alternative 2.

B3 ALTERNATIVE 4: EXCAVATION, *EX SITU* SOLIDIFICATION AND STABILIZATION, AND DISPOSAL

The major components of this alternative are (1) excavation of contaminated soil, (2) *ex situ* solidification and stabilization (S/S) of contaminated soil, (3) backfilling the excavation and disposal of treated soil, and (4) site restoration. Each of these components is described below.

B3.1 Excavation

The assumptions used in the cost analysis for excavation under Alternative 4 are identical to those listed for Alternative 2.

B3.2 *Ex Situ* S/S

The assumptions used in the cost analysis for S/S treatment of contaminated soil are listed below.

- The total volume of excavated soil, 135 cubic yards for Scenario 1 and 223 cubic yards for Scenario 2, will be treated at the excavation site.
- Vitrification will be the stabilization method.
- The soil will be stabilized in batches of 10 cubic yards each, with a total of 14 batches for Scenario 1 and 23 batches for Scenario 2.
- Each batch requires 45 minutes to process.

- Stabilized soil will be sampled once every two batches. A total of seven samples for Scenario 1 and twelve samples for Scenario 2 will be collected.
- Soil samples will be analyzed for dioxins.
- The volume of the soil will increase by 50 percent during the stabilization process.

B3.3 Backfilling and Disposal of Treated Soil

Three soil disposal options are proposed under alternative 4; (1) backfilling with treated soil and on-site disposal of excess treated soil; (2) backfilling with imported material and on-site disposal of treated soil; and (3) backfilling with imported material and off-site disposal of treated soil. The assumptions used in the cost analysis for each of these options are listed below.

Disposal Option 1

- Excavated soil will be used as backfill after it has been treated with the S/S process.
- For Scenario 1, the volume of soil remaining after backfilling the excavation pits will be 80 cubic yards. For Scenario 2, this volume will be 212 cubic yards.
- The soil that remains after backfilling the excavation pit will be loaded and hauled 1 mile to an interim storage site.
- The storage site will be fenced with 150 feet of security fencing for Scenario 1 and 200 feet of security fencing for Scenario 2.
- The soil will be stored in closed-top, roll-off containers.
- Each container will hold a volume of 20 cubic yards. Four containers will be required for Scenario 1 and eleven containers will be required for Scenario 2.
- The soil will be staged for 2 years until construction of the IR Site 1 landfill cap.
- Monthly inspections of the stored soil will be conducted during the 2-year staging period to ensure the integrity of the containers.
- One field technician working one, 8-hour shift will be required to perform each monthly inspection.
- One site visit per year by a professional will be required.
- After being staged for 2 years, the soil will be hauled 1 mile to the IR Site 1 Landfill.
- Quarterly groundwater monitoring of the filled excavation area will be conducted for 1 year, followed by semiannual groundwater monitoring of the same area for 9 years.

- Seven monitoring wells, one per the three smaller excavations and two per the two larger excavations, will be installed at the excavation area.
- Five monitoring wells will be installed at 75-foot spacings along the shoreline adjacent to the FTA.
- Two monitoring wells will be installed upgradient of the monitoring wells.
- Groundwater samples will be analyzed for dioxins.
- Two field technicians, each working one, 8-hour shift, will be required for each groundwater-sampling event.
- One site visit per year by a professional will be required for groundwater monitoring.
- Travel distance for the field technicians and professionals will be 50 to 100 miles.

Disposal Option 2

- All excavations will be filled with materials imported from off site.
- For Scenario 1, the volume of soil after treatment will be 203 cubic yards. For Scenario 2, this volume will be 335 cubic yards.
- The soil that remains after treatment will be loaded and hauled 1 mile to an interim storage site.
- The storage site will be fenced with 200 feet of security fencing for Scenario 1, Disposal Option 2 and 250 feet of security fencing for Scenario 2, Disposal Option 2.
- The soil will be stored in closed-top, roll-off containers.
- Each container will hold a volume of 20 cubic yards. Eleven containers will be required for Scenario 1, and seventeen containers will be required for Scenario 2.
- The soil will be staged for 2 years, until construction of the IR Site 1 landfill cap.
- Monthly inspections of the stored soil will be conducted during the 2-year staging period to ensure the integrity of the containers.
- One field technician working one, 8-hour shift will be required to perform each monthly inspection.
- One site visit per year by a professional will be required.
- After being staged for 2 years, the soil will be hauled 1 mile to the IR Site 1 Landfill.

Disposal Option 3

- All excavations will be filled with materials imported from off site.

- For Scenario 1, the volume of soil remaining after treatment will be 203 cubic yards. For Scenario 2, this volume will be 335 cubic yards.

- Disposal of the treated soil will be done by a Class II landfill. Assumptions pertaining to disposal at a Class II landfill are identical to those listed for Alternative 3.

B3.4 Site Restoration

The assumptions used in the cost analysis for site restoration are listed below.

- The ground surface cover is soil-gravel. Surface replacement cover will also be soil-gravel.

- General area cleanup of the excavation site will extend across 0.25 acre.

ALTERNATIVE 2
SCENARIO 1

Project Escalated Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 2 SCENARIO 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND ON-SITE DISPOSAL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Interim Action (Capital)	$112,610	$70,477	$183,087
Interim Action (O&M)	$6,379	$12,380	$18,759
Subtotal:	$118,988	$82,857	$201,845
		Escalation Dollars:	$5,582
		Total Project Cost	$207,427

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

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Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT 2 SCENARIO 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND ON-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 2 SCENARIO 1
ID: CTO 386
Type: None
Description: ALTERNATIVE 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name		Capital Cost	O&M Cost
Interim Action	IR SITE 14 ALT 2 SCENARIO 1		183,087	18,759
		Site Totals	**183,087**	**18,759**
		Project Totals	**$183,087**	**$18,759**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 2 SCENARIO 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 2 SCENARIO 1
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action
Start Date: 9/2000

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	37,225
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	31,024
1	Fencing	20,834
1	Load and Haul	541
1	Professional Labor - RA	17,944
	Total Direct Capital Costs	**112,610**
0	Operations and Maintenance	6,379
	Total Direct O&M Costs	**6,379**
	Total Phase Element Direct Costs	**$118,988**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element

Name: IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action
Start Date: 9/2000

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

DS. 0386.15534

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 2 SCENARIO 1 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 2 SCENARIO 1 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	17,943.57	0.00	$17,943.57	☑

Total Direct Cost: **$17,943.57**

Comments:

Total Technology Direct Costs: **$17,943.57**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
33080584	Plastic Laminate Waste Pile Cover	1,376.11	SF	0.11	0.03	0.00	$190.18	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	163.36	CY	3.96	1.49	2.17	$1,245.05	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐

Total Direct Cost: **$31,024.12**

Comments:

Total Technology Direct Costs: **$31,024.12**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040501	Hazardous Waste Signing	3.00	EA	15.72	48.20	0.00	$191.76	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	560.00	LF	12.72	13.80	10.34	$20,641.99	☐

Total Direct Cost: **$20,833.75**

Comments:

Total Technology Direct Costs: **$20,833.75**

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33010423	Disposable Gloves (Latex)	13.00	PAIR	0.15	0.00	0.00	$1.98	☐
33010425	Disposable Coveralls (Tyvek)	13.00	EA	4.01	0.00	0.00	$52.17	☐
99020110	Annual Maintenance Materials and Labor	1.00	LS	0.00	0.00	0.00	$0.00	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐
33220112	Field Technician	120.00	HR	0.00	25.46	0.00	$3,055.20	☐

Total Direct Cost: **$3,688.67**

Total Technology Direct Costs: **$3,688.67**

Comments:
Operations and Maintenance

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	7.00	EA	4,603.58	0.00	0.00	$32,225.05	☐

Total Direct Cost: **$37,225.05**

Comments:

Total Technology Direct Costs: **$37,225.05**

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 1
Type: Interim Action

Start Date: 9/2000
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030226	988, 7.0 CY, Wheel Loader	1.00	HR	0.00	41.09	171.04	$212.13	☐
17030295	35 Ton, 769, Off-highway Truck	2.00	HR	0.00	23.98	140.31	$328.58	☐

Total Direct Cost: **$540.72**

Comments:

Total Technology Direct Costs: **$540.72**

Total Phase Element Direct Costs **$116,298.29**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 2
SCENARIO 2

Project Escalated Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 2 SCENARIO 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 2: EXCAVATION (INCLUDING BERM SURFACE) AND ON-SITE DISPOSAL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Interim Action (Capital)	$145,787	$80,760	$226,547
Interim Action (O&M)	$6,379	$12,380	$18,759
Subtotal:	$152,166	$93,140	$245,306
		Escalation Dollars:	$10,751
		Total Project Cost	$256,057

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT 2 SCENARIO 2
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 2: EXCAVATION (INCLUDING BERM SURFACE) AND ON-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 2 SCENARIO 2
ID: CTO 386
Type: None
Description: ALTERNATIVE 2: EXCAVATION (INCLUDING BERM SURFACE) AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name		Capital Cost	O&M Cost
Interim Action	IR SITE 14 ALT 2 SCENARIO 2		226,547	18,759
		Site Totals	**226,547**	**18,759**
		Project Totals	**$226,547**	**$18,759**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 2 SCENARIO 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 2 SCENARIO 2
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 2: EXCAVATION (INCLUDING BERM SURFACE) AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	63,243
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	36,790
1	Fencing	22,308
1	Load and Haul	541
1	Professional Labor - RA	17,862
	Total Direct Capital Costs	**145,787**
1	Operations and Maintenance	6,379
	Total Direct O&M Costs	**6,379**
	Total Phase Element Direct Costs	**$152,166**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

hase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2 **Media/Waste Type:** Soil

Type: Interim Action **Contaminant:** Other

Start Date: 5/2001 **Approach:** Ex Situ

Description: ALTERNATIVE 2: EXCAVATION (INCLUDING BERM SURFACE) AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 2 SCENARIO 2 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 2 SCENARIO 2 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	17,862.28	0.00	$17,862.28	☑

Total Direct Cost: **$17,862.28**

Comments:

Total Technology Direct Costs: **$17,862.28**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	265.21	CY	3.96	1.49	2.17	$2,021.30	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
33080584	Plastic Laminate Waste Pile Cover	2,234.11	SF	0.11	0.03	0.00	$308.75	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑

Total Direct Cost: **$36,790.33**

Comments:

Total Technology Direct Costs: **$36,790.33**

DS.0386.15534

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040501	Hazardous Waste Signing	3.00	EA	15.72	48.20	0.00	$191.76	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	600.00	LF	12.72	13.80	10.34	$22,116.42	☐

Total Direct Cost: **$22,308.18**

Comments:

Total Technology Direct Costs: **$22,308.18**

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Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33010423	Disposable Gloves (Latex)	13.00	PAIR	0.15	0.00	0.00	$1.98	☐
33220112	Field Technician	120.00	HR	0.00	25.46	0.00	$3,055.20	☐
33010425	Disposable Coveralls (Tyvek)	13.00	EA	4.01	0.00	0.00	$52.17	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐

Total Direct Cost: **$3,688.67**

Total Technology Direct Costs: **$3,688.67**

Comments:
Operations and Maintenance

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	12.00	EA	4,603.58	0.00	0.00	$55,242.94	☐

Total Direct Cost: **$63,242.94**

Comments:

Total Technology Direct Costs: **$63,242.94**

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE 14 ALT 2 SCENARIO 2
Type: Interim Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17030226	988, 7.0 CY, Wheel Loader	1.00	HR	0.00	41.09	171.04	$212.13	☐
17030295	35 Ton, 769, Off-highway Truck	2.00	HR	0.00	23.98	140.31	$328.58	☐

Total Direct Cost: **$540.72**

Comments:

Total Technology Direct Costs: **$540.72**

Total Phase Element Direct Costs **$149,475.53**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 3
CLASS I
SCENARIO 1

Project Escalated Cost Summary Report

Project **Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
ID:	CTO 386
Location:	ALAMEDA NAS, CALIFORNIA
Description:	ALTERNATIVE 3 (CLASS I): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$123,973	$72,296	$196,269
Remedial Action (O&M)	$0	$0	$0
Subtotal:	$123,973	$72,296	$196,269
		Escalation Dollars:	$8,381
		Total Project Cost	$204,650

Note: All costs are shown as "Present Value" costs **(with markups and escalation)**

Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Site

Name: IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
ID: CTO 386
Type: None
Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE 14 ALT 3 (CLASS I) SCE	196,269	0
	Site Totals	**196,269**	**0**
	Project Totals	**$196,269**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element

Name: IR SITE 14 ALT 3 (CLASS I) SCENARIO
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL CLASS I LANDFILL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	5,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	31,024
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	50,599
1	Professional Labor - RA	17,435
	Total Direct Capital Costs	**123,973**
0	Operations and Maintenance	0
	Total Direct O&M Costs	**0**
	Total Phase Element Direct Costs	**$123,973**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO **Media/Waste Type:** Soil
Type: Remedial Action **Contaminant:** Other
Start Date: 5/2001 **Approach:** Ex Situ

Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL CLASS I LANDFILL

Seq #	Technology	Direct Costs

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐

Total Direct Cost: **$14,872.12**

Comments:

Total Technology Direct Costs: **$14,872.12**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190102	Bulk Solid Hazardous Waste Loading Into Truck	135.00	CY	0.00	0.95	1.71	$359.10	☐
33190213	Dump Truck Transportation Hazardous Waste 500 - 599 Miles	3,920.00	MI	1.78	0.00	0.00	$6,988.97	☐
33190311	Truck Washout/Decontamination	7.00	EA	151.95	0.00	0.00	$1,063.65	☐
33197265	Landfill Hazardous Solid Bulk Waste Requiring Stabilization	168.75	TON	250.00	0.00	0.00	$42,187.50	☑

Total Direct Cost: **$50,599.22**

Comments:

Total Technology Direct Costs: **$50,599.22**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	17,435.11	0.00	$17,435.11	☑

Total Direct Cost: **$17,435.11**

Comments:

Total Technology Direct Costs: **$17,435.11**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	163.36	CY	3.96	1.49	2.17	$1,245.05	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
33080584	Plastic Laminate Waste Pile Cover	1,376.11	SF	0.11	0.03	0.00	$190.18	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐

Total Direct Cost: **$31,024.12**

Comments:

Total Technology Direct Costs: **$31,024.12**

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑

Total Direct Cost: **$5,000.00**

Comments:

Total Technology Direct Costs: **$5,000.00**

Total Phase Element Direct Costs **$123,972.99**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 3
CLASS I
SCENARIO 2

Project Escalated Cost Summary Report

Project	**Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
	ID: CTO 386
	Location: ALAMEDA NAS, CALIFORNIA
	Description: ALTERNATIVE 3: EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$173,154	$99,314	$272,468
Remedial Action (O&M)	$0	$0	$0
Subtotal:	$173,154	$99,314	$272,468
		Escalation Dollars:	$11,634
		Total Project Cost	$284,102

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 3: EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Site	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
	ID:	CTO 386
	Type:	None
	Description:	ALTERNATIVE 3 (CLASS I): EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE 14 ALT 3 (CLASS I) SCE	272,468	0
	Site Totals	**272,468**	**0**
	Project Totals	**$272,468**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element
Name: IR SITE 14 ALT 3 (CLASS I) SCENARIO
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	8,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	36,790
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	84,085
1	Professional Labor - RA	24,364
	Total Direct Capital Costs	**173,154**
1	Operations and Maintenance	0
	Total Direct O&M Costs	**0**
	Total Phase Element Direct Costs	**$173,154**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 3 (CLASS I): EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS I LANDFILL

Seq #	Technology	Direct Costs

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Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐

Total Direct Cost: **$14,872.12**

Comments:

Total Technology Direct Costs: **$14,872.12**

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190102	Bulk Solid Hazardous Waste Loading Into Truck	223.00	CY	0.00	0.95	1.71	$593.18	☐
33190213	Dump Truck Transportation Hazardous Waste 500 - 599 Miles	6,720.00	MI	1.78	0.00	0.00	$11,981.09	☐
33190311	Truck Washout/Decontamination	12.00	EA	151.95	0.00	0.00	$1,823.40	☐
33197265	Landfill Hazardous Solid Bulk Waste Requiring Stabilization	278.75	TON	250.00	0.00	0.00	$69,687.50	☑

Total Direct Cost: **$84,085.17**

Comments:

Total Technology Direct Costs: **$84,085.17**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	24,364.47	0.00	$24,364.47	☑

Total Direct Cost: **$24,364.47**

Comments:

Total Technology Direct Costs: **$24,364.47**

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
33080584	Plastic Laminate Waste Pile Cover	2,234.11	SF	0.11	0.03	0.00	$308.75	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	265.21	CY	3.96	1.49	2.17	$2,021.30	☐

Total Direct Cost: **$36,790.33**

Comments:

Total Technology Direct Costs: **$36,790.33**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS I) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑

Total Direct Cost: **$8,000.00**

Comments:

Total Technology Direct Costs: **$8,000.00**

Total Phase Element Direct Costs **$173,154.51**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 3
CLASS II
SCENARIO 1

Project Escalated Cost Summary Report

Project	**Name:** IR SITE14 ALT3 (CLASS II) SCENARIO 1
	ID: CTO 386
	Location: ALAMEDA NAS, CALIFORNIA
	Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$71,258	$47,489	$118,747
Subtotal:	$71,258	$47,489	$118,747
		Escalation Dollars:	$5,071
		Total Project Cost	$123,818

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE14 ALT3 (CLASS II) SCENARIO 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Site

Name: IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
ID: CTO 386
Type: None
Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Phase Element Type	Phase Element Name		Capital Cost	O&M Cost
Remedial Action	IR SITE 14 ALT 3 (CLASS II) SC		118,747	
		Site Totals	**118,747**	**0**
		Project Totals	**$118,747**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:** IR SITE14 ALT3 (CLASS II) SCENARIO 1 **ID:** CTO 386 **Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1 **ID:** CTO 386 **Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE) AND DIPOSAL AT CLASS II LANDFILL

Seq #	Technology	Direct Costs
1	*Bulk Material Storage*	5,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	31,024
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	3,978
1	Professional Labor - RA	11,341
	Total Direct Capital Costs	**71,258**

Total Phase Element Direct Costs **$71,258**

Note: *All costs are shown as "Present Value" costs*
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE14 ALT3 (CLASS II) SCENARIO 1 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐

Total Direct Cost: **$14,872.12**

Total Technology Direct Costs: **$14,872.12**

Comments:

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	163.36	CY	3.96	1.49	2.17	$1,245.05	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
33080584	Plastic Laminate Waste Pile Cover	1,376.11	SF	0.11	0.03	0.00	$190.18	☐

Total Direct Cost: **$31,024.12**

Comments:

Total Technology Direct Costs: **$31,024.12**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190102	Bulk Solid Hazardous Waste Loading Into Truck	135.00	CY	0.00	0.95	1.71	$359.10	☐
33190205	Transport Bulk Solid Hazardous Waste, Maximum 20 CY (per Mile)	630.00	MI	1.46	0.00	0.00	$918.98	☐
17020401	Dump Charges	135.00	CY	20.00	0.00	0.00	$2,700.00	☑

Total Direct Cost: **$3,978.08**

Comments:

Total Technology Direct Costs: **$3,978.08**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	11,341.20	0.00	$11,341.20	☑

Total Direct Cost: **$11,341.20**

Comments:

Total Technology Direct Costs: **$11,341.20**

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APPENDIX A – ENGINEERING EVALUATION/
COST ANALYSIS

APPENDIX B – DETAILED COST ESTIMATES

PHASE ELEMENT DIRECT COST DETAIL REPORT

PAGE 5

FINAL INSTALLATION RESTORATION SITE 14
DIOXIN NON-TIME CRITICAL REMOVAL ACTION
ACTION MEMORANDUM

THE ABOVE IDENTIFIED PAGE IS NOT
AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY
SOUTHWEST DIVISION TO LOCATE THIS PAGE.
THIS PAGE HAS BEEN INSERTED AS A
PLACEHOLDER AND WILL BE REPLACED
SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Total Technology Direct Costs: **$98.95**

Comments:

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑

Total Direct Cost: **$5,000.00**

Comments:

Total Technology Direct Costs: **$5,000.00**

Total Phase Element Direct Costs **$71,257.94**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 3
CLASS II
SCENARIO 2

ALTERNATIVE 4
DISPOSAL OPTION 1
SCENARIO 1

Project Escalated Cost Summary Report

Project	
Name:	IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
ID:	CTO 386
Location:	ALAMEDA NAS, CALIFORNIA
Description:	ALTERNATIVE 3: EXCAVATION (INCLUDING BERM BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$84,844	$55,793	$140,637
Subtotal:	$84,844	$55,793	$140,637
		Escalation Dollars:	$6,005
		Total Project Cost	$146,642

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 3: EXCAVATION (INCLUDING BERM BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Site

Name: IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
ID: CTO 386
Type: None
Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (INCLUDING BERM SURFACE) AND DISPOSAL AT CLASS II LANDFILL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE 14 ALT 3 (CLASS II) SC	140,637	
	Site Totals	**140,637**	**0**
	Project Totals	**$140,637**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 3 (CLASS II): EXCAVATION (INCLUDING BERM SURFACE) AND DIPOSAL AT CLASS II LANDFILL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	8,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Excavation	36,790
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	6,629
1	Professional Labor - RA	13,510
	Total Direct Capital Costs	**84,844**

Total Phase Element Direct Costs **$84,844**

Note: *All costs are shown as "Present Value" costs*
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐

Total Direct Cost: **$14,872.12**

Comments:

Total Technology Direct Costs: **$14,872.12**

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	265.21	CY	3.96	1.49	2.17	$2,021.30	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑
33080584	Plastic Laminate Waste Pile Cover	2,234.11	SF	0.11	0.03	0.00	$308.75	☐

Total Direct Cost: **$36,790.33**

Comments:

Total Technology Direct Costs: **$36,790.33**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190102	Bulk Solid Hazardous Waste Loading Into Truck	223.00	CY	0.00	0.95	1.71	$593.18	☐
33190205	Transport Bulk Solid Hazardous Waste, Maximum 20 CY (per Mile)	1,080.00	MI	1.46	0.00	0.00	$1,575.40	☐
17020401	Dump Charges	223.00	CY	20.00	0.00	0.00	$4,460.00	☑

Total Direct Cost: **$6,628.58**

Comments:

Total Technology Direct Costs: **$6,628.58**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	13,510.37	0.00	$13,510.37	☑

Total Direct Cost: **$13,510.37**

Comments:

Total Technology Direct Costs: **$13,510.37**

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Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE 14 ALT 3 (CLASS II) SCENARIO 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑

Total Direct Cost: **$8,000.00**

Comments:

Total Technology Direct Costs: **$8,000.00**

Total Phase Element Direct Costs **$84,843.82**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Project Escalated Cost Summary Report

Project

Name: IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 4 DISPOSAL OPTION 1: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$295,942	$182,096	$478,038
Remedial Action (O&M)	$199,901	$83,168	$283,069
Subtotal:	$495,844	$265,264	$761,108
		Escalation Dollars:	$60,881
		Total Project Cost	$821,989

Note: All costs are shown as "Present Value" costs **(with markups and escalation)**

Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 4 DISPOSAL OPTION 1: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
ID: CTO 386
Type: None
Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 1: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, TREATED BACKFILL AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 1 DIS	478,038	283,069
	Site Totals	**478,038**	**283,069**
	Project Totals	**$478,038**	**$283,069**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element
Name: IR SITE14 ALT 4 SCENARIO 1
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 1: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, TREATED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	23,414
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	112,758
1	Excavation	30,382
1	Fencing	20,465
1	Load and Haul	376
1	Monitoring	64,106
1	Professional Labor - RA	39,399
	Total Direct Capital Costs	**295,942**
0	Operations and Maintenance	199,901
	Total Direct O&M Costs	**199,901**
	Total Phase Element Direct Costs	**$495,844**

All costs are shown as "Present Value" costs

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 1: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, TREATED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 1 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030415	Backfill with Excavated Material	169.89	CY	0.29	3.57	0.81	$792.67	☐
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐

Total Direct Cost: **$30,381.57**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs:	**$30,381.57**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040501	Hazardous Waste Signing	3.00	EA	15.72	48.20	0.00	$191.76	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	550.00	LF	12.72	13.80	10.34	$20,273.39	☐

Total Direct Cost: **$20,465.14**

Comments:

Total Technology Direct Costs: **$20,465.14**

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030226	988, 7.0 CY, Wheel Loader	1.00	HR	0.00	41.09	171.04	$212.13	☐
17030295	35 Ton, 769, Off-highway Truck	1.00	HR	0.00	23.98	140.31	$164.29	☐

Total Direct Cost: **$376.43**

Comments:

Total Technology Direct Costs: **$376.43**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	3.00	EA	2,228.60	0.00	0.00	$6,685.80	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33420301	Process Water, Supplied by Tanker Truck	3.00	KGAL	8.80	0.00	0.00	$26.40	☐
33420201	Diesel Fuel	63.00	GAL	1.01	0.00	0.00	$63.82	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	8.00	TON	96.24	0.01	0.01	$770.05	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐
33150420	Operational Labor for Process Equipment	32.00	HR	0.00	45.44	0.00	$1,454.06	☐
33140109	Vitrification, Operations Cost	183.00	TON	519.16	0.00	0.00	$95,006.74	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
17030285	12 CY, Dump Truck	16.00	HR	0.00	39.00	44.17	$1,330.71	☐
17030220	910, 1.25 CY, Wheel Loader	16.00	HR	0.00	48.00	32.69	$1,291.01	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐

Total Direct Cost: **$112,757.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs: **$112,757.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	4.00	EA	4,603.58	0.00	0.00	$18,414.31	☐

Total Direct Cost: **$23,414.31**

Comments:

Total Technology Direct Costs: **$23,414.31**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	39,399.23	0.00	$39,399.23	☑

Total Direct Cost: **$39,399.23**

Comments:

Total Technology Direct Costs: **$39,399.23**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33020402	Decontamination Materials per Sample	26.00	EA	9.35	0.00	0.00	$243.10	☐
33020401	Disposable Materials per Sample	26.00	EA	8.07	0.00	0.00	$209.70	☐
33010425	Disposable Coveralls (Tyvek)	18.00	EA	4.01	0.00	0.00	$72.23	☐
33010423	Disposable Gloves (Latex)	18.00	PAIR	0.15	0.00	0.00	$2.74	☐
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33190340	Non Haz Drummed Site Waste - Load, Transp, & Landfill Disp (55-Gal Drums)	2.00	EA	184.44	0.00	0.00	$368.88	☐
33199921	DOT Steel Drum, 55 Gallon	13.00	EA	73.17	0.00	0.00	$951.20	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐
33022145	Dioxins (SW 8280) with prep, Water Analys	26.00	EA	746.58	0.00	0.00	$19,411.11	☐
33232407	Disposable Bailer, Polyethylene, 1.5" Outside Diameter x 36"	26.00	EA	10.88	0.00	0.00	$282.87	☐

Total Direct Cost: **$23,394.15**

Total Technology Direct Costs: **$23,394.15**

Comments:
Operations and Maintenance

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Monitoring (12 - months only)

Task: Groundwater

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33232407	Disposable Bailer, Polyethylene, 1.5" Outside Diameter x 36"	56.00	EA	10.88	0.00	0.00	$609.26	☐
33231189	Furnish 55 Gallon Drum for Development/Purge Water	27.00	EA	73.17	0.00	0.00	$1,975.56	☐
33022145	Dioxins (SW 8280) with prep, Water Analys	56.00	EA	746.58	0.00	0.00	$41,808.54	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	7.00	EA	192.47	0.00	0.00	$1,347.29	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	216.10	0.00	0.00	$432.21	☐
33020402	Decontamination Materials per Sample	62.00	EA	9.35	0.00	0.00	$579.70	☐
33020401	Disposable Materials per Sample	62.00	EA	8.07	0.00	0.00	$500.06	☐

Total Direct Cost: $47,252.61

Task: Surface Soil

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33020603	Surface Soil Sampling Equipment	1.00	EA	354.88	0.00	0.00	$354.88	☐
33021721	Base/Neutral & Acid Extractable Organics(SW3550/SW8270), Soil Analysis	8.00	EA	226.23	0.00	0.00	$1,809.87	☐

Total Direct Cost: $2,164.75

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Task: General Monitoring

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33010202	Per Diem (per person)	16.00	DAY	99.78	0.00	0.00	$1,596.49	☐
33220115	Draftsman/CADD	35.00	HR	0.00	25.46	0.00	$891.10	☐
33220114	Word Processing/Clerical	35.00	HR	0.00	21.95	0.00	$768.37	☐
33220108	Project Scientist	158.00	HR	0.00	45.29	0.00	$7,156.55	☐
33010104	Car or Van Mileage Charge	270.00	MI	0.47	0.00	0.00	$125.82	☐
33220112	Field Technician	163.00	HR	0.00	25.46	0.00	$4,149.98	☐

Total Direct Cost: **$14,688.30**

Comments:

Total Technology Direct Costs: **$64,105.67**

Total Phase Element Direct Costs **$319,336.51**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 4
DISPOSAL OPTION 2
SCENARIO 1

Project Escalated Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$261,990	$141,862	$403,852
Remedial Action (O&M)	$7,564	$14,760	$22,324
Subtotal:	$269,554	$156,621	$426,175

Escalation Dollars: $18,531

Total Project Cost $444,706

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 2
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND ON-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
ID: CTO 386
Type: None
Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMORTED BACKFILL AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 1 DIS	403,852	22,324
	Site Totals	**403,852**	**22,324**
	Project Totals	**$403,852**	**$22,324**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	55,639
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	112,758
1	Excavation	31,024
1	Fencing	22,308
1	Load and Haul	541
1	Professional Labor - RA	34,678
	Total Direct Capital Costs	**261,990**
0	Operations and Maintenance	7,564
	Total Direct O&M Costs	**7,564**
	Total Phase Element Direct Costs	**$269,554**

Note: All costs are shown as "Present Value" costs

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 **Media/Waste Type:** Soil
Type: Remedial Action **Contaminant:** Other
Start Date: 5/2001 **Approach:** Ex Situ

Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 2: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

Cost Database Date: 1/1/99

DS . 0386 . 15534

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 2 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2 **Start Date:** 5/2001

Type: Remedial Action **Media/Waste Type:** Soil

Contaminant: Other

Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	163.36	CY	3.96	1.49	2.17	$1,245.05	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
33080584	Plastic Laminate Waste Pile Cover	1,376.11	SF	0.11	0.03	0.00	$190.18	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐

DS. 0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Total Direct Cost:	**$31,024.12**
Total Technology Direct Costs:	**$31,024.12**

Comments:

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040501	Hazardous Waste Signing	3.00	EA	15.72	48.20	0.00	$191.76	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	600.00	LF	12.72	13.80	10.34	$22,116.42	☐

Total Direct Cost: **$22,308.18**

Comments:

Total Technology Direct Costs: **$22,308.18**

DS.0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17030226	988, 7.0 CY, Wheel Loader	1.00	HR	0.00	41.09	171.04	$212.13	☐
17030295	35 Ton, 769, Off-highway Truck	2.00	HR	0.00	23.98	140.31	$328.58	☐

Total Direct Cost: **$540.72**

Comments:

Total Technology Direct Costs: **$540.72**

DS.0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
17030220	910, 1.25 CY, Wheel Loader	16.00	HR	0.00	48.00	32.69	$1,291.01	☐
17030285	12 CY, Dump Truck	16.00	HR	0.00	39.00	44.17	$1,330.71	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33140109	Vitrification, Operations Cost	183.00	TON	519.16	0.00	0.00	$95,006.74	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐
33150420	Operational Labor for Process Equipment	32.00	HR	0.00	45.44	0.00	$1,454.06	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	8.00	TON	96.24	0.01	0.01	$770.05	☐
33420201	Diesel Fuel	63.00	GAL	1.01	0.00	0.00	$63.82	☐
33420301	Process Water, Supplied by Tanker Truck	3.00	KGAL	8.80	0.00	0.00	$26.40	☐
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	3.00	EA	2,228.60	0.00	0.00	$6,685.80	☐
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐

Total Direct Cost: **$112,757.60**

DS.0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs:	**$112,757.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	11.00	EA	4,603.58	0.00	0.00	$50,639.36	☐

Total Direct Cost: **$55,639.36**

Comments:

Total Technology Direct Costs: **$55,639.36**

DS. 0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	34,677.60	0.00	$34,677.60	☑

Total Direct Cost: **$34,677.60**

Comments:

Total Technology Direct Costs: **$34,677.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

ALTERNATIVE 4
DISPOSAL OPTION 3
SCENARIO 1

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
99020110	Annual Maintenance Materials and Labor	1.00	LS	0.00	0.00	0.00	$0.00	☐
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33010423	Disposable Gloves (Latex)	13.00	PAIR	0.15	0.00	0.00	$1.98	☐
33010425	Disposable Coveralls (Tyvek)	13.00	EA	4.01	0.00	0.00	$52.17	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐
33220112	Field Technician	144.00	HR	0.00	25.46	0.00	$3,666.24	☐

Total Direct Cost: **$4,299.71**

Comments:
Operations and Maintenance

Total Technology Direct Costs: **$4,299.71**

Total Phase Element Direct Costs **$266,289.71**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Project Escalated Cost Summary Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 3
	ID: CTO 386
	Location: ALAMEDA NAS, CALIFORNIA
	Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 3: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$200,796	$111,500	$312,296
Subtotal:	$200,796	$111,500	$312,296
		Escalation Dollars:	$13,335
		Total Project Cost	$325,631

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 3
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 3: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND OFF-SITE DISPOSAL

Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
	ID:	CTO 386
	Type:	None
	Description:	ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 3: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND OFF-SITE DISPOSAL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 1 DIS	312,296	
	Site Totals	**312,296**	**0**
	Project Totals	**$312,296**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 3
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 1 DISPOSAL OPTION 3: EXCAVATION (WITHOUT REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND OFF-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	5,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	112,758
1	Excavation	31,024
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	6,044
1	Professional Labor - RA	26,056
	Total Direct Capital Costs	**200,796**

Total Phase Element Direct Costs	**$200,796**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 1 DISPOSAL OPTION 3 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030418	Delivered & Dumped, Backfill with Stone	12.27	BCY	21.85	0.80	1.00	$290.13	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	163.36	CY	3.96	1.49	2.17	$1,245.05	☐
33020401	Disposable Materials per Sample	40.00	EA	8.07	0.00	0.00	$322.62	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	40.00	EA	700.00	0.00	0.00	$28,000.00	☑
33080584	Plastic Laminate Waste Pile Cover	1,376.11	SF	0.11	0.03	0.00	$190.18	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	122.69	CY	0.00	2.24	2.38	$567.09	☐

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Total Direct Cost:	**$31,024.12**
Total Technology Direct Costs:	**$31,024.12**

Comments:

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐

Total Direct Cost: **$14,872.12**

Comments:

Total Technology Direct Costs: **$14,872.12**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐
17030285	12 CY, Dump Truck	16.00	HR	0.00	39.00	44.17	$1,330.71	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33140109	Vitrification, Operations Cost	183.00	TON	519.16	0.00	0.00	$95,006.74	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐
17030220	910, 1.25 CY, Wheel Loader	16.00	HR	0.00	48.00	32.69	$1,291.01	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	8.00	TON	96.24	0.01	0.01	$770.05	☐
33420201	Diesel Fuel	63.00	GAL	1.01	0.00	0.00	$63.82	☐
33420301	Process Water, Supplied by Tanker Truck	3.00	KGAL	8.80	0.00	0.00	$26.40	☐
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	3.00	EA	2,228.60	0.00	0.00	$6,685.80	☐
33150420	Operational Labor for Process Equipment	32.00	HR	0.00	45.44	0.00	$1,454.06	☐

Total Direct Cost: **$112,757.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs: **$112,757.60**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	5.00	EA	1,000.00	0.00	0.00	$5,000.00	☑

Total Direct Cost: **$5,000.00**

Comments:

Total Technology Direct Costs: **$5,000.00**

Phase Element **Name:** IR SITE14 ALT 4 SCENARÍO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	26,055.78	0.00	$26,055.78	☑

Total Direct Cost: **$26,055.78**

Comments:

Total Technology Direct Costs: **$26,055.78**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 1 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190205	Transport Bulk Solid Hazardous Waste, Maximum 20 CY (per Mile)	990.00	MI	1.46	0.00	0.00	$1,444.11	☐
17020401	Dump Charges	203.00	CY	20.00	0.00	0.00	$4,060.00	☑
33190102	Bulk Solid Hazardous Waste Loading Into Truck	203.00	CY	0.00	0.95	1.71	$539.98	☐

Total Direct Cost: **$6,044.09**

Comments:

Total Technology Direct Costs: **$6,044.09**

Total Phase Element Direct Costs **$200,796.13**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 4
DISPOSAL OPTION 1
SCENARIO 2

Project Escalated Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 1: EXCAVATION (INCLUDING BERM SURFACE), EX SITU S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$424,219	$251,616	$675,835
Remedial Action (O&M)	$199,901	$83,168	$283,069
Subtotal:	$624,120	$334,784	$958,904
		Escalation Dollars:	$69,361
		Total Project Cost	$1,028,265

Note: All costs are shown as "Present Value" costs
(with markups and escalation)

Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 1: EXCAVATION (INCLUDING BERM SURFACE), EX SITU S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
ID: CTO 386
Type: None
Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 1: EXCAVATION (INCLUDING BERM SURFACE) , EX SITU S/S,TREATED BACKFILL, AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name	Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 2 DIS	675,835	283,069
	Site Totals	**675,835**	**283,069**
	Project Totals	**$675,835**	**$283,069**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 1: EXCAVATION (INCLUDING BERM SURFACE), EX SI S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	58,639
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	177,235
1	Excavation	35,747
1	Fencing	22,308
1	Load and Haul	541
1	Monitoring	67,233
1	Professional Labor - RA	57,473
	Total Direct Capital Costs	**424,219**
0	Operations and Maintenance	199,901
	Total Direct O&M Costs	**199,901**
	Total Phase Element Direct Costs	**$624,120**

All costs are shown as "Present Value" costs

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 1: EXCAVATION (INCLUDING BERM SURFACE), EX SI S/S, TREATED BACKFILL, AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17030415	Backfill with Excavated Material	275.82	CY	0.29	3.57	0.81	$1,286.92	☐
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐

Total Direct Cost: **$35,747.20**

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs:	**$35,747.20**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040501	Hazardous Waste Signing	3.00	EA	15.72	48.20	0.00	$191.76	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	600.00	LF	12.72	13.80	10.34	$22,116.42	☐

Total Direct Cost: **$22,308.18**

Comments:

Total Technology Direct Costs: **$22,308.18**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1 **Start Date:** 5/2001
Type: Remedial Action **Media/Waste Type:** Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17030226	988, 7.0 CY, Wheel Loader	1.00	HR	0.00	41.09	171.04	$212.13	☐
17030295	35 Ton, 769, Off-highway Truck	2.00	HR	0.00	23.98	140.31	$328.58	☐

Total Direct Cost: **$540.72**

Comments:

Total Technology Direct Costs: **$540.72**

DS. 0386.15834

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	4.00	EA	2,228.60	0.00	0.00	$8,914.40	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33420301	Process Water, Supplied by Tanker Truck	5.00	KGAL	8.80	0.00	0.00	$44.00	☐
33420201	Diesel Fuel	67.00	GAL	1.01	0.00	0.00	$67.87	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	10.00	TON	96.24	0.01	0.01	$962.57	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐
33150420	Operational Labor for Process Equipment	34.00	HR	0.00	45.44	0.00	$1,544.94	☐
33140109	Vitrification, Operations Cost	302.00	TON	519.16	0.00	0.00	$156,787.08	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
17030285	12 CY, Dump Truck	17.00	HR	0.00	39.00	44.17	$1,413.88	☐
17030220	910, 1.25 CY, Wheel Loader	17.00	HR	0.00	48.00	32.69	$1,371.70	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐

Total Direct Cost: **$177,235.44**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs: **$177,235.44**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	11.00	EA	4,603.58	0.00	0.00	$50,639.36	☐

Total Direct Cost: **$58,639.36**

Comments:

Total Technology Direct Costs: **$58,639.36**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	57,472.53	0.00	$57,472.53	☑

Total Direct Cost: **$57,472.53**

Comments:

Total Technology Direct Costs: **$57,472.53**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1 **Start Date:** 5/2001
Type: Remedial Action **Media/Waste Type:** Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33020402	Decontamination Materials per Sample	26.00	EA	9.35	0.00	0.00	$243.10	☐
33020401	Disposable Materials per Sample	26.00	EA	8.07	0.00	0.00	$209.70	☐
33010425	Disposable Coveralls (Tyvek)	18.00	EA	4.01	0.00	0.00	$72.23	☐
33010423	Disposable Gloves (Latex)	18.00	PAIR	0.15	0.00	0.00	$2.74	☐
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33190340	Non Haz Drummed Site Waste - Load, Transp, & Landfill Disp (55-Gal Drums)	2.00	EA	184.44	0.00	0.00	$368.88	☐
33199921	DOT Steel Drum, 55 Gallon	13.00	EA	73.17	0.00	0.00	$951.20	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐
33022145	Dioxins (SW 8280) with prep, Water Analys	26.00	EA	746.58	0.00	0.00	$19,411.11	☐
33232407	Disposable Bailer, Polyethylene, 1.5" Outside Diameter x 36"	26.00	EA	10.88	0.00	0.00	$282.87	☐

Total Direct Cost: **$23,394.15**

Total Technology Direct Costs: **$23,394.15**

Comments:
Operations and Maintenance

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Monitoring (12 - months only)

Task: Groundwater

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33232407	Disposable Bailer, Polyethylene, 1.5" Outside Diameter x 36"	56.00	EA	10.88	0.00	0.00	$609.26	☐
33231189	Furnish 55 Gallon Drum for Development/Purge Water	27.00	EA	73.17	0.00	0.00	$1,975.56	☐
33022145	Dioxins (SW 8280) with prep, Water Analys	56.00	EA	746.58	0.00	0.00	$41,808.54	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	12.00	EA	192.47	0.00	0.00	$2,309.64	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	216.10	0.00	0.00	$432.21	☐
33020402	Decontamination Materials per Sample	62.00	EA	9.35	0.00	0.00	$579.70	☐
33020401	Disposable Materials per Sample	62.00	EA	8.07	0.00	0.00	$500.06	☐

Total Direct Cost: **$48,214.96**

Task: Surface Soil

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33020603	Surface Soil Sampling Equipment	1.00	EA	354.88	0.00	0.00	$354.88	☐
33021721	Base/Neutral & Acid Extractable Organics(SW3550/SW8270), Soil Analysis	14.00	EA	226.23	0.00	0.00	$3,167.27	☐

Total Direct Cost: **$3,522.15**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 1
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Task: General Monitoring

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33010202	Per Diem (per person)	16.00	DAY	99.78	0.00	0.00	$1,596.49	☐
33220115	Draftsman/CADD	38.00	HR	0.00	25.46	0.00	$967.48	☐
33220114	Word Processing/Clerical	38.00	HR	0.00	21.95	0.00	$834.23	☐
33220108	Project Scientist	171.00	HR	0.00	45.29	0.00	$7,745.38	☐
33010104	Car or Van Mileage Charge	270.00	MI	0.47	0.00	0.00	$125.82	☐
33220112	Field Technician	166.00	HR	0.00	25.46	0.00	$4,226.36	☐

Total Direct Cost: **$15,495.75**

Comments:

Total Technology Direct Costs: **$67,232.86**

Total Phase Element Direct Costs **$447,612.86**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

ALTERNATIVE 4
DISPOSAL OPTION 2
SCENARIO 2

Project Escalated Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 2: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$382,055	$206,115	$588,170
Remedial Action (O&M)	$7,564	$14,760	$22,324
Subtotal:	$389,620	$220,873	$610,493
		Escalation Dollars:	$26,402
		Total Project Cost	$636,895

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

Project Present Value Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
	Description:	ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 2: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND ON-SITE DISPOSAL

Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
	ID:	CTO 386
	Type:	None
	Description:	ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 2: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMORTED BACKFILL AND ON-SITE DISPOSAL

Phase Element Type	Phase Element Name		Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 2 DIS		588,170	22,324
		Site Totals	**588,170**	**22,324**
		Project Totals	**$588,170**	**$22,324**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)
Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 2
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 2: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	86,261
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	177,235
1	Excavation	36,790
1	Fencing	24,215
1	Load and Haul	917
1	Professional Labor - RA	51,594
	Total Direct Capital Costs	**382,055**
0	Operations and Maintenance	7,564
	Total Direct O&M Costs	**7,564**
	Total Phase Element Direct Costs	**$389,620**

Note: All costs are shown as "Present Value" costs

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 **Media/Waste Type:** Soil
Type: Remedial Action **Contaminant:** Other
Start Date: 5/2001 **Approach:** Ex Situ

Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 2: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND ON-SITE DISPOSAL

Seq #	Technology	Direct Costs

Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 2 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2 **ID:** CTO 386	**Initial Date:** 5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	265.21	CY	3.96	1.49	2.17	$2,021.30	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑
33080584	Plastic Laminate Waste Pile Cover	2,234.11	SF	0.11	0.03	0.00	$308.75	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Total Direct Cost:	**$36,790.33**
Total Technology Direct Costs:	**$36,790.33**

Comments:

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
18040501	Hazardous Waste Signing	4.00	EA	15.72	48.20	0.00	$255.67	☐
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	650.00	LF	12.72	13.80	10.34	$23,959.46	☐

Total Direct Cost: **$24,215.13**

Comments:

Total Technology Direct Costs: **$24,215.13**

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Load and Haul

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030226	988, 7.0 CY, Wheel Loader	2.00	HR	0.00	41.09	171.04	$424.27	☐
17030295	35 Ton, 769, Off-highway Truck	3.00	HR	0.00	23.98	140.31	$492.87	☐

Total Direct Cost: **$917.14**

Comments:

Total Technology Direct Costs: **$917.14**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
17030220	910, 1.25 CY, Wheel Loader	17.00	HR	0.00	48.00	32.69	$1,371.70	☐
17030285	12 CY, Dump Truck	17.00	HR	0.00	39.00	44.17	$1,413.88	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33140109	Vitrification, Operations Cost	302.00	TON	519.16	0.00	0.00	$156,787.08	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐
33150420	Operational Labor for Process Equipment	34.00	HR	0.00	45.44	0.00	$1,544.94	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	10.00	TON	96.24	0.01	0.01	$962.57	☐
33420201	Diesel Fuel	67.00	GAL	1.01	0.00	0.00	$67.87	☐
33420301	Process Water, Supplied by Tanker Truck	5.00	KGAL	8.80	0.00	0.00	$44.00	☐
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	4.00	EA	2,228.60	0.00	0.00	$8,914.40	☐
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐

Total Direct Cost: **$177,235.44**

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Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs: **$177,235.44**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑
33100123	20 CY Closed Top Roll-Off Container	17.00	EA	4,603.58	0.00	0.00	$78,260.84	☐

Total Direct Cost: **$86,260.84**

Comments:

Total Technology Direct Costs: **$86,260.84**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	51,594.02	0.00	$51,594.02	☑

Total Direct Cost: **$51,594.02**

Comments:

Total Technology Direct Costs: **$51,594.02**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 2
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Operations and Maintenance (12 - months only)

Task: Miscellaneous

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
99020110	Annual Maintenance Materials and Labor	1.00	LS	0.00	0.00	0.00	$0.00	☐
33010205	Mobilize Crew, 50 Miles, per Person	2.00	EA	56.98	0.00	0.00	$113.96	☐
33010423	Disposable Gloves (Latex)	13.00	PAIR	0.15	0.00	0.00	$1.98	☐
33010425	Disposable Coveralls (Tyvek)	13.00	EA	4.01	0.00	0.00	$52.17	☐
33220106	Staff Engineer	10.00	HR	0.00	46.54	0.00	$465.37	☐
33220112	Field Technician	144.00	HR	0.00	25.46	0.00	$3,666.24	☐

Total Direct Cost: **$4,299.71**

Comments:
Operations and Maintenance

Total Technology Direct Costs: **$4,299.71**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Total Phase Element Direct Costs **$386,355.02**

ALTERNATIVE 4
DISPOSAL OPTION 3
SCENARIO 2

Project Escalated Cost Summary Report

Project	
Name:	IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 3
ID:	CTO 386
Location:	ALAMEDA NAS, CALIFORNIA
Description:	ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 3: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND

Cost Category (Phase Element)	Direct Cost	Markups	Total Costs
Remedial Design	$0	$0	$0
Remedial Action (Capital)	$290,451	$156,308	$446,759
Subtotal:	$290,451	$156,308	$446,759
		Escalation Dollars:	$19,077
		Total Project Cost	$465,836

Note: All costs are shown as "Present Value" costs
(with markups and escalation)
Cost Database Date: 1/1/99

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Project Present Value Cost Summary Report

Project

Name: IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 3
ID: CTO 386
Location: ALAMEDA NAS, CALIFORNIA
Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 3: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL, AND OFF-SITE DISPOSAL

Site

Name: IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
ID: CTO 386
Type: None
Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 3: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND OFF-SITE DISPOSAL

Phase Element Type	Phase Element Name		Capital Cost	O&M Cost
Remedial Action	IR SITE14 ALT 4 SCENARIO 2 DIS		446,759	
		Site Totals	**446,759**	**0**
		Project Totals	**$446,759**	**$0**

Note: All costs are shown as "Present Value" costs
(with markups, non-escalated)

Cost Database Date: 1/1/99

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Phase Element Direct Cost Summary Report

Project	**Name:**	IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 3
	ID:	CTO 386
	Location:	ALAMEDA NAS, CALIFORNIA
Site	**Name:**	IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
	ID:	CTO 386
	Initial Date:	5/2001

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2
Type: Remedial Action
Start Date: 5/2001

Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Description: ALTERNATIVE 4 SCENARIO 2 DISPOSAL OPTION 3: EXCAVATION (INCLUDING REMOVAL OF BERM SURFACE), EX SITU S/S, IMPORTED BACKFILL AND OFF-SITE DISPOSAL

Seq #	Technology	Direct Costs
1	Bulk Material Storage	8,000
1	Cleanup and Landscaping	99
1	Decontamination Facilities	4,943
1	Ex Situ Solidification/Stabilization	177,235
1	Excavation	36,790
1	Fencing	14,872
1	Off-site Transportation and Landfill Disposal	9,823
1	Professional Labor - RA	38,688
	Total Direct Capital Costs	**290,451**

Total Phase Element Direct Costs **$290,451**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

Phase Element Direct Cost Detail Report

Project	**Name:** IR SITE 14 ALT4 SCENARIO 2 DISPOSAL OPTION 3 **ID:** CTO 386	**Location:** ALAMEDA NAS, CALIFORNIA	
Site	**Name:** IR SITE 14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3 **ID:** CTO 386	**Initial Date:** 5/2001	

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Excavation

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17030418	Delivered & Dumped, Backfill with Stone	22.69	BCY	21.85	0.80	1.00	$536.51	☐
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	265.21	CY	3.96	1.49	2.17	$2,021.30	☐
33020401	Disposable Materials per Sample	46.00	EA	8.07	0.00	0.00	$371.01	☐
33021740	Dioxins & Dibenzofurans (SW 3550/SW 8280), Soil Analysis	46.00	EA	700.00	0.00	0.00	$32,200.00	☑
33080584	Plastic Laminate Waste Pile Cover	2,234.11	SF	0.11	0.03	0.00	$308.75	☐
33170803	Decontaminate Heavy Equipment	1.00	EA	0.00	409.06	0.00	$409.06	☐
17030276	1 CY, Crawler-mounted, Hydraulic Excavat	204.17	CY	0.00	2.24	2.38	$943.69	☐

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Total Direct Cost:	**$36,790.33**
Total Technology Direct Costs:	**$36,790.33**

Comments:

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Fencing

Task: N/A

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
18040101	Security Fence, 10' Galvanized with 3 Strands Barbed Wire	400.00	LF	12.72	13.80	10.34	$14,744.28	☐
18040501	Hazardous Waste Signing	2.00	EA	15.72	48.20	0.00	$127.84	☐

Total Direct Cost: **$14,872.12**

Comments:

Total Technology Direct Costs: **$14,872.12**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Ex Situ Solidification/Stabilization

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33150423	10 CY Mixing System	1.00	MO	4,595.67	0.00	0.00	$4,595.67	☐
17030285	12 CY, Dump Truck	17.00	HR	0.00	39.00	44.17	$1,413.88	☐
19040401	550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	303.90	0.00	0.00	$303.90	☐
19040408	21,000 Gallon Steel, Open Top, Tank Rent	1.00	MO	714.17	0.00	0.00	$714.17	☐
33140109	Vitrification, Operations Cost	302.00	TON	519.16	0.00	0.00	$156,787.08	☐
33150418	1 CY Plywood Boxes	6.00	EA	24.06	37.43	0.00	$368.94	☐
17030220	910, 1.25 CY, Wheel Loader	17.00	HR	0.00	48.00	32.69	$1,371.70	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33330116	Quicklime, Combination 1/4" & 3/4" Granules, Bulk Quantity	10.00	TON	96.24	0.01	0.01	$962.57	☐
33420201	Diesel Fuel	67.00	GAL	1.01	0.00	0.00	$67.87	☐
33420301	Process Water, Supplied by Tanker Truck	5.00	KGAL	8.80	0.00	0.00	$44.00	☐
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	4.00	EA	2,228.60	0.00	0.00	$8,914.40	☐
33150420	Operational Labor for Process Equipment	34.00	HR	0.00	45.44	0.00	$1,544.94	☐

Total Direct Cost: **$177,235.44**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Comments:

Total Technology Direct Costs: **$177,235.44**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Bulk Material Storage

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33100122	30 CY Open Top Roll-Off Container	8.00	EA	1,000.00	0.00	0.00	$8,000.00	☑

Total Direct Cost: **$8,000.00**

Comments:

Total Technology Direct Costs: **$8,000.00**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Professional Labor - RA

Task: Professional Labor Percentage

Assembly	Description	Quantity	Units of Measure	Material Costs	Labor Costs	Equipment Costs	Extended Costs	Cost Override
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	38,687.54	0.00	$38,687.54	☑

Total Direct Cost: **$38,687.54**

Comments:

Total Technology Direct Costs: **$38,687.54**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Decontamination Facilities

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33220112	Field Technician	50.00	HR	0.00	25.46	0.00	$1,273.00	☐
33199921	DOT Steel Drum, 55 Gallon	2.00	EA	73.17	0.00	0.00	$146.34	☐
33170823	Operation of Pressure Washer, Including Water, Soap, Electricity, Labor	10.00	HR	7.91	48.20	0.00	$561.11	☐
33170818	1,800 PSI Pressure Washer Rental	1.00	MO	607.80	0.00	0.00	$607.80	☐
33170821	8' x 24' Decontamination Trailer with 4 Showers, HVAC, 2 Sinks	1.00	MO	2,355.23	0.00	0.00	$2,355.23	☐

Total Direct Cost: **$4,943.47**

Comments:

Total Technology Direct Costs: **$4,943.47**

DS.0386.15534

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Cleanup and Landscaping

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
17040101	General Area Cleanup	0.25	ACRE	0.00	263.71	132.09	$98.95	☐

Total Direct Cost: **$98.95**

Comments:

Total Technology Direct Costs: **$98.95**

Phase Element **Name:** IR SITE14 ALT 4 SCENARIO 2 DISPOSAL OPTION 3
Type: Remedial Action

Start Date: 5/2001
Media/Waste Type: Soil
Contaminant: Other
Approach: Ex Situ

Technology: Off-site Transportation and Landfill Disposal

Task: N/A

Assembly	*Description*	*Quantity*	*Units of Measure*	*Material Costs*	*Labor Costs*	*Equipment Costs*	*Extended Costs*	*Cost Override*
33190205	Transport Bulk Solid Hazardous Waste, Maximum 20 CY (per Mile)	1,530.00	MI	1.46	0.00	0.00	$2,231.81	☐
17020401	Dump Charges	335.00	CY	20.00	0.00	0.00	$6,700.00	☑
33190102	Bulk Solid Hazardous Waste Loading Into Truck	335.00	CY	0.00	0.95	1.71	$891.10	☐

Total Direct Cost: **$9,822.91**

Comments:

Total Technology Direct Costs: **$9,822.91**

Total Phase Element Direct Costs **$290,450.75**

Note: All costs are shown as "Present Value" costs
Cost Database Date: 1/1/99

APPENDIX B

ADMINISTRATIVE RECORD
LEADING UP TO THE REMOVAL ACTION

DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 000886 REPO NONE 0000	11-24-99 8-25-1993 NONE 00.0	PRC	FINAL DATA SUMMARY REPORT RI/FS PHASES 1 AND 2A	Admin Record			SOUTHWEST DIVISION
N00236 / 000887 REPO N62474-88-D-5086 0000	11-24-99 8-25-1993 00121 00.0	PRC BALCH, DUANE C NAVY KIKUGAWA, GEORGE	FINAL DATA SUMMARY REPORT, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) PHASES 1 AND 2A, VOLUME II, APPENDICES 1 THROUGH D	Admin Record			SOUTHWEST DIVISION
N00236 / 001182 LTR NONE 0000	11-24-1999 **05-01-1995** NONE 00.0	NAVY	DOCUMENT SUMMARY FOR DRAFT DATA TRANSMITTAL MEMORANDUM FOR SITES 4, 5, 8, 10A, 12, AND 14	INFO REPOSITORY		004 005 008 010 012 014	IRON MOUNTAIN 45359736
N00236 / 001188 LTR NONE 0000	11-24-1999 **05-18-1995** NONE 00.0	NAVY	SUBMISSION OF RI/FS DRAFT DATA TRANSMITTAL MEMORANDUM SITES 4, 5, 8, 10A, 12, AND 14	ADMIN RECORD	FS RI	004 005 008 010 012 014 018	IRON MOUNTAIN 45359736
N00236 / 001189 RPT NONE 0000	11-24-1999 **05-18-1995** NONE 00.0	PRC	RI/FS DRAFT DATA TRANSMITTAL MEMORANDUM SITES 4, 5, 8, 10A, 12, AND 14, VOLUME I OF II	ADMIN RECORD	FS RI	004 008 010 012 014 018	IRON MOUNTAIN 45359736

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DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 001190 RPT NONE 0000	11-24-1999 **05-18-1995** NONE 00.0	PRC	RI/FS DRAFT DATA TRANSMITTAL MEMORANDUM SITES 4, 5, 8, 10A, 12, AND 14, VOLUME II OF II	ADMIN RECORD	FS RI	004 005 008 010 012 014 018	IRON MOUNTAIN 45359736
N00236 / 001218 CMNT NONE 0006 0006	11-24-1999 **07-26-1995** NONE 00.0	DTSC LANPHAR, THOMAS THOMAS NAVY GARIBALDI, CAMIL	COMMENTS ON THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) DATA TRANSMITTAL MEMORANDUM SITES 4, 5, 8, 9, 10A, 12 AND 14	ADMIN RECORD	FS RI	004 005 008 009 010 012 014	IRON MOUNTAIN 45359737
N00236 / 001220 CMNT NONE 0004	11-24-1999 **08-04-1995** NONE 00.0	DTSC LANPHAR, THOMAS THOMAS NAVY GARIBALDI, CAMIL	COMMENTS ON THE PRELIMINARY DRAFT ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) - REMOVAL ACTION (RM) WORK PLANS (WP) AT SITE 14, 16 AND 18	ADMIN RECORD	CA EE RM WP	014 016 018	IRON MOUNTAIN 45359737
N00236 / 001279 RESP NONE 0009 0009	11-24-1999 **04-01-1996** NONE 00.0	NAVY KIKUGAWA, GEORGE GEORGE DTSC LANPHAR, THOMAS	RESPONSE TO COMMENTS ON THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), DRAFT DATA TRANSMITTAL MEMORANDUM FOR SITES 4, 5, 8, 10A, 12 AND 14	ADMIN RECORD	FS RI	004 005 008 010 012 014	IRON MOUNTAIN 45359738

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DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 001280 LTR NONE 0005 0005	11-24-1999 **04-01-1996** NONE 00.0	NAVY KIKUGAWA, GEORGE GEORGE DTSC LANPHAR, THOMAS	REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), FINAL DATA TRANSMITTAL MEMORANDUM, SITES 4, 5, 8, 10A, 12 AND 14; COVER SHEET AND ERRATA SHEET	ADMIN RECORD	FS RI	004 005 008 010 012 014 022	IRON MOUNTAIN 45359738
N00236 / 001436 RPT N62474-94-D-7609 0250	11-24-1999 **09-16-1997** 00122 00.0	TETRA TECH HUTCHISON, NEAL NEAL NAVY MCFADDEN, PATRIC	DRAFT FIELD SAMPLING PLAN (SP) FOR SITE 4 AND 5, CHLORINATED SOLVENT PLUME DEFINITION, AND SITE 14 SUMP INVESTIGATION	REMOVED	CHLORINATED PLUME PSP SOLVENT	004 005 014	SOUTHWEST DIVISION
N00236 / 001489 RPT N62474-94-D-7609 0151	11-24-1999 **12-12-1997** 00122 00.0	TETRA TECH HUTCHISON, NEAL NEAL NAVY MCFADDEN, PATRIC	FINAL FIELD SAMPLING PLAN (SP) FOR SITE 4 AND 5, CHLORINATED SOLVENT PLUME DEFINITION AND SITE 14 SUMP INVESTIGATION	ADMIN RECORD	CHLORINATED SOLVENT SP	004 005 014	IRON MOUNTAIN 45359743
N00236 / 001534 RPT N62474-94-D-7609 0250	11-24-1999 **06-26-1998** 00122 00.0	TETRA TECH NAVY MCFADDEN, PATRIC	DATA TRANSMITTAL MEMORANDUM FOR SITES 4 AND 5 CHLORINATED SOLVENT PLUME DEFINITION AND SITE 14 SUMP INVESTIGATION	ADMIN RECORD	CHLORINATED SOLVENT	004 005 014	IRON MOUNTAIN 45359744

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DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 001535 RPT N62474-94-D-7609 0200	11-24-1999 **06-26-1998** 00122 00.0	TETRA TECH NAVY MCFADDEN, PATRIC	DATA TRANSMITTAL MEMORANDUM FOR SITES 4 AND 5 CHLORINATED SOLVENT PLUME DEFINITION AND SITE 14 SUMP INVESTIGATION, APPENDICES	ADMIN RECORD	CHLORINATED SOLVENT	004 005 014	IRON MOUNTAIN 45359745
N00236 / 001563 RPT N62474-94-D-7609 0250	11-24-1999 **10-01-1998** 00122 00.0	TETRA TECH HUTCHISON, NEAL NEAL NAVY MCFADDEN, PATRIC	FINAL SAMPLING PLAN (SP) SITE 14 GROUNDWATER INVESTIGATION AND SITE 25 REMEDIAL INVESTIGATION (RI) - OCTOBER 1998	ADMIN RECORD	GW RI SP	014	IRON MOUNTAIN 45359745
N00236 / 001679 NONE MM NONE 0015	01-21-2000 **08-03-1999** NONE 10.4	NAVFAC - WESTERN DIVISION NAVFAC - WESTERN DIVISION	RESTORATION ADVISORY BOARD (RAB) MEETING SUMMARY FOR 3 AUGUST 1999 (INCLUDES AGENDA, HANDOUTS AND SIGN-IN SHEETS)	ADMIN RECORD	FS PCB RAB RI UXO	001 002 003 004 005 009 010 013 014 017 019 020 021 022 023 024 025 1112 360	IRON MOUNTAIN 45359751

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DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
						400 410 BLDG. 14 BLDG. 162 BLDG. 5 OU 1 OU 2 OU 3 OU 4	
N00236 / 001678 NONE MM NONE 0050	01-21-2000 **09-07-1999** NONE 10.4	NAVFAC - WESTERN DIVISION NAVFAC - WESTERN DIVISION	DRAFT RESTORATION ADVISORY BOARD MEETING SUMMARY FOR 7 SEPTEMBER 1999 (INCLUDES AGENDA, HANDOUTS AND SIGN-IN SHEETS)	ADMIN RECORD	BTEX EBS RAB TPH	003 004 005 009 010 011 012 013 014 015 021 022 023 025 BLDG. 14 BLDG. 400 BLDG. 410 BLDG. 5 BLDG. 530 OU 2	IRON MOUNTAIN 45359751

DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 001677 NONE MM NONE 0020	01-21-2000 **10-05-1999** NONE 10.4	NAVFAC - WESTERN DIVISION NAVFAC - WESTERN DIVISION	DRAFT RESTORATION ADVISORY BOARD (RAB) MEETING SUMMARY FOR 5 OCTOBER 1999 (INCLUDES AGENDA, HANDOUTS AND SIGN-IN SHEETS)	ADMIN RECORD	BTEX FFA RAB TDS UST	001 002 005 010 014 025 BLDG. 400 BLDG. 5 OU 1 OU 2 OU 3	IRON MOUNTAIN 45359751
N00236 / 000049 DS.0386.15534 & SWDIV SER SWDIV SER 06CA.GC/0002 RPT N62474-94-D-7609 0290	01-05-2001 **01-05-2001** 00386 00386	TETRA TECH EM INC. C. FENNESSY C. FENNESSY NAVFAC - SOUTHWEST DIVISION G. CLARK	DRAFT DIOXIN REMOVAL ACTION, ENGINEERING EVALUATION AND COST ANALYSIS (EE/CA) - INCLUDES TRANSMITTAL LETTER BY GLENNA CLARK & RESPONSE TO COMMENTS ON THE PRELIMINARY DRAFT	ADMIN RECORD INFO REPOSITORY REPOSITORY	DIOXIN EE/CA MTBE PCB REMOVAL SVOC TOC TPPH TRPH VOC	014	IRON MOUNTAIN 80462377
N00236 / 000086 NONE LTR LTR NONE 0002	06-25-2001 **03-05-2001** NONE	DTSC, BERKELEY, CA M. CASSA M. CASSA NAVFAC - SOUTHWEST DIVISION G. CLARK	DTSC REVIEW AND CONCURRENCE ON THE DRAFT ENGINEERING EVALUATION AND COST ANALYSIS (EE/CA) FOR DIOXIN REMOVAL ACTION (PORTIONS OF THE MAILING LIST IS CONFIDENTIAL) {SEE AR #49 - DRAFT DIOXIN EE/CA, #87 - COMMENTS BY EPA & #98 - NAVY'S RESPONSE TO COMMENTS}	ADMIN RECORD CONFIDENTIAL INFO REPOSITORY	COMMENTS DIOXIN EE/CA REMOVAL	014	SOUTHWEST DIVISION

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DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)
Search Words = SITE 14, Dioxin, and EE/CA

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
N00236 / 000087 NONE LTR LTR NONE 0006	06-25-2001 **03-05-2001** NONE NONE	U.S. EPA, SAN FRANCISCO, CA A. COOK A. COOK NAVFAC - SOUTHWEST DIVISION G. CLARK	REVIEW AND COMMENTS ON THE ENGINEERING EVALUATION AND COST ANALYSIS (EE/CA) FOR THE DIOXIN AND CADMIUM REMOVAL ACTIONS (WITH ENCLOSURE)	ADMIN RECORD INFO REPOSITORY REPOSITORY	CADMIUM COMMENTS DIOXIN EE/CA REMOVAL	005 014	SOUTHWEST DIVISION
N00236 / 000098 TC.0386.10978 & SWDIV SER SWDIV SER 06CA.GC/0486 MISC N62474-94-D-7609 0013	06-25-2001 **05-04-2001** 00386	TETRA TECH EM INC. U.S. EPA, SAN FRANCISCO, CA A. COOK	NAVY'S RESPONSE TO DTSC & EPA COMMENTS ON THE DRAFT DIOXIN REMOVAL ACTION, ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) - INCLUDES SWDIV TRANSMITTAL LETTER BY G. CLARK (PORTIONS OF THE MAILING LIST IS CONFIDENTIAL)	ADMIN RECORD CONFIDENTIAL INFO REPOSITORY	COMMENTS DIOXIN EE/CA REMOVAL	014	SOUTHWEST DIVISION

UIC=N00236
No Keywords

This Administrative Record (AR) Index includes references to documents which cite bibliography sources.
These bibliographic citations are considered to be part of this AR but may not be cited separately in the index.

N00236.000305
ALAMEDA POINT
SSIC NO. 5090.3

SENSITIVE RECORD

PORTIONS OF THIS RECORD ARE CONSIDERED SENSITIVE AND ARE NOT FOR PUBLIC VIEWING

PRIVATE CITIZEN'S HOME ADDRESS HAS BEEN REDACTED IN ACCORDANCE WITH THE PRIVACY ACT

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

ARARs for the proposed removal actions. If I identify an ARAR that appears to have been revised or is new, I will inform the Navy as soon as it comes to my attention.

Please contact me at (510) 540-3767 if you have any questions regarding this letter.

Sincerely,

Mary Rose Cassa

Mary Rose Cassa, R.G.
Engineering Geologist
Office of Military Facilities

cc: Mr. Phillip Ramsey (SFD-8-2)
U. S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105

Mr. Brad Job
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Southwest Division
Naval Facilities Engineering Command
BRAC Office
Attn: Mr. Michael McClelland (Code 06CA.MM)
1230 Columbia Street, Suite 1100
San Diego, CA 92101-8517

Ms. Dina Tasini
Alameda Reuse and Redevelopment Authority
950 West Mall Square
Alameda, CA 94501

Mr. Michael John Torrey
RAB Community Co-Chair

APPENDIX C
ARAR CORRESPONDENCE

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

5090
Ser 06CA.GC/1044
December 27, 2000

Ms. Mary Rose Cassa
Project Manager
State of California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710

Subj: IDENTIFICATION OF STATE "APPLICABLE" OR "RELEVANT AND APPROPRIATE" REQUIREMENTS (ARARS) FOR REMOVAL ACTIONS AT ALAMEDA POINT, ALAMEDA, CALIFORNIA

Dear Ms. Cassa:

Pursuant to previous discussions and to accomplish the goals of Alameda Point, Installation Restoration (IR) program, we are hereby requesting that the Department of Toxic Substances Control (DTSC) identify potential State chemical-specific, action specific, and location specific ARARs for the cleanup of IR Sites 3, 4, 5, 9, 11, 16, 19 and 21.

In addition, the Department of the Navy (DON) is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests be considered (TBCs) for the above identified sites. Please coordinate responses from all California state agencies.

Timely identification of potential State ARARs is required under Section 121(d)(2)(A) of CERCLA and under the National Contingency Plan (NCP), 40 CFR 300.400(g) and 300.515(d) & (h). 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 action. To ensure timely and complete ARARs identification, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) 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 the particular IR Site.

3. A description of how the potential State ARAR would apply to potential remedial action, including: specific numeric discharge, effluent, or emission limitations; hazardous

5090
Ser 06CA.GC/1044
December 27, 2000

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

5. If the State determines that there is not enough information to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Consistent with 40 CFR 300.515(h)(2), we are requesting that you send a response via first class mail addressed to me and postmarked within 30 calendar days of receipt of this request. If you have any technical questions concerning this request, please call me at (619) 532-0951. For any legal questions, please call Mr. Armando Alvarez, Environmental Counsel at (619) 532-0992.

Sincerely,

Glenna Clark

GLENNA CLARK
Base Realignment and Closure
Remedial Project Manager

Department of Toxic Substances Control

Edwin F. Lowry, Director
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

February 8, 2001

Southwest Division
Naval Facilities Engineering Command
BRAC Office
Attn: Ms. Glenna M. Clark
1230 Columbia Street, Suite 1100
San Diego, CA 92101-8517

IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR REMOVAL ACTIONS AT ALAMEDA POINT, ALAMEDA, CALIFORNIA

Dear Ms. Clark:

This letter is in response to your letter of December 27, 2000 requesting the Department of Toxic Substances Control (DTSC) to identify potential State chemical-specific, action specific, and location specific ARARs for planned removal actions at Installation Restoration Sites 3, 4, 5, 9, 11, 16, 19, and 21 at Alameda Point.

DTSC provided ARARs in a letter dated November 13, 1996 and proposed that a workshop be scheduled with all responsible State and Federal agencies to establish the ARARs for the remediation activities at Alameda Point. We proposed that the Restoration Advisory Board be encouraged to participate in the workshop and that the invitation to participate in the workshop include a new solicitation for ARARs from the invited agencies. DTSC also provided ARARs for discharge of groundwater to San Francisco Bay for removal actions at Sites 1, 2, 5, and 10 at Alameda Point in a letter dated May 21, 1998.

To our knowledge, no significant changes have taken place that would alter the basic ARARs that have already been compiled. We continue to urge the Navy to initiate a participatory and consensual process to identify ARARs that is based on our mutual goals and our mutual responsibility for protection of human health and the environment at Alameda Point.

Our legal staff will review the existing ARARs and recommend changes which we will submit to the Navy by March 15, 2001. Further, I will also continue to review potential

APPENDIX D

RESPONSE TO COMMENTS

RESPONSE TO COMMENTS
DRAFT INSTALLATION RESTORATION SITE 14 DIOXIN
REMOVAL ACTION - ACTION MEMORANDUM
ALAMEDA POINT, ALAMEDA, CALIFORNIA (AUGUST 24, 2001)

REF	COMMENT	RESPONSE
Anna Marie Cook, Remedial Project Manager, United States Environmental Protection Agency (EPA) Region IX, September 28, 2001		**Tetra Tech EM, Inc.**
EPA Office of Regional Counsel Comments		
1	Page 23. The first bullet indicates that to be a state ARAR, a state requirement must be a state law. This is not correct, as discussed in our previous comment on the EE/CA and as acknowledged by the Navy on page 2, ref. 5, of its response to comments.	The Navy agrees with the comment that a state regulation or other requirement can be an applicable or relevant and appropriate requirement (ARAR) if it is a promulgated standard, requirement, criterion, or limitation under a state environmental or facility siting law.
2	Page 27, Action-Specific ARARs. The document states that because action-specific ARARs depend on the action selected, they are identified after an alternative has been selected. EPA objected to this language in our comments on the EE/CA, and the Navy acknowledged in its response to comments that this language was confusing. As written, it sounds as if action-specific ARARs are only analyzed after the preferred alternative has been decided. If that is the intended meaning, it is a procedure EPA does not agree with. Rather, action-specific ARARs should be identified for all alternatives, because one of the factors in weighing the alternatives is analyzing whether ARARs can be met. If, on the other hand, "selected" means that ARARs are identified after an alternative has been put forward as an alternative (as opposed to chosen as the selected remedy), then that needs to be clarified.	The Navy examined action specific ARARs during its analysis of the different removal actions considered in the EE/CA. The action specific ARARs for each removal action alternative identified for evaluation were evaluated, but only the selected alternative for the removal action was discussed for brevity's sake.
3	Page 28 discussion of AOC. As noted in EPA's comments on the EE/CA, it is incorrect to state that if material remains in an AOC it is not subject to <u>any</u> RCRA requirements; rather, it is not subject to the LDRs. The Navy acknowledged this in its response to comments, but did not fix the confusing language.	If the material will stays within the area of concern it will not be subject to land disposal requirements (LDRs). The Navy will consider RCRA action-specific ARARs in accordance with guidance set forth in EPA's Management of Remediation Waste under RCRA (October 14, 1998) Guidance.

REF	COMMENT	RESPONSE
4	Tables 5-1A and 5-1B. The response to comments indicated that the action memorandum would clarify that Alternative 1 did not meet the threshold protectiveness criterion, but Alternatives 2, 3, and 4 met that criterion. That has not been done.	The Navy acknowledges that Alternative 1 does not meet the threshold protectiveness criterion, but Alternatives 2, 3, and 4 meet that criterion.
5	Tables 5-1A and 5-1B. The statement that there are no action-specific ARARs with which either alternative 2, 3, or 4 must comply is not correct. The ARARs table and the discussion in the text indicate that there are in fact action-specific ARARs.	Table 5-4 discusses action-specific ARARs.
6	Tables in Section 5. It would be very helpful to have page numbers for these tables.	Comment Noted.
7	ARARs Tables. The response to comments on the EE/CA indicates that only the preferred alternative will be discussed in the Action Memorandum (see, e.g. response to comment ref. 10), and it appears that table 5-4 lists ARARs only for Alternative 3. EPA strongly urges that ARARs for all alternatives be analyzed prior to selection of the preferred alternative because compliance with ARARs is a threshold criterion, and because ARARs can affect other factors, e.g. cost. Additionally, Tables 5-1A and 5-1B suggest that a complete ARARs analysis was performed, which does not appear to be correct.	Please see response to comment 2.

EPA General Comments		
8	Page 9, fourth paragraph: It is unclear whether the FTA always had a containment berm or whether it started its use without a berm. Also unclear is whether the berm took six years to construct or whether the date of construction is estimated to be anywhere in the six year period. The absence of a berm for containment during early years of the FTA use may mean that dioxin contaminants are present beneath the area that is now bermed.	It is not known exactly when the berm was constructed. Additional Soil samples were collected as part of the Data Gap Sampling Program, conducted June through September 2001. Soil borings were advanced through the berm and soil samples were collected from beneath the berm to evaluate the extent of dioxin contaminated soil.
9	Risk Calculation and Risk Management: a) Response to EPA General Comment #17 on the EE/CA does not satisfactorily address the problem. All contaminants, including background, need to be factored into the risk calculations for a site. The amount of risk attributed to background contaminants is then a factor taken into account when the BCT makes risk management decisions about a site during evaluation in the RI/FS. b) Page 18 in Action Memo and Response to EPA General Comment #18 on the EE/CA: The soil at Site 14 is proposed to be cleaned up to a level that will leave a $3.5x10^{-6}$ risk under a residential exposure scenario. It is premature and inappropriate to state in an Action Memo that this risk level is protective of human health under a residential scenario since the level is above the $1x10^{-6}$ departure level and lies within the risk management range. The remaining risk at this site needs to be described in the RI/FS and a risk management decision by the BCT needs to explain in the FS whether institutional controls need to be added to the remedy for the site or whether no further action is justified.	a) Based on the OU-1 risk assessment, risks from dioxin contamination at IR Site 14 triggered a removal action. Following this removal action, a revised risk assessment will be included in the revised OU-1 RI/FS. b) This statement is retracted. The BCT will discuss acceptable risk after the RI report is prepared. The removal action will reduce risks associated with dioxin-contaminated soil. Risks associated with other contaminants in soil will be evaluated in the RI. The RI will calculate remaining risk based on all data including background data. If after reevaluating the risk, it is determined that risks are still unacceptable, the FS will discuss the risk management decisions made by the BCT and whether institutional controls need to be added to the remedy for the site.