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Final

Record of Decision
Inland Area Site 17

Naval Weapons Station Seal Beach
Detachment Concord
Concord, California

June 10, 2005

Prepared by:
Tetra Tech EM Inc.
135 Main Street, Suite 1800
San Francisco, California 94105

Prepared under:
General Services Administration
Delivery Order Number 62474-03-F-4032
GSA-10F-0076K

GSA.0121.00012

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February 13, 2006

Phillip Ramsey
Floor SFD 8-3
75 Hawthorne Street
San Francisco, CA 94105

Subject: **Final Site 17 Record of Decision**
Naval Weapons Station Seal Beach Detachment Concord
General Services Administration Contract No. 10F-0076K
Delivery Order No. N62474-03-F-4032

Dear Mr. Ramsey:

On behalf of Ellen Casados (U.S. Navy Remedial Project Manager for Site 17), Tetra Tech is pleased to submit the final signed version of the Site 17 Record of Decision (ROD) for your records.

Please contact me at (425) 877-2806 if you have any questions.

Sincerely,

Joanna Canepa
Installation Coordinator

Enclosures

cc: Jim Pinasco (Department of Toxic Substances Control)
Ellen Casados (Code: BPMOW.EC BRAC Project Management Office West)

Final

Record of Decision
Inland Area Site 17

Naval Weapons Station Seal Beach Detachment Concord
Concord, California

GSA.0113.0012
Order N62474-03-F-4032; GSA-10F-0076K

June 10, 2005

(Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act)

Department of the Navy
Integrated Product Team West, Southwest Division
Naval Facilities Engineering Command
Daly City, California

U.S. Environmental Protection Agency, Region 9
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Department of Toxic Substances Control
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San Francisco Bay Regional Water Quality Control Board
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ABBREVIATIONS AND ACRONYMS

µg/L	Micrograms per liter
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BRAC	Base realignment and closure
BTEX	Benzene, toluene, ethylbenzene, and xylene
CCCHSD	Contra Costa County Health Services Department
CCWD	Contra Cost Water District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COEC	Chemical of ecological concern
COPC	Chemical of potential concern
CSM	Conceptual site model
DTSC	California Department of Toxic Substances Control
EOD	Explosive ordnance disposal
EPC	Exposure point concentration
ERA	Ecological risk assessment
ER-M	Effects range-median
FFA	Federal Facility Agreement
FS	Feasibility study
HHRA	Human health risk assessment
HI	Hazard index
IAS	Initial assessment study
IRP	Installation restoration program
KTW	KTW & Associates
LeadSpread 7	Risk Assessment Spreadsheet Model Version 7
mg/kg	Milligrams per kilogram
MTBE	Methyl-tert-butyl-ether
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
PAH	Polynuclear aromatic hydrocarbon
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal

RAB	Restoration advisory board
RI	Remedial investigation
ROD	Record of Decision
RPM	Remedial project manager
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SBD	Seal Beach Detachment
SCAPS	Site Characterization and Analysis Penetrometer System
SF	Slope factor
SI	Site investigation
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPH-d	TPH as diesel
TPH-mo	TPH as motor oil
TtEMI	Tetra Tech EM Inc.
UCL_{95}	95 percent upper confidence limit on the arithmetic mean
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile organic compound
WET	Waste extraction test

1.0 DECLARATION FOR NO ACTION AT NAVAL WEAPONS STATION SBD CONCORD, INLAND AREA SITE 17

1.1 SITE NAME AND LOCATION

This Record of Decision (ROD) addresses Site 17 (Building IA-24) located in the Inland Area at Naval Weapons Station Seal Beach Detachment (SBD) Concord, formerly known as Naval Weapons Station Concord, in Concord, California. The U.S. Environmental Protection Agency (U.S. EPA) identification number for Naval Weapons Station Concord is CA7170024528.

Naval Weapons Station SBD Concord was entered on the National Priorities List on December 16, 1994. Naval Weapons Station SBD Concord is an active Naval installation.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Site 17 at Naval Weapons Station SBD Concord. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and is consistent, to the extent practical, with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Supporting information for the Navy's decision of no action for Site 17 is contained in the Administrative Record file.

The U.S. EPA, the California Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board (RWQCB) concur with the selected remedy.

1.3 DESCRIPTION OF THE SELECTED REMEDY: NO ACTION

The U.S. Department of the Navy has selected no action as the remedy for Site 17 at Naval Weapons Station SBD Concord, with the concurrence of U.S. EPA Region 9, DTSC, and RWQCB. The Navy conducted a remedial investigation (RI) at Site 17 that revealed the presence of hazardous substances in soil, sediment, and groundwater. Based on the findings of the RI, a human health risk assessment (HHRA) and ecological risk assessment (ERA) were completed for the site. The results of the ERA and HHRA indicate no unacceptable risk levels under the residential or industrial land use scenarios. Therefore, the no action alternative is appropriate for this site.

The Navy conducted the HHRA and ERA to evaluate whether hazardous substances, as defined in CERCLA, at Site 17 pose a significant risk to human health and the environment. The HHRA evaluated potential risks to the most probable receptors (that is, occasional site workers or base personnel) from exposure to chemicals identified in soil, sediment, and groundwater. Under this scenario, potential carcinogenic risks and noncarcinogenic hazards are present, but at acceptable levels. At the request of the regulatory agencies, Site 17 was also evaluated assuming unrestricted land use (that is, residential). An unrestricted land-use scenario poses the greatest potential for

exposure to contaminants at a site and is the most conservative (protective of human health) scenario in view of current and projected future land uses. The carcinogenic risks associated with potential residential exposure to chemicals detected at the site were at the lower end of U.S. EPA's target levels considered protective of human health, and the potential noncarcinogenic hazards were below levels of concern. Based on the results of the HHRA, conditions at the sites are considered protective of human health. Viable animal habitat is found near Site 17, but potential ecological risks are negligible.

1.4 STATUTORY DETERMINATIONS

Based on an evaluation of the analytical data, HHRA, and ERA, the Navy has concluded that no remedial action is necessary to protect human health and the environment at Site 17.

Hazardous substances are not present at Site 17 at concentrations that result in risks above acceptable risk levels and, therefore, the 5-year review requirement of CERCLA Section 121(c) is not applicable.

R. W. Fowler — 6/15/05

R. W. FOWLER
Captain, U.S. Navy
Commanding Officer

Date

Kathleen H. Johnson — 9/30/05

Kathleen Johnson
Chief, Federal Facility and Site Cleanup Branch
U.S. Environmental Protection Agency Region 9

Date

A. J. Landis — 1-24-06

Anthony J. Landis, P.E.
Chief of Operations, Office of Military Facilities
California Environmental Protection Agency
Department of Toxic Substances Control

Date

In signing this decision document the Department of Toxic Substances Control is confirming that we have reviewed and commented on the Record of Decision for Site 17 and our concerns were addressed.

Bruce H. Wolfe — 2/1/06

Bruce H. Wolfe
Executive Officer
San Francisco Bay Regional Water Quality Control Board

Date

2.0 DECISION SUMMARY FOR NAVAL WEAPONS STATION SBD CONCORD, INLAND AREA SITE 17

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Naval Weapons Station SBD Concord, the major naval munitions transshipment facility on the West Coast, is located in the north-central portion of Contra Costa County, California, 30 miles northeast of San Francisco. The facility encompasses approximately 13,000 acres. It is bounded by Suisun Bay to the north, Los Medanos Hills and the City of Pittsburg to the east, and the City of Concord to the south and west (Figure 1). Currently, the facility includes three main separate land holdings: the Tidal Area (which includes islands in Suisun Bay), the Inland Area, and a radiography facility in Pittsburg.

The Inland Area encompasses 6,200 acres. A Navy-owned road and rail line link the Inland Area to the Tidal Area. The Inland Area lies between Los Medanos Hills and the City of Concord, and is crossed by three public roads: State Route 4, Willow Pass Road, and Bailey Road (Figure 2).

Site 17 is located along the eastern side of Kinne Boulevard (Figure 3). Site 17 includes Building IA-24 and its surrounding area. Site 17 was formerly used for forklift maintenance and battery service.

2.1.1 Physiography and Topography

Naval Weapons Station SBD Concord lies 10 miles west of the confluence of the Sacramento and San Joaquin Rivers. This confluence forms the Delta region, which contains more than 600 miles of interconnected and meandering tidal waterways.

Most of the western half of the Inland Area is characterized by gently sloping land designated as alluvial slope. Steeply sloping terrain, beginning at 100 feet above mean sea level and rising to more than 800 feet above mean sea level, forms the northeast boundary of the Inland Area.

2.1.2 Local Geology and Groundwater Beneficial Use Determination

Groundwater beneath the Inland Area commonly resides in the coarser sand and gravel units of unconsolidated alluvial deposits. Typically, groundwater is first encountered at depths of approximately 25 to 50 feet below ground surface (bgs) under semiconfined to confined conditions. Based on the available information, the upper 30 to 80 feet of sediments is believed to consist of discontinuous sand and gravel layers surrounded by a silt and clay matrix. Depth to groundwater within these units is variable, and locally perched conditions appear to exist. A regionally continuous sand and gravel layer lies beneath the upper fine-grained sediments. Groundwater in this zone is under confined conditions, although it appears to be semiconfined to unconfined near the base of Los Medanos Hills near Site 17.

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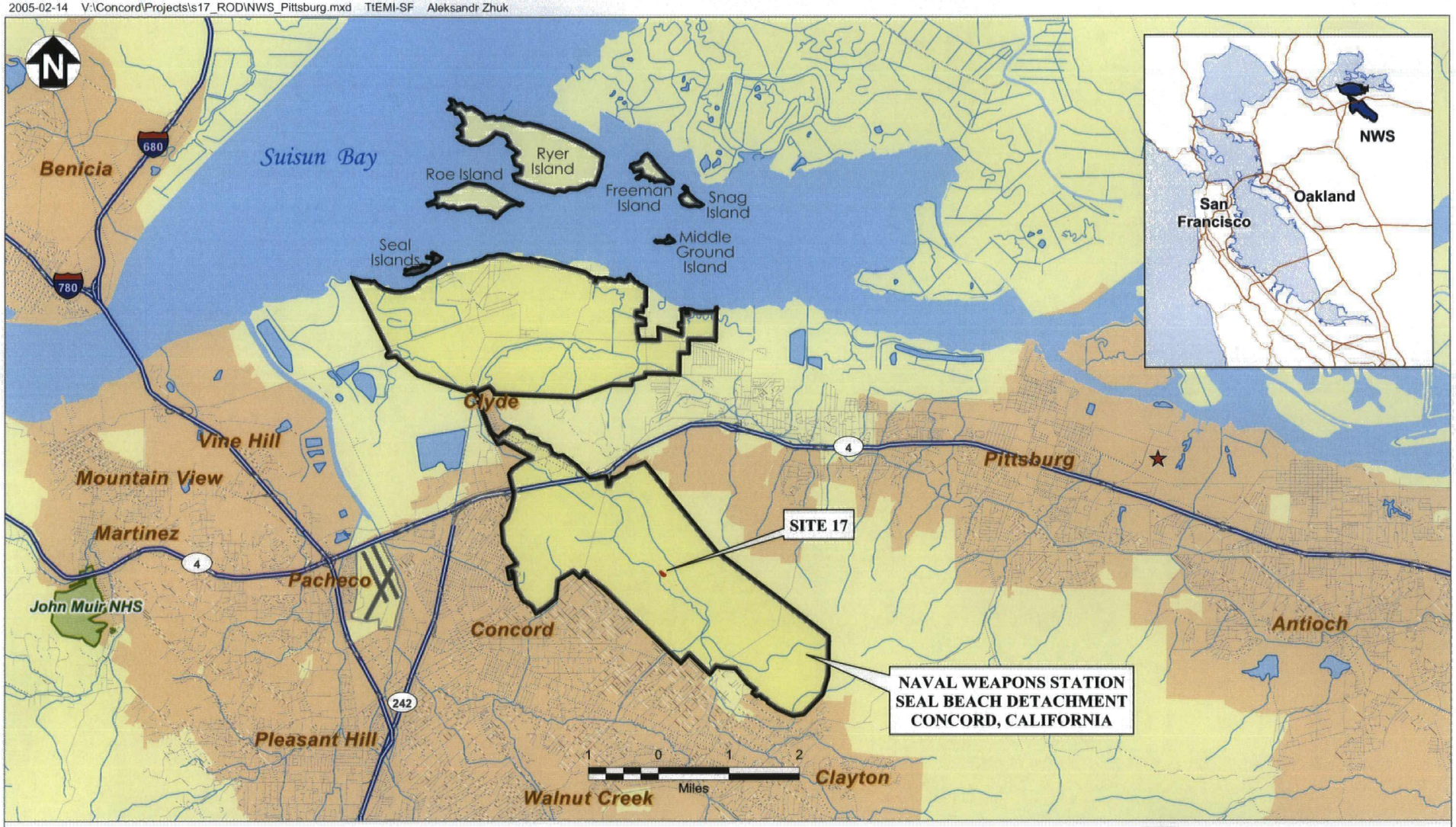

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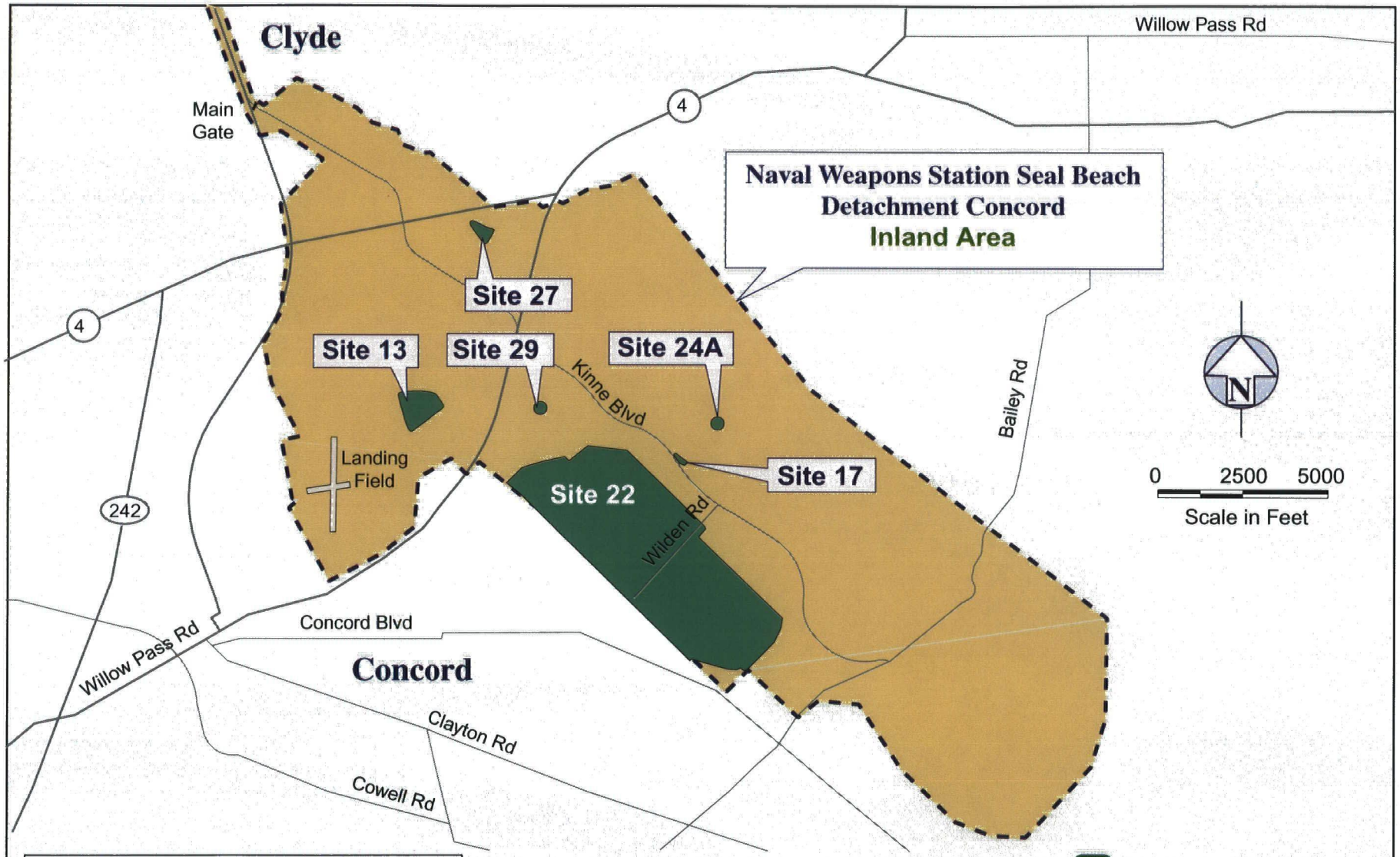
NAVAL WEAPONS STATION SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

★ RADIOGRAPHY FACILITY

FIGURE 1
SITE LOCATION MAP

Site 17 Record of Decision



SITE DESCRIPTION

13	Burn Area
17	Building IA-24
22	Building 7SH5
24A	Operating Small Arms Firing Range
27	Building IA-20

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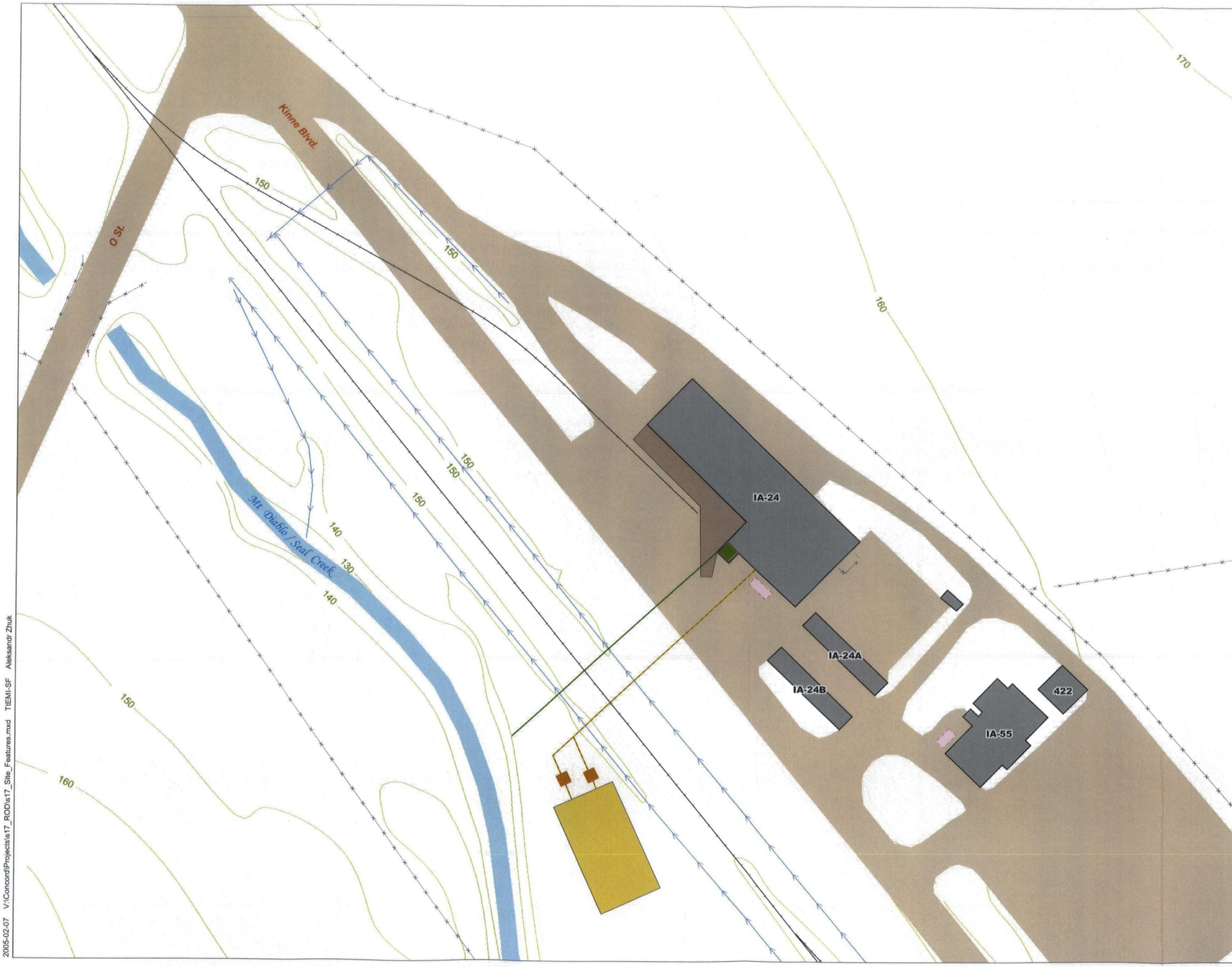
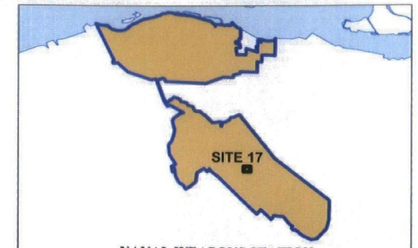
NAVAL WEAPONS STATION SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA
Integrated Product Team West, Daly City

FIGURE 2
INLAND AREA IR SITES





NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT CONCORD

- Building
- Former UST
- Leachfield
- Pavement
- Platform
- Steam Cleaner Stall
- Septic Tank
- Fence
- Railroad
- Drainage Channel
- Sewage Line
- Steam Clean Discharge Line

Topographic Contours
- Major (10 Feet Interval)
- Minor (2 Feet Interval)

N

80 0 80
Feet

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NAVAL WEAPONS STATION SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA
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FIGURE 3
SITE 17 - BUILDING IA-24
SITE FEATURES

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Naval Weapons Station SBD Concord is located within the Clayton Groundwater Basin, as identified in the water quality control plan for the San Francisco Bay region (RWQCB 1995) and associated amendments (RWQCB 2000). This plan, referred to as the "basin plan," identifies the Clayton Basin as a potentially significant groundwater basin in the San Francisco Bay Region. In the basin plan, the term "groundwater" is defined to include all subsurface waters, whether they meet the definition of an aquifer or occur within identified groundwater basins. Unless specifically exempted, a groundwater basin or portion of is designated as potentially suitable for municipal and domestic water supply (RWQCB 2000).

Groundwater in the area meets the federal definition of a potential drinking water supply (Class II groundwater [U.S. EPA 1986]) based on several factors. The first of these factors is the presence of one or more operating drinking water wells within 2 miles of the site (known as the Classification Review Area). The second factor is that the concentrations of total dissolved solids (TDS) in the groundwater are significantly lower than EPA's 10,000-milligram-per-liter (mg/L) threshold. Third, although well yield has not been measured at the site itself, it likely exceeds the EPA minimum threshold of 150 gallons per day. Because the groundwater meets these conditions, it is considered Class II groundwater according to the EPA criteria.

The Navy has not conducted a comprehensive assessment of residential drinking water or irrigation wells in the area; however, based upon a preliminary assessment of groundwater use in the Concord area and from discussion with State Department of Water Resources, Contra Costa County Health officials, and Contra Costa Water District representatives, an unknown number of residents in the Concord area might be using private groundwater wells as a source of drinking water. The Navy has not identified specific locations of residential drinking water wells; however, a few irrigation wells and production wells have been identified, some of which are described below.

Water supply wells near Naval Weapons Station SBD Concord include: (1) a well located at the Diablo Creek Golf Course used to supply water to one of the major lakes on the golf course and to irrigate the fairways during the dry season (April through September), and (2) wells located at Mallard Reservoir used during periods of drought. These wells are all located more than a mile away from Site 17. Irrigation wells are also off-site Navy property to the south at Concord High School (located at 4200 Concord Boulevard in Concord, California 94521), at the Gehringer Park Recreation Club (located at 1790 Lynnwood Drive in Concord, California 94519), and to the west at the Willow Pass Community Park (located at 2748 East Olivera Rd, in Concord, California 94519).

2.1.3 Local Hydrology

The Inland Area lies within the Mount Diablo-Seal Creek hydrologic watershed. The principal drainage for this watershed is Mount Diablo Creek, known as Seal Creek after it enters Naval Weapons Station SBD Concord. Flow in Seal Creek along the Inland Area is intermittent and occurs primarily during the winter rainy season. Historic records show that some flooding occurs during years of normal precipitation along portions of the creek near the Tidal Area.

However, the section of the creek that runs through the Inland Area is not a source of severe overbank flooding because the channel is deeply incised.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The following sections discuss the background of Site 17 and summarize the environmental investigations conducted at Naval Weapons Station SBD Concord. Site 17 is not the subject of any CERCLA enforcement order or other enforcement activity. The Navy and U.S. EPA signed a Federal Facility Agreement (FFA) for Naval Weapons Station SBD Concord on June 21, 2001. The FFA governs the methodology and schedule for conducting environmental investigations under the Installation Restoration Program (IRP) at Naval Weapons Station SBD Concord.

2.2.1 Background

In December 1942, the Navy commissioned the ordnance shipping depot at Naval Magazine, Port Chicago, now known as the Tidal Area of Naval Weapons Station SBD Concord. When munitions passing through the Port Chicago waterfront began to exceed the capacity of the facility, the Navy acquired a 5,143-acre parcel of land in the Diablo Creek Valley. This land became the Inland Area of Naval Weapons Station SBD Concord.

Currently, operations at Naval Weapons Station SBD Concord are associated primarily with routine ammunition transshipment and storage. The facility's current active tenant, the U.S. Army, confines these activities for the most part to the Tidal Area. Since 1999, the Inland Area has been mostly inactive, with no immediate plans to resume active operations. Although the Army controls daily site activities in the Tidal Area, the Navy retains responsibility for environmental restoration at the facility.

Former operations in the Inland Area included receiving munitions for inspection and classification, and holding them before their transportation and outload. Five magazine groups for ammunition storage were used within the Inland Area. The Inland Area also housed several production support facilities for weapons, as well as vehicle maintenance facilities. The northwest corner of the Inland Area included an administrative complex, the public works department, and personnel housing used to support the munitions operations. The 162-acre public golf course (80 acres of which are owned by the City of Concord) remains active. A Weapons Quality Engineering Center was located between State Route 4 and Willow Pass Road, and an abandoned airfield south of State Route 4 was used to train forklift operators. Approximately 1,000 acres of pastureland in the Inland Area is currently leased for cattle grazing (Tetra Tech EM Inc. [TtEMI] 1997).

Site 17 – Buildings IA-24, IA-24A, and IA-24B

Building IA-24 is located along the eastern side of Kinne Boulevard, about 3 miles from the front gate (Figure 2). Buildings IA-24, IA-24A, and IA-24B and the surrounding areas (Figure 3) were formerly used for forklift maintenance and battery recharging. An asphalt

parking lot for forklift storage was located along the southeastern wall of Building IA-24. Forklifts and batteries were steam cleaned to remove oil and grease. The steam cleaning area, last used in 1988, discharged condensate, oil, and grease through a pipeline from the southwestern side of Building IA-24 into Seal Creek (Figure 4).

Accounts differ as to whether an earthen sump for disposal of battery acid was present in the area. No official documentation is available on the existence or use of an acid sump. Extensive sampling revealed no residual contamination or other evidence of its existence in the reported area of the sump (TtEMI 1997). Areas sampled to identify the location of the suspected sump are identified on Figure 4.

The unpaved area between Buildings IA-24 and IA-55 was used for parking trucks. A 550-gallon diesel underground storage tank (UST) was located near the western corner of Building IA-55, and a 2,000-gallon diesel UST was located on the southern corner of Building IA-24 (Figure 3). Both USTs were removed in early February 1997 and replaced with aboveground tanks. The cleanup activities for these tanks are discussed below.

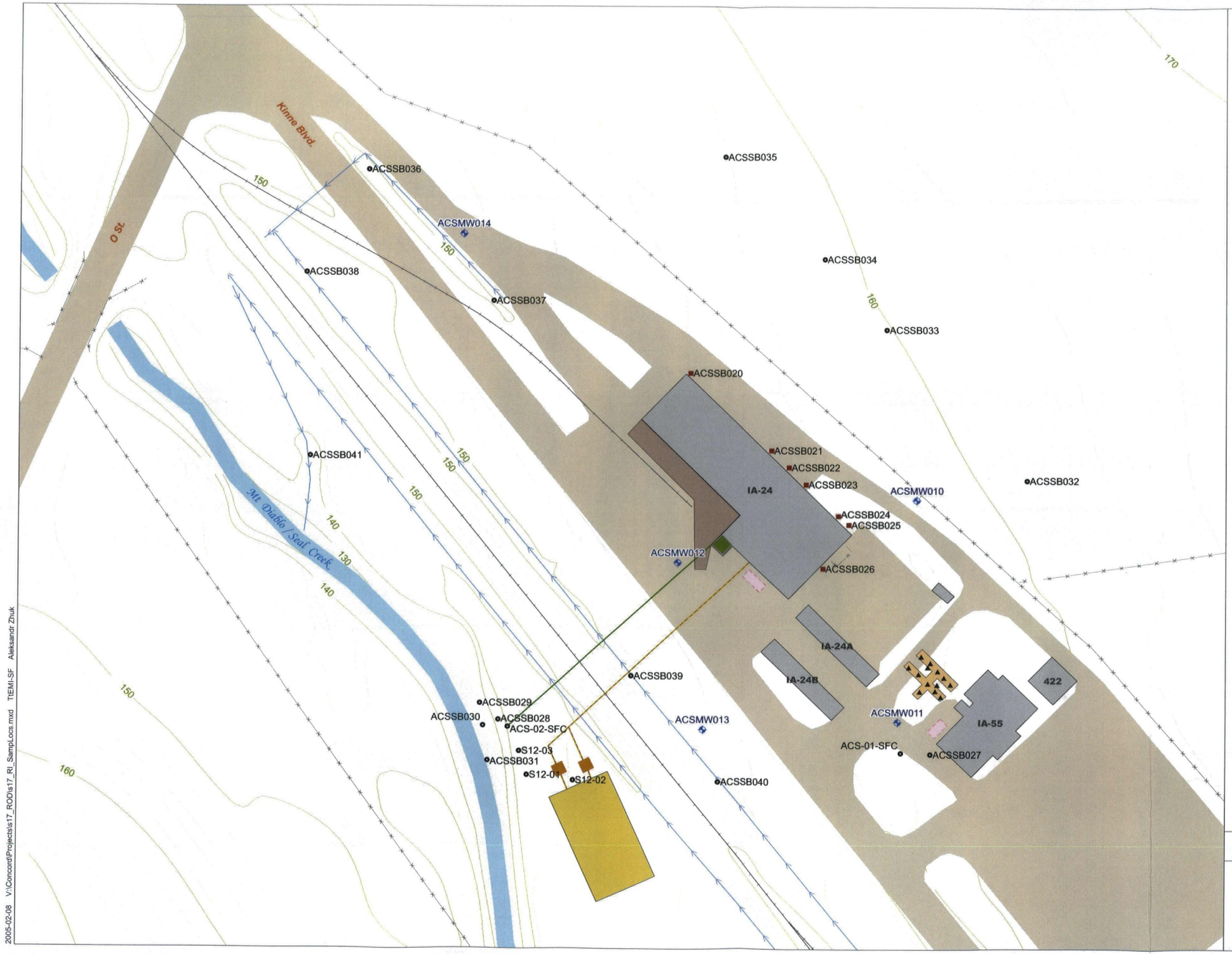
Currently, Building IA-24 is locked and empty. Buildings IA-24A and IA24B are used by cattle rancher lease holders to store hay bales for cattle that graze in portions of the Inland Area. Future land use at Site 17 is not expected to change from its current use.

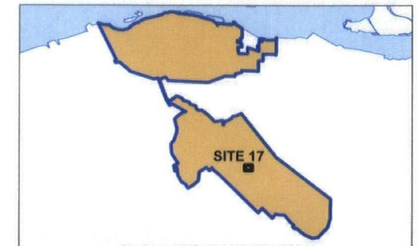
Any State of California or Contra Costa County requirements that pertain to any environmental investigation and cleanup of former USTs at the site are not affected by this No-Action ROD. The following UST information is provided for site description and site background purposes only.

UST IA-55

UST IA-55 was a 550-gallon, single-wall, steel tank used to store diesel fuel for heating Building IA-55. The tank was installed in 1954. No fluids were found stored in the UST immediately prior to its removal. The UST removal project included excavation and removal of the tank, supply line, return line, and vent; soil sampling to assess the site for potential contamination; backfilling; and site restoration.

The UST removal report prepared by KTW & Associates (KTW) noted that soil below the tank was discolored at a depth of 6 feet below grade (KTW 1997a). The tank excavation was initially 6 feet deep, 7 feet wide, and 10 feet long. One soil sample was collected at a depth of 7.5 feet, approximately 1.5 feet below the backfill-native soil interface. Another soil sample was collected at a depth of approximately 2 feet below the fuel supply and return lines. The samples were analyzed for total petroleum hydrocarbons as diesel (TPH-d); benzene, toluene, ethylbenzene, and total xylenes (BTEX); and methyl-tertiary-butyl-ether (MTBE).





NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT CONCORD

- Monitoring Well Location
- Soil Boring Location
- Trench Sample Collected at Suspected Acid Pit Location (ACS-01-SB through ACS-13-SB)
- RI Soil Samples Collected to Identify Suspected Acid Dumping from Old Floor Drain Outfalls
- Building
- Former UST
- Leachfield
- Pavement
- Platform
- Steam Cleaner Stall
- Septic Tank
- Trench
- Fence
- Railroad
- Drainage Channel
- Sewage Line
- Steam Clean Discharge Line

Topographic Contours
- Major (10 Feet Interval)
- Minor (2 Feet Interval)

N

80 0 80
Feet

Tetra Tech EM Inc.

NAVAL WEAPONS STATION SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA
Integrated Product Team West, Daly City

FIGURE 4
SITE 17 - SITE INVESTIGATION AND REMEDIAL INVESTIGATION SAMPLING LOCATIONS

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The soil sample below the tank contained 260 milligrams per kilogram (mg/kg) TPH-d, 0.010 mg/kg MTBE, 0.18 mg/kg ethylbenzene, and 0.040 mg/kg total xylenes. Benzene and toluene were not detected. The soil sample below the fuel line did not contain detectable concentrations of TPH-d, BTEX, or MTBE.

Additional soil excavation was conducted to remove the stained soils. The northeast wall was extended 2 feet beyond the original excavation, and the hole was deepened to16 feet bgs. Five soil samples were collected from the excavation. Four of the five samples did not contain detectible concentrations of TPH-d. The fifth sample contained 16 mg/kg TPH-d. None of the five samples contained detectible BTEX. The tank pit was backfilled.

On April 17, 1997, the Contra Costa County Health Services Department (CCCHSD) issued a letter to Naval Weapons Station SBD Concord. The letter concluded that the residual levels of diesel did not pose a threat to human health or the environment. CCCHSD stated that they required no further action at this site. CCCHSD no further action determinations for USTs do not fulfill the RWQCB requirements for UST no further action determinations. The Navy is coordinating with the RWQCB to obtain RWQCB site closure under the Navy's UST program.

UST IA-24A

UST IA-24A was a 2,000-gallon, single-wall, steel tank used to store diesel fuel for heating Building IA-24A. The tank was installed in 1944. Approximately 100 gallons of diesel fuel were stored in the UST immediately prior to its removal. The UST removal project included excavating and removing the tank, supply line, return line, and vent; excavating contaminated soil; sampling soil to assess the site for potential contamination; backfilling; and restoring the site.

The UST removal report prepared by KTW noted that soil below the tank was discolored at a depth of 7 feet below grade (KTW 1997b). The tank excavation was initially 7 feet deep, 7.5 feet wide, and 19.5 feet long. Two soil samples were collected at depths of 7 and 8 feet. The samples were analyzed for TPH-d and BTEX. TPH-d and BTEX were not detected in either soil sample.

Although TPH-d and BTEX were not detected, stained soil was observed and the demolition contract included a requirement for removal of the hold-down slab. Additional soil excavation was performed, and the excavation was extended to a depth of 16 feet bgs (the maximum depth capability of the backhoe). This time, four soil samples were collected and analyzed for TPH-d and BTEX. Although staining was visible, TPH-d and BTEX were not detected in the soil samples.

Due to the staining, the excavation was deepened to a depth of 21 feet and stained soil samples were collected from the base of the excavation. Soil TPH-d contamination was detected at a concentration of 7,400 mg/kg. Total xylene was detected at a concentration of less than 1 mg/kg, and no other BTEX was detected.

On March 7 1997, the excavation was deepened further to 30 feet bgs, and groundwater was found in the pit at a depth of 29.5 feet. One soil sample was collected from a depth of 30 feet. TPH-d was detected at a concentration of 2,200 mg/kg. BTEX was not detected in the soil sample.

The excavation was backfilled with crushed Class II aggregate baserock. Prior to backfilling, a 12-inch diameter well casing was placed within the excavation.

KTW recommended the following work for this site:

- Install a groundwater monitoring (and potential recovery) well within the conductor casing.
- Install at least two groundwater monitoring wells at locations downgradient of the former UST to estimate the extent of diesel-impacted groundwater.
- Gather information on locations of potential sensitive receptors (such as water supply wells, springs, seeps, surface waters, etc.) within 0.5 mile of UST Site IA-24A to evaluate the potential for impact on the receptors.

The Navy conducted a supplemental investigation of UST site IA-24 to delineate the extent of soil and groundwater contamination. The Navy performed the site assessment in August 2003 by using the Site Characterization and Analysis Penetrometer System (SCAPS) laser-induced fluorescence to delineate petroleum contamination in soil. A report summarizing the work reported no indication of petroleum contamination in soil or groundwater at the site, and recommended the UST site IA-24 for closure by the RWQCB (U.S. Navy Public Works Center Sand Diego [Navy PWC] 2004). The Navy is coordinating with the RWQCB to obtain site closure for this UST under the Navy's UST program.

2.2.2 Environmental Investigations at Naval Weapons Station SBD Concord

This section summarizes environmental investigations and cleanups conducted by the Navy at Naval Weapons Station SBD Concord. Regulatory agencies actively involved in overseeing the environmental work have included the U.S. EPA, DTSC, the RWQCB, the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration (NOAA), the California Department of Fish and Game, and the Contra Costa County Environmental Health Division.

An initial assessment study (IAS) conducted in 1983 under the Navy Assessment and Control of Installation Pollutants (NACIP) Program identified 26 sites at Naval Weapons Station SBD Concord that could present a risk to human health or the environment (Ecology & Environment 1983). Since that time, five additional IRP sites have been added to the program, for a total of 31 IRP sites to date. These 31 sites are divided among the following areas: (1) Tidal Area, (2) Litigation Area, and (3) Inland Area.

The Inland Area currently includes Site 17 (the subject of this ROD) and Sites 13, 22, 27, and 29, as shown on Figure 2. Additional groundwater characterization is planned for Inland Area Site 13 in 2005. Site 22 is in the remedial investigation (RI) phase. Site 29 is in the feasibility study (FS) phase, and Site 27 is in the proposed plan phase. Site 24A, the Pistol Firing Range, is a small outdoor small arms range located in the Inland Area; it was removed from the IRP in 1997 because the range was active.

The Tidal Area includes Sites 1, 2, 9, 11, 30, and 31. A ROD has been signed for Site 1, the Tidal Area Landfill, selecting a landfill cap remedy (TtEMI 2004a). A separate groundwater ROD will eventually be prepared to address potential groundwater contamination from the Tidal Area Landfill. Sites 2, 9, 11, and 31 are currently in the RI phase. A time-critical removal action was conducted at Site 31 in 2002. An engineering evaluation/cost analysis has been prepared for Site 30 for a non-time-critical removal action planned in 2007.

The RI/FS for the Litigation Area (Sites 3, 4, 5, 6, 25, 26, and 28) was completed in 1988, the ROD was signed in 1989, and the remedial actions were completed in 1996. Five years of monitoring in the Litigation Area have been completed; the remediation is evaluated in the Final Five-Year Periodic Review Assessment report (TtEMI 2003). A supplemental feasibility study, treatability study, data gaps investigation, and long-term monitoring program are in progress for those sites.

The Navy has recommended no further action for the remaining installation restoration sites at Naval Weapons Station SBD Concord (Sites 7, 8, 10, 12, 14, 15, 16, 18, 19, 20, 21, 23 [A and B], and 24B) because none of these sites poses a significant risk to human health or the environment. Table 1 lists the NWS SBD Concord IRP sites.

2.2.3 IRP History for Site 17

Following the1983 IAS for Concord, a number of additional Inland Area IRP sites were identified during a site investigation (SI) completed in 1993 (PRC Environmental Management, Inc. [PRC] 1993). The SI recommended Inland Area Sites 13, 17, 22, 24A, and 27 for a Remedial Investigation (RI).

A draft RI work plan and community relations plan for Sites 13, 17, 22, 24A, and 27 was submitted on December 1, 1993 (PRC 1993a, b). Comments received on the RI work plan (U.S. EPA 1994, DTSC 1994a) were incorporated, and a draft final RI work plan was submitted on February 2, 1995 (PRC 1993c). The Navy submitted responses to comments received on the draft final RI work plan (U.S. EPA 1995a) on June 9, 1995 (PRC 1995a). The field work for the RI was conducted in 1995, and a draft RI was completed on October 21, 1996 (PRC 1996). The draft final RI, which incorporated agency comments on the draft (U.S. EPA 1997b, DTSC 1997, RWQCB 1997), was submitted on October 15, 1997 (TtEMI 1997).

TABLE 1: INSTALLATION RESTORATION PROGRAM SITES

Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Site Number	Site Name	Location	Status
1	Tidal Area Landfill	Tidal Area	Remedial Design (soil cap); Remedial investigation for groundwater
2	R Area Disposal Site	Tidal Area	Remedial Investigation
3	Kiln Site (RASS 2)	Litigation Area	Long-term monitoring
4	Allied Site A (RASS 1)	Litigation Area	Long-term monitoring (marsh surface) Supplemental Feasibility study (ditches and sloughs)
5	Allied Site B (RASS 1)	Litigation Area	Long-term monitoring (marsh surface) Supplemental Feasibility study (ditches and sloughs)
6	Coke Pile Site (RASS 4)	Litigation Area	Long-term monitoring
7	1944 Explosion-Docks	Tidal Area	Recommended for no further action
8	1944 Explosion - Ryer Island	Tidal Area	Recommended for no further action
9	Froid and Taylor Road Disposal Site	Tidal Area	Remedial Investigation
10	Nichols Road	Tidal Area	Recommended for no further action
11	Wood Hogger	Tidal Area	Remedial Investigation
12	Port Chicago	Tidal Area	Recommended for no further action
13	Burning Area	Inland Area	Remedial Investigation
14	Kinne Boulevard Wells	Inland Area	Recommended for no further action
15	Railroad Classification Yard	Inland Area	Recommended for no further action
16	Black Pit at Red Rock	Inland Area	Recommended for no further action
17	Building IA-24	Inland Area	Record of Decision for no further action
18	Building IA-25	Inland Area	Recommended for no further action
19	Seal Creek Disposal Area	Inland Area	Recommended for no further action
20	Old homestead, Seal Creek	Inland Area	Recommended for no further action
21	Building 97 Fuel Tanks	Inland Area	Recommended for no further action
22	Building 7SH5 and Magazine Area	Inland Area	Remedial Investigation
23	23A: Inland Area Explosive Ordnance Disposal 23B: Eagle's Nest Explosive Ordnance Disposal	Inland Area	Recommended for no further action
24	24A: Pistol Firing Range 24B: Aircraft Firing Range	Inland	24A: Removed from IRP 24B:Recommended for no further action
25	K-2 Area (RASS 3)	Litigation Area	Supplemental Feasibility Study (Nichols Creek)
26	G-1 Area (RASS 3)	Litigation Area	Supplemental Feasibility Study (Nichols Creek)
27	Building IA-20 Chemical Laboratory	Inland Area	Proposed Plan
28	ES Site (RASS 3)	Litigation Area	Supplemental Feasibility Study (Nichols Creek)
29	Building IA-25	Inland Area	Remedial Investigation
30	Taylor Boulevard Bridge	Tidal Area	Non-time Critical Removal Action
31	Pump Station Area (Former Fertilizer Plant)	Tidal Area	Remedial Investigation

Notes:

IRP Installation restoration program

RASS Remedial action subsite

Following the draft final RI, a second phase of groundwater sampling, was conducted during April and September 1998 to complete the RI sampling (TtEMI 1998a). This additional groundwater sampling was conducted to determine whether bis(2-ethylhexyl)phthalate was present in groundwater in excess of the U.S. EPA Region 9 tap water preliminary remediation goal (PRG). The results of that investigation indicated that bis(2-ethylhexyl)phthalate was not present in groundwater in excess of the tap water PRG at Site 17.

Based on a review by the U.S. EPA and DTSC of the RI (U.S. EPA 1998a) and agreements reached by the remedial project managers (RPM), the Navy pursued a no further action ROD for Sites 13, 17, 22, and 27. A pre-public 'draft' ROD and proposed plan for Sites 13, 17, 22, and 27 was submitted for agency review on August 24, 1998 (TtEMI 1998b). Agency comments received on the pre-public internal draft proposed plan (U.S. EPA 1998b, c; DTSC 1998) were incorporated, and a draft proposed plan was prepared in March 1999 (TtEMI 1999a). The public review and comment period began on March 19, 1999, and ended on April 19, 1999. A public meeting was held on April 5, 1999, and the final proposed plan was completed in May 1999. A draft final ROD for Sites 13, 17, 22, and 27 was completed in June 1999 (TtEMI 1999b).

The Navy received agency comments on the draft final ROD (U.S. EPA 1999, California Department of Fish and Game 1999) that required significant additional work for Site 22 and Site 27. The Navy subsequently decided to prepare a no further action ROD for Site 13 and Site 17 only. Sites 22 and Site 27 are currently being addressed separately under the Navy's Installation Restoration Program (IRP), and the appropriate remedial actions for these sites will be documented in separate, future RODs. A Revised Draft Final ROD for Sites 13 and 17 was submitted on October 30, 2001, to the agencies (TtEMI 2001). Agency review comments were received (U.S. EPA 2002a, RWQCB 2001) and incorporated, and a second Revised Draft Final ROD was submitted on June 20, 2002 to the agencies (TtEMI 2002a). Additional comments received from U.S. EPA were received (U.S. EPA 2002b) and responded to (TtEMI 2002b). However, the U.S. EPA informally disputed with the Navy on the ROD over a data gap associated with perchlorate, an emerging chemical of concern that may have been released at Site 13. This concern was outlined in correspondence dated January 29, 2003 (U.S. EPA 2003). The Navy agreed in April 2003, to conduct additional groundwater sampling and analysis at Site 13 (Naval Facilities Engineering Command, Engineering Field Activity West [EFA West] 2003). The additional sampling was conducted in June 2003. Because perchlorate was detected in the groundwater, additional groundwater investigations are planned for Site 13; therefore, this ROD was revised to include only Site 17. A Revised Draft Final ROD was submitted for agency review in March 2004 (TtEMI 2004b); comments received were addressed (U.S. EPA 2004, RWQCB 2004, DTSC 2004) in a pre-signature version of the Final ROD (TtEMI 2005).

2.2.4 Estimation of Ambient Concentrations of Metals in Inland Area Soils

Ambient concentrations of metals in soils (also known as background concentrations) were estimated as part of the RI for Inland Area Sites 13, 17, 22, 24A, and 27. Estimated ambient metals concentrations were used as a basis to assess whether detection of a metal indicated site-related contamination or a naturally occurring or non-site-related anthropogenic source.

Before estimation of ambient metal concentrations began, a conceptual model of the geology in the Inland Area was developed, and sites were grouped based on similarity of the data. The concentrations of some metals displayed two distinct populations: one population corresponded to the data from Sites 17 and 24A, and another population was formed by the data from Sites 13 and 22. The two populations reflect geological differences between these two areas. Sites 17 and 24A are located in an area below the Los Mendanos Hills in an erosional environment from the upslope bedrock area. Sites 13 and 22 are part of a much larger alluvial plain depositional environment. Ambient sampling locations were identified for use in estimating ambient concentrations for the two groups. The locations were chosen in areas topographically upgradient of each site that were not affected by Navy operations or other industrial activities.

After receipt of the analytical results for the ambient soil samples, statistical procedures were used to establish ambient concentrations of metals at the sites. The 95th and 99th percentiles of the distribution of the ambient data sets were identified to define a reasonable upper level of the ambient concentrations. The 95th percentile of the distribution of ambient concentration limits for metals in soils at Site 17 are presented in Table 2. The table includes the 2002 U.S. EPA Region IX PRGs for residential use for comparison (U.S. EPA 2002b). As shown on the table, the estimated 95th percentile ambient concentration for arsenic exceeds the residential cancer PRG, but is less than the noncancer PRG. For Site 17, ambient concentrations for molybdenum, selenium, silver, and thallium were not detected in the ambient data set; therefore, the ambient concentration for each of these metals was assumed equal to the analytical method detection limit concentration of the metal. The detection limits established for these metals in the Quality Assurance Project Plan (included as Appendix I of the RI report [TtEMI 1997]) are listed in Table 2. A detailed description of the statistical method used to estimate ambient concentrations is provided in Appendix A of the RI (TtEMI 1997).

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Navy formed a restoration advisory board (RAB) on July 20, 1995. The RAB is comprised of community members and the Navy. The RAB held regular meetings open to the public until April 1999 to review the progress of environmental cleanup at Naval Weapons Station SBD Concord. In January 2002, a reestablished RAB began meeting monthly. The RAB was briefed on the Site 17 ROD at their monthly meeting on March 4, 2002. The RAB received a technical assistance for public participation (TAPP) grant from the Navy to assist in their review of Inland Area documents in 2003. With that grant, the Navy hired a RAB-approved contractor to review IR documents for Site 17 and to provide comments to the Navy. Comments on the Site 17 ROD and other Site 17 documents were submitted from the TAPP grantee on November 10, 2003 (Peter Strauss, PM Strauss & Associates 2003). The Navy prepared and distributed responses to those comments to the RAB on March 30, 2004 via electronic mail (Naval Weapons Station Seal Beach 2004). They were also distributed in hard copy form at the April 2004 RAB meeting.

TABLE 2: AMBIENT CONCENTRATIONS OF METALS IN SOILS FOR INLAND AREA SITE 17

Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Metal	Residential Soil PRG[a] (mg/kg)	Ambient Concentration (mg/kg) Site 17[b]
Aluminum	76,000	21,000
Antimony	31	0.9
Arsenic (cancer)	0.39	7.3
Arsenic (noncancer)	22	7.3
Barium	5,400	560
Beryllium	150	0.12
Cadmium	37	0.29
Chromium	210[c]	62
Cobalt	900	25
Copper	3,100	65
Lead	400/150[f]	33
Manganese	1,800	1,200
Mercury	23	0.17
Molybdenum	390	Detection limit (0.47[e])
Nickel	1,600	100
Selenium	390	Detection limit (0.45[e])
Silver	390	Detection limit (0.13[e])
Thallium	5.2	Detection limit (0.43[e])
Vanadium	550	96
Zinc	23,000	99

Notes:

a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRGs for residential land use (U.S. EPA 2002b).

b The ambient limit presented is the maximum detected concentration after outliers were excluded.

c The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III.

d The U.S. EPA Region 9 residential PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using the California Department of Toxic Substances Control LeadSpread Model Version 7 (California Department of Toxic Substances Control [DTSC] 1999).

e The value presented is the reporting limit goal listed in the Quality Assurance Project Plan, as presented in Appendix I of the remedial investigation report (Tetra Tech EM Inc. 1997).

mg/kg Milligrams per kilogram

PRG Preliminary remediation goal

Other community involvement efforts for Naval Weapons Station SBD Concord have included public notices, fact sheets, community relations' plans, and press releases that have been published regarding the Naval Weapons Station SBD Concord IRP. Public fact sheets describing Site 17 were published and distributed to a community mailing list in May 1995, February 1999, January 2003, and February 2005. Community relations' plans for the Inland Area IRP sites were published in 1989 and 1993. Basewide IRP program community relations' plans that included Site 17 were also published in 1996 and 2003.

The draft final RI report was completed in October 1997 (TtEMI 1997). The RI report and subsequent IRP documents have been made available to the public through the information repository located the City of Concord Public Library (located at 2900 Salvio Street in Concord, California 94519) and the Naval Weapons Station SBD Concord website (http://www.sbeach.navy.mil/ir/). The proposed plan for Inland Area Site 17 that identifies the preferred no action alternative became available to the public in March 1999. The notice of availability for the proposed plan was also published in the *Contra Costa Times* at the beginning of the public comment period that extended from March 19 through April 19, 1999. A public meeting was held on April 5, 1999. At this meeting, representatives from the Navy, DTSC, and U.S. EPA answered questions regarding the proposed no action alternative for Site 17 at Naval Weapons Station SBD Concord. The Navy provided written responses to comments received during the public comment period. These responses are presented in the responsiveness summary (Appendix A of this ROD). The responsiveness summary also includes comments received on Site 13. (As noted in Section 2.2.2, Sites 13, 22, and 27 were included in the proposed plan and earlier versions of this ROD, but are now being addressed separately under the IRP.)

These community participation activities fulfill the requirements of Sections 113(k)(2)(B)(i-v) and 117(a)(2) of CERCLA. The No Action decision for Site 17 has not changed since the close of the public comment period.

2.4 SITE CHARACTERISTICS

This section summarizes the results of the chemical characterization of soil and groundwater conducted during the SI (PRC 1993c), RI (TtEMI 1997), and other related investigations at Site 17 (TtEMI 1998b).

Soil and groundwater were sampled at Site 17 in 1992 during the SI to evaluate environmental conditions and determine if the sites were appropriate for further action, immediate action or removal, or no further action. Site 17 was deemed appropriate for further investigation to evaluate the steam discharge line and evaluate for presence of metals in groundwater.

Soil, sediment, and groundwater were sampled during the RI from April 1995 to June 1995, and groundwater was sampled again in September 1995, to evaluate environmental conditions and to assess the need for cleanup actions at the sites. The RI report compared the analytical results against the 1995 U.S. EPA Region 9 PRGs—current at that time (U.S. EPA 1995b) during

evaluation of the environmental conditions at the Inland Area sites. These comparisons were used to assist in delineating site-related contamination and focus the discussion of chemical characterization in the report. Soil, sediment, and groundwater were sampled at Site 17 to evaluate the nature and extent of chemicals present as a result of past site activities, including forklift maintenance and USTs. Sampling focused on the areas of the suspected sump for disposal of battery acid, a steam-cleaning pad with an outfall to Seal Creek, a fuel UST at Building IA-55, and the site drainage channels (Figures 3 and 4). A suspected sump for disposal of battery acid was alleged to have been present at the site, but observations during field sampling and the subsequent analytical laboratory results did not provide any evidence to confirm this.

2.4.1 Results of Soil Investigations

The locations of soil samples collected during the RI and SI are included on Figure 4. Site soils were analyzed for total metals, hexavalent chromium, SVOCs, VOCs, extractable total petroleum hydrocarbons, and purgeable total petroleum hydrocarbons. Soil data at the site for characterization purposes were compared to U.S. EPA residential PRGs (U.S. EPA 2002b). Except for benzo(a)pyrene, VOCs and SVOCs were detected in soil samples at concentrations below residential PRGs. Table 3 presents a summary of organic constituents detected in soils at Site 17. Benzo(a)pyrene was detected (concentrations ranging from 0.033 to 0.110 mg/kg) in three of 38 samples analyzed. Concentrations of benzo(a)pyrene exceeded the residential PRG (0.062 mg/kg) in two surface soil samples collected from a drainage ditch (sample locations ACSSB039 [0.110 mg/kg] and ACSSB040 [0.073 mg/kg]); these concentrations are comparable to levels commonly reported for urban and rural soils (Agency for Toxic Substances and Disease Registry [ATSDR] 1995). Figure 5 illustrates locations of organic constituents detected in soil above the residential PRG during the RI at Site 17.

Four metals were detected in soil samples collected in the 0- to 10-foot depth interval at concentrations that exceeded the 2002 PRGs. Table 4 summarizes the inorganic constituents detected in soil at Site 17 and the respective ambient values, PRGs, and maximum concentrations. Figure 6 illustrates locations of inorganic constituents detected in soil during the RI at Site 17. Arsenic was detected in almost all soil samples at concentrations that exceeded its residential PRG; however, concentrations in all samples were equal to or less than the established ambient limit of 7.3 mg/kg so the presence of arsenic is not attributed to site activities. Lead was detected in samples collected at two locations at concentrations that exceeded its LeadSpread PRG of 150 mg/kg but below the U.S. EPA 2002 PRG of 400 mg/kg; the maximum detected concentration was 225 mg/kg. Manganese and thallium were detected above the residential PRG, but only at depths greater than 10 feet bgs. No petroleum hydrocarbons were detected in samples collected near the former USTs. The maximum concentration of TPH as motor oil (TPH-mo) (1,300 mg/kg) in soil was detected in a sample collected from a drainage ditch, and the maximum concentration detected in sediment (4,100 mg/kg) was found in a sample collected at Seal Creek. Inorganic chemicals were not identified above ambient levels in soil samples collected near the drainage ditches.

TABLE 3: ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17

Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Maximum Concentration[c] (mg/kg)	Comments
Volatile Organic Compound			
1,2-Dichlorpropane	0.34	0.058	1,2-Dichoropropane was detected in only one sample at a depth of 10 ft.
4-Methyl-2-pentanone	790	0.005	4-Methyl-2-pentanone was detected in two samples, both at a depth of 15 ft.
Semivolatile Organic Compound			
Benzo(a)anthracene	0.62	0.087	
Benzo(a)pyrene	0.062	**0.11**	In 38 samples analyzed, benzo(a)pyrene was detected in two surface soil samples at concentrations exceeding its PRG. Subsurface samples were not collected at these locations, and nearby samples were not available. The detected concentrations of benzo(a)pyrene are comparable to background concentrations in urban and rural soils in the U.S. (Agency for Toxic Substances and Disease Registry 1995).
Benzo(b)fluoranthene	0.62	0.11	
Benzo(g,h,i)perylene	2,300	0.099	A PRG is not available for benzo(g,h,i)perylene; the PRG for pyrene is used as a surrogate value.
Benzo(k)fluoranthene	0.38	0.13	Cal-modified PRG.
Chrysene	3.8	0.15	Cal-modified PRG.
Dibenz(a,h)anthracene	0.062	0.024	
Fluoranthene	2,300	0.16	
Indeno(1,2,3-cd)pyrene	0.62	0.083	
Phenanthrene	2,300	0.07	A PRG is not available for phenanthrene; the PRG for pyrene is used as a surrogate value.
Phenol	37,000	0.76	
Pyrene	2,300	0.19	
Total Petroleum Hydrocarbon			
Diesel	NE	164	
Gasoline	NE	0.082	
Motor oil	NE	1,300	

Notes:

a Detected analytes are listed for all depth intervals sampled and are based on samples collected during the site investigation and remedial investigation.

b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2002b) unless otherwise noted.

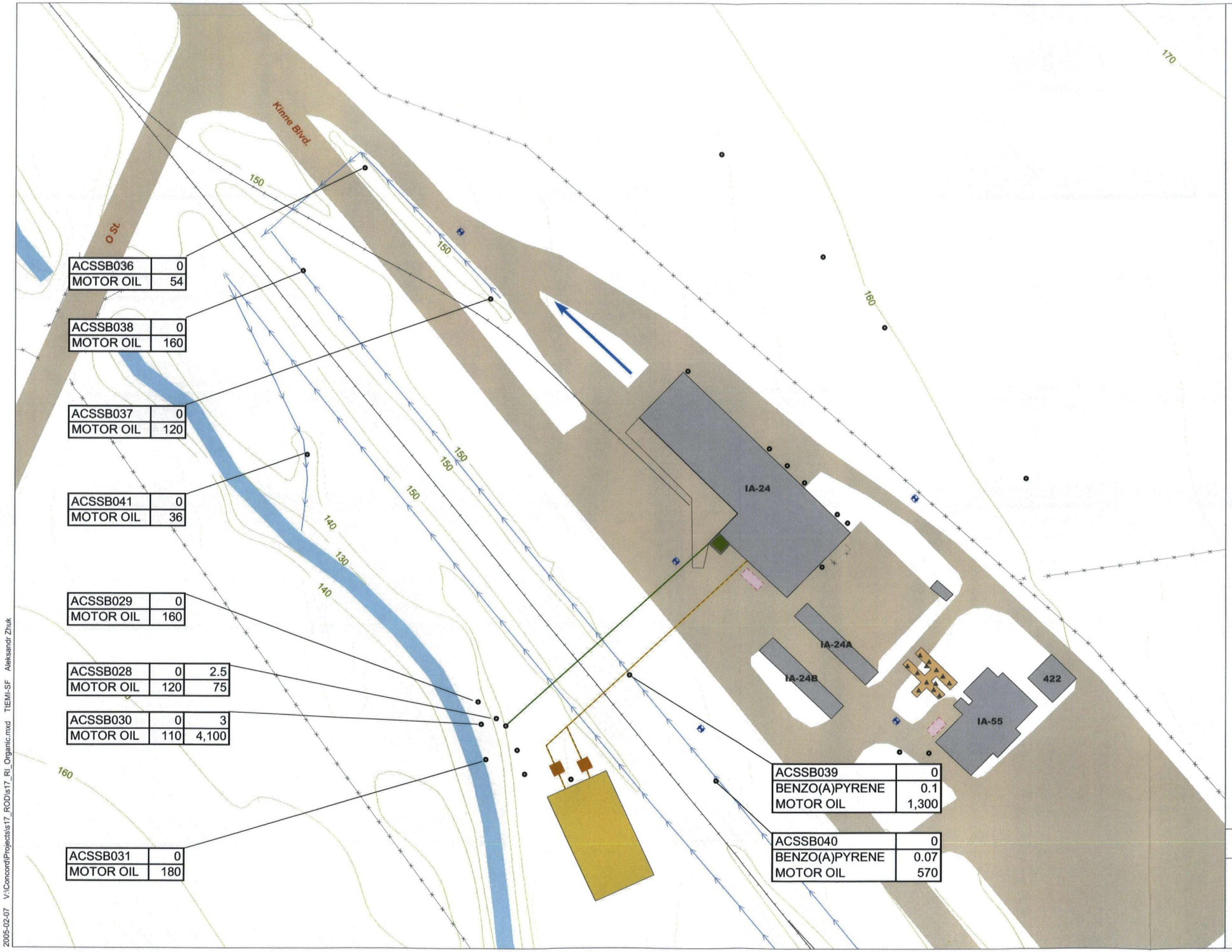
c Concentrations shown in bold exceed the PRG.

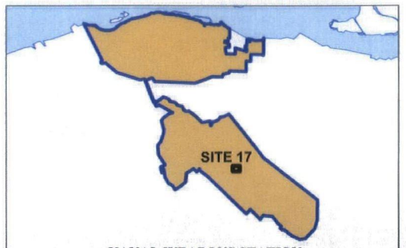
ft Feet

mg/kg Milligram per kilogram

NE None established

PRG Preliminary remediation goal





NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT CONCORD

Sample Location ID
ACSSB029 | 0
MOTOR OIL | 160
Sample Depth (in feet below ground surface)
Analyte
Concentrations (in mg/kg)

- Soil Sampling Location
- Trench Sample Collected at Suspected Acid Pit Location (ACS-01-SB through ACS-13-SB)
- Monitoring Well Location
- Building
- Former UST
- Leachfield
- Pavement
- Septic Tank
- Steam Cleaner Stall
- Trench
- Fence
- Railroad
- Drainage Channel
- Sewage Line
- Steam Clean Discharge Line
- Prevalent Direction of Groundwater Flow

Topographic Contours
- Major (10 Feet Interval)
- Minor (2 Feet Interval)

Notes:
1. Only organics detected at concentrations exceeding U.S. EPA preliminary remediation goals ror residential land use are shown.
2. All detected concentrations for TPH are shown

N

80 0 80
Feet

Tetra Tech EM Inc.

NAVAL WEAPONS STATION SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA
Integrated Product Team West, Daly City

FIGURE 5
ORGANIC CONSTITUENTS DETECTED DURING THE RI AT SITE 17 IN SOIL

2005-02-07 V:\Concord\Projects\s17_RODs\s17_RI_Organic.mxd TtEMI-SF Aleksandr Zhuk

TABLE 4: INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17

Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Detected Analyte[a]	Residential PRG[b] (mg/kg)	Ambient Concentration[c] (mg/kg)	Maximum Concentration[d] (mg/kg)	Comments
Aluminum	76,000	20,000	30,000	
Antimony	31	1.2	19.3	
Arsenic	0.39 (cancer) 22 (noncancer)	7.3	**7.3**	Although arsenic concentrations exceeded the PRG, concentrations were less than or equal to the ambient concentration in all samples.
Barium	5,400	210	1,320	
Beryllium	150	0.56	0.95	
Cadmium	37	0.15	3.1	
Chromium	210	55	78.5	The PRG for total chromium is based on an assumed 1 to 6 ratio of chromium VI to chromium III.
Cobalt	900	24	29.4	
Copper	3,100	64	334	
Lead	400/150	18	**225**	The U.S. EPA Region 9 residential PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using DTSC's LeadSpread model (DTSC 1999). Lead was detected at levels that exceeded its residential PRG in two of 48 samples.
Manganese	1,800	870	**12,100**	This maximum concentration of manganese was detected at 15 ft. The maximum concentration detected from 0 to 10 ft was 1,500 mg/kg.
Mercury	23	0.14	0.45	
Molybdenum	390	0.47	1.8	
Nickel	1,600	86	203	
Silver	390	0.13	24.5	The ambient value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI (TtEMI 1997).
Thallium	5.2	0.43	**15.6**	The ambient value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI (TtEMI 1997). The maximum concentration of thallium was detected at 15 ft. The maximum concentration detected from 0 to 10 ft was 1.3 mg/kg.
Vanadium	550	86	98.7	
Zinc	23,000	83	255	

Notes:

a Detected metals are listed for all depth intervals sampled at Site 17 and are based on samples collected during the site investigation and remedial investigation, unless otherwise noted.

b U.S. EPA Region 9 PRG (U.S. EPA 2002b), unless otherwise noted.

c The ambient limit presented is the maximum detected concentration after outliers had been excluded.

d Concentrations shown in bold exceed the PRG.

DTSC California Department of Toxic Substances Control

ft Feet

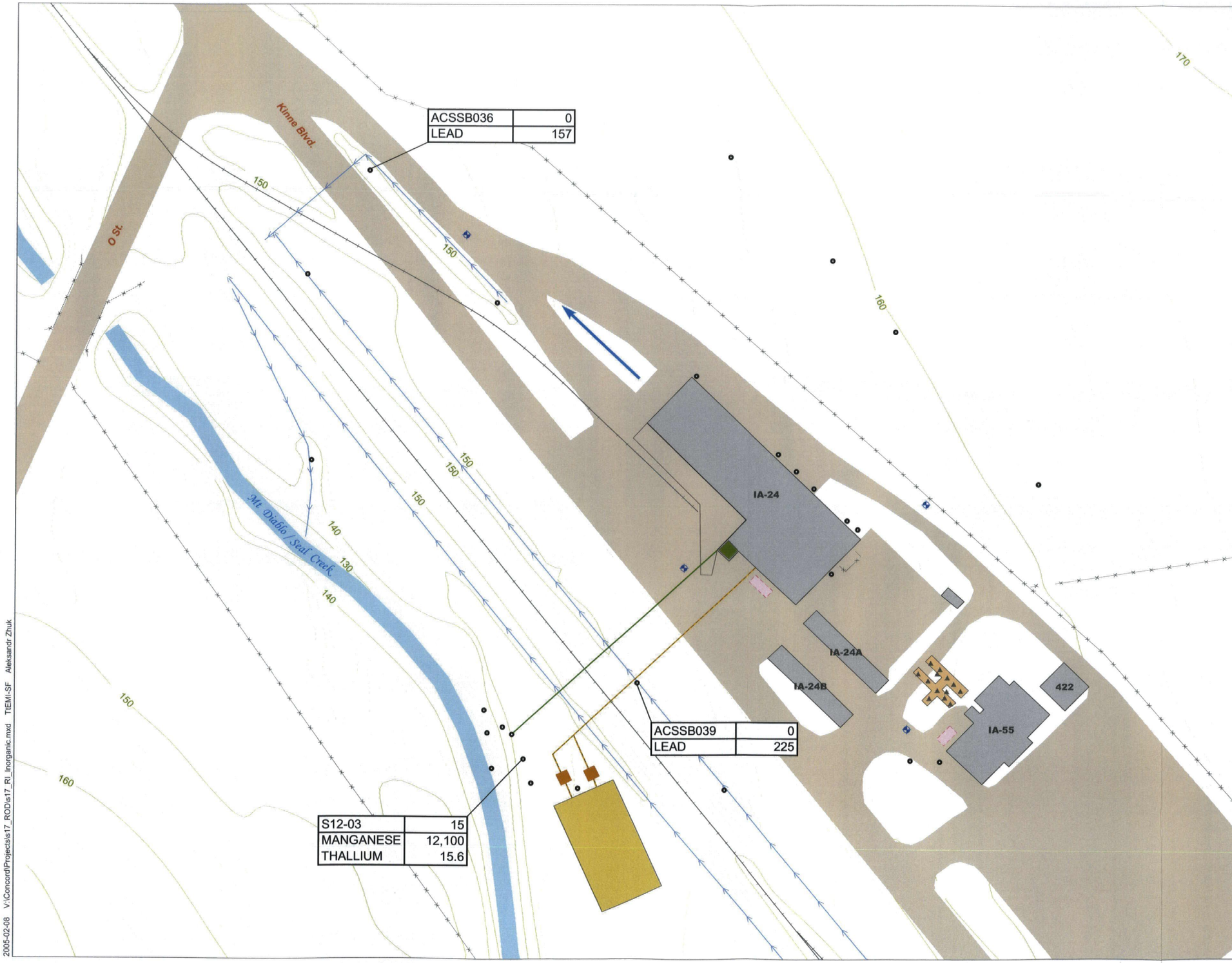
Max Maximum

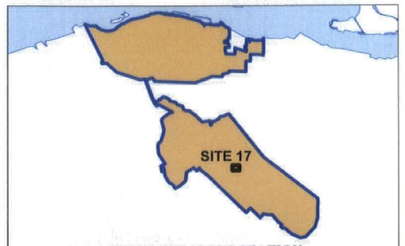
mg/kg Milligram per kilogram

PRG Preliminary remediation goal

RI Remedial investigation

U.S.EPA U.S. Environmental Protection Agency





NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT CONCORD

Sample Location ID

ACSSB039	0
LEAD	225

Sample Depth (in feet below ground surface)

Concentrations (in mg/kg)

Analyte

- Soil Sampling Location
- Trench Sample Collected at Suspected Acid Pit Location (ACS-01-SB through ACS-13-SB)
- Monitoring Well Location
- Building
- Former UST
- Leachfield
- Pavement
- Septic Tank
- Steam Cleaner Stall
- Trench
- Fence
- Railroad
- Drainage Channel
- Sewage Line
- Steam Clean Discharge Line
- Prevalent Direction of Groundwater Flow

Topographic Contours
- Major (10 Feet Interval)
- Minor (2 Feet Interval)

Notes:
1. Only inorganics detected at concentrations exceeding U.S. EPA preliminary remediation goals (PRG) for residential land use are shown.
2. Arsenic was detected at several locations above the residential PRG but at concentrations below ambient levels. Therefore arsenic concentrations are not shown on the figure.

N

80 0 80
Feet

Tetra Tech EM Inc.

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FIGURE 6
INORGANIC CONSTITUENTS DETECTED DURING THE RI AT SITE 17 IN SOIL

2005-02-08 V:\Concord\Projects\s17_ROD\s17_RI_Inorganic.mxd TtEMI-SF Aleksandr Zhuk

2.4.2 Results of Sediment Investigations

Table 5 presents a summary of organic and inorganic constituents detected in sediment at Site 17. No volatile organic compounds (VOC) or semivolatile organic compounds (SVOC) were detected in sediments.

Metals were not detected at concentrations exceeding the PRGs in sediment, except for arsenic. Arsenic was detected in sediment at a maximum concentration of 5.7 mg/kg, which is below the ambient value for soils. The RI report includes a comprehensive discussion of the soil investigation and the nature and extent of the chemicals detected in soil and sediment (TtEMI 1997).

2.4.3 Results of Groundwater Investigations

Five monitoring wells were installed at the site during the RI. Two rounds of unfiltered groundwater samples were collected during the RI (in May and September 1995) and were analyzed for VOCs, SVOCs, metals, nitrate/nitrite, and extractable total petroleum hydrocarbons. Two additional rounds of unfiltered groundwater samples were collected and analyzed for SVOCs after the RI (in January and April 1998). All groundwater samples were collected using low flow purge methods. The detected groundwater concentrations are shown on Figure 7.

Metals were not detected at concentrations exceeding tap water PRGs in groundwater samples collected from Site 17. VOCs, SVOCs, and petroleum hydrocarbons have not been detected consistently in groundwater samples collected at the site. However, bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was detected in samples from two wells at concentrations of 55 and 60 micrograms per liter (μg/L) during the first RI groundwater sampling in May 1995 (Table 6). The second RI groundwater sampling event did not detect bis(2-ethylhexyl)phthalate. Two additional groundwater monitoring events were conducted to evaluate whether the results for the samples collected during the RI were representative of actual groundwater conditions (TtEMI 1998b). Bis(2-ethylhexyl)phthalate was not detected in samples collected during either groundwater monitoring event following the RI. Based on these findings, the Navy concluded that bis(2-ethylhexyl)phthalate is not present in groundwater at Site 17.

2.5 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Naval Weapons Station SBD Concord is an active military base. Current industrial operations are associated primarily with routine munitions transshipment and storage. The facility's current active tenant, the U.S. Army, confines these activities for the most part to the Tidal Area at Naval Weapons Station SBD Concord. Since 1999, the Inland Area has been on reduced operational status and is mostly inactive, with no immediate plans to resume active operations. Naval Weapons Station SBD Concord was included on the recommended Base Realignment and Closure (BRAC) list submitted by the Secretary of Defense to the BRAC Commission in May 2005 (Department of Defense 2005). The May 2005 BRAC list is a proposal that must still undergo a review and approval process that will not result in a final list any sooner than approximately November 2005. Future plans for use of the site are unknown.

TABLE 5: ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN SEDIMENT AT SITE 17

Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Ambient Concentration[c] (mg/kg)	Maximum Concentration[d] (mg/kg)	Comment
Inorganic Compounds				
Aluminum	76,000	20,000	15,000	
Arsenic	0.39 (cancer) 22 (noncancer)	7.3	**5.7**	Although arsenic concentrations exceeded the PRG, concentrations were less than the ambient concentration in all samples.
Barium	5,400	210	153	
Beryllium	150	0.56	0.4	
Chromium	210	55	35.4	The PRG for total chromium is based on an assumed 1 to 6 ratio of chromium VI to chromium III.
Cobalt	900	24	15.8	
Copper	3,100	64	44.3	
Lead	400/150	18	15.4	The U.S. EPA Region 9 PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using the DTSC Lead Risk Assessment Model Version 7 (DTSC 1999).
Manganese	1,800	870	646	
Molybdenum	390	0.47	1.1	The ambient value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI (TtEMI 1997).
Nickel	1,600	86	59	
Thallium	5.2	0.13	0.21	The ambient value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI (TtEMI 1997).
Vanadium	550	86	62.9	
Zinc	23,000	83	81.2	
Total Petroleum Hydrocarbon				
Motor oil	NE	NE	4,100	

Notes:

a Detected analytes are listed for all depth intervals sampled at Site 17 and are based on samples collected during the site investigation and remedial investigation. Volatile and semivolatile organic compounds were analyzed for but not detected in sediment samples.

b U.S. EPA Region 9 PRG (U.S. EPA 2002b), unless otherwise noted.

c The ambient limit presented is the maximum detected concentration after outliers had been excluded.

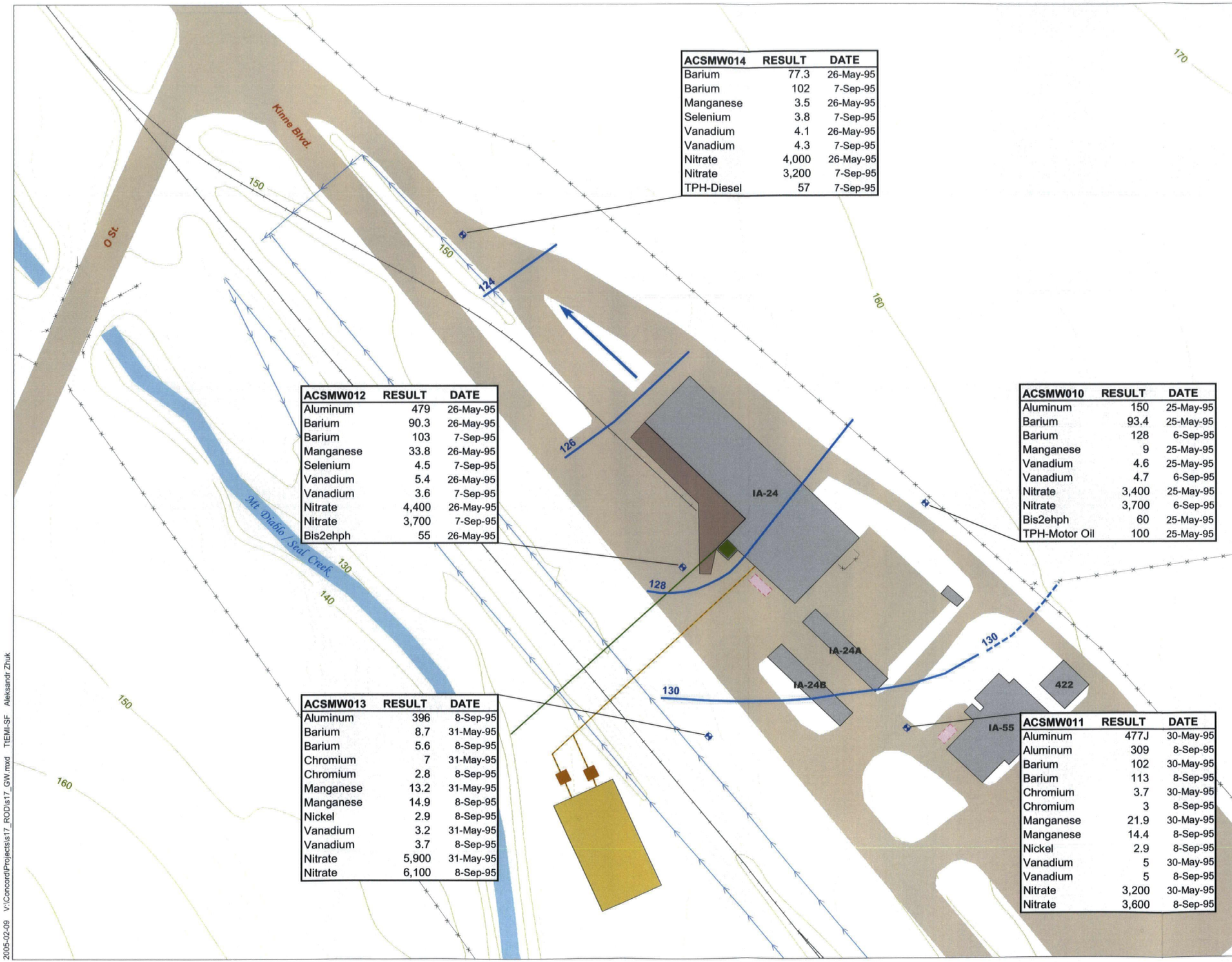
d Concentrations shown in bold exceed the PRG.

mg/kg Milligram per kilogram

NE None established

PRG Preliminary remediation goal

U.S. EPA U.S. Environmental Protection Agency



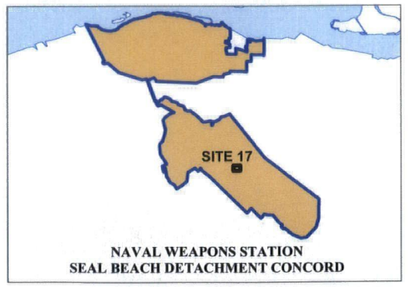
ACSMW014	RESULT	DATE
Barium	77.3	26-May-95
Barium	102	7-Sep-95
Manganese	3.5	26-May-95
Selenium	3.8	7-Sep-95
Vanadium	4.1	26-May-95
Vanadium	4.3	7-Sep-95
Nitrate	4,000	26-May-95
Nitrate	3,200	7-Sep-95
TPH-Diesel	57	7-Sep-95

ACSMW012	RESULT	DATE
Aluminum	479	26-May-95
Barium	90.3	26-May-95
Barium	103	7-Sep-95
Manganese	33.8	26-May-95
Selenium	4.5	7-Sep-95
Vanadium	5.4	26-May-95
Vanadium	3.6	7-Sep-95
Nitrate	4,400	26-May-95
Nitrate	3,700	7-Sep-95
Bis2ehph	55	26-May-95

ACSMW010	RESULT	DATE
Aluminum	150	25-May-95
Barium	93.4	25-May-95
Barium	128	6-Sep-95
Manganese	9	25-May-95
Vanadium	4.6	25-May-95
Vanadium	4.7	6-Sep-95
Nitrate	3,400	25-May-95
Nitrate	3,700	6-Sep-95
Bis2ehph	60	25-May-95
TPH-Motor Oil	100	25-May-95

ACSMW013	RESULT	DATE
Aluminum	396	8-Sep-95
Barium	8.7	31-May-95
Barium	5.6	8-Sep-95
Chromium	7	31-May-95
Chromium	2.8	8-Sep-95
Manganese	13.2	31-May-95
Manganese	14.9	8-Sep-95
Nickel	2.9	8-Sep-95
Vanadium	3.2	31-May-95
Vanadium	3.7	8-Sep-95
Nitrate	5,900	31-May-95
Nitrate	6,100	8-Sep-95

ACSMW011	RESULT	DATE
Aluminum	477J	30-May-95
Aluminum	309	8-Sep-95
Barium	102	30-May-95
Barium	113	8-Sep-95
Chromium	3.7	30-May-95
Chromium	3	8-Sep-95
Manganese	21.9	30-May-95
Manganese	14.4	8-Sep-95
Nickel	2.9	8-Sep-95
Vanadium	5	30-May-95
Vanadium	5	8-Sep-95
Nitrate	3,200	30-May-95
Nitrate	3,600	8-Sep-95



- Building
- Former UST
- Leachfield
- Pavement
- Platform
- Septic Tank
- Steam Cleaner Stall
- Fence
- Railroad
- Drainage Channel
- Sewage Line
- Steam Clean Discharge Line
- Prevalent Direction of Groundwater Flow
- Groundwater Elevation Contour(in feet) (Dashed Where Inferred), May 1995

Topographic Contours

- Major (10 Feet Interval)
- Minor (2 Feet Interval)

Notes:
1. All results are in micrograms per liter.
2. Samples collected from all five wells in May 1995 and September 1995 were analyzed for total metals, semivolatile organic compounds (SVOC), volatile organic compounds, and extractable total petroleum hydrocarbons. Samples collected from all five wells in January 1998 and April 1998 were analyzed for SVOCs only.
3. Groundwater gradient is 0.012.
4. Bis2ehph Bis(2-ethylhexyl)phthalate
5. J Estimated result.

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FIGURE 7
CHEMICALS DETECTED IN GROUNDWATER AT SITE 17

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TABLE 6: ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 17
Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Analyte	Residential Tap Water PRG (µg/L)[a]	Maximum Detected Concentration[b] (µg/L)			
		May 1995	September 1995	January 1998	April 1998
Aluminum	36,000	479	309	--	--
Barium	2,600	102	128	--	--
Chromium[c]	55,000/110[d]	7.0	3.0	--	--
Manganese	880	34	15	--	--
Nickel	730	3.0	Not detected	--	--
Selenium	180	Not detected	5.0	--	--
Vanadium	260	5	5.0	--	--
Nitrate	10,000	4,400	6,100	--	--
Bis(2-ethylhexyl)phthalate	4.8	**60**[e]	Not detected	Not detected	Not detected
TPH-Diesel (mg/L)	None established	0.3	0.06	--	--
TPH-Motor Oil (mg/L)	None established	0.1	Not detected	--	--

Notes:
a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for Tap Water (U.S. EPA 2002b), unless otherwise noted.
b Concentrations shown in bold exceed the PRG.
c The chromium results were reported for total chromium.
d The U.S. EPA Region 9 PRG is 55,000 µg/L for chromium III and 110 µg/L for chromium VI; the Cal-modified PRG for chromium VI is 0.16 µg/L.
e Bis(2-ethylhexyl)phthalate exceeded its tap water PRG in two of 10 samples analyzed.

µg/L Microgram per liter
mg/L Milligram per liter
PRG Preliminary remediation goal
TPH Total petroleum hydrocarbons
-- Not analyzed

Groundwater in this area meets the definition of a potable water source (PRC 1995b). The beneficial uses of groundwater at the site are discussed in Section 2.1.2 of this ROD. The Contra Costa Water District (CCWD) is the municipal water supplier for Concord and the surrounding community (except Bay Point) through surface water intakes at Rock Slough (east of Antioch), Old River (near Discovery Bay), and Mallard Slough (PRC 1995b). Bay Point gets water from the California Cities Water Company. Bay Point's water supply is derived from surface water purchased from the CCWD is blended with groundwater collected from three wells within the Bay Point Area.

2.6 SUMMARY OF SITE RISKS

The following sections summarize the results of the HHRA (Section 2.6.1) and ERA (Section 2.6.2) for Site 17. Conclusions and the risk management evaluation in support of the no action alternative are presented in Section 2.6.3.

2.6.1 Human Health Risk Assessment

The baseline HHRA estimates cancer and noncancer risks under current and possible future conditions if no action is taken at a site. It provides the basis for decisions on the need for action and identifies the contaminants and exposure pathways to be considered in the risk management decision. This section of the ROD summarizes the results of the HHRA for Site 17.

A HHRA was conducted as part of the 1997 RI (TtEMI 1997), using U.S. EPA Region 9 PRGs for industrial and residential soils to estimate potential risk. The 1997 HHRA evaluated potential risks to human health associated with exposure to soil and groundwater at Site 17 under current and future land use scenarios, assuming no subsequent cleanup action. Exposure to sediment was also evaluated for Site 17.

U.S. EPA Region 9 periodically revises the PRGs to reflect changes in risk assessment methodologies, reference doses, cancer slope factors, and exposure assumptions. The PRGs were modified in 1998, 1999, 2000, and 2002. As a result, the original risk estimates presented in the 1997 HHRA were revised in the Draft ROD using the 2000 PRGs. Since the PRGs were again modified after the Draft ROD was prepared, the risk estimates in this document were updated to reflect 2002 PRGs (U.S. EPA 2002b). The risk estimates are presented in this ROD, and detailed tables documenting the risk calculations are included in Appendix B.

U.S. EPA guidance on preparing RODs (U.S. EPA 1999) states that the primary focus of the HHRA summary presented in a ROD should be on those chemicals and exposure pathways found to pose actual or potential threats to human health. For Site 17, where no action is the proposed remedy, the HHRA summary has been abbreviated and discusses primarily the approach used to estimate risks. Further, because the tables included in Appendix B document the HHRA, this information is not repeated in this section of the ROD.

Consistent with U.S. EPA and DTSC guidance on using Region 9 PRGs to assess risk (DTSC 1994b, U.S. EPA 2000), a four-step process was used in the HHRA for Site 17. First, chemicals of potential concern (COPC) were identified. Second, an exposure assessment was performed. Third, a toxicity assessment was conducted. Fourth, cancer and noncancer risks were quantified. Each of those steps, and their outcomes, is described in the following sections.

2.6.1.1 Data Evaluation and Identification of Chemicals of Potential Concern

COPCs are defined as chemicals present as a result of a release associated with current or historic operations and that may pose a potential threat to human health. In the HHRA, COPCs were identified from analytical data generated from soil, sediment, and groundwater samples collected during the SI and RI. All organic compounds detected in soil and groundwater were retained as COPCs. Chemicals eliminated as COPCs were metals detected at concentrations within the range of ambient concentrations established for these sites (see Section 2.2.3) and elements considered essential for nutrition (calcium, iron, magnesium, potassium, and sodium).

The analytical data sets, COPCs, and exposure point concentrations (EPC) identified for soil, sediment, and groundwater (TtEMI 1997) were used in the HHRA. Any revisions to the data sets, COPCs, and EPCs between the completion of the RI and the preparation of the HHRA are described below:

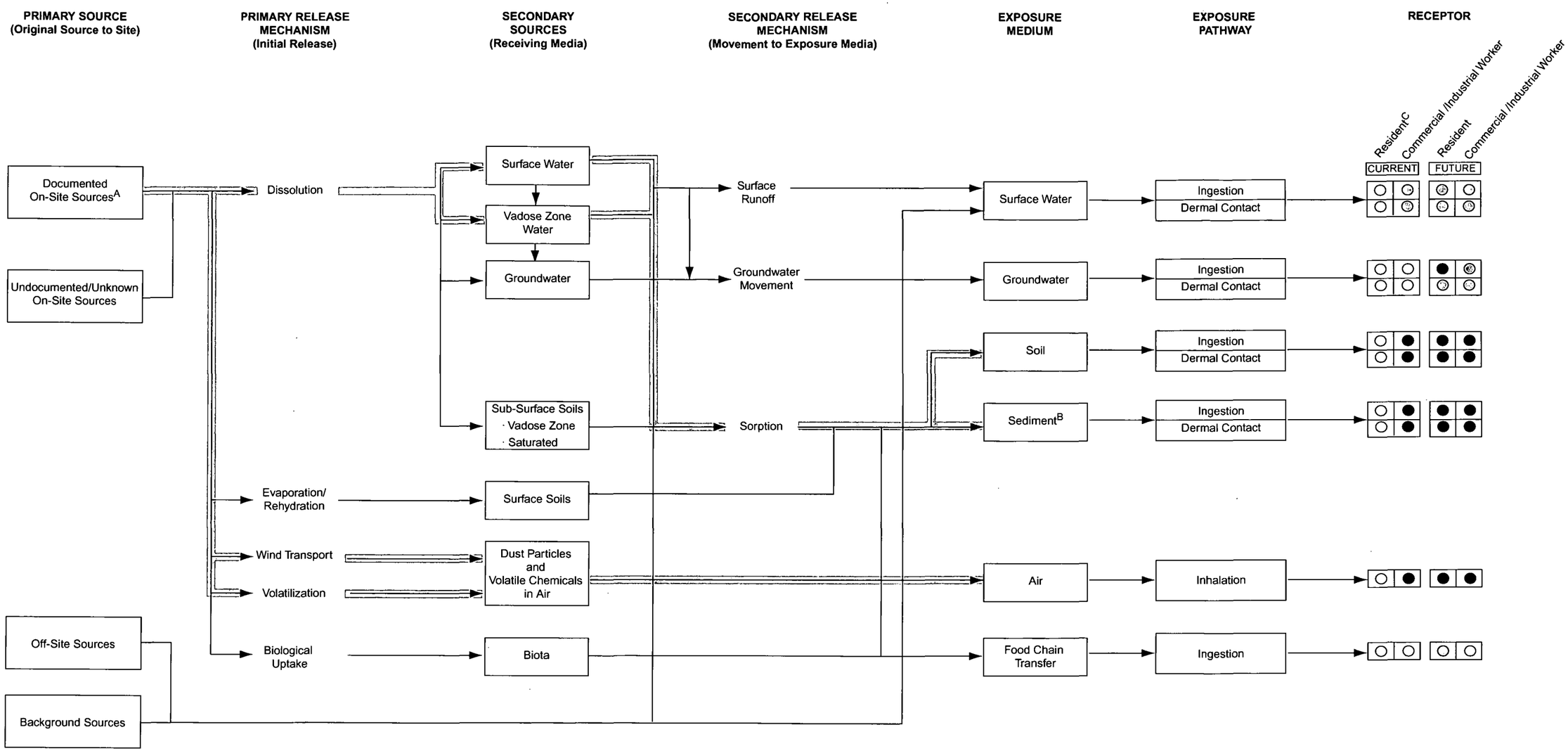
- Bis(2-ethylhexyl)phthalate in groundwater at Site 17. Bis(2-ethylhexyl)phthalate was detected in samples from two groundwater monitoring wells at Site 17. The 1997 HHRA indicated that the cancer risk associated with residential exposure to this contaminant (6×10^{-6}) was within the target range. Two additional quarters of groundwater samples were collected in January and April 1998 to evaluate whether the samples collected during the RI were representative of actual groundwater conditions. Bis(2-ethylhexyl)phthalate was not detected in any of the groundwater samples collected in the 1998 quarterly groundwater monitoring events. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and has not been consistently detected in samples collected at Site 17. Based on these findings, bis(2-ethylhexyl)phthalate was eliminated from the list of COPCs evaluated for groundwater in the revised HHRA.

Tables in Appendix B list the COPCs identified for soil, sediment, and groundwater.

2.6.1.2 Exposure Assessment

Figure 8 presents the conceptual site model (CSM) that served as the framework for the HHRAs for Site 17. The CSM presents current and historic sources and release mechanisms, receiving and affected media, and exposure pathways and receptors. Historic sources of contamination and affected media at the sites are discussed in Sections 2.2 and 2.4. The receptors and exposure pathways evaluated in the HHRA are discussed in the following text.

Naval Weapons Station SBD Concord is not currently scheduled for closure or property transfer. However, the facility is included on the 2005 recommended BRAC list (DOD 2005). Therefore, future closure and property transfer might occur if the station remains on the list when it is finalized. Currently, Buildings IA-24A and IA24B are used by the cattle ranchers to store hay bales for cattle that graze in portions of the Inland Area. Future land use at these sites is not expected to change from its current use. Therefore, future residential, recreational, or private industrial or commercial use of the site is not anticipated. Current and future receptors were identified based on current and projected future land use and activity patterns at each site. The most probable current and future receptors for both sites are base personnel or cattle ranchers. For the risk assessment, activities of base personnel or cattle ranchers were assumed similar to an industrial worker as defined within the PRG framework. The exposure pathways evaluated for an industrial worker within the PRG framework are incidental ingestion of soil, dermal contact with soil, and inhalation of airborne particles and VOCs released from soil.



LEGEND

- ● Complete and significant exposure pathway quantified in the risk assessment
- ○ Incomplete exposure pathway not quantified in the risk assessment
- ○ Potentially complete exposure pathway but not quantified in the risk assessment
- ▭ Denotes potentially significant pathway

NOTES

A = Documented sources at Site 17:
- Petroleum Hydrocarbons
- Metals Constituents

B = Sediment is present only at Site 17

C = Residents are currently not present at Site 17

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FIGURE 8
CONCEPTUAL SITE MODEL FOR HUMAN HEALTH RISK ASSESSMENT

A residential scenario was also evaluated for Site 17 to assess an unrestricted land use scenario. Potential impacts to residents associated with exposure to soils were assessed for three exposure pathways: incidental ingestion of soil, dermal contact with soil, and inhalation of airborne particles and VOCs released from soil. Exposure to chemicals in sediments also was evaluated for Site 17. Data for two depth intervals were evaluated for soil: a 0- to 0.5-foot depth interval and a 0- to 10-foot depth interval. Residential exposure to chemicals in groundwater also was evaluated. The exposure pathways evaluated for residential exposure within the PRG framework are ingestion of groundwater and inhalation of VOCs released while showering and other household uses.

Nominally, the EPC was the 95 percent upper confidence limit of the arithmetic mean (UCL_{95}) of the measured concentrations. When the UCL_{95} exceeded the highest reported concentration, the highest concentration was used as the EPC. The EPCs for all COPCs in soil and groundwater are presented in Appendix B.

2.6.1.3 Toxicity Assessment

The soil PRGs used in the HHRA are available online from U.S. EPA Region 9 (U.S. EPA 2002b). The PRGs are risk-based concentrations that correspond to a cancer risk of 10^{-6} or a hazard quotient (HQ) of 1. For most compounds, only one soil PRG and one tap water PRG are listed in the main PRG table. More than one PRG is listed for some compounds in the electronic file. The following decision rules were applied to compounds with more than one PRG:

- PRGs with a "sat" notation. Two soil PRGs are available for some VOCs: a risk-based PRG and a "sat" PRG that corresponds to the soil saturation limit of the compound. The saturation limit is the predicted concentration at which the compound is expected to be present in free phase, as a nonaqueous phase liquid (for compounds that are liquid at ambient temperatures) or as a solid phase (for compounds that are solid at ambient temperatures). U.S. EPA requested that the "sat" PRG be used in HHRAs prepared for Naval Weapons Station SBD Concord.

- PRGs with a "ceiling" notation. Two soil PRGs are available for some compounds of low toxicity: a risk-based PRG and a "ceiling" limit PRG concentration of 100,000 mg/kg. U.S. EPA assigns a ceiling limit when the risk-based concentration is greater than 100,000 mg/kg (which is 10 percent by weight). U.S. EPA requested that the "ceiling" PRG be used in HHRAs prepared for Naval Weapons Station SBD Concord.

- "Cal-modified" PRGs. DTSC has developed cancer slope factors (SF) that for certain chemicals differ significantly from the U.S. EPA SFs. As a result, some chemicals have two PRGs, one developed using the U.S. EPA SF and the other based on the DTSC SF. The Cal-modified PRGs are lower (more health protective) than the corresponding U.S. EPA Region IX PRGs. DTSC requested that the "Cal-modified" PRGs be used in HHRAs prepared for Naval Weapons Station SBD Concord, if available.

- PRGs for carcinogens. For some carcinogens, separate PRGs are available to assess their noncarcinogenic effects as well as their carcinogenic effects (U.S. EPA 2000). For these compounds, both PRGs were used to evaluate both the cancer risks and noncancer health effects (that is, to calculate the hazard index [HI]).

Finally, PRGs were not available for some of the COPCs at the Site 17. A surrogate (substitute) PRG was selected to evaluate COPCs lacking PRGs. Selection of surrogate compounds was based on chemical structure. The soil and tap water PRGs used to conduct the revised HHRA are listed in Appendix B.

2.6.1.4 Characterization of Risk

Potential cancer risks and noncancer hazard indices (HI) were estimated for residential and industrial exposure to COPCs in soil and groundwater. To estimate the potential cancer risk for a carcinogenic COPC, the EPC for the COPC was divided by the cancer-based PRG and the resulting quotient was multiplied by 10^{-6}. The calculated cancer risks for each carcinogenic COPC in each exposure medium were summed to calculate the total cancer risk for each exposure medium. A cancer risk of 1×10^{-6} is generally used as the point of departure for decisions regarding the need to implement remedial action, and the range of cancer risks between 1×10^{-4} and 1×10^{-6} is referred to as the "risk management range" (U.S. EPA 2002b).

To estimate the potential noncancer hazard for a noncarcinogenic COPC, the EPC for the COPC was divided by the noncancer-based PRG to yield the noncancer hazard quotient (HQ). The calculated HQs for each noncarcinogenic COPC in each exposure medium were then summed to calculate the total HI for each exposure medium. A total HI of less than 1 indicates no potential for noncancer health effects. When the total HI exceeds 1, further evaluation in the form of a segregation of HI analysis is performed to determine whether noncancer hazards are a concern at the site. The noncancer effects of chemicals with different target organs are generally not additive. Segregated HIs are calculated by segregating nocarcinogenic COPCs by affected target organ. For each target organ, the HQs for the associated COPCs are then summed to yield the segregated HI for that target organ. Any one segregated HI that exceeds 1 indicates the potential for adverse noncancer health effects (U.S. EPA 1989). A segregated HI of less than 1 indicates little or no potential for noncancer health effects. Appendix B presents the cancer risks and HIs estimated for all COPCs in soil and groundwater.

Lead was evaluated by comparing the EPC for lead with the U.S. EPA Region 9 residential (400 mg/kg) and industrial (750 mg/kg) PRGs, and with a PRG of 150 mg/kg derived using LeadSpread 7 (DTSC 1999).

2.6.1.6 Results of Risk Characterization for Site 17

The results of the HHRA for Site 17 are summarized in Table 7. Appendix B details the COPCs, EPCs, and PRGs used to conduct the risk assessment; and calculates the chemical-specific cancer risks and noncancer HIs for each exposure medium.

TABLE 7: RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT FOR SITE 17
Final Record of Decision, Inland Area Site 17, Naval Weapons Station SBD Concord

Receptor	Exposure Medium	Cancer Risk[a]	Hazard Index[a]
Resident	Surface soil (0 to 0.5 feet)	3×10^{-6}	0.9
	Subsurface soil (0 to 10 feet)	3×10^{-6}	0.9
	Sediment	1×10^{-5}	0.4[b]
	Groundwater	Not evaluated[c]	0.2
Industrial Worker	Surface soil (0 to 0.5 feet)	9×10^{-7}	0.2
	Subsurface soil (0 to 10 feet)	9×10^{-7}	0.2

Notes:
a The results presented are for the reasonable maximum exposure case.
b The hazard index (HI) presented is the highest segregated HI. The total HI for sediment is 1.1.
c Cancer risk was not evaluated because no carcinogenic chemicals were detected in groundwater samples collected at Site 17.

Soil

For the industrial worker receptor, the carcinogenic risks associated with exposure to chemicals detected in surface and subsurface soil (9×10^{-7}) are less than the point of departure (1×10^{-6}) of the target risk range, and the HI (0.2) is below the threshold value of 1 (Table 7).

For a resident, the carcinogenic risk attributable to exposures to chemicals detected in surface and subsurface soil (3×10^{-6}) and sediment (1×10^{-5}) are within the risk management range. The only chemical-specific risk that exceeded 1×10^{-6} for soil was associated with exposure to benzo(a)pyrene. Benzo(a)pyrene was detected in three of seven soil samples. The risk associated with benzo(a)pyrene was based on the maximum detected concentration of 0.1 mg/kg. The chemical-specific carcinogenic risk for a benzo(a)pyrene concentration of 0.1 mg/kg is approximately 2×10^{-6}, which is within the risk range for which no remedial action is necessary. A conservative risk estimate was made for the 35 shallow soil samples (all with non-detected levels of benzo(a)pyrene) that utilized detection limits between 0.340 and 0.440 mg/kg (Note: these detection limits exceed the benzo(a)pyrene PRG of 0.062 mg/kg). Assuming that average benzo(a)pyrene concentration is approximately half the detection limit or 0.2 mg/kg, the chemical-specific carcinogenic risk is approximately 4×10^{-6} (twice the risk based upon the 0.1 mg/kg maximum detected value), which would also be within the risk range for which no remedial action is necessary. This concentration is comparable to background levels in urban and rural soils (ATSDR 1995). For sediments, the risk associated with exposure to arsenic was the only chemical-specific risk that exceeded 1×10^{-6}. The EPC for arsenic of 5.7 mg/kg is the maximum concentration detected in sediment and is less than the ambient level established for arsenic in soil (7.3 mg/kg).

For the resident, total HIs associated with exposure to surface and subsurface soils are below the threshold value of 1. The highest segregated HI associated with residential exposure to chemicals detected in sediment (0.4) is below the threshold value of 1 (Table 7).

The EPCs for lead in surface soil (225 mg/kg) and subsurface soil (24 mg/kg) are below the U.S. EPA Region 9 residential PRG of 400 mg/kg and industrial PRG of 750 mg/kg, although the maximum concentration of lead detected at the site (225 mg/kg) is above the LeadSpread PRG of 150 mg/kg. Only two other samples (at concentrations of 153 and 157 mg/kg) contained lead at concentrations above this residential PRG. The EPC for lead in sediment (14.5 mg/kg) is less than the residential PRG for soil.

Groundwater

The HI of 0.2 estimated for residential exposure to groundwater is well below the threshold level of 1, and lead was not detected in groundwater samples collected from monitoring wells at Site 17.

2.6.2 Ecological Risk Assessment

The objective of the ERA was to evaluate the nature and extent of risks posed to the environment from the release of hazardous substances at Site 17. The ERA consisted of a screening level exposure estimate and risk characterization. The steps of the ERA included: (1) identifying ecological receptors that could be at risk, (2) identifying chemicals of potential ecological concern (COPEC), (3) identifying potentially complete exposure pathways, (4) formulating a conceptual site model, and (5) characterizing and evaluating risk using a weight-of-evidence approach. Risk characterization integrates the information gained during the assessment of exposure and ecological effects and describes the relationship between potential environmental stressors and adverse ecological effects. Existing site-specific information and reviews of scientific literature are used to evaluate the risk posed by site-specific chemicals. The available information is used in a weight-of-evidence approach to characterize risk to the ecological receptors.

Lines of evidence evaluated in the ERA included: (1) estimates of the daily dose from food-chain modeling to selected receptors (California quail, red-tailed hawk, western harvest mouse, and coyote), (2) comparison of concentrations of metals in sediment and soil to screening benchmarks and ambient levels, (3) Microtox bioassays, and (4) comparisons of results from the California Waste Extraction Test (WET) to the Ambient Water Quality Criteria (AWQC).

The ERA for Site 17 identified a lack of significant habitat near the building and reported minimal use of the site by area fauna (approximately 90 percent of the site is covered by buildings and paved areas). However, the habitat value of Seal Creek is significant, and thus the potential for ecological impact to riparian receptors in the area of Seal Creek from the discharge of the steam pipe was evaluated. The potential risk to aquatic biota was evaluated by comparing site-specific sediment data with: (1) site-specific ambient concentrations in soil and (2) effects range-median (ER-M) values (Long and Morgan 1990). The ER-M represents the 50th percentile, or median, of the effects data. Adverse biological effects are expected at concentrations above the ER-M.

Only beryllium in sediment samples exceeded background concentrations (for soils) in the area. TPH-mo was detected in sediments at concentrations up to 4,100 mg/kg, indicating that hydrocarbons were discharged from the outfall of the steam cleaner to the streambed area. As no ER-M is available for TPH, chemical screening and risk characterization related to TPH focused on the persistent toxic constituents of motor oil (polynuclear aromatic hydrocarbons [PAH] and BTEX. TPH-mo was not considered a COEC because no VOCs (including BTEX) or SVOCs (including PAHs) were detected in sediments. Several metals exceeded background concentrations for soil in the single soil sample collected from the creek bank near the outfall; however, only nickel concentrations also exceeded the ER-M. Should the creek bank erode as expected, and soil deposit into the streambed, the soil is expected to disperse to Suisun Bay. The amount of nickel in this soil sample falls within the range of background concentrations for nickel in the San Francisco Bay sediment, which exceeds the ER-M by a factor of 2.0. Thus, concentrations of nickel in soil near Seal Creek are not sufficiently elevated to warrant concern.

Site 17 does not pose an unacceptable risk to the environment based on these quantitative and qualitative risk screening evaluations and observations of the site during field surveys.

2.6.3 Conclusions and Risk Management Evaluation

U.S. EPA guidance for Superfund remedy selection (1991, 1997, 1999) states that a response action is generally warranted under one or more of the following conditions:

- The cumulative excess cancer risk to an individual exceeds 10^{-4} (based on RME assumptions for current or reasonably anticipated future land use and considering beneficial uses of groundwater).
- The noncancer HI is greater than 1 (based on RME assumptions for current or reasonably anticipated future land use and considering beneficial uses of groundwater).
- Site contaminants cause adverse environmental impacts.
- Chemical-specific standards or other measures that define acceptable risk levels are exceeded and exposure to contaminants above acceptable risk levels is predicted for the RME.

In general, action is not warranted at sites that do not meet these conditions. However, U.S. EPA Region IX has stated that a risk of 1×10^{-6} should be used as the point of departure for decisions regarding the need to implement remedial action, and refers to the range of cancer risks between 1×10^{-4} and 1×10^{6} as the "risk management range" (U.S. EPA 2002b). For sites where risks fall within the risk management range, U.S. EPA Region IX recommends a risk management evaluation by which decisions regarding the need for remedial action are made on a case-by-case basis after consideration of all factors, of which the results of the HHRA and ERA are only one component. The following sections discuss the results of the HHRA and ERA for Site 17

relative to the conditions listed above, and present justification that action is not warranted in support of the risk management evaluation required for Site 17.

The estimated cancer risks for industrial workers from potential exposures to surface and subsurface soils and sediments were less than 1×10^{-6}. The estimated cancer risks to residents from potential exposures to surface and subsurface soils were each 3×10^{-6}, and risk from exposure to sediments was 1×10^{-5}. For both receptors, the HIs for noncancer effects were below 1 (0.21 for industrial workers and 0.89 for residents). Concentrations of lead in soil (both depth intervals) and sediment were below the U.S. EPA Region IX PRG of 400 mg/kg. Cancer risk was not evaluated for groundwater because no carcinogenic chemicals were detected in groundwater samples collected at Site 17. The total HI for residential exposure to groundwater was less than 1.

Because the estimated cancer risks for residential exposure to surface and subsurface soils and sediments were within the risk management range, a risk management evaluation was conducted. Justification that action is not warranted at Site 17 is supported by the following information:

- **Surface and subsurface soils.** The RME cancer risks are attributable primarily to benzo(a)pyrene, which was the only COPC for which the cancer risk exceeded 1×10^{-6}, and to a lesser extent, to other PAHs, with risks ranging from 4×10^{-8} to 4×10^{-7}. Benzo(a)pyrene was detected in three of 26 samples; of these detections, concentrations exceeded the residential PRG in two surface soil samples collected from a drainage ditch (sample locations ACSSB039 and ACSSB040, shown on Figure 4). Only surface soil samples were collected at these locations, and no other locations within the ditch were sampled. Although benzo(a)pyrene was not detected in 23 samples collected at other locations at Site 17, detection limits (ranging from 0.34 to 0.44 mg/kg) were elevated compared with the PRG of 0.062 mg/kg. The cancer risk associated with the highest detection limit (7×10^{-6}) is within the risk management range.

  Although the estimated cancer risk for benzo(a)pyrene is greater than 1×10^{-6}, the detected concentrations of benzo(a)pyrene are consistent with background concentrations reported in soils in northern California (Environ Corporation, ENTRIX, and IRIS Environmental 2002) and worldwide (ATSDR 1995). PAHs are formed during the incomplete combustion of organic materials. They originate from natural sources, such as volcanic eruptions and forest fires, and from anthropogenic sources, primarily the incomplete combustion of fuels such as wood, coal, oil, and gas. PAHs are typically released as particulates into the atmosphere where they can be transported long distances and subsequently deposited on soil, water, and sediments. As a result of these transport and depositional processes, low levels of PAHs appear to be widespread in the environment.

The Navy and Pacific Gas and Electric supported a study of background levels of carcinogenic PAHs in surface soils in northern California (Environ Corporation, ENTRIX, and IRIS Environmental 2002). The study was conducted in cooperation and collaboration with a task group of representatives from the Human Health and Ecological Risk Division and Site Mitigation Branches of DTSC. The final background data set contains 86 samples of surface soil collected from background locations at 21 sites across northern California. The 95th percentile of the final background data set, expressed as benzo(a)pyrene equivalents, was 0.92 mg/kg (Benzo(a)pyrene equivalents represent a weighted sum of the concentrations of carcinogenic PAHs relative to benzo(a)pyrene). Numerous other studies (summarized in ATSDR 1995) support the ubiquitous presence of background levels of PAHs in soils, with background concentrations for benzo(a)pyrene measured at 0.165 to 0.22 mg/kg.

- **Sediments.** The RME cancer risks are attributable primarily to arsenic, which was the only COPC for which the cancer risk exceeded 1×10^{-6}. The EPC for arsenic of 5.7 mg/kg (the maximum concentration detected in sediment) is less than the ambient level established for arsenic in soils (7.3 mg/kg) at Site 17. An ambient screen for metals was not conducted for sediments in the absence of an ambient data set developed specifically for sediments. However, the cancer risk associated with arsenic in sediment is comparable to the risks associated with arsenic present in ambient soils.

These considerations indicate that cancer risks associated with benzo(a)pyrene and other PAHs in soils, and arsenic in sediments at Site 17, reflect ambient conditions and are not associated with a site release.

No chemical-specific standards for soil or groundwater that define acceptable risk were exceeded.

On the basis of these findings, conditions at Site 17 are considered protective to human health and the environment, and no action is warranted.

2.7 DESCRIPTION OF NO ACTION ALTERNATIVE

Based on the results of the RI, as described in this ROD, Inland Area Site 17 does not pose an unacceptable risk to human health or the environment. The potential risks associated with exposure to hazardous substances in soil and groundwater at this site are either within or below U.S. EPA's acceptable levels for the anticipated current and future land uses of the site, including unrestricted use of the property. Accordingly, no action is appropriate for Site 17. The U.S. EPA, DTSC, and RWQCB agree with this determination. The Navy's selection of no action for this site reflects the determination that the overall condition of Site 17 is protective of human health and the environment.

2.8 DOCUMENTATION OF SIGNIFICANT CHANGES

Previously, in a December 2002 draft, this ROD included Site 13 as well as Site 17. As discussed in Section 2.2.3, Site 13 was removed from the ROD over a data gap associated with perchlorate, an emerging chemical of concern that was identified at Site 13. The proposed plan for Site 13 and 17 was released for public comment on March 19, 1999, before Site 13 was removed from the ROD. That proposed plan identified no further action as the preferred alternative for Site 17.

As required by CERCLA and the NCP, the Navy has reviewed all written and verbal comments submitted during the public comment period. Based on this review, the Navy determined that no significant changes to the Site 17 remedy, as originally identified in the proposed plan, were necessary or appropriate.

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APPENDIX A
RESPONSIVENESS SUMMARY FOR INLAND AREA SITE 17

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1.0 OVERVIEW

In March and April 1999, the Navy presented to the public the "Inland Area Sites 13, 17, 22, and 27 Proposed Plan" for Naval Weapons Station Seal Beach Detachment (SBD) Concord, to describe its proposed approach to addressing the four sites. Since that time, the Navy has decided to revise the record of decision (ROD) to address only Site 17. This responsiveness study has been edited in accordance with the reduced scope of the ROD. Although this responsiveness summary has been edited to a limit extent, public comments and Navy responses to public commentary have not been altered to exclude mention of Sites 13, 24a, 22, or 27.

Site 17 was investigated as part of the Navy's Installation Restoration Program, a comprehensive environmental investigation and cleanup program that mirrors the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA requires that a responsiveness summary be prepared after the public comment period ends. The responsiveness summary must meet two requirements:

- Detail community comments on the Navy's proposed cleanup alternative presented in the proposed plan.
- Present the Navy's responses to those comments.

This document has been prepared to fulfill these requirements.

The proposed plan presented the Navy's rationale for proposing the four sites for no action. A 45-day public comment period from March 19, 1999, to May 3, 1999, was provided. A public meeting was held to present the proposed plan and receive public comment on April 7, 1999. Notice of the public meeting was provided to the parties on the community mailing list and published in the *Contra Costa Times*. No written comments were received on the proposed plan; however, oral comments were received from two community members at the April 7 public meeting.

The selected approach to addressing Site 17 is described in the record of decision; it is the same as the preferred approach for this site described in the proposed plan.

Section 2.0 of this document presents background information on the community involvement programs at Naval Weapons Station SBD Concord. Section 3.0 presents the public comments received at the April 7, 1999, meeting on the proposed plan, and the Navy's responses.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

The Navy has conducted an active community involvement program at Naval Weapons Station SBD Concord since 1989 and has initiated a wide range of activities. Numerous open houses, site tours, and community meetings have been held to explain the environmental investigation and cleanup process and to solicit community input on the Navy's approach. Fact sheets have been sent to all parties on the community mailing list that includes elected officials, community organizations and interest groups, residents, and local businesses.

A community relations plan (CRP) was developed for the Inland Area IRP sites in 1989 and 1993. A basewide community relations plan (CRP) for the IRP Sites at Naval Weapons Station SBD Concord was prepared in February 1996. An update of the 1996 CRP was completed in 2003. The CRP presents an outreach program to inform and involve the community in the cleanup decision making process. An information repository has been established to provide public access to detailed information on environmental cleanup at Naval Weapons Station SBD Concord. The repository is located at the Concord Library, 2800 Salvio Street, Concord, California. Additionally, an administrative record for the ROD has been established at the Navy's Integrated Product Team West offices at 2001 Junipero Serra Boulevard, Suite 600 in Daly City, California. The administrative record includes documentation to support final decisions and documentation on sites undergoing environmental investigations and cleanup at Naval Weapons Station SBD Concord. Both the information repository and administrative record are available for public review.

Public fact sheets describing Site 17 were published and distributed to a community mailing list in May 1995, February 1999, January 2003, and March 2005.

The Navy established a restoration advisory board (RAB) comprised of community members to provide a forum for ongoing dialogue among the Navy, regulatory agencies, and the community on environmental cleanup issues at Naval Weapons Station SBD Concord. The RAB includes a wide range of community members. The goal of the RAB is to advise the Navy on its cleanup approach and to review and comment on environmental cleanup documents. RAB meetings are held the first Wednesday of every month and are open to the public. RAB meeting announcements are placed in the Public Meeting section or a Community Bulletin Board section of the *Concord Transcript, Pleasant Hill and Martinez Record, Contra Costa Sun, Contra Costa Times, Martinez News Gazette, and San Francisco Chronicle* during the week just prior to the meeting.

The RAB received a technical assistance for public participation (TAPP) grant from the Navy to assist in their review of Inland Area documents in 2003. With that grant, the Navy hired a RAB-approved contractor to review IR documents for Site 17 and provide comments to the Navy. Comments on the Site 17 ROD and other Site 17 documents were submitted from the TAPP grantee on November 10, 2003. The Navy prepared and distributed responses to those comments to the RAB on March 30, 2004 via electronic mail. They were also distributed in hard copy form at the April 2004 RAB meeting.

3.0 PUBLIC COMMENTS AND THE NAVY'S RESPONSES

The following summary reflects comments and questions raised during the public meeting conducted by the Navy on April 7, 1999. The purpose of the public meeting was to: (1) present the proposed plan for the four Inland Area sites to the community, (2) receive community comments on the proposed plan, and (3) respond to questions. Two community members provided comments during the public meeting. Their comments are summarized below. The Navy provided brief oral responses to community member questions at the public meeting. The following are the Navy's formal and complete responses to the comments received.

No written comments were received during the 45-day public comment period.

3.1 COMMENTS FROM MARCUS O'CONNELL, COMMUNITY MEMBER

1. **Comment:** **Mr. O'Connell raised concern that the Clyde/Concord community is situated over a very high water table and people pump groundwater to water their yards. He questioned whether contaminants from Site 13 (for example, elevated concentrations of benzo(a)pyrene, manganese, lead, and barium) could have entered the groundwater and pose a risk to children playing on yards watered by that groundwater.**

   Response: A total of 312 soil samples from Site 13 were collected and analyzed. With respect to benzo(a)pyrene, the concentrations detected in the soil were within the U.S. Environmental Protection Agency (U.S. EPA) acceptable risk range; that is, the concentrations were not at levels that U.S. EPA would consider to pose an unacceptable risk. This chemical is a residual of the ashes created from historic fire-fighting training at Site 13, and its presence at the site was expected. With respect to its possible effects on the groundwater, benzo(a)pyrene is not very soluble in water; that is, it will not dissolve easily. As a result, benzo(a)pyrene is unlikely to contaminate the groundwater.

   Manganese is a naturally occurring metal often found in rocks, soils, and groundwater. The Navy collected and analyzed groundwater samples from two separate wells, and only one sample contained an elevated concentration of manganese (resampling of the well in May 2000 did not detect elevated concentrations of manganese). The fact that the original sample was not filtered explains the cause of the elevated concentration of manganese. Based on the results from all of the samples collected at the site, elevated concentrations of soluble manganese in groundwater do not appear to be present at the site.

   Groundwater samples were also analyzed for lead and barium; all the samples contained concentrations of lead and barium below screening levels that U.S. EPA has established for testing tap water. As a result, the concentrations of lead and barium did not warrant further investigation.

2. **Comment:** **Mr. O'Connell noted that groundwater samples should be collected during both the rainy and dry seasons to account for varying groundwater flow rates.**

Response: Groundwater samples from the burn pit area (Site 13) were collected in July and August 1992, June and September 1995 and June 2003. Samples from monitoring well BUAMW10 at Site 13 were also collected in May 2000. Samples were collected throughout the year at the remaining three sites (Sites 17, 22, and 24), including during the rainy and dry seasons.

3.2 COMMENTS FROM BEATRICE GAYLORD, COMMUNITY MEMBER

1. **Comment:** **Ms. Gaylord expressed concern that Naval Weapons Station SBD Concord property may be transferred in the future for residential or business use.**

Response: No plans currently exist to transfer Naval Weapons Station SBD Concord property. The Navy's current focus is to ensure that the environmental condition of the property is appropriate for its present use. If the property is slated for transfer in the future, the Navy is required to evaluate the environmental condition of the entire base property (from "fence to fence") and undertake a series of steps to clean up the property to levels appropriate for its intended future use.

2. **Comment:** **Ms. Gaylord asked whether private companies operate within the boundaries of the station and whether they must adhere to applicable environmental requirements.**

Response: Currently, no private industries operate on Naval Weapons Station SBD Concord property. The Navy acquired contaminated land from several private industrial facilities that operate or have operated adjacent to Navy land. The Navy is evaluating or cleaning up any contamination present on these contaminated parcels (located in the area of Naval Weapons Station SBD Concord called the "Litigation Area"). Any existing industries currently operating are located outside of the base.

4.0 COMMENTS FROM PM STRAUSS AND ASSOCIATES ON THE SITE INVESTIGATION REPORT, REMEDIAL INVESTIGATION AND RECORD OF DECISION FOR SITE 17 AND THE NAVY'S RESPONSES HE NAVY'S RESPONSES

PM Strauss and Associates was the grantee of a Technical Assistance Public Participation (TAPP) grant. In that role the firm provided document review and advisory services to the Naval Weapons Station Seal Beach Detachment Concord Restoration Advisory Board (RAB). The Navy received comments from PM Strauss and Associates on November 10, 2003 on Site 17

documents that were reviewed. These documents include: the Site Investigation Report (PRC Environmental Management Inc./Montgomery Watson 1993), the Remedial Investigation Report for Inland Area Sites (PRC 1997) and the Revised Record of Decision for Inland Area Sites 13 and 17 (Tetra Tech EM Inc. [Tetra Tech 2002]. PM Straus and Associates' comments are provided in the following text along with the Navy's responses. The below Navy responses were provided to the RAB via electronic mail on March 30, 2004. They were also distributed in hard copy form at the April 2004 RAB meeting.

1. Comment: **I am concerned that the acid sump, reported by personnel has not been found. This sump potentially contained high levels of lead in a soluble form that could slowly leach to groundwater. The IAS had reported that the sump was in the southeast corner of Building 1A-24. The Navy reported that "Despite the excavation of 3 trenches, drilling of 28 soil borings, and analysis of 58 soil samples and 11 groundwater samples, there is no evidence of a sump in the area of reported activity." I am not in favor of drilling more holes and wells unless there is a conceptual model that indicates that the sump is in another location. However, upon reviewing the RI, Figure 6-10 and 6-7, only one soil sample location was sampled on the immediate eastern side of the Building, and one groundwater monitoring well is located on the south-southwestern side of the building. Most of the soil sample locations for the RI were on the northern side of the building. During the SI, most of the sample locations were between Building 1A-24A and 1A-55, apparently attempting to locate the acid sump. Despite the Navy taking a large amount of samples during the SI and the RI, it does not appear that it focused on the southeast side of Building 1A-24. I think that before this site is granted no further action, this area needs to be ruled out. The Board is also concerned with this issue, as it has asked whether the Navy reviewed aerial and ground photographs of Site 17 to deny the existence of an acid sump.**

Response: Accounts differ on the possible existence of an earthen sump for disposal of battery acid that was reportedly present in the Site 17 Area, and no official documentation on the existence or use of the sump has been obtained.

During the IAS, Ecology and Environment Inc. [E&E] reported that the sump was suspected to be located off the southeast corner of Building IA-24 (E&E 1983). During the SI, PRC and Montgomery Watson conducted a site reconnaissance and excavated trenches in the area southeast of Building IA-24A where visual evidence of surface staining were observed in an attempt to locate the sump (PRC/Montgomery Watson 1993). Soil and groundwater samples were collected but the sump was not found.

During the RI, two soil samples were collected from location ACSSB026 in the area where E&E reported the sump (PRC 1997). Lead concentrations in these samples, which were collected at 1.5 and 3 feet below ground surface (bgs), were 5.8 and 5.0 milligrams per kilogram (mg/kg), respectively. These concentrations are well below the 2002 residential preliminary

remediation goals (PRG) (U.S. EPA 2002) and ambient levels for lead established for the site (18 mg/kg). Lead was not detected in any of the wells at the site including monitoring well ACSMW014 located downgrading of Building IA-24 and the location where E&E reported the sump.

Based on (1) the attempts to locate the sump during the SI site reconnaissance and RI excavations and (2) the absence of elevated concentration of lead at any of the locations at the site, the Navy does not feel that additional investigation for the sump is warranted.

2. Comment: **EPA commented that since cancer risks exceed 1 x 10^{-6} for the residential scenario, it requested a discussion of the risk management decision that was made to justify why no further action is warranted for Site 17. In other words, if a risk assessment concludes that a risk is within the risk target range set by the National Contingency Plan (that is, within the range of 1 x10^{-4} to 1x 10^{-6}), it is incumbent upon the sponsor of the action to explain why it arrived at a decision. I take this issue one step further. I think sites should be cleaned up to the 1 x 10^{-6} level. Where they cannot be, there should be a good justification, and an alternative risk management strategy should be proposed by the proponent. This could take the form of institutional controls or land-use restrictions. Upon reviewing the contamination found at Site 17, I believe that what has been found presents a relatively low risk, but the Navy must explain its risk management strategy.**

Response: EPA guidance for Superfund remedy selection (1991, 1997, 1999) and on the role of baseline human health risk assessment in supporting risk management decisions (U.S. EPA 1991) states that a response action is generally warranted if one or more of the following conditions is met:

- The cumulative excess cancer risk to an individual exceeds 10^{-4} (based on RME assumptions for current or reasonably anticipated future land use and considering beneficial uses of groundwater).
- The noncancer HI is greater than 1 (based on RME assumptions for current or reasonably anticipated future land use and considering beneficial uses of groundwater).
- Site contaminants cause adverse environmental impacts.
- Chemical-specific standards or other measures that define acceptable risk levels are exceeded and exposure to contaminants above acceptable risk levels is predicted for the RME.

In general, action is not warranted at sites that do not meet these conditions. However, U.S. EPA Region 9 has stated that a risk of 1×10^{-6} should be used as the point of departure for decisions regarding the need to implement

remedial action, and refers to the range of cancer risks between 1×10^{-4} and 1×10^{-6} as the "risk management range" (U.S. EPA 2002). For sites where risks fall within the risk management range, U.S. EPA Region 9 recommends a risk management evaluation by which decisions regarding the need for remedial action are made on a case-by-case basis after consideration of all factors, of which the results of the HHRA and ERA are only one component.

The Navy submitted the Revised ROD (Tetra Tech 2002), which justifies why action is not warranted for those chemicals driving the risk range (benzo[a]pyrene for soil and arsenic for sediment). Concentrations of both chemicals are related to background levels rather than an environmental release. Based on a consideration of all factors at this site, the Navy does not believe a remedial action is necessary to address risks within the risk management. A discussion of background concentrations is presented below. More detailed justification is presented in the ROD.

Surface and subsurface soils. Although the estimated cancer risk for benzo(a)pyrene is greater than 1×10^{-6}, the detected concentrations of benzo(a)pyrene at Site 17 are consistent with background concentrations reported in soils in northern California (Environ Corporation, ENTRIX, and IRIS Environmental 2002). Polynuclear aromatic hydrocarbons (PAH) are formed during the incomplete combustion of organic materials. They originate from natural sources, such as volcanic eruptions and forest fires, and from anthropogenic sources, primarily the incomplete combustion of fuels such as wood, coal, oil, and gas. PAHs are typically released as particulates into the atmosphere where they can be transported long distances and subsequently deposited on soil, water, and sediments. As a result of these transport and depositional processes, low levels of PAHs appear to be widespread in the environment.

The Navy and Pacific Gas and Electric supported a study of background levels of carcinogenic PAHs in surface soils in northern California (Environ Corporation, ENTRIX, and IRIS Environmental 2002). The study was conducted in cooperation and collaboration with a task group of representatives from the Human Health and Ecological Risk Division and Site Mitigation Branches of DTSC. The final background data set contains 86 samples of surface soil collected from background locations at 21 sites across northern California. The 95th percentile of the final background data set, expressed as benzo(a)pyrene equivalents, was 0.92 mg/kg (Benzo(a)pyrene equivalents represent a weighted sum of the concentrations of carcinogenic PAHs relative to benzo(a)pyrene). Numerous other studies (summarized in ATSDR 1995) support the ubiquitous presence of background levels of PAHs in soils, with background concentrations for benzo(a)pyrene measured at 0.165 to 0.22 mg/kg.

Sediments. Although estimated cancer risk for arsenic at Site 17 are greater than 1×10^{-6}, the detected concentrations are lower than the ambient levels established for arsenic in soil. The exposure point concentration for arsenic of 5.7 mg/kg (the maximum concentration detected in sediment) is less than the ambient level established for arsenic in soils (7.3 mg/kg) at Site 17.

While an ambient screen for metals was not conducted for sediments, the cancer risk associated with arsenic in sediment is comparable to the risks associated with arsenic present in ambient soils.

3. Comment:

It is recognized that Seal Creek is of significant ecological importance. I am concerned that two ecological risk thresholds were exceeded in drainage channels and Seal Creek. These indicators are "effects range-median" (ERM) and "effects range-low" (ERL). Exceeding these levels indicate the possibility for ecological harm. Exceeding the ERM is more serious. The RI reported that the "metals cadmium, copper, lead, mercury, nickel and zinc were detected in the surface drainage soil samples or Seal Creek sediments at concentrations exceeding ERLs and ERMs." Lead also exceeded the PRG in two drainage channel samples, as well as the ERM in one drainage channel soil sample. Nickel also exceeded the ERM in two drainage channel samples. The San Francisco Bay Regional Water Quality Control Board is also concerned that Site 17 poses adverse effects to the environment due to the following findings: Contaminants (lead, nickel, TPH-mo) are found above the residential Preliminary Remedial Goals (PRGs).

Response:

The effects range low (ER-L) and effects range median (ER-M) levels are sediment quality guidelines, which were developed to evaluate the effect of sediment quality on saltwater and freshwater ecological organisms (U.S. National Oceanic and Atmospheric Administration 1999). The ER-Ls represent observed effects in 10 percent of the study population, while the ER-Ms represent observed effects in 50 percent of the study population. The ER-Ls and ER-Ms were derived with data from soft sedimentary deposits. In the 1997 RI, all soil and sediment concentrations at Site 17 were compared with ER-Ls and ER-Ms. Since the time of the RI, NOAA guidance has recommended that ER-Ls and ER-Ms should not be applied to assessments of upland soils (NOAA 1999). Since four sediment samples were collected at the site from locations within the Seal Creek stream bed, (locations ACSSB029 through ACSSB031), those are the only samples at Site 17 that are appropriate for comparison with sediment quality guidelines. All other samples represent upland soils and are not appropriate for comparison with sediment quality guidelines.

From sediment sample locations ACSSB029 through ACSSB031, surface samples were collected and submitted for analysis of metals, SVOCs, TPH-extractables, and pH. From location ACSSB030, a subsurface sample was also collected (3 to 3.5 feet bgs) and was analyzed for metals, semivolatile organic compounds (SVOC), TPH-extractables, pH, and volatile organic compounds (VOC).

SVOCs or VOCs were not detected in the sediment samples. The only ER-M that was exceeded in the sediment samples was nickel. TPH-motor oil was detected in each of the sediment samples. The maximum concentration of 4,100 mg/kg was detected at sample location ACSSB030 at 3 feet bgs. The other concentrations were below 200 mg/kg. No ER-Ls or ER-Ms have been established for TPH.

Nickel was detected above the ER-M in a subsurface sediment sample collected from location ACSSB030 at 59 mg/kg and a surface sediment sample collected from location ACSSB031 at a concentration of 54.1 mg/kg. The concentrations detected in these samples, which only slightly exceeded the ER-M, were below the established ambient levels for nickel for soil (86 mg/kg). In addition, the nickel concentrations are well below the ambient concentration of nickel in the San Francisco Bay sediment (70 mg/kg to 100 mg/kg)(SFEI 2000). Thus, concentrations of nickel in soil near Seal Creek do not appear to be the result of environmental contamination and thus are not sufficiently elevated to warrant concern.

The ER-L for copper (34 mg/kg) was exceeded in two sediment samples collected from locations ACSSB030 at depth and ACSSB031 at the surface. Like nickel, the concentrations detected in these samples (44.3 and 38.4 mg/kg, respectively) only slightly exceed the ER-L, were below ambient limits established for soil (64 mg/kg), and were within the range of background concentrations for copper in San Francisco Bay (20 to 55 mg/kg, depending on sediment particle size), (SFEI 2000). The concentrations of copper in sediment do not appear to be the result of environmental contamination and thus are not of concern. The ER-L for nickel was exceeded in the same samples that exceeded the ER-M as well as the two surface sediment samples collected from locations ACSSB029 and ACSSB030. All sediment concentrations of cadmium, lead, mercury, and zinc collected from locations ACSSB029 through ACSSB031 were below both the ER-L and ER-M.

The PRGs are used to evaluate risk to human receptors, not ecological receptors. Exceedances of the PRGs were evaluated as part of the human health risk assessment conducted at Site 17, which concluded that no unacceptable human health risks exist from chemicals evaluated at Site 17. The most recent discussion of the human health risk assessment is presented in the ROD (Tetra Tech 2002).

APPENDIX B
HUMAN HEALTH RISK ASSESSMENT TABLES

TABLE B-1
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Quotient (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.40E+04	--	1.00E+05	--	1.40E-01
Antimony	4.60E+00	--	4.09E+02	--	1.13E-02
Barium	1.40E+02	--	6.66E+04	--	2.10E-03
Beryllium	4.40E-01	2.24E+03	1.94E+03	1.96E-10	2.27E-04
Cadmium	3.10E+00	2.99E+03	4.51E+02	1.04E-09	6.87E-03
Chromium[b]	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	1.92E+03	1.33E+04	8.33E-09	1.20E-03
Copper	4.60E+01	--	4.09E+04	--	1.13E-03
Lead[c]	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	1.95E+04	--	2.93E-02
Mercury	9.40E-02	--	3.07E+02	--	3.07E-04
Molybdenum	7.50E-01	--	5.11E+03	--	1.47E-04
Nickel	5.70E+01	--	2.04E+04	--	2.79E-03
Silver	2.70E+00	--	5.11E+03	--	5.28E-04
Vanadium	5.20E+01	--	7.15E+03	--	7.27E-03
Zinc	1.50E+02	--	1.00E+05	--	1.50E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.11E+00	--	4.12E-08	--
Benzo(a)pyrene	1.10E-01	2.11E-01	--	5.21E-07	--
Benzo(b)fluoranthene	1.10E-01	2.11E+00	--	5.21E-08	--
Benzo(g,h,i)perylene[d]	9.90E-02	--	2.91E+04	--	3.40E-06
Benzo(k)fluoranthene[e]	1.30E-01	1.28E+00	--	1.01E-07	--
Chrysene[c]	1.50E-01	1.28E+01	--	1.17E-08	--
Dibenz(a,h)anthracene	2.40E-02	2.11E-01	--	1.14E-07	--
Fluoranthene	1.60E-01	--	2.20E+04	--	7.27E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.11E+00	--	3.93E-08	--
Phenanthrene[d]	7.00E-02	--	2.91E+04	--	2.40E-06
Pyrene	1.90E-01	--	2.91E+04	--	6.52E-06
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL CANCER RISK AND HAZARD INDEX				**8.9E-07**	**2.1E-01**

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
d	The PRG is for pyrene, which was used as a surrogate chemical.
e	Cal-modified PRG is shown.
--	Not available or not calculated because a PRG was not available.

TABLE B-2
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG[a] (mg/kg) Cancer	Industrial Soil PRG[a] (mg/kg) Noncancer	Cancer Risk (unitless)	Hazard Quotient (unitless)
Metals					
Aluminum	1.50E+04	--	1.00E+05	--	1.50E-01
Antimony	1.90E+00	--	4.09E+02	--	4.65E-03
Barium	1.70E+02	--	6.66E+04	--	2.55E-03
Beryllium	9.50E-01	2.24E+03	1.94E+03	4.24E-10	4.90E-04
Cadmium	1.10E+00	2.99E+03	4.51E+02	3.68E-10	2.44E-03
Chromium[b]	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	1.92E+03	1.33E+04	8.33E-09	1.20E-03
Copper	3.40E+01	--	4.09E+04	--	8.32E-04
Manganese	5.80E+02	--	1.95E+04	--	2.98E-02
Mercury	9.30E-02	--	3.07E+02	--	3.03E-04
Molybdenum	7.80E-01	--	5.11E+03	--	1.53E-04
Nickel	5.50E+01	--	2.04E+04	--	2.69E-03
Silver	2.50E+01	--	5.11E+03	--	4.89E-03
Vanadium	5.50E+01	--	7.15E+03	--	7.69E-03
Zinc	7.50E+01	--	1.00E+05	--	7.50E-04
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.11E+00	--	4.12E-08	--
Benzo(a)pyrene	1.10E-01	2.11E-01	--	5.21E-07	--
Benzo(b)fluoranthene	1.10E-01	2.11E+00	--	5.21E-08	--
Benzo(g,h,i)perylene[c]	9.90E-02	--	2.91E+04	--	3.40E-06
Benzo(k)fluoranthene[d]	1.30E-01	1.28E+00	--	1.01E-07	--
Chrysene[d]	1.50E-01	1.28E+01	--	1.17E-08	--
Dibenz(a,h)anthracene	2.40E-02	2.11E-01	--	1.14E-07	--
Fluoranthene	1.60E-01	--	2.20E+04	--	7.27E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.11E+00	--	3.93E-08	--
Phenanthrene[c]	7.00E-02	--	2.91E+04	--	2.40E-06
Phenol	4.00E-01	--	1.00E+05		
Pyrene	1.90E-01	--	2.91E+04	--	6.52E-06
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL CANCER RISK AND HAZARD INDEX				**8.9E-07**	**2.1E-01**

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	The PRG is for pyrene, which was used as a surrogate chemical.
d	Cal-modified PRG is shown.
--	Not available or not calculated because a PRG was not available.

TABLE B-3
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Quotient (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.40E+04	--	7.61E+04	--	1.84E-01
Antimony	4.60E+00	--	3.13E+01	--	1.47E-01
Barium	1.40E+02	--	5.37E+03	--	2.60E-02
Beryllium	4.40E-01	1.05E+03	1.54E+02	4.18E-10	2.85E-03
Cadmium	3.10E+00	1.40E+03	3.70E+01	2.21E-09	8.37E-02
Chromium[b]	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	9.03E+02	1.38E+03	1.77E-08	1.16E-02
Copper	4.60E+01	--	3.13E+03	--	1.47E-02
Lead[c]	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	1.76E+03	--	3.23E-01
Mercury	9.40E-02	--	2.35E+01	--	4.01E-03
Molybdenum	7.50E-01	--	3.91E+02	--	1.92E-03
Nickel	5.70E+01	--	1.56E+03	--	3.64E-02
Silver	2.70E+00	--	3.91E+02	--	6.90E-03
Vanadium	5.20E+01	--	5.47E+02	--	9.50E-02
Zinc	1.50E+02	--	2.35E+04	--	6.39E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.21E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.21E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.21E-01	--	1.77E-07	--
Benzo(g,h,i)perylene[d]	9.90E-02	--	2.32E+03	--	4.27E-05
Benzo(k)fluoranthene[e]	1.30E-01	3.78E-01	--	3.44E-07	--
Chrysene[e]	1.50E-01	3.78E+00	--	3.97E-08	--
Dibenz(a,h)anthracene	2.40E-02	6.21E-02	--	3.86E-07	--
Fluoranthene	1.60E-01	--	2.29E+03	--	6.98E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.21E-01	--	1.34E-07	--
Phenanthrene[d]	7.00E-02	--	2.32E+03	--	3.02E-05
Pyrene	1.90E-01	--	2.32E+03	--	8.20E-05
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL CANCER RISK AND HAZARD INDEX				**3.0E-06**	**9.4E-01**

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
d	The PRG is for pyrene, which was used as a surrogate chemical.
e	Cal-modified PRG is shown.
--	Not available or not calculated because a PRG was not available.

TABLE B-4
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Quotient (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.61E+04	--	1.97E-01
Antimony	1.90E+00	--	3.13E+01	--	6.07E-02
Barium	1.70E+02	--	5.37E+03	--	3.16E-02
Beryllium	9.50E-01	1.05E+03	1.54E+02	9.02E-10	6.15E-03
Cadmium	1.10E+00	1.40E+03	3.70E+01	7.83E-10	2.97E-02
Chromium[b]	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	9.03E+02	1.38E+03	1.77E-08	1.16E-02
Copper	3.40E+01	--	3.13E+03	--	1.09E-02
Manganese	5.80E+02	--	1.76E+03	--	3.29E-01
Mercury	9.30E-02	--	2.35E+01	--	3.96E-03
Molybdenum	7.80E-01	--	3.91E+02	--	1.99E-03
Nickel	5.50E+01	--	1.56E+03	--	3.52E-02
Silver	2.50E+01	--	3.91E+02	--	6.39E-02
Vanadium	5.50E+01	--	5.47E+02	--	1.00E-01
Zinc	7.50E+01	--	2.35E+04	--	3.20E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.21E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.21E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.21E-01	--	1.77E-07	--
Benzo(g,h,i)perylene[c]	9.90E-02	--	2.32E+03	--	4.27E-05
Benzo(k)fluoranthene[d]	1.30E-01	3.78E-01	--	3.44E-07	--
Chrysene[d]	1.50E-01	3.78E+00	--	3.97E-08	--
Dibenz(a,h)anthracene	2.40E-02	6.21E-02	--	3.86E-07	--
Fluoranthene	1.60E-01	--	2.29E+03	--	6.98E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.21E-01	--	1.34E-07	--
Phenanthrene[c]	7.00E-02	--	2.32E+03	--	3.02E-05
Phenol	4.00E-01	--	3.67E+04		
Pyrene	1.90E-01	--	2.32E+03	--	8.20E-05
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL CANCER RISK AND HAZARD INDEX				**3.0E-06**	**8.9E-01**

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	*Total petroleum hydrocarbon*
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	The PRG is for pyrene, which was used as a surrogate chemical.
d	Cal-modified PRG is shown.
--	Not available or not calculated because a PRG was not available.

TABLE B-5
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SEDIMENT
RESIDENT, RME SCENARIO
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Quotient (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.61E+04	--	1.97E-01
Arsenic	5.70E+00	3.90E-01	2.16E+01	1.46E-05	2.63E-01
Barium	1.50E+02	--	5.37E+03	--	2.79E-02
Beryllium	4.00E-01	1.05E+03	1.54E+02	3.80E-10	2.59E-03
Chromium[b]	3.50E+01	--	1.00E+05	--	3.50E-04
Cobalt	1.60E+01	9.03E+02	1.38E+03	1.77E-08	1.16E-02
Copper	4.40E+01	--	3.13E+03	--	1.41E-02
Lead[c]	1.50E+01	--	--	--	--
Manganese	6.50E+02	--	1.76E+03	--	3.69E-01
Molybdenum	9.90E-01	--	3.91E+02	--	2.53E-03
Nickel	5.80E+01	--	1.56E+03	--	3.71E-02
Thallium	2.10E-01	--	5.16E+00	--	4.07E-02
Vanadium	6.20E+01	--	5.47E+02	--	1.13E-01
Zinc	8.10E+01	--	2.35E+04	--	3.45E-03
TOTAL CANCER RISK AND HAZARD INDEX				**1.5E-05**	**1.1E+00**

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	3.69E-01
Liver	4.07E-02
Renal	0.00E+00
Lung	3.36E-01
Blood	3.45E-03
Skin	2.63E-01
Reproductive	0.00E+00
General	3.96E-02
None	2.83E-02
TOTAL	**1.1E+00**

TABLE B-6
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO GROUNDWATER
RESIDENT, RME SCENARIO
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/L)	Residential Tap Water PRG[a] (µg/L)		Cancer Risk (unitless)	Hazard Quotient (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	3.20E-01	--	3.65E+04	--	8.77E-03
Barium	1.30E-01	--	2.55E+03	--	5.09E-02
Chromium[b]	4.50E-03	--	5.47E+04	--	8.22E-05
Iron	4.20E-01	--	1.09E+04	--	3.84E-02
Manganese	1.80E-02	--	8.76E+02	--	2.05E-02
Nickel[c]	2.00E-03	--	7.30E+02	--	2.74E-03
Selenium	2.90E-03	--	1.82E+02	--	1.59E-02
Vanadium	4.80E-03	--	2.55E+02	--	1.88E-02
TPH Extractable					
Diesel	5.20E-02	--	--	--	--
Motor Oil	6.40E-02	--	--	--	--
Anions					
Chloride	5.06E+01	--	--	--	--
Fluoride	1.70E-01	--	2.19E+03	--	7.76E-02
Nitrate	4.80E+00	--	--	--	--
Sulfate	1.28E+02	--	--	--	--
TOTAL CANCER RISK AND HAZARD INDEX				--	**1.6E-01**

Notes:

µg/L	Microgram per liter
mg/L	Milligram per liter
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2002).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
--	Not available or not calculated because a PRG was not available.

TABLE B-7
LEAD CONCENTRATION IN BLOOD
EXPOSURE FROM SURFACE SOIL, 0 TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	230.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.9	3.4	4.0	4.9	5.6	676	1063
BLOOD Pb, CHILD	4.4	8.0	9.5	11.6	13.2	146	247
BLOOD Pb, PICA CHILD	6.0	11.0	13.0	15.8	18.0	94	159
BLOOD Pb, OCCUPATIONAL	1.3	2.3	2.7	3.3	3.7	3475	5464

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/da	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/da	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/da	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	103.5	

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.20	11%	6.3E-4	0.14	12%
Inhalation, bkgrnd		0.05	2%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	45%		0.84	67%
Food Ingestion, bkgrnd		0.22	12%		0.23	19%
Food Ingestion	2.4E-3	0.55	30%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.01	0%
Soil Ingestion	7.0E-3	1.62	37%	1.4E-2	3.24	54%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	1%		0.04	1%
Water Ingestion		0.96	22%		0.96	16%
Food Ingestion, bkgrnd		0.50	11%		0.50	8%
Food Ingestion	5.5E-3	1.28	29%		1.28	21%

Notes:

Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program Version 7.0 (DTSC 2000).

TABLE B-8
LEAD CONCENTRATION IN BLOOD
EXPOSURE FROM SEDIMENT
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	15.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.2	2.1	2.5	3.0	3.4	676	1063
BLOOD Pb, CHILD	1.7	3.1	3.7	4.4	5.0	146	247
BLOOD Pb, PICA CHILD	1.8	3.3	3.9	4.7	5.4	94	159
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	3475	5464

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/da	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/da	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/da	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	6.8	

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.01	1%	6.3E-4	0.01	1%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	73%		0.84	75%
Food Ingestion, bkgrnd		0.22	19%		0.23	21%
Food Ingestion	2.4E-3	0.04	3%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	7.0E-3	0.11	6%	1.4E-2	0.21	12%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	57%		0.96	54%
Food Ingestion, bkgrnd		0.50	30%		0.50	28%
Food Ingestion	5.5E-3	0.08	5%		0.08	5%

Notes:

Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program Version 7.0 (DTSC 2000).