RECORD OF DECISION
INLAND AREA SITES 13 AND 17
NAVAL WEAPON STATION SEAL BEACH
DETACHMENT CONCORD
CONCORD, CALIFORNIA

DS.0141.17748

June 24, 2002

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

Issued by

DEPARTMENT OF THE NAVY
Engineering Field Activity West
Naval Facilities Engineering Command
San Bruno, California

CONTENTS

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	Benzene, toluene, ethylbenzene, and xylene
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COEC	Chemical of ecological concern
COPC	Chemical of potential concern
DTSC	California Department of Toxic Substances Control
EPC	Exposure point concentration
ERA	Ecological risk assessment
ER-M	Effects range-median
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
IAS	Initial assessment study
IRP	Installation restoration program
LeadSpread 7	Risk Assessment Spreadsheet Model Version 7
µg/L	Microgram per liter
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
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
SBD	Seal Beach Detachment
SI	Site investigation
SVOC	Semivolatile organic compound

ABREVIATIONS AND ACCRONYMS (CONTINUED)

TPH	Total petroleum hydrocarbons
TPH-d	TPH as diesel
TPH-mo	TPH as motor oil
TRV	Toxicity reference value
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

1.0 DECLARATION FOR NO ACTION AT NAVAL WEAPON STATION SBD CONCORD, INLAND AREA SITES 13 AND 17

1.1 SITE NAME AND LOCATION

This Record of Decision (ROD) includes Site 13 (Burn Area) and Site 17 (Building IA-24) located in the Inland Area at Naval Weapon Station Seal Beach Detachment (SBD) Concord, formerly known as Naval Weapon Station Concord, in Concord, California.

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

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Sites 13 and 17 at Naval Weapon Station SBD Concord. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Supporting information for the Navy and the Agency's decisions of No Further Action for Site 13 and the No Action for Site 17 is contained in the Administrative Record file.

The U.S. Environmental Protection Agency (U.S. EPA) and the California Environmental Protection Agency (Cal/EPA) concur with the selected remedy.

1.3 DESCRIPTION OF THE SELECTED REMEDY: NO ACTION

The U.S. Department of the Navy, U.S. EPA Region 9, and Cal/EPA have selected no action as the remedy for Sites 13 and 17 of Naval Weapon Station SBD Concord. The Navy conducted a remedial investigation (RI) at Sites 13 and 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 each site. Both assessments found no unacceptable risk under the residential or industrial land use scenarios. Therefore, no action is appropriate for these sites.

The Navy conducted the HHRA and ERA to evaluate whether hazardous substances at the sites pose a significant risk to human health and the environment. The HHRA evaluated potential risks to the most probable receptors (that is, workers or base personnel) from exposure to chemicals identified in soil, sediment, and groundwater. Under this scenario, potential carcinogenic risks and noncarcinogenic hazards do not pose an unacceptable risk. At the request of the regulatory agencies, each site was also evaluated assuming that land use is unrestricted (that is, residential). An unrestricted land-use scenario generally provides the greatest

potential for exposure to contaminants at a site and is very conservative (protective of health) in view of current and projected future land uses. The carcinogenic risks associated with potential residential exposure to chemicals detected at the two sites were less than or within U.S. EPA 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 nearby both Sites 13 and 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 Sites 13 and 17.

Hazardous substances are not present at Sites 13 and 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.

_____ _____

Commander J.C. Steelman
Officer-in-Charge
Naval Weapons Station
Seal Beach Detachment Concord

Date

_____ _____

Branch Chief
U.S. Environmental Protection Agency Region 9
Federal Facilities Cleanup Branch

Date

_____ _____

Chief
Northern California Operations
Office of Military Facilities
California Department of Toxic Substances Control

Date

_____ _____

Executive Director
California Regional Water Quality Control Board
San Francisco Bay Region

Date

2.0 DECISION SUMMARY FOR NAVAL WEAPON STATION SBD CONCORD, INLAND AREA SITES 13 AND 17

2.1 SITE NAME, LOCATION, AND DESCRIPTION

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

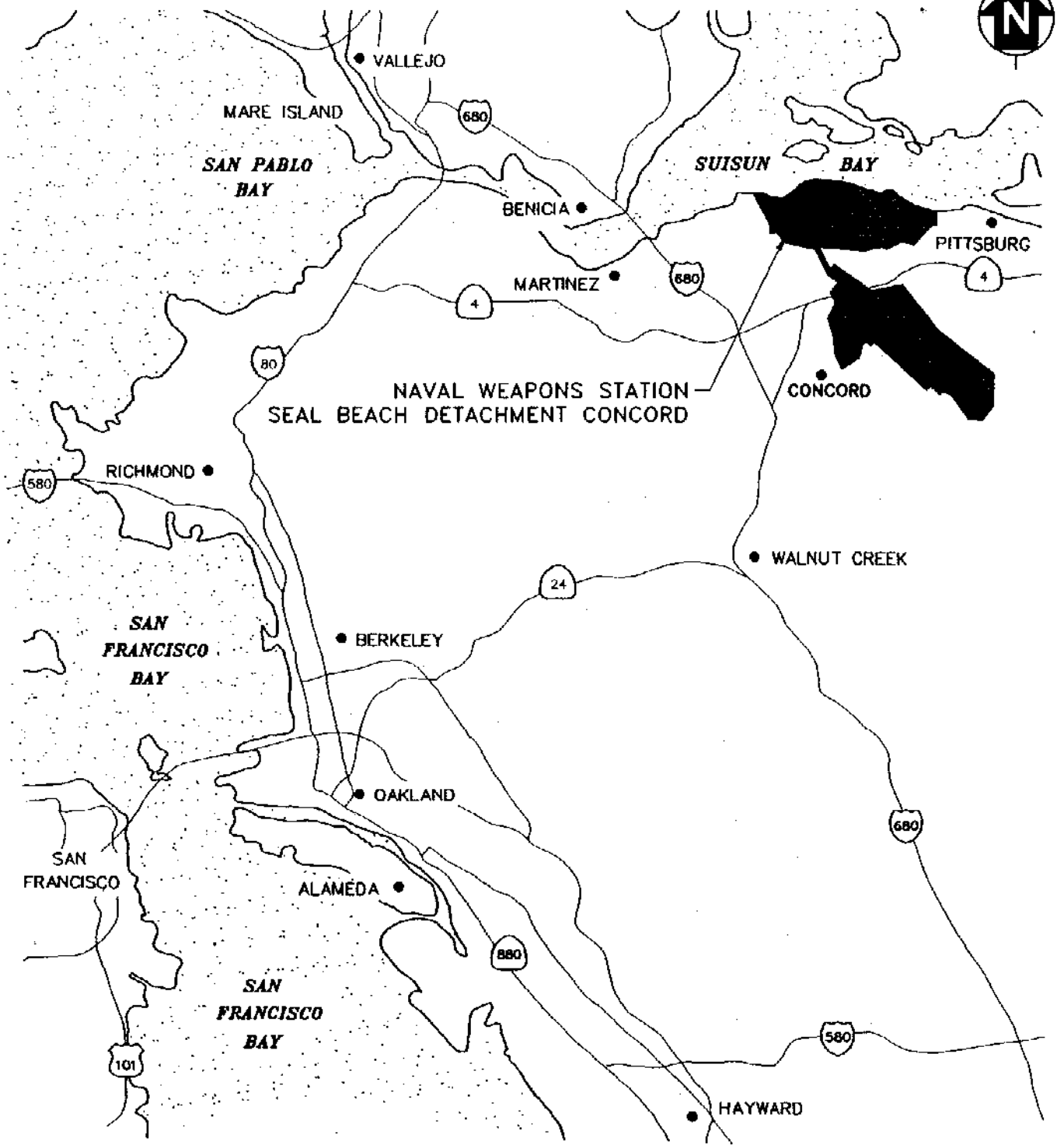
The Inland Area encompasses 6,200 acres. A Navy-owned road and rail line link the Inland Area to the Tidal Area. The Inland Area lies between Los Medanos Hills and the city of Concord, and is crossed by three public roads: State Route 4, Willow Pass Road, and Bailey Road (Figure 2).

Site 13 is a 1,100- by 1,400-square foot area located in the western portion of the Inland Area of Naval Weapon Station SBD Concord (Figure 3). Site 13 was used as a burn area for live ordnance and napalm. Site 17 is located along the eastern side of Kinne Boulevard (Figure 4). Site 17 includes Building IA-24 and surrounding area. Site 17 was formerly used for forklift maintenance and battery service.

2.1.1 Physiography and Topography

Naval Weapon 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. These hills are composed of soft sandstone that erodes easily, making it poorly suited for construction.



0 3.5 7.0 10.0 14.0

SCALE IN MILES (APPROXIMATE)

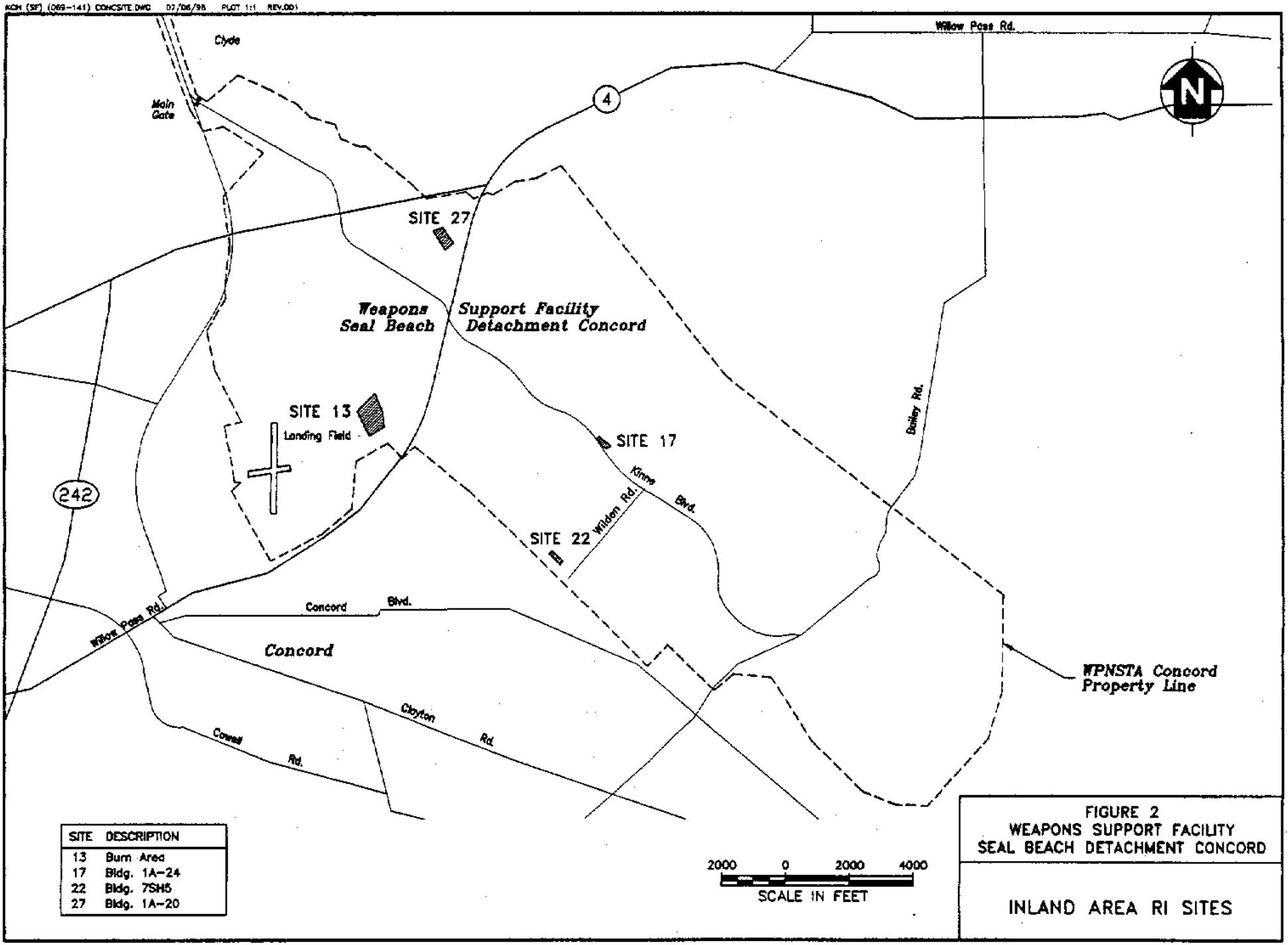
WPNNSUPPFAC CONCORD INLAND AREA
CONCORD, CALIFORNIA

FIGURE 1

FACILITY VICINITY MAP

SIZE	DATE	DWG NAME	REV
A	06/19/99	CONCLOC	1

KCH (SF) (069-144) CONCLOC.DWG 06/17/99 PLOT 1:1 REV.001


Clyde
Main Gate
Willow Pass Rd.
4
SITE 27
Weapons Support Facility
Seal Beach Detachment Concord
SITE 13
Landing Field
SITE 17
Kinne Blvd.
Bailey Rd.
242
SITE 22
Wilden Rd.
Concord Blvd.
Willow Pass Rd.
Concord
Clayton Rd.
Cowell Rd.
WPNSTA Concord
Property Line
N
2000 0 2000 4000
SCALE IN FEET
SITE DESCRIPTION
13 Burn Area
17 Bldg. 1A-24
22 Bldg. 7SH5
27 Bldg. 1A-20
FIGURE 2
WEAPONS SUPPORT FACILITY
SEAL BEACH DETACHMENT CONCORD
INLAND AREA RI SITES

LEGEND:

- FENCE
- DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
- 190 GROUND SURFACE ELEVATION CONTOUR (FT MSL)
- SITE BOUNDARY
- TRENCHES

250 0 250 500
SCALE IN FEET

WPNNSUPPFAC CONCORD INLAND AREA
CONCORD, CALIFORNIA

FIGURE 3

SITE 13 - BURN AREA
SITE FEATURES

SIZE	DATE	DWG NAME	REV
B	07/07/98	SITE13	2

Figure 4

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

2.1.2 Local Geology

Groundwater beneath the Inland Area is commonly found in the coarser sand and gravel units of the unconsolidated alluvial deposits. Typically, groundwater is first encountered at depths of approximately 25 to 50 feet below ground surface under semiconfined to confined conditions. Based on the available information, it is believed that the upper 30 to 80 feet of sediments 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.

Although groundwater in this area meets the definition of a source of potable water, it is not used as such; potable water is provided exclusively from treated surface water sources (PRC Environmental Management, Inc. [PRC] 1995b). Water supply wells near Naval Weapons Station SBD Concord include a well located at the Diablo Creek Golf Course that is used to supply water to the ponds and wells located at Mallard Reservoir. These wells are located more than a mile away from Sites 13 and 17.

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, which is known as Seal Creek after it enters Naval Weapon Station SBD Concord. Flow in Seal Creek along the Inland Area is intermittent and occurs primarily during the winter rainy season. Historical records show that some degree of 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 Sites 13 and 17 and summarize the environmental investigations that have taken place at Naval Weapon Station SBD Concord. Sites 13 and 17 are not the subject of any CERCLA enforcement order or other enforcement activity.

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 Weapon 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 Weapon Station SBD Concord.

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

Former operations in the Inland Area included receiving both containerized and break-bulk munitions for inspection and classification. Munitions were held while they awaited transportation and were outloaded. 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 that were used to support the munitions operations. The 162-acre public golf course (of which 80 acres 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 are currently leased for cattle grazing (Tetra Tech EM Inc. [TtEMI] 1997). There are no current plans for any changes in ownership of the Inland Area or in land use.

Site 13 – Burn Area

The Burn Area is located in the western portion of the Inland Area between the former Landing Field and Kinne Boulevard (Figure 2), and within the area bounded on the west by Wake Way and on the southeast by Tarawa Way (Figure 3). The Contra Costa Canal runs parallel to Wake Way along the west side of the road.

From the late 1940s to approximately 1974, portions of the approximately 1,100- by 1,400-foot area were used for the destruction of live ordnance. Ordnance was destroyed by open burning in large, excavated trenches and natural gullies at the site. The initial assessment study (IAS) indicated that ordnance burned at the site might have included flares, smoke chemicals, Thermite generators, small-arms ammunition, powder, and loose material cleaned from ammunition ships. Mark 1 and Mark 13 flares also might have been burned or buried in the burn pit. The powder from several thousand 5-inch rockets and photoflash cartridges might have been burned. In 1947, a "large quantity of smoke chemicals" (sulfur trioxide and

chlorosulfonic acid) might have been disposed of at the site. An estimated 500,000 pounds of explosives (both black and smokeless powder) were reportedly destroyed at this site from 1967 to 1969. Estimates of the amount of materials destroyed during other periods are not available, however. Residual material from ordnance burning was reportedly removed and disposed of off site (TtEMI 1997).

Site 13 was also used for other purposes. The area was used briefly as a fire-fighting training area, where napalm and fuel oil were ignited and extinguished by firefighters. Napalm is a general term for jellied gasoline and consists of a mixture of gasoline and aluminum soap powder or polystyrene. Explosive ordnance disposal personnel from Naval Weapon Station SBD Concord also stated that target practice with 50-caliber machine guns had been conducted at the site (TtEMI 1997).

Site 17 – Building IA-24

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 4) 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 on the possible existence of an earthen sump for disposal of battery acid that was reportedly present in the area. However, there is no official documentation on the existence or use of an acid sump. Extensive sampling revealed no residual contamination or other evidence of its existence in the area of the reported sump (TtEMI 1997).

The unpaved area between Buildings IA-24 and IA-55 was used for parking trucks. A 1,000-gallon diesel underground storage tank (UST) was located near the northwest corner of Building IA-55, and a 2,000-gallon diesel UST was located west of Building IA-24 (Figure 4). Both USTs were replaced with aboveground tanks in 1997.

Two underground storage tanks were formerly located in the vicinity of Site 17 at the locations illustrated on the site plan, Figure 4. The tank located adjacent to Building IA-55 is designated underground storage tank (UST) IA-55 and the tank located adjacent to Building IA-24A is designated UST IA-24A. Both tanks were removed from the ground in early February 1997.

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 the hole, and restoring the site.

The UST removal report prepared by 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-tert-butyl-ether (MTBE).

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, and MTBE.

Additional soil excavation was performed to remove the stained soils. The northeast wall was extended 2 feet beyond the original excavation and the hole was deepened to a depth of 16 feet below the ground surface. 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 5 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 Concord. The letter concluded that the residual levels of diesel do not pose a threat to human health or the environment. CCCHSD stated that they require no further action at this site.

UST IA-24A

UST IA-24A was a 2000-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 removal of the tank, supply line, return line, and vent, excavating contaminated soil, sampling soil to assess the site for potential contamination, backfilling the hole, 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 (the maximum depth capability of the backhoe). This time 4 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, it was decided to extend the depth of the excavation once more using a different excavator with a depth capability of approximately 21 feet. With new equipment, the excavation was deepened to a depth of 21 feet and stained soil samples were collected from the base of the excavation. This time 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, another excavator was brought to the site and the excavation was deepened to 30 feet. 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 basecrock. Prior to backfilling, a 12-inch diameter conductor casing was placed within the excavation.

For this site, KTW recommended the following work:

- Install a groundwater monitoring (and potential recovery) well within the conductor casing.
- Install at least 2 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 (i.e. water supply wells, springs, seeps, surface waters, etc.) within ½ mile of UST Site IA-24A to evaluate the potential for impact to the receptors.

The Navy plans to conduct a supplemental investigation of UST site IA-24 to delineate the extent of soil and groundwater contamination. The Navy is proposing to conduct additional assessment at UST site IA-

24A. Details regarding the proposed investigation are not yet complete and are being developed by the Navy's public works center, San Diego.

2.2.2 Environmental Investigations at Naval Weapon Station SBD Concord

This section presents an overview of environmental investigations and cleanups conducted by the Navy at Naval Weapon Station SBD Concord. Regulatory agencies that have been actively involved in overseeing the environmental work include the U.S. EPA, the California Department of Toxic Substances Control (DTSC), the Regional Water Quality Control Board (RWQCB), the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the California Department of Fish and Game, and the Contra Costa County Environmental Health Division.

An IAS conducted in 1983 under the Navy's Installation Restoration Program (IRP) identified 26 sites at Naval Weapon Station SBD Concord that could present a risk to human health or the environment. Of these sites, 13 were identified as potentially contaminated and were recommended for further investigation. The remaining sites were proposed for no action. Site 13 was included in these initial 13 sites.

Subsequent to the IAS, a number of additional Inland Area sites were identified and these were investigated during the site investigation (SI) completed in 1993 (PRC 1993). When the SI was completed, portions of Site 13 were proposed for immediate action or removals and Inland Area Sites 13, 17, 22, 24A, and 27 were recommended for an RI. Site 24A, the Pistol Firing Range, is a small arms range that was initially identified and investigated under the IRP. Base security forces currently use the pistol range for periodic exercises. No action is proposed at this time because the site is currently considered active.

Based on the findings of the SI and subsequent targeted investigations, soils contaminated with what appeared to be a residue from burning napalm were excavated in October 1997 from an area of former burning operations at Site 13 (TtEMI 1998a). Results of the HHRA conducted after excavation was complete indicate that the napalm residue and any related constituents that might pose a risk to human health or the environment have been removed. The results of the confirmation sampling event are further discussed in Section 2.5.1.

At Site 13, one additional round of groundwater sampling was conducted in May 2000 in well MW-10 to evaluate elevated concentrations of manganese formerly measured in groundwater samples from that well. The additional sampling was conducted to evaluate previous sample results with detections

of manganese in groundwater that exceeded EPA Region 9 Preliminary Remediation Goal (PRG) for tap water.

At Site 17, the RI included two rounds of groundwater sampling, the first of which detected bis(2-ethylhexyl)phthalate at concentrations in excess of the US EPA Region 9 tap water PRG. The second groundwater sampling event during the RI did not detect bis(2-ethylhexyl)phthalate nor did two additional rounds of groundwater sampling that were conducted following the RI for the purpose of evaluating the potential presence of bis(2-ethylhexyl)phthalate in groundwater (TtEMI 1998b).

Based on a review by the U.S. EPA and DTSC of the RI and agreements reached during the remedial project manager (RPM) meetings up until that time, the Navy pursued a no further action ROD for Sites 13, 17, 22, and 27. A draft ROD was completed on August 24, 1998 and a draft proposed plan was prepared in March 1999. Public review and comment started on March 19, 1999, and ended on April 19, 1999. A public meeting was held on April 5, 1999. A final proposed plan was completed in May 1999. A draft final ROD was completed in June 1999, and a final ROD for Sites 13, 17, 22, and 27 was completed in August 1999. The Navy received comments from U.S. EPA on the final ROD on October 20, 1999. Comments by the U.S. EPA raised issues that required significant additional work. Therefore, the Navy decided to prepare this no further action ROD to exclude Sites 22 and 27 and address only Site 13 and Site 17 to expeditiously close these two sites. The RODs for Site 22 and Site 27 will be handled separately under the Navy's IRP and the appropriate remedial actions for Sites 22 and 27 will be documented in a separate, future ROD.

2.2.3 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 the Inland Area sites. Ambient concentrations were estimated as a basis to assess whether the detection of a constituent indicates site-related contamination or may be attributed to naturally occurring or non-site related anthropogenic sources.

Before the estimation of ambient concentrations began, a conceptual model of the geology in the Inland Area was developed, and sites were grouped based on similar 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. (Sites 22 and 24A are not discussed in this ROD.) The two populations are the result of the 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 to estimate ambient concentrations for the two groups. The locations were chosen in areas topographically upgradient from each site that were not affected by Navy operations or other industrial activities.

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 ambient concentration limits for metals in soils of the two groups of sites are presented in Table 1. The table includes the 2000 U.S. EPA Region 9 PRGs for residential use for comparison. As shown on the table, the estimated 95th percentile ambient limit for arsenic exceeds the residential cancer PRG but is less than the noncancer PRG. For Sites 13 and 17, ambient concentrations for molybdenum, selenium, and silver were set at the detection limit. That is, the metal was considered present at ambient levels if it was not detected in any sample. The detection limits established for these metals in the Quality Assurance Project Plan (included as Appendix 1 of the RI report [TtEMI 1997]) are listed in Table 1. For Site 17, the ambient concentration for thallium was also set at the detection limit. 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 made up of members of the community and the Navy. Since it was formed, the RAB held regular public meetings until April 1999 to discuss the progress of environmental cleanup at Naval Weapon Station SBD Concord. The RAB has not met regularly since that time because of a lack of community interest. Other community involvement efforts for NWS SBD Concord have included legal notices, fact sheets, and press releases that have been published regarding the Naval Weapons Station SBD Installation Restoration Program.

The Inland Area RI report was completed in October 1997 (TtEMI 1997). The RI report was made available to the public through the administrative record located at Naval Weapon Station SBD Concord and the city of Concord public library. The proposed plan for Inland Area Sites 13, 17, 22, and 27, which identifies the preferred alternative (no action), was made 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

TABLE 1

AMBIENT CONCENTRATIONS OF METALS IN SOILS FOR INLAND AREA SITES 13 AND 17 NAVAL WEAPON STATION SBD CONCORD

Metal	Residential Soil PRG[a] (mg/kg)	Ambient Limit (mg/kg)	
		Site 13[b]	Site 17[c]
Aluminum	76,000	21,000 (23,000)	20,000
Antimony	31	0.9 (1.8)	1.2
Arsenic	0.39 (cancer) 22 (noncancer)	10 (27)	7.3
Barium	5,400	560 (660)	210
Beryllium	150	0.12 (0.16)	0.56
Cadmium	9[d]	0.29 (0.50)	0.15
Chromium	210[e]	62 (69)	55
Cobalt	4,700	25	24
Copper	2,900	65 (67)	64
Lead	400/150[f]	33 (38)	18
Manganese	1,800	1,200 (1,500)	870
Mercury	23	0.17 (0.23)	0.14
Molybdenum	390	Detection limit (0.47[g])	Detection limit (0.47[g])
Nickel	150[d]	100 - 130	86
Selenium	390	Detection limit (0.45[g])	Detection limit (0.45[g])
Silver	390	Detection limit (0.13[g])	Detection limit (0.13[g])
Thallium	5.2	1.9 (3.6)	Detection limit (0.43[g])
Vanadium	550	96 (100)	86
Zinc	23,000	99 (110)	83

Notes:

a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for residential land use (U.S. EPA 2000) unless otherwise noted.

b The first value listed is the 95th percentile of the ambient data set and the value in parenthesis is the 99th percentile of the ambient data set.

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

d Cal-modified PRG

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

f 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 Lead Risk Assessment Model Version 7 (California Department of Toxic Substances Control 1999).

g 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 Milligram per kilogram

PRG Preliminary remediation goal

beginning of the public comment period, which extended from March 19 through April 19, 1999. A public meeting was held on April 5, 1999. At this meeting, representatives from the Navy, Cal/EPA, and U.S. EPA answered questions about the proposed no action alternative for Sites 13, 17, 22, and 27 at Naval Weapon Station SBD Concord. The Navy responded in writing to comments received during the public comment period. These responses are presented in the responsiveness summary, which is Appendix A of this ROD.

These community participation activities fulfill the requirements of Sections 113(k)(2)(B)(i-v) and 117(a)(2) of CERCLA. (As noted in Section 2.2.2, Sites 22 and 27 were included in the proposed plan and earlier versions of this ROD, but are now being addressed separately under the IRP.) The No Further Action decision for Site 13 and the No Action decision for Site 17has not changed since the close of the public comment period.

2.4 SCOPE AND ROLE OF THE NO ACTION ALTERNATIVE

This section of the ROD is intended to provide a list of sites at Naval Weapons Station SBD Concord and briefly indicate the environmental status of each site. The purpose of this information is to comply with EPA guidance and provide an overall framework or impression of environmental activities at Naval Weapons Station SBD Concord. With this information, the scope and context of the No Action Alternative for Sites 13 and 17 will be better understood within the larger context of environmental investigation and remediation activities at Naval Weapons Station SBD Concord.

The Navy identified 34 sites at Naval Weapons Station SBD Concord for inclusion in the Naval Weapons Station SBD Installation Restoration Program. The current phase of site activities is summarized below and is presented for each site in Table 2.

- At the IAS or SI stage, the Navy concluded, with regulatory agency concurrence, that no action was needed at 14 sites.
- Litigation Area sites were subject to a remedial action in accordance with a 1989 ROD. The remedial action was completed in 1996, and the Navy is currently conducting post-remediation monitoring and a 5-year review.
- The RI for three Tidal Area sites is under way.
- A ROD is being prepared for Site 1, the Tidal Area Landfill.
- An investigation of groundwater in the Inland Area is being pursued near former solid waste management unit sites 1, 2, 5, 7, and 18.
- A remedial investigation is proposed for Site 22.

TABLE 2

CURRENT PHASE OF SITE ACTIVITIES
NAVAL WEAPONS STATION SBD CONCORD SITES

Site	Site Name	Phase
1	Tidal Area Landfill	Record of Decision, Pending Signature
2	Tidal Area R Area Site	Remedial Investigation
3	Litigation Area Remedial Action Subsite (RASS) 2, Kiln Site	Post-remediation Monitoring
4	Litigation Area RASS 1, Allied Site A	Post-remediation Monitoring
5	Litigation Area RASS 1, Allied Site A	Post-remediation Monitoring
6	Litigation Area RASS 4, Coke Pile Site	Post-remediation Monitoring
7	1944 Explosion Docks	Initial Assessment Study, No Further Action
8	1944 Explosion Ryer Island	Site Investigation, No Further Action
9	Tidal Area Froid and Taylor Roads Site	Remedial Investigation
10	Nichols Road Site	Initial Assessment Study, No Further Action
11	Tidal Area Wood Hogger Site	Remedial Investigation
12	Port Chicago	Initial Assessment Study, No Further Action
13	Inland Area Burn Area	Record of Decision
14	Kinne Boulevard Wells	Site Investigation, Wells Closed, No Further Action
15	Railroad Classification Yard	Initial Assessment Study, No Further Action
16	Black Pit at Red Rock	Site Investigation, No Further Action
17	Inland Area Building IA-24	Record of Decision
18	Inland Area Building IA-25/ IA-20[1]	Initial Assessment Study, No Further Action
19	Inland Area Seal Creek	Site Investigation, No Further Action
20	Old Homestead	Initial Assessment Study, No Further Action
21	Building 97 Fuel Tanks	Initial Assessment Study, No Further Action
22	Inland Area Building 7SH5	Remedial Investigation
23A	Inland Area Explosive Ordnance Disposal	Site Investigation, No Further Action
23B	Inland Area Eagles Nest Explosive Ordnance Disposal	Site Investigation, No Further Action
24A	Pistol Firing Range	Active facility, not currently under investigation
24B	Inland Area Aircraft Firing Range	Initial Assessment Study, No Further Action
25	Litigation Area, RASS 3	Post-remediation Monitoring
26	Litigation Area, RASS 3	Post-remediation Monitoring
27	Inland Area Building IA-20	Feasibility Study
28	Litigation Area, RASS 3	Post-remediation Monitoring
29	Inland Area, Building IA-25	Feasibility Study
30	Tidal Area Taylor Blvd. Bridge Disposal Site	Remedial Investigation
AOC 1	Tidal Area Area of Concern Number 1	Removal Action, Remedial Investigation
SWMUs	Inland Area SWMU Sites 1, 2, 5, 7, and 18	Groundwater Remedial Investigation

Note:

1 This site became Site 27, Inland Area Building IA-20.

- Feasibility studies are proposed or are under way for Inland Area Sites 27 and 29. A Removal Action is proposed for Area of Concern Number 1 located near the Litigation Area sites.
- Although Site 24A was initially addressed in the RI, it has been removed from the Naval Weapons Station SBD Installation Restoration Program because of its status as an active pistol firing range.
- The risk assessments for Sites 13 and 17 (initiated in the RI and updated in this ROD) concluded that contaminants in soil and groundwater do not pose an unacceptable risk to human health and the environment assuming future residential or industrial land use. Therefore, the Navy concluded that these sites do not require further investigation or cleanup actions.

2.5 SITE CHARACTERISTICS

This section summarizes the results of the chemical characterization of soil and groundwater conducted during the SI (PRC 1993), RI (TtEMI 1997), and other related investigations at Sites 13 and 17 (TtEMI 1998a).

During the SI, an explosive ordinance disposal (EOD) visual inspection and geophysical survey were conducted to identify debris at the site and to target test pit locations for physical inspection and contaminant analysis. EOD personnel familiar with Naval ordinance destruction practices conducted the survey. During the field investigation, no live ordinance was encountered although spent ordinance related debris and miscellaneous scrap was found. Soil and groundwater were sampled at Sites 13 and 17 in 1992 during the SI to evaluate environmental conditions and determine if the sites were appropriate for further action, for immediate action or removal, or for no further action. Site 13 was deemed appropriate for both further investigation and immediate action or removal due to the detected inorganic constituents in soils and the presence of burned napalm thickener. Site 17 was deemed appropriate for further investigation to evaluate the steam discharge line and evaluate if metals were present in groundwater.

Soil 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. Two additional groundwater samples were collected at Site 13 on May 16, 2000, to evaluate anomalously high concentrations of manganese detected in a sample from an upgradient background well during an earlier sampling event. Soils at Site 13 that contained napalm residues were excavated in October 1997, and confirmation samples were collected after the removal action (TtEMI 1998a).

The RI report compared the analytical results with the 1995 U.S. EPA Region 9 PRGs current at that time (U.S. EPA 1995) during the evaluation of the environmental conditions at the Inland Area sites. These comparisons were used to help delineate site-related contamination and focus the discussion of chemical characterization in the report. The discussion in the following sections has been updated using the most current PRGs, issued in November 2000 (U.S. EPA 2000).

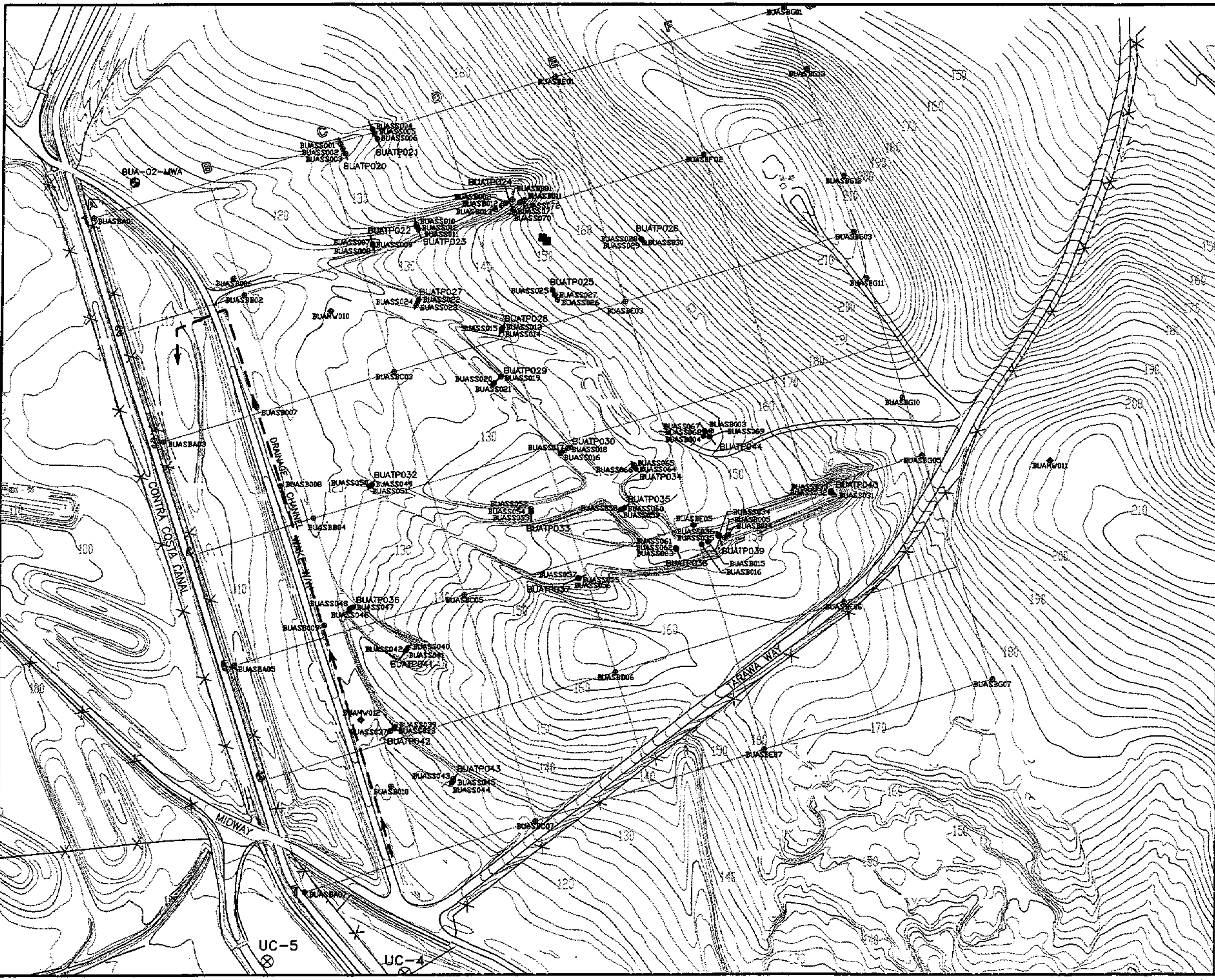
2.5.1 Site 13 – Burn Area

During the SI, a 3- to 5-inch layer of a semisolid, dark honey-colored material was encountered during trenching in one of the gullies at the site. The visible surface extent of the material, which was tentatively identified as napalm residue, was approximately 70 square feet. Investigation during the SI found high concentrations of volatile organic compounds (VOC) in the air, as measured by photoionization detector, at locations where the napalm residue was lifted from the ground.

Further investigation of Site 13 was recommended based on the results of the SI. Soil and groundwater samples were collected at Site 13 during the RI and subsequent sampling events to assess whether historical ordnance burning had contaminated environmental media at the site. Soil sampling focused on gullies where burning is known to have taken place, in drainage channels, and at unbiased grid locations. Three monitoring wells were installed at the site during the RI, and two rounds of groundwater sampling were conducted. The location of soil samples and monitoring wells installed at Site 13 is illustrated on Figure 5. Analytes detected in soils and groundwater during the SI and RI are presented in Tables 3, 4, and 5.

VOCs, semivolatile organic compounds (SVOC), total petroleum hydrocarbons (TPH), and metals were detected in soils (Tables 3 and 4). A portion of the sample results for organic constituents in soil are graphically presented on Figure 6 and a similar figure for inorganic constituents is presented on Figure 7. Benzo(a)pyrene (an SVOC) was detected in two trench samples at concentrations above the U.S. EPA Region 9 residential PRG of 0.062 milligrams per kilogram (mg/kg). The concentration of benzo(a)pyrene was 0.07 mg/kg at location BUATP033 in a sample collected at a depth of 0.5 feet. The sample, along with two others, was obtained from a test pit; the other two samples were collected at depths of 2.5 and 4.0 feet. Benzo(a)pyrene was not detected in the deeper soil samples from this pit. Benzo(a)pyrene was also detected at a concentration of 0.27 mg/kg in a sample collected at a depth of 1.75 feet from location BUATP025. This location was also sampled at depths of 0.5 and 3.0 feet; benzo(a)pyrene was not detected in these samples. These findings suggest that benzo(a)pyrene detected at the site is localized and is associated with relatively small volumes of soil. No other SVOC or VOC was detected in soils collected at the site at concentrations above its residential PRG. Petroleum

JOB No. 2738.1325 FILE: RI-13A.DWG REV. 8/25/97



N

200 0 200 400
SCALE IN FEET

LEGEND:

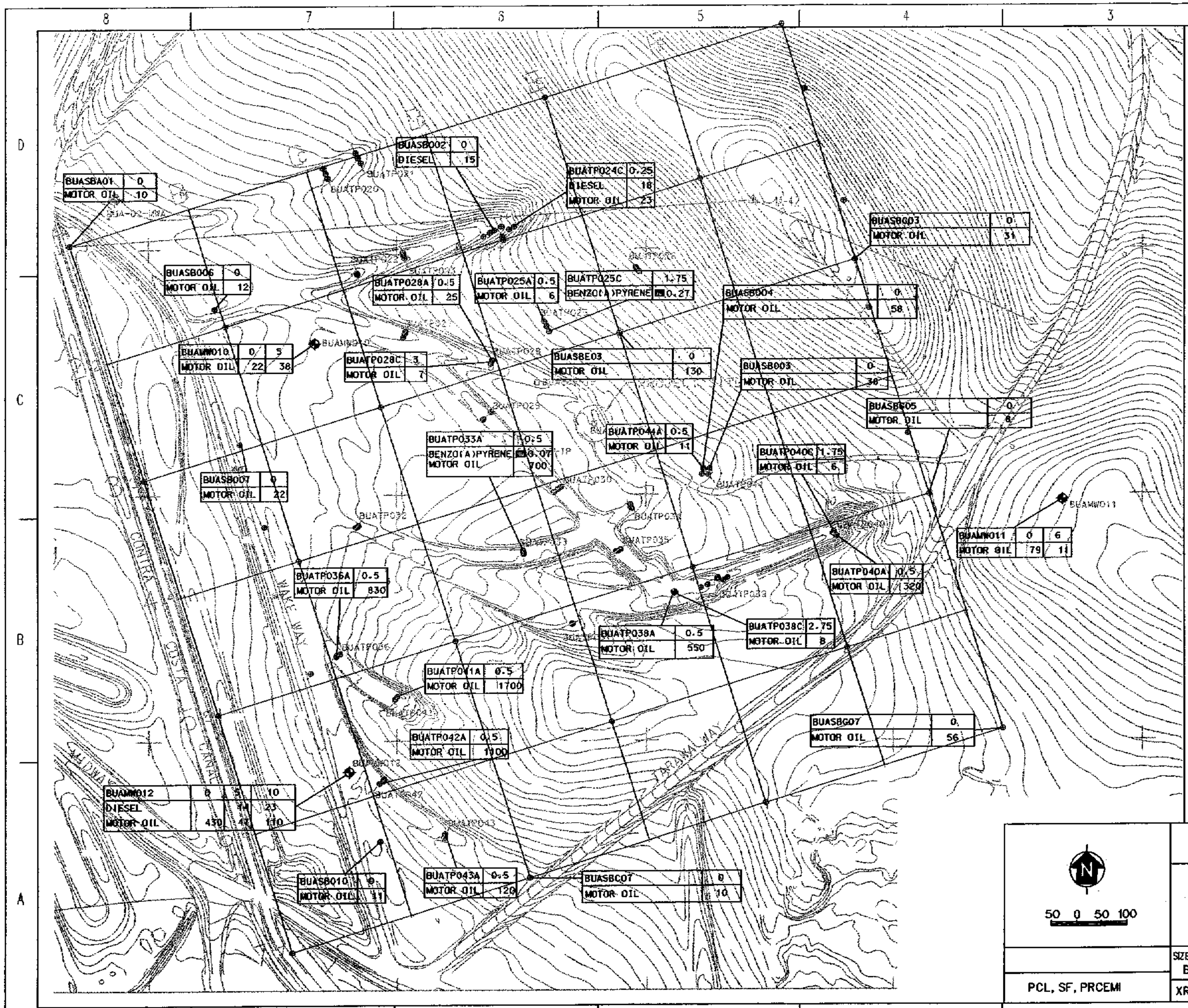
- FENCE
- DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
- 190 GROUND SURFACE ELEVATION CONTOUR (FT MSL)
- PIEZOMETER LOCATION (50–110 FT BGS, INSTALLATION DATA UNKNOWN)
- UC-2 UNOCAL MONITORING WELLS (0–30 FT BGS, INSTALLED BY GTI, 1991)
- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SURVEY GRID LOCATION
- TRENCH PIT ORIENTATION AND LOCATION

NWS CONCORD – INLAND AREA
CONCORD, CALIFORNIA

Figure 5

SITE 13 - REMEDIAL INVESTIGATION SAMPLING LOCATIONS

SIZE	DATE	DWG NAME	REV



NOTE:
1. ONLY ORGANICS DETECTED AT CONCENTRATIONS EXCEEDING U.S. EPA PRELIMINARY REMEDIATION GOALS FOR RESIDENTIAL LAND USE ARE SHOWN.

2. ALL DETECTED CONCENTRATIONS FOR TPH ARE SHOWN

N

50 0 50 100

WPNSTA CONCORD
CONCORD, CALIFORNIA

Figure 6

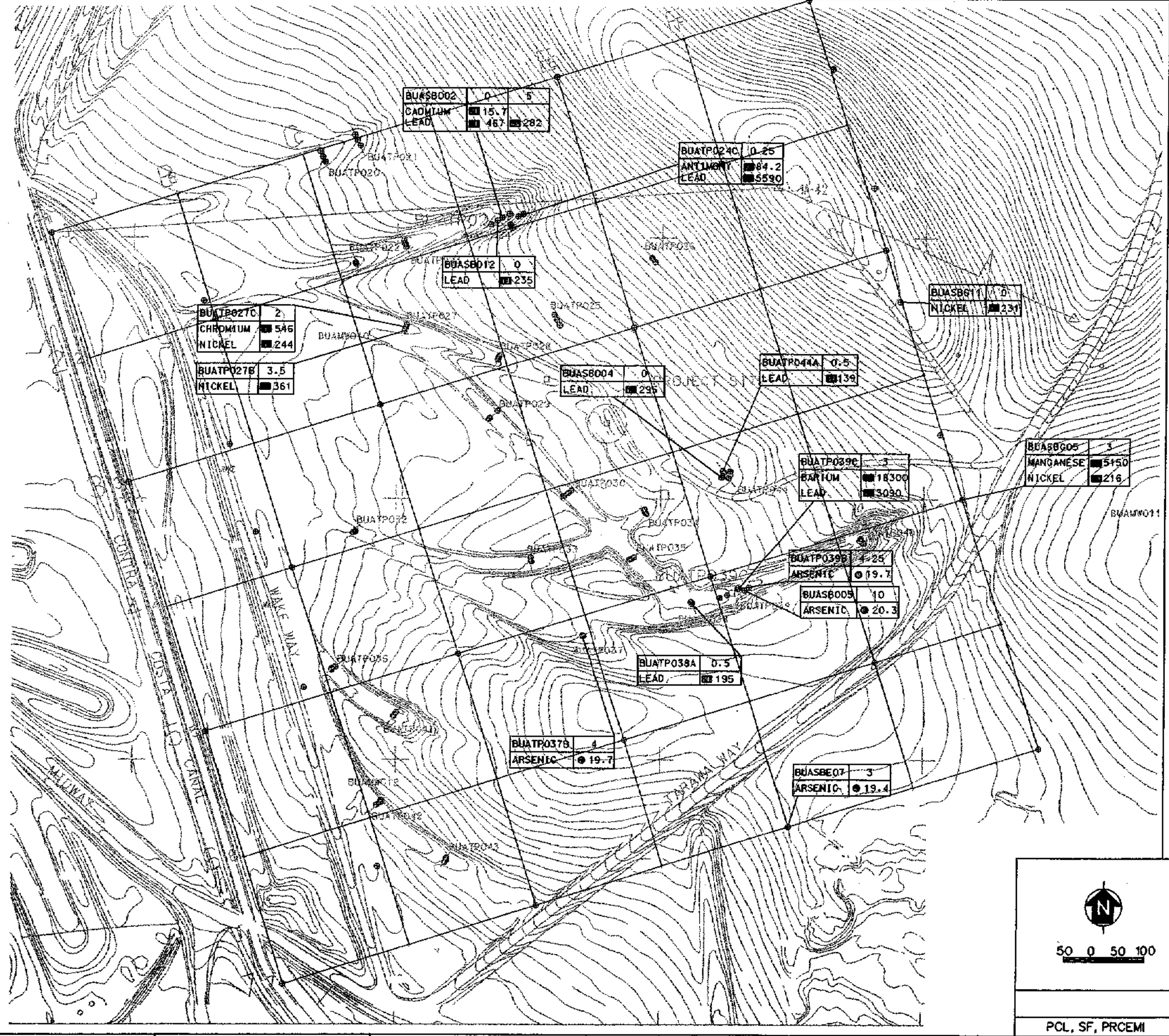
ORGANIC CONSTITUENTS DETECTED DURING THE RI AT SITE 13 IN SOIL

SIZE	DATE	DGN NAME
B	09/16/96	CTO303_13ORGREF.DGN

PCL, SF, PRCEMI

XREF=CTO303_13_ORG.DGN, LV OFF=54

j:\mi2\dgn\zip\cto303_13orgref.dgn Sep. 08, 1997 09:21:13



LEGEND

- MONITORING WELL
- SOIL BORING LOCATION

SAMPLE LOCATION
SAMPLE DEPTH

ACCSSB039	0.5
MANGANESE	5150
ARSENIC	7.6

CONCENTRATIONS IN MG/KG

CONCENTRATIONS GREATER THAN RESIDENTIAL PRG

CONCENTRATIONS GREATER THAN AMBIENT VALUES FOR METALS

ANALYTE

NOTE:
1. ONLY INORGANICS DETECTED AT CONCENTRATIONS EXCEEDING U.S. EPA PRELIMINARY REMEDIATION GOALS FOR RESIDENTIAL LAND USE ARE SHOWN.

2. BERYLLIUM WAS DETECTED AT 39 OF 109 LOCATIONS AT CONCENTRATIONS RANGING FROM 0.21 TO 1.0 MG/KG. AND IS NOT SHOWN ON FIGURE. (SEE SECTION 5.5.1.2 FOR DISCUSSION)

3. ARSENIC IS SHOWN ONLY IF DETECTED ABOVE AMBIENT VALUE.

N

50 0 50 100

WPNSTA CONCORD
CONCORD, CALIFORNIA

Figure 7
INORGANIC CONSTITUENTS DETECTED DURING THE RI AT SITE 13 IN SOIL

PCL, SF, PRCEMI

SIZE	DATE	DGN NAME
B	9/18/96	CTO303_13REF.DGN

j:\mi2\dgn\zip\cto303_13ref.dgn Sep. 08, 1997 09:27:40

TABLE 3

ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Maximum Concentration[c] (mg/kg)	Comment
Volatile Organic Compound			
Chloroform	0.24	0.001	
Toluene	520	0.0023	The PRG is the soil saturation limit and is not a health-based value. The health-based value would be higher.
Xylenes (total)	210	0.006	The PRG is the soil saturation limit and is not a health-based value. The health-based value would be higher.
Semivolatile Organic Compound			
Benzo(a)pyrene	0.062	**0.27**	Concentrations of benzo(a)pyrene exceeded its PRG in two of 119 samples. The two samples were collected from different trenches at depths of 0.5 and 1.75 ft; concentrations of benzo(a)pyrene in nearby samples were less than the PRG (see text).
Benzo(b)fluoranthene	0.62	0.45	
Benzo(e)pyrene	2,300	0.021	A PRG is not available for benzo(e)pyrene; the PRG for pyrene is used as a surrogate value.
Benzoic acid	100,000	0.031	The PRG is a "ceiling limit" established by U.S. EPA Region 9 when the health-based PRG is greater than 100,000 mg/kg.
2-Chlorophenol	63	0.19	
Chrysene	6.1	0.21	Cal-modified PRG.
2,4-Dinitrotoluene	120	0.12	
Fluoranthene	2,300	0.031	
2-Methylnaphthalene	56	0.074	A PRG is not available for 2-methylnaphthalene; the PRG for naphthalene is used as a surrogate value.
Naphthalene	56	0.075	
n-Nitrosodiphenylamine	99	0.063	
Phenanthrene	22,000	0.005	A PRG is not available for phenanthrene; the PRG for anthracene is used as a surrogate value.
Phenol	37,000	1.9	
Pyrene	2,300	0.25	
Total Petroleum Hydrocarbon			
Diesel	NE	5,500	
Motor oil	NE	1,700	

TABLE 3 (Continued)

ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Notes:

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

b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000) unless otherwise noted in the comments column.

c Concentrations shown in bold exceed the PRG.

ft	Feet	NE	None established
mg/kg	Milligram per kilogram	PRG	Preliminary remediation goal

TABLE 4

INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Ambient Concentration[c] (mg/kg)	Maximum Concentration[d] (mg/kg)	Comment
Aluminum	76,000	21,000 - 23,000	**79,700**	Aluminum exceeded the PRG in only one sample (BUA-09-TP at 0.5 ft). The only other chemical that exceeded its PRG in this sample was barium (50,500 mg/kg).
Antimony	31	0.9 - 1.8	**84.2**	Antimony exceeded the PRG in only one sample (BUATP024C at 0.25 feet). Other chemicals exceeding PRGs in this sample were lead (5,590 mg/kg) and manganese (1,890 mg/kg).
Arsenic	0.39 (cancer) 22 (non-cancer)	10 - 27	**37.5**	The maximum concentration was detected at 25 ft. The maximum concentration in the 0- to 10-foot depth interval was 19.7 mg/kg.
Barium	5,400	560 - 660	**50,500**	Barium exceeded the PRG in two samples. The concentration at BUA-09-TP (0.5 ft) was 50,500 mg/kg, and the concentration at BUATP039C (3 ft) was 18,300 mg/kg. Other chemicals that exceeded PRGs at BUA-09-TP were aluminum (79,700mg/kg) and lead (1,330 mg/kg). The lead concentration at BUATP039C was 3,090 mg/kg.
Beryllium	150	0.12 - 0.16	1.2	
Cadmium	9	0.29 - 0.50	**15.7**	Cal-modified PRG. The concentration of cadmium exceeded its PRG in only one sample (BUASB002 at 0 to 1 foot). The only other chemical that exceeded its PRG in this sample was lead (467 mg/kg).
Chromium	210	62 - 69	**546**	The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III. The concentration of chromium exceeded its PRG in only one sample (BUATP027C at 2 feet). Nickel (244 mg/kg) also exceeded the PRG at this location.
Cobalt	4,700	25	68.5	
Copper	2,900	65 - 67	2,090	
Lead	400/150	33 - 38	**5,590**	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 exceeded the PRG of 150 mg/kg in seven of 205 samples analyzed. Other chemicals exceeding PRGs that were collocated with elevated lead were antimony, barium, cadmium, and manganese (see comments for these chemicals).

TABLE 4 (Continued)

INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Ambient Concentration[c] (mg/kg)	Maximum Concentration[d] (mg/kg)	Comment
Manganese	1,800	1,200 - 1,500	**5,150**	The maximum concentration of manganese was detected at an ambient location (BUASBG05). Manganese exceeded its PRG in two site samples (BUATP024C at 1,890 mg/kg and BUATP027B at 3,090 mg/kg.) Antimony (84.2 mg/kg) and lead (5,590 mg/kg) exceeded their PRGs at BUATP024C, and nickel (361 mg/kg) exceeded the PRG at BUATP027B.
Mercury	23	0.17 - 0.23	6.20	
Molybdenum	390	Detection limit (0.47)	2.2	The detection limit presented is the reporting limit goal listed in the Quality Assurance Project Plan in Appendix I of the RI (Tetra Tech EM Inc. 1997).
Nickel	150	100 –130	**361**	Cal-modified PRG. Nickel exceeded its residential PRG in six samples. Concentrations of chromium and manganese were elevated in two of these samples (see comments for chromium and manganese).
Selenium	390	Detection limit (0.45)	0.66	The detection limit presented is the reporting limit goal listed in the Quality Assurance Project Plan in Appendix I of the RI (Tetra Tech EM Inc. 1997).
Silver	390	Detection limit (0.13)	140	The detection limit presented is the reporting limit goal listed in the Quality Assurance Project Plan in Appendix I of the RI (Tetra Tech EM Inc. 1997). The maximum concentration of silver was detected at an ambient location. Concentrations in all other samples were less than the PRG.
Thallium	5.2	1.9 - 3.6	3.60	
Vanadium	550	96 - 100	145	
Zinc	23,000	99 - 110	4,570	

Notes:

a Detected metals 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 2000) unless otherwise noted.

c The estimated ambient concentration is expressed as a range. The lower value is the 95th percentile of the ambient data set, and the higher value is the 99th percentile of the ambient data set.

d Concentrations shown in bold exceed the PRG.

DTSC California Department of Toxic Substances Control
ft Feet
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RI Remedial investigation

TABLE 5

ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Detected Analyte		Tap Water PRG[a] (µg/L)	Maximum Detected Concentration (µg/L)[b]			
			July and August 1992[c] (filtered water samples, all wells sampled)	June 1995[d] (unfiltered water samples, all wells sampled)	September 1995[d] (unfiltered water samples, all wells sampled)	May 2000 (low-flow purging water sample from only well MW-10)
VOCs	None detected	Varies	None detected	Not detected	Not detected	Not analyzed
SVOCs	4-Methylphenol	180	Not analyzed	Not detected	6.0	Not analyzed
Explosives	None detected	Varies	Not detected	Not detected	Not detected	Not analyzed
TPH	TPH-diesel	None established	Not detected	120	100	Not analyzed
Inorganic Analytes	Aluminum	36,000	Not detected	575	849	67.1
	Barium	2,600	31.1	299	262	92.4
	Chromium[e]	55,000/110/0.16[f]	Not detected	23	Not detected	16.4
	Cobalt	2,200	Not detected	Not detected	Not detected	Not detected
	Lead	None established	Not detected	1	Not detected	Not detected
	Manganese	880	18.9	**1,210**	**3,130**[g]	245
	Molybdenum	180	Not detected	97	28	24.7
	Selenium	180	13.5	15	Not detected	7.4
	Thallium	2.4	Not detected	2	Not detected	Not detected
	Vanadium	260	8.9	11	12	Not detected
	Zinc	11,000	40	Not detected	Not detected	6.5
	Nitrate	10,000	Not analyzed	9,600	3,000	Not analyzed
	Nitrate/nitrite	10,000/1,000[h]	**10,500**[i]	Not analyzed	Not analyzed	Not analyzed

TABLE 5 (CONTINUED)

ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Notes:

a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for residential land use (U.S. EPA 2000), unless otherwise noted.

b Concentrations shown in bold exceed the PRG.

c Maximum detected concentration reported in the site investigation (PRC 1993).

d Maximum detected concentration reported in the remedial investigation for the two sampling periods (TtEMI 1997).

e The chromium results were reported for total chromium.

f 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.

g Manganese was detected at a concentration that exceeded its tap water PRG in one of 16 samples analyzed. The maximum detected concentration of manganese in groundwater was collected from well MW-10. The concentration of manganese in the upgradient well (MW-11) on 9/11/95 was 492 µg/L.

h The U.S. EPA Region 9 PRG is 10,000 µg/L for nitrate and 1,000 µg/L for nitrite.

i Analyses for combined nitrate/nitrite were reported for only two samples, both collected in 1992 from monitoring well BUAMW002. Samples collected from this well in 1995 were analyzed separately for nitrate and nitrite; nitrite was not detected (at a detection limit of 30 µg/L) and the detected concentrations of nitrate in well BUAMW002 were 3,500 and 3,000 µg/L (for June and September, respectively). The maximum concentration of nitrate listed in the table for June 1995 was for monitoring well BUAMWU04 and the maximum concentration listed for September 1995 was for monitoring well BUAMW002.

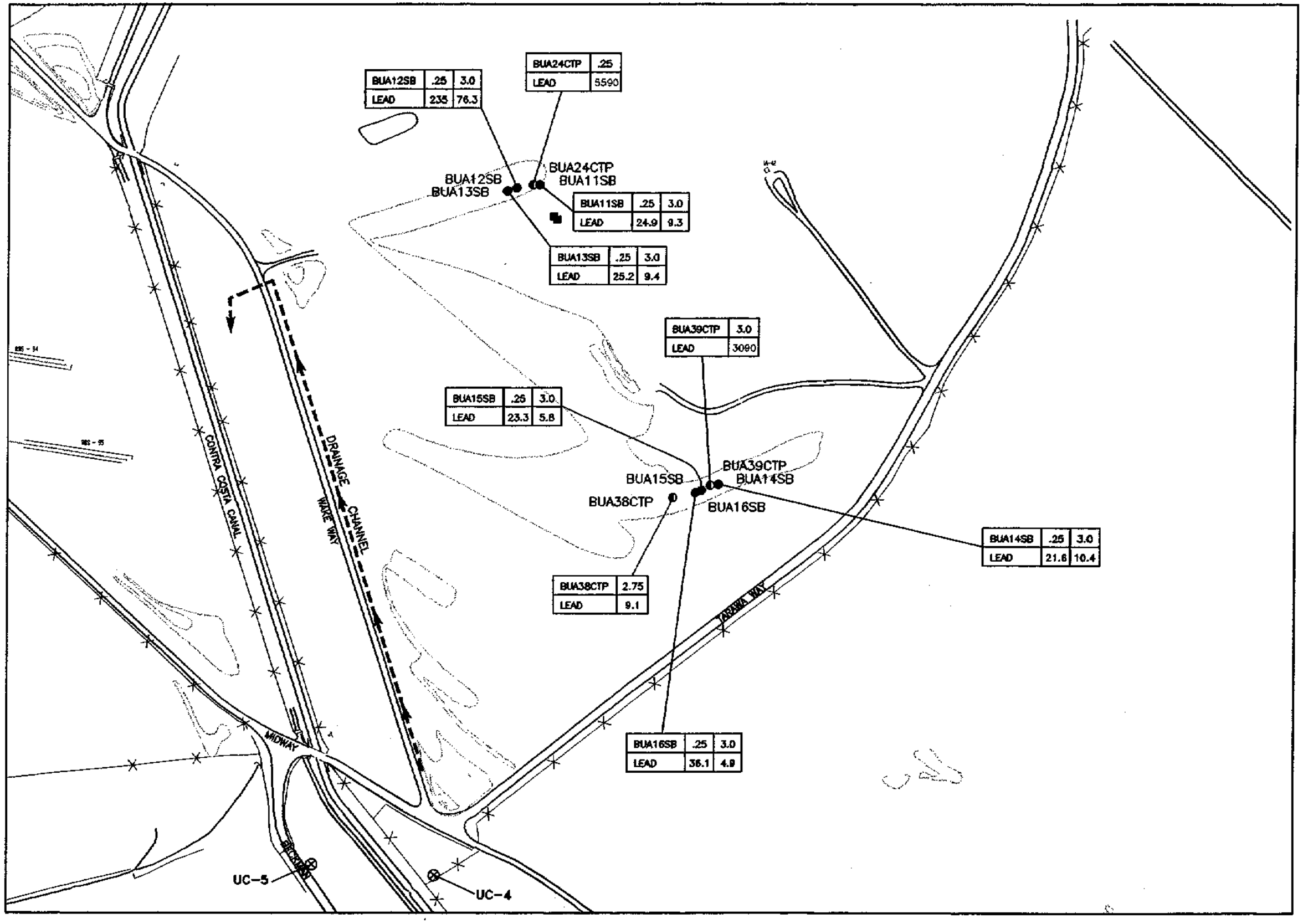
µg/L Microgram per liter
PRG Preliminary remediation goal
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbons
VOC Volatile organic compound

hydrocarbons detected at Site 13 are at locations that are strongly correlated with the former burning operations conducted in the trench excavations at Site 13. TPH as motor oil (TPH-mo) was detected at low concentrations in three surface soil samples from the drainage channel.

Several metals were detected in soil samples collected at the burn area at concentrations above residential PRGs. However, these metals were detected infrequently and at concentrations that exceeded both ambient limits and residential PRGs. The maximum detected concentrations of the metals are listed in Table 4 and concentrations that exceed PRGs are shown in bold. Aluminum, antimony, barium, cadmium, chromium, manganese, and nickel were each detected in one or two of the approximately 150 samples analyzed at concentrations that exceeded residential PRGs. As noted in the footnotes to Table 4, the elevated concentrations of metals were often collocated, particularly with lead. Lead was detected in samples collected at 133 locations; concentrations in seven samples exceeded the residential PRG of 150 mg/kg, derived using DTSC's Risk Assessment Spreadsheet Model Version 7. Concentrations of lead in samples from two trench locations (5,590 mg/kg at location BUATP024C and 3,090 mg/kg at location BUATP039C) were well above the U.S. EPA Region 9 industrial PRG of 750 mg/kg. Additional samples were collected close to these locations. The analytical results from this sampling did not confirm the presence of high concentrations of lead in these areas, and no definable area of lead contamination was identified. The concentrations of lead in the confirmation samples ranged from 4.9 to 235 mg/kg. Figure 8 presents the delineation of elevated lead concentrations detected at Site 13.

Of the 149 detections of nickel, only six exceeded the residential PRG of 150 mg/kg. Arsenic was the only metal that was detected at concentrations that consistently exceeded its residential cancer PRG (all 129 concentrations of arsenic detected exceeded 0.39 mg/kg); however, all concentrations of arsenic in samples collected within the 0- to 10-foot depth interval were less than its established ambient limit (10 to 27 mg/kg), so that the presence of arsenic is not attributed to site activities. The RI concluded that there is no clear spatial pattern of metals at Site 13 and no evidence to suggest that metals are being transported off site. A comprehensive discussion of the soil investigation and nature and extent of the chemicals detected is presented in the RI report (TtEMI 1997).

No organic compounds were detected in samples collected in the SI or the first round of groundwater sampling conducted during the RI in June 1995 (Table 5). TPH as diesel (TPH-d) and 4-methylphenol were detected in samples from at least one well during the second-round groundwater sampling. No other organic compound was detected in groundwater samples collected at the site.



N

LEGEND:

- SOIL BORING LOCATION (0-3 FT BGS)
- TEST PIT LOCATION (SAMPLES COLLECTED AT 0.25 AND 2.75 FT BGS)
- PIEZOMETER LOCATION (50-110 FT BGS, INSTALLATION DATA UNKNOWN)
- UC-2 ⊗ UNOCAL MONITORING WELLS (0-30 FT BGS, INSTALLED BY GTI, 1991)

BUA11SP	.25
LEAD	24.9

SAMPLE LOCATION
SAMPLE DEPTH
CONCENTRATIONS IN MG/KG
ANALYTE

—×— FENCE

DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)

NOTES:

1. RED COLOR INDICATES LEAD GREATER THAN TTLC VALUE (1000 mg/kg)

125 0 125 250
SCALE IN FEET

NAVAL WEAPONS STATION CONCORD
CONCORD, CALIFORNIA

Figure 8

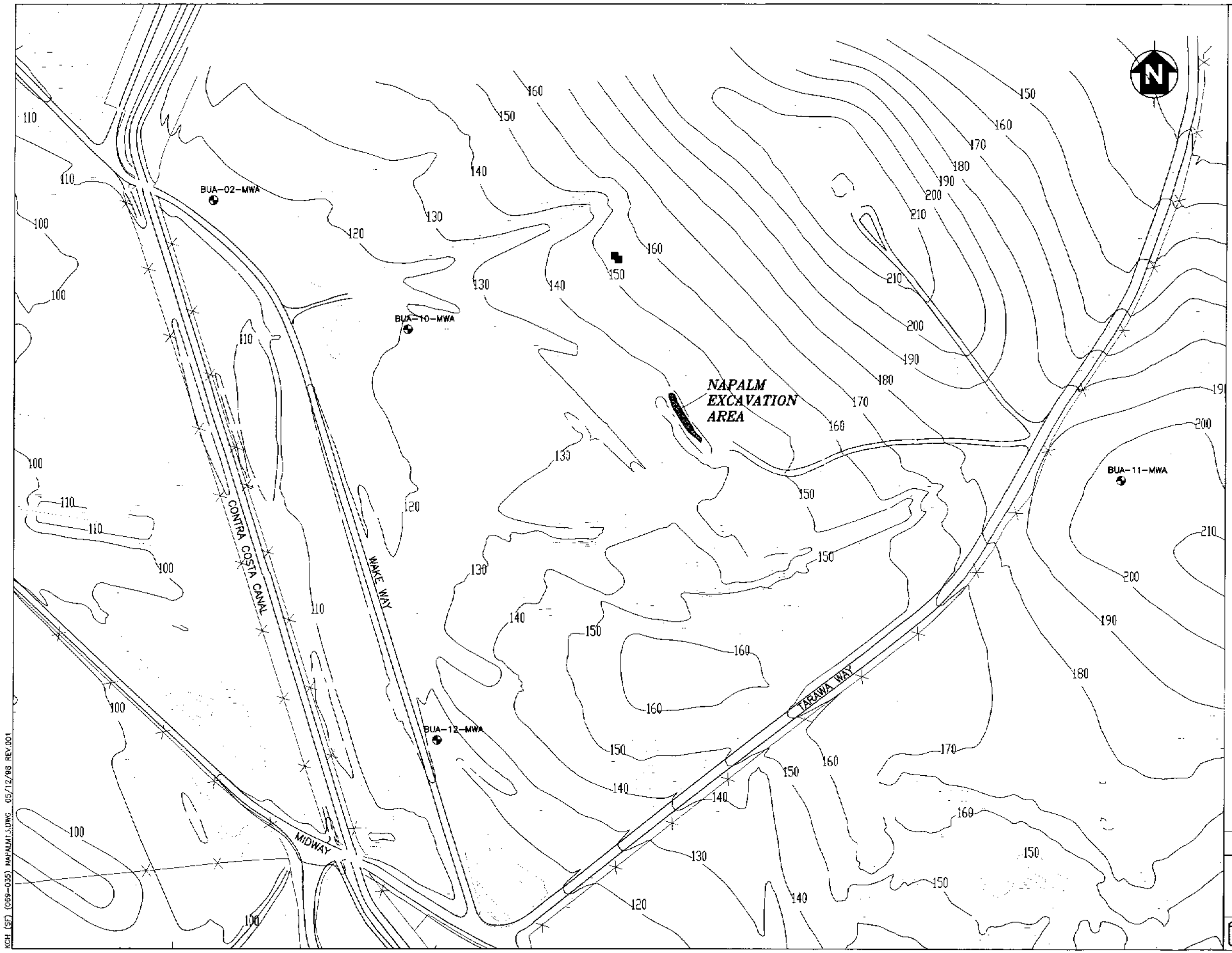
SITE 13 - DELINEATION OF ELEVATED LEAD CONCENTRATIONS

SIZE	FSCM NO.	DWG NO.	REV
B		LEAD13	2

During sampling and analysis for the 1995 RI, the maximum concentration of manganese detected in samples collected in June (1,210 µg/L) and September (3,130 µg/L) were the only results for metals in groundwater that exceeded a residential tap water PRG. These concentrations were detected in samples from monitoring well MW10. All groundwater samples collected in 1995 were analyzed at the laboratory without filtration to remove suspended particles of soil. In contrast, samples collected in 1992 were filtered in the field before they were analyzed at the laboratory. Table 5 provides a summary of the maximum concentrations of metals measured in groundwater. A review of the groundwater data from 1992 determined that the concentrations were significantly lower for most analytes, suggesting that turbidity had a strong influence on the results. To determine if sample turbidity was the reason for the anomalous increase in the results, Well MW-10 was sampled again in May 2000 using a low-flow purging technique to minimize suspended particulate matter. The concentration of manganese was more than 12 times less than the maximum concentration reported from the 1995 sampling event, suggesting that the elevated concentrations were the result of turbidity or other artifacts. In addition, no soil sample collected from the boring at well MW10 contained elevated concentrations of manganese. These findings suggest that the elevated concentrations of manganese detected during the June and September 1995 sampling events were not the result of a release from the site.

Based on the findings of the SI, the Navy decided to excavate soils contaminated with napalm residue. The residue and underlying contaminated soils were excavated from the former burn areas in October 1997. The area of the napalm residue excavation is illustrated on Figure 9. Because the only contamination was from petroleum hydrocarbons, the Navy, with concurrence of the U.S. EPA, DTSC, and RWQCB, submitted a work plan to RWQCB and subsequently completed soil cleanup. Approximately 23 cubic yards of contaminated soil and napalm residue was disposed of off site (ItEMI 1998a). The samples collected during the RI at locations BUATP025 and BUATP033 that contained benzo(a)pyrene at concentrations greater than the PRG were not collocated with the napalm residues; soils at these areas were therefore not removed as part of this action.

Results for samples collected after excavation was complete indicate that the napalm residue and related constituents are no longer present at the site at concentrations that exceed risk-based screening levels and residential PRGs. The removal of the soil from the trench reduced the levels of TPH to less than 100 mg/kg (ItEMI 1998a). Table 6 presents the results for post-excavation confirmation samples collected in October 1997 (analyzed for TPH and VOCs) and February 1998 (analyzed for SVOCs).



LEGEND:

- FENCE
- PIEZOMETER LOCATION (50--110 FT BGS, INSTALLATION DATA UNKNOWN)
- MONITORING WELL LOCATION

200 0 200 400
SCALE IN FEET

WPNSUPPFAC DETACHMENT CONCORD

Figure 9

SITE 13-NAPALM EXCAVATION AREA

Tetra Tech EM, Inc.

KOH (SF) (069-035) NAPALM13.DWG 05/12/98 REV 001

TABLE 6

ORGANIC CONSTITUENTS DETECTED IN SOIL CONFIRMATION SAMPLES COLLECTED AFTER THE NAPALM RESIDUE REMOVAL AT SITE 13 NAVAL WEAPON STATION SBD CONCORD

Analyte	Maximum Detected Concentration (mg/kg)			
	October 1997		February 1998	
	Sample Depth 0.75 - 1.0 feet	Sample Depth 2.75 – 3.00 feet	Sample Depth 0.5 - 0.75 feet	Sample Depth 2.0 - 2.5 feet
TPH-d	31	< 10	--	--
TPH-mo	52	< 34	--	--
Benzene	0.012	< 0.0005	--	--
Toluene	0.004	< 0.0005	--	--
Ethylbenzene	0.001	< 0.0010	--	--
Xylene	0.005	< 0.0005	--	--
SVOC	--	--	Not detected	Not detected

Notes:
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound
TPH-d Total petroleum hydrocarbon as diesel
TPH-mo Total petroleum hydrocarbon as motor oil
-- Not analyzed

2.5.2 Site 17 - Building IA-24

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 use of 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 (Figure 4). A suspected sump for disposal of battery acid was alleged to be present at the site, but observations during field sampling and the subsequent analytical laboratory results did not find any evidence to suggest its actual existence.

In addition to CERCLA activities, the Navy investigated the septic system under the Resource Conservation and Recovery Act. Five monitoring wells were installed at the site during the RI. Two rounds of groundwater samples were collected during the RI, and two additional rounds of groundwater sampling and analysis were conducted after the RI. The location of samples collected during the RI illustrated on Figure 10.

Figure 10

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

SVOCs were detected in soil samples at concentrations below PRGs, with one exception. Table 7 presents a summary of organic constituents detected in soils at Site 17. Benzo(a)pyrene was detected in two of 34 samples; concentrations in both samples exceeded the residential PRG in two surface soil samples collected from a drainage ditch (sample locations ACSSB039 and ACSSB040). Figure 11 illustrates the location of organic constituents detected in soil during the RI at Site 17. Results for all other samples were reported as not detected, although detection limits (ranging from 0.34 to 0.44 mg/kg) were elevated compared with the PRG of 0.062 mg/kg. Only surface samples were collected at these locations, and no other samples had been collected from the trench. However, the two concentrations (0.073 and 0.11 mg/kg) of benzo(a)pyrene that exceed the PRG are comparable to levels commonly reported for urban and rural soils (Agency for Toxic Substances and Disease Registry 1995), which suggests that the concentrations detected are not the result of a release. No petroleum hydrocarbons were detected in samples collected near the former fuel USTs. The maximum concentration of 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 detected in a sample collected at Seal Creek. Table 8 presents a summary of organic and inorganic constituents detected in sediment at Site 17. No VOCs or SVOCs were detected in sediments. Inorganic chemicals were not identified above ambient levels in soil samples collected near the drainage ditches.

Three metals were detected in samples of soil collected in the 0- to 10-foot depth interval at concentrations that exceeded the 2000 PRGs. Table 9 presents a summary of inorganic constituents detected at Site 17. Figure 12 illustrates the location 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 less than the established ambient limit of 7.3 mg/kg so that 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; the maximum detected concentration was 225 mg/kg. Nickel was detected in samples collected at 48 locations. Concentrations in seven samples exceeded the residential PRG; five were collected from depths of 19 feet and greater, one was from a depth of 9.5 feet, and one was from a depth of 5 feet. In all cases, concentrations of nickel in nearby samples were less than the PRG. The lack of a pattern in the spatial distribution of samples that contained elevated concentrations of nickel suggests that nickel is not present as a result of a site release. Table 9 lists all metals detected in soil samples at Site 17 and the ambient and PRG values. Table 8 presents similar information for sediment samples. Infrequent detections of metals in soils at concentrations above ambient and PRG values indicate that there is no clear spatial pattern of metals on site and no evidence to suggest

TABLE 7

ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17
NAVAL WEAPON STATION SBD CONCORD

Detected Analyte[a]	Residential Soil PRG[b] (mg/kg)	Maximum Concentration[c] (mg/kg)	Comments
Volatile Organic Compound			
1,2-Dichloropropane	0.35	0.058	1,2-Dichoropropane was detected in only one sample at a depth of 10 ft.
4-Methyl-2-pentanone	786	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 34 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	0.61	0.13	Cal-modified PRG.
Chrysene	6.1	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	NE	0.07	
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 2000), 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

Figure 11

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

TABLE 8

ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN SEDIMENT AT SITE 17 NAVAL WEAPON 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 1:6 ratio of chromium VI to chromium III.
Cobalt	4,700	24	15.8	
Copper	2,900	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 California Department of Toxic Substances Control Lead Risk Assessment Model Version 7 (DTSC 2000).
Manganese	1,800	870	646	
Molybdenum	390	0.47	1.1	
Nickel	150	86	59	Cal-modified PRG
Thallium	5.2	0.13	0.21	The 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. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000), 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.

ft Feet

mg/kg Milligram per kilogram

NE None established

PRG Preliminary remediation goal

RI Remedial investigation

TABLE 9

INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17
NAVAL WEAPON 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 or equal to the ambient concentration in all samples.
Barium	5,400	210	1,320	
Beryllium	150	0.56	0.95	
Cadmium	9	0.15	3.1	Cal-modified PRG.
Chromium	210	55	78.5	The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III.
Cobalt	4,700	24	29.4	
Copper	2,900	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 2000). 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 feet was 1,500 mg/kg.
Mercury	23	0.14	0.45	
Molybdenum	390	0.47	1.8	
Nickel	150	86	**203**	Cal-modified PRG. Nickel exceeded its PRG in 4 of 48 samples. The maximum concentration was detected at 19.5 ft; the maximum concentration in the 0 to 10 ft interval was 165 mg/kg.
Silver	390	0.45	24.5	The value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI (TtEMI 1997).
Thallium	5.2	0.13	**15.6**	The 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 feet 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 othersise noted.

b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000), 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

Figure 12

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

that metals are being transported off site. Metals were not detected at concentrations exceeding PRGs in sediment samples. A comprehensive discussion of the soil investigation and the nature and extent of the chemicals detected in soil and sediment is presented in the RI report (TtEMI 1997).

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 10). 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.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Naval Weapon Station SBD Concord is an active base. Currently, industrial operations 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 at Naval Weapons Station SBD Concord. The Inland Area is in a transition phase and is now mostly inactive, with no immediate plans to resume active operations. There are no current plans for changes in ownership or land use of Naval Weapon Station SBD Concord.

Although groundwater in this area meets the definition as a source of potable water, it is not used as such; instead, potable water is provided exclusively from treated surface water sources (PRC 1995b). Water supply wells near Naval Weapons Station SBD Concord include a well located at the Diablo Creek Golf Course that is used to supply water to the ponds and wells located at Mallard Reservoir. These wells are located more than a mile away from Sites 13 and 17.

2.7 SUMMARY OF SITE RISKS

The following sections summarize the results of the HHRA (Section 2.7.1) and ERA (Section 2.7.2) for Sites 13 and 17. Conclusions and the risk management evaluation in support of the no action alternative are presented in Section 2.7.3.

TABLE 10

ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 17 NAVAL WEAPON 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]	55,000/110/0.16[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 residential land use (U.S. EPA 2000), 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

2.7.1 Human Health Risk Assessment

The baseline HHRA estimates cancer and noncancer risks under current and possible future conditions if no action were 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 Sites 13 and 17.

An 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 Sites 13 and 17 under current and future land use scenarios, assuming that no subsequent cleanup action will be taken. Exposure to sediment was also evaluated for Site 17.

Since 1997 the U.S. EPA Region 9 has revised the PRGs to reflect changes in risk assessment methodologies, reference doses, cancer slope factors, and exposure assumptions (EPA 2000). As a result, the original risk estimates presented in the 1997 HHRA have been revised using the updated PRGs. The revised risk estimates are presented in this ROD and detailed tables documenting the risk calculations are included in Appendix B.

EPA guidance on preparing RODs (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 Sites 13 and 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 fully document the revised HHRA, this information is not repeated in this section of the ROD.

Consistent with EPA and DTSC guidance on using Region 9 PRGs to assess risk (DTSC 1994, EPA 2000), a four-step process was used in the HHRA for Sites 13 and 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 subsections.

2.7.1.1 Data Evaluation and Identification of Chemicals of Potential Concern

COPCs are defined as chemicals that are present as a result of a release associated with current or historical operations and that may present 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, RI, and confirmation sampling at the napalm trench. 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 (EPCs) identified for soil, sediment, and groundwater in the 1997 HHRA (TtEMI 1997) were also used for the revised HHRA, except those for manganese, nitrates, and nitrites. The revisions to the data sets, COPCs, and EPCs are described below.

- Manganese in groundwater at Site 13. The 1997 HHRA reported an HQ of 1.8 for manganese at Site 13. This result was based on the maximum detected concentration (3,100 µg/L in a sample collected from monitoring well MW10), and the 1996 PRG of 1,700 µg/L. As discussed in Section 2.5.1, the elevated concentrations of manganese measured in samples collected in 1995 and used in the 1997 HHRA were believed to be due to sample turbidity. Monitoring well MW-10 was resampled in May 2000 using a low-purging technique to minimize suspended particulate matter. Monitoring well MW-10 was selected for resampling because the highest concentration of manganese was at this location. The concentration of manganese measured in May 2000 was 245 µg/L. This concentration was used to represent the concentration of manganese at monitoring well MW-10 and the UCL_{95} was recalculated, yielding an exposure point concentration of 445 µg/L.

- Nitrate and nitrite in groundwater at Site 13. Nitrate and nitrite were not identified as COPCs in the 1997 HHRA even though separate reference doses were available for each of these analytes. These analytes were therefore reviewed for consideration as COPCs in the revised HHRA. Groundwater analyses were available for (1) nitrates, (2) nitrites, and (3) nitrate/nitrite. When analyzed as nitrate/nitrite, the result is reported for total nitrogen and hence, it is not possible to distinguish between nitrate and nitrite. During the SI, nitrate/nitrite was detected at concentrations of 3,700 µg/L (in July 1992) and 10,500 µg/L (in August 1992) in samples collected from monitoring well BUAMW002. No other sample collected during the SI was analyzed for nitrate, nitrite, or nitrate/nitrite. During the RI, samples were collected from 13 wells in the June and/or September of 1995 and analyzed separately for nitrate and nitrite. The concentration of nitrate in monitoring well BUAMW002 was 3,500 µg/L and the maximum concentration of nitrate was 9,600 µg/L, detected in a sample from monitoring well BUAMWU04. Nitrite was not detected in any sample collected in 1995, including samples from monitoring well BUAMW002. Because concentrations of nitrate and nitrite could not be distinguished in the sample collected in 1992 and because separate analytical results for nitrite and nitrate were reported for this location in 1995, the 1992 nitrate/nitrite results were not included in the HHRA data set. On the basis of the final HHRA data set, nitrates were identified as a COPC for evaluation in the revised HHRA and nitrites, which were not detected in any sample analyzed for nitrites, were excluded as a COPC.

- 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.

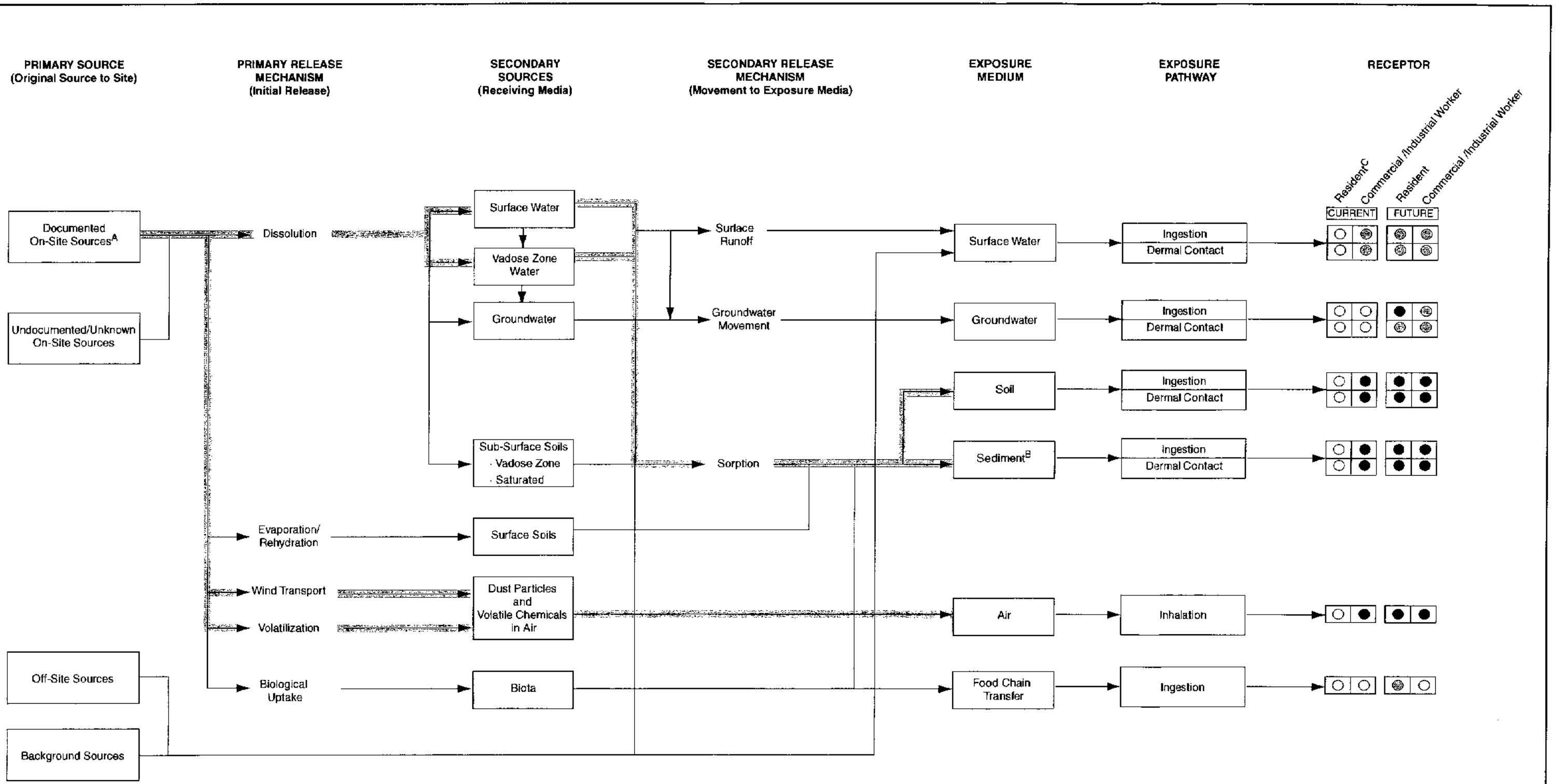
Tables in Appendix B list the COPCs identified for soil, sediment, and groundwater.

2.7.1.2 Exposure Assessment

The conceptual site model (CSM) that served as the framework for the HHRAs for Sites 13 and 17 is shown on Figure 13. The CSM presents current and historical sources and release mechanisms, receiving and affected media, and exposure pathways and receptors. Historical sources of contamination and affected media at the sites are discussed in Sections 2.2 and 2.5. The receptors and exposure pathways evaluated in the HHRA are discussed in the following text.

Naval Weapon Station SBD Concord is not scheduled for closure or property transfer. There is no regular human activity at either Site 13 or Site 17. 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 sites 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 are base personnel for both sites. For the risk assessment, activities of base personnel were assumed to be 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.

A residential scenario was also evaluated for each site 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 was also 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 was also evaluated. Although most private



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 13:
- Napalm
- Petroleum Hydrocarbons
- Burned Ordnance
- Metals Constituents

Site 17:
- Petroleum Hydrocarbons
- Metals Constituents

B = Sediment is present only at Site 17

C = Residents are currently not present at either Site 13 or Site 17

NWS CONCORD - INLAND AREA
CONCORD, CALIFORNIA

FIGURE 13
CONCEPTUAL SITE MODEL
FOR HUMAN HEALTH RISK ASSESSMENT

and city municipal water in the region is supplied by treated surface water sources, it was conservatively assumed that groundwater resources on the site could be developed as a domestic water supply in the future. The exposure pathways evaluated for residential exposure within the PRG framework are ingestion of groundwater and inhalation of VOCs released during 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.

2.7.1.3 Toxicity Assessment

The soil PRGs used in the revised HHRA were taken from an electronic file available online from EPA Region 9 (EPA 2000). 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). EPA requested that the "sat" PRG be used in HHRAs prepared for Naval Weapon 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 milligrams per kilogram (mg/kg). EPA assigns a ceiling limit when the risk-based concentration is greater than 100,000 mg/kg. EPA requested that the "ceiling" PRG be used in HHRAs prepared for Naval Weapon Station SBD Concord.

- "Cal-modified" PRGs. The Cal/EPA has developed cancer SFs that for a few chemicals differ significantly from the EPA SFs. As a result, some chemicals have two PRGs, one developed using the EPA SF and the other based on the Cal/EPA SF. The Cal-modified PRGs are lower (more health protective) than the corresponding EPA Region 9 PRGs. Cal/EPA requested that the "Cal-modified" PRGs be used in HHRAs prepared for Naval Weapon Station SBD Concord, if available.

- PRGs for carcinogens. For some carcinogens, separate PRGs are available to assess their carcinogenic effects and their noncarcinogenic effects (EPA 2000-ST). For these compounds, both PRGs were used to evaluate 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 Sites 13 and 17. A surrogate (substitute) PRG was selected to evaluate COPCs lacking a PRG. The 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.

2.7.1.4 Characterization of Risk

Noncancer risks (hazard quotients) were estimated for all COPCs, and potential carcinogenic risks were estimated for the carcinogenic COPCs. The hazard quotient for each COPC was estimated by dividing the EPC by the noncancer-based PRG. The cancer risk for each carcinogenic COPC was estimated by dividing the EPC by the cancer-based PRG and multiplying the quotient by 10^{-6}. Appendix B present the cancer risks and hazard indices 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).

2.7.1.4 Risk Characterization Results for Site 13

The results of the HHRA for Site 13 are summarized in Table 11. The COPCs evaluated, EPCs and PRGs used to conduct the risk assessment, and chemical-specific cancer risks and HIs are fully documented in Appendix B.

TABLE 11

RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT FOR SITE 13
NAVAL WEAPON STATION SBD CONCORD

Receptor	Medium	Cancer Risk[a]	Hazard Index[a]
Resident	Surface soil (0 to 0.5 feet)	1×10^{-7}	0.5[b]
	Subsurface soil (0 to 10 feet)	6×10^{-8}	0.6[c]
	Groundwater	Not evaluated[d]	1[e]
Industrial Worker	Surface soil (0 to 0.5 feet)	7×10^{-10}	0.2
	Subsurface soil (0 to 10 feet)	3×10^{-9}	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 surface soils is 1.3.
c The HI presented is the highest segregated HI. The total HI for subsurface soils is 1.4.
d Cancer risk was not evaluated because no carcinogenic chemicals were detected in groundwater samples collected at Site 13.
e The HI presented is the highest segregated HI. The total HI for groundwater is 2.8.

Soil

For both the resident and industrial worker receptors, the carcinogenic risks associated with exposure to chemicals detected in surface soils and subsurface soils are below 1×10^{-6}, the lower end of the risk management range of 1×10^{-6} to 1×10^{-4} (Table 11). The hazard indices (HIs) estimated for exposure to chemicals detected in samples from both soil depth intervals for the industrial worker receptor are less than the threshold value of 1. The highest segregated HIs for the resident receptor are well below the threshold value of 1 for both soil depth intervals. (Consistent with EPA guidance (1989), segregated IIIs were calculated when the total HI for all chemicals was greater than 1. The segregated HI represents a target organ-specific or effect-specific HI.)

The average (UCL_{95}) concentrations of lead in surface soil (106 mg/kg) and subsurface soil (33 mg/kg) are below the value calculated using DTSC's LeadSpread model (150 mg/kg) and the U.S. EPA Region 9 residential PRG (400 mg/kg). However, lead was detected in samples from two trench locations at concentrations (5,590 mg/kg and 3,090 mg/kg) well above the industrial PRG (750 mg/kg). Based on these findings, Site 13 was resampled in February 1996 to assess the extent of the lead detected previously. Samples were collected close to the locations where the high concentrations of lead were detected. Analytical results from this sampling event did not confirm the presence of high concentrations of lead in this area, and no definable area of lead contamination was identified. The concentrations of lead in the confirmation samples ranged from 4.9 to 235 mg/kg. On the basis of these findings, concentrations of lead in soils at Site 13 are not considered to pose an unacceptable risk to human health.

Groundwater

Cancer risks associated with exposure to groundwater at Site 13 were not evaluated because no carcinogenic COPCs were identified for groundwater (Appendix B).

Based on the results of the reanalysis, the highest segregated HI was 1, for ingestion of groundwater under a residential scenario. The segregated HI was for changes in blood chemistry and was attributed to thallium.

Concentrations of lead in groundwater were less than the U.S. EPA drinking water action level of 15 µg/L.

2.7.1.5 Results of Risk Characterization for Site 17

The results of the HHRA for Site 17 are summarized in Table 12. The COPCs evaluated, EPCs and PRGs used to conduct the risk assessment, and chemical-specific cancer risks and HIs are fully documented in Appendix B.

TABLE 12

RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT FOR SITE 17
NAVAL WEAPON STATION SBD CONCORD

Receptor	Medium	Cancer Risk[a]	Hazard Index[a]
Resident	Surface soil (0 to 0.5 feet)	3×10^{-6}	0.5[b]
	Subsurface soil (0 to 10 feet)	3×10^{-6}	0.4[c]
	Sediment	1×10^{-5}	0.4[d]
	Groundwater	Not evaluated[e]	0.2
Industrial Worker	Surface soil (0 to 0.5 feet)	6×10^{-7}	0.2
	Subsurface soil (0 to 10 feet)	6×10^{-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 surface soils is 1.3.

c The HI presented is the highest segregated HI. The total HI for subsurface soil is 1.2.

d The HI presented is the highest segregated HI. The total HI for sediment is 1.4.

e 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 soil (6×10^{-7}) and subsurface soil (6×10^{-7}) are less than the lower limit (1×10^{-6}) of the target risk range, and the HI (0.2) is below the threshold value of 1 (Table 12).

For a resident, the carcinogenic risk attributable to exposures to chemicals detected in surface soil (3×10^{-6}), subsurface soil (3×10^{-6}), and sediment (1×10^{-5}) are within the target risk 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. 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).

The highest segregated HIs associated with residential exposure to chemicals detected in surface soil (0.5), subsurface soil (0.4), and sediment (0.4) are below the threshold value of 1 (Table 12).

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

Cancer risks associated with exposure to groundwater at Site 13 were not evaluated because no carcinogenic COPCs were identified for groundwater (Appendix B).

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.

2.7.2 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 the Sites 13 and 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 ecological concern (COEC), (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) comparison of WET extractions to AWQC.

2.7.2.1 Site 13 - Burn Area

The habitat of Site 13 is disturbed grasslands that have been grazed by cattle. The vegetation is dominated by yellow thistle and non-native grasses. Soils at the trench areas formerly used to burn ordnance often are gravelly (top soil was not present) and were typically barren at the time of the RI.

A chemical detected at Site 13 was identified as a chemical of ecological concern if it exceeded the ambient concentration established for the site in at least 10 percent of the samples, or if the concentration

of the chemical in the waste extraction test exceeded the freshwater chronic ambient water quality criteria in at least 10 percent of the samples.

Beryllium, cadmium, lead, and zinc were detected in soils at concentrations above ambient levels and in more than 10 percent of the soil samples. Copper, lead, mercury, and zinc in waste extraction test liquid extract from soil samples were detected at concentrations that exceeded the chronic freshwater ambient water quality criteria. However, these metals are not expected to be bioavailable, based on the following lines of evidence: (1) concentrations of metal in the weak acid liquid extract from the in waste extraction tests were generally two to three orders of magnitude less than concentrations of metals in bulk soils; (2) weak acid extractions of metals completed as part of the comprehensive soil analysis indicated limited availability of potentially toxic metals, especially in surface soils where wildlife is most likely to encounter the chemicals; and (3) the results of the Microtox bioassay indicated only limited bioavailability of inorganic chemicals in soils.

TABLE 13

HAZARD QUOTIENTS (HQS) COMPARING ESTIMATED DOSES TO TOXICITY REFERENCE VALUES (TRV) FOR TERRESTRIAL RECEPTORS NAVAL WEAPON STATION SBD CONCORD

	Hazard Quotients Estimated Daily Dose/TRV							
	California Quail		Red-tailed Hawk		Western Harvest Mouse		Coyote	
Chemical	HQ_1	HQ_2	HQ_1	HQ_2	HQ_1	HQ_2	HQ_1	HQ_2
Cadmium	0.01	0.54	0.55	35.7	0.52	23.33	5.8	180
Copper	0.08	1.66	0.1	1.97	0.37	16.67	0.02	4.19
Lead	1.13	1,572.73	0.65	883.33	0.01	866.67	0.14	11,000
Mercury	0.01	0.06	0.04	0.17	0.0004	0.009	0.05	0.5
Zinc	0.05	0.55	0.15	1.51	0.02	1.51	0.2	16.63

Notes:

HQ_1 = Dose/High TRV
HQ_2 = Dose/Low TRV

HQ_1 > 1.0 indicates risk
HQ_2 > 1.0 indicates no risk
HQ_2 > 1.0 indicates need for further evaluation

Another assessment of risk posed by chemicals in soils at Site 13 focused on trophic transfer of contaminants from soil to animal receptors. Receptors evaluated included the California quail, the western harvest mouse, the red-tailed hawk, and the coyote. The food-chain analysis was conducted for six inorganic COECs (cadmium, copper, lead, mercury, and zinc). Food-chain modeling integrates ecological information such as life history and feeding behavior of receptors and spatial variation in chemical concentrations in prey and soil into the risk assessment. Food-chain modeling is especially appropriate for chemicals that tend to bioconcentrate or bioaccumulate. Dose models were based on the

assumption that exposure to chemicals is primarily through ingestion of contaminated prey and the incidental ingestion of contaminated soil or sediment. Surface water ingestion, dermal contact, and inhalation are other possible routes of exposure, but are not evaluated in these conceptually simple models. Estimates of chemical concentrations in prey items were derived using biomagnification factors or other estimates from the literature.

Exposure models estimate the mass of a chemical ingested daily by a receptor per kilogram of body weight (daily chemical dose). Estimated daily doses are then evaluated using a hazard quotient (HQ) approach, where the HQ is calculated as the ratio of the dose to both high and low toxicity reference values (TRVs). A summary of the food-chain modeling results has been provided in Table 13.

Results of the food-chain evaluation using conservative exposure parameters indicated potential risk to the coyote (from cadmium) and California quail (from lead) based on the hazard quotient (HQ). The HQ for coyotes that ingest cadmium was 5.8, and for quail that ingest lead was 1.1. Although HQs greater than 1.0 indicate the potential for a toxic response, the low measures of bioavailability of metals in soils indicate acceptable risk to receptors at Site 13.

Based on these quantitative and qualitative screening evaluations and observations of the site during field surveys, Site 13 does not pose an unacceptable risk to the environment.

2.7.2.2 Site 17 - Building 1A-24

The ERA for Site 17 itself concluded after a lack of significant habitat was found near the building and minimal use of the site by area fauna was reported (approximately 90 percent of the site is covered by buildings and paved areas). However, the habitat value of Seal Creek is significant, so the potential for ecological impact to riparian receptors in the area of Seal Creek from 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 [PAHs] and benzene, toluene, ethylbenzene, and xylene [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 the concentration of nickel also exceeded the ER-M. Should the creek bank erode, as expected, and soil is deposited into the streambed, the soil is expected to be dispersed 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.

2.7.3 Conclusions and Risk Management Evaluation

EPA guidance for Superfund remedy selection (1991, 1997, 1999) 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, EPA Region 9 has stated that 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" (EPA 2002). For sites where risks fall within the risk management range, EPA Region 9 recommends a risk management evaluation in 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 Sites 13 and 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.

Site 13

The estimated cancer risks for industrial workers and residents for potential exposures to surface and subsurface soils and sediment are less than 1×10^{-6} and the HIs for noncancer effects are less than 1, the level of concern. Concentrations of lead in soil are below the U.S. EPA Region 9 PRG of 400 mg/kg. Cancer risk was not evaluated for groundwater because no carcinogenic chemicals were detected in groundwater samples collected at Site 13. The segregated HI for residential exposure to groundwater was 1.

The quantitative and qualitative screening evaluations presented in the ERA and observations of the site during field surveys indicate that Site 13 does not pose an unacceptable risk to the environment.

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

On the basis of these findings, conditions at Site 13 are considered protective of human health and the environment and no remedial action is warranted.

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. Concentrations of lead in soil (both depth intervals) and sediment were below the U.S. EPA Region 9 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 segregated III 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 2×10^{-9} 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 11). 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 BAP 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 B[a]P equivalents, was 0.92 mg/kg. (B[a]P 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.

The quantitative and qualitative screening evaluations presented in the ERA and observations of the site during field surveys indicate that Site 13 does not pose an unacceptable risk to the environment.

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.

2.8 DESCRIPTION OF NO ACTION ALTERNATIVE

Based on the results of the RI, as described in this ROD, Inland Area Sites 13 and 17 do 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 these sites are either within or below U.S. EPA's acceptable levels for the anticipated current and future land uses of the sites, including unrestricted use of the property. Accordingly, no action is appropriate for Sites 13 and 17. The U.S. EPA and Cal/EPA agree with this determination. The Navy's selection of no action for these sites reflects the determination that the overall condition of Sites 13 and 17 is protective of human health and the environment.

2.9 DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan for Sites 13 and 17 was released for public comment on March 19, 1999. The proposed plan identified no action as the preferred alternative. The Navy reviewed all written and verbal comments submitted during the public comment period. Based on this review, the Navy concluded that no significant changes to the remedy, as originally identified in the proposed plan, were necessary or appropriate.

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APPENDIX A

RESPONSIVENESS SUMMARY FOR INLAND SITES 13 AND 17

CONTENTS

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 Sites 13 and 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 24a, 22 or 27.

Sites 13 and 17 were 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 was held from March 19, 1999, to May 3, 1999. 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 community mailing list and issued 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 Sites 13 and 17 is described in the record of decision; it is the same as the preferred approach for these sites that was described in the proposed plan.

Section 2.0 of this document presents background information on the community involvement programs at Naval Weapon 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 Weapon 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 solicit community input on the Navy's approach. Fact sheets have been sent to a community mailing list that includes elected officials, community organizations and interest groups, residents, and local businesses.

A community relations plan (CRP) for Naval Weapon Station SBD Concord was prepared in February 1996. 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 Weapon Station SBD Concord. The repository is located at Central Library/Pleasant Hill, Contra Costa County Library, 1750 Oak Boulevard, Pleasant Hill, California. Additionally, an administrative record has been established at the library that includes documentation to support final decisions on how to address sites undergoing environmental investigations and cleanup at Naval Weapon Station SBD Concord. Both the information repository and administrative record are available for public review.

The Navy established a restoration advisory board (RAB) composed of community members to provide a forum for ongoing dialogue among the Navy, regulatory agencies, and the community on environmental cleanup issues at Naval Weapon Station SBD Concord. The RAB included 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 as needed and are open to the public.

3.0 PUBLIC COMMENTS AND THE NAVY'S RESPONSES

The following summary reflects comments and questions raised during the public meeting that was 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 in the public meeting. The following is the Navy's formal and complete response 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 amount detected in the soil was at concentrations 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 historical 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 collected showed 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 and June and September 1995. Samples from monitoring well MW-10 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 Weapon Station SBD Concord property may be transferred in the future for residential or business use.**

Response: There are currently no plans to transfer Naval Weapon 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. In the event that 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: There are currently no private industries operating on Naval Weapon 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 Weapon Station SBD Concord called the "Litigation Area"). Any existing industries that are currently operating are located outside of the base.

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 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.60E+04	--	1.00E+05	--	1.60E-01
Antimony	2.40E+00	--	8.20E+02	--	2.93E-03
Barium	3.90E+02	--	1.00E+05	--	3.90E-03
Beryllium	4.10E-01	2.20E+03	3.70E+03	1.86E-10	1.11E-04
Cadmium	1.10E+00	3.00E+03	8.10E+02	3.67E-10	1.36E-03
Chromium[b]	4.00E+01	--	1.00E+05	--	4.00E-04
Cobalt	1.70E+01	--	1.00E+05	--	1.70E-04
Copper	5.80E+01	--	7.60E+04	--	7.63E-04
Manganese	8.30E+02	--	3.20E+04	--	2.59E-02
Mercury	1.10E-01	--	6.10E+02	--	1.80E-04
Nickel[c]	6.10E+01	--	4.10E+04	--	1.49E-03
Silver	7.30E+00	--	1.00E+04	--	7.30E-04
Zinc	2.10E+02	--	1.00E+05	--	2.10E-03
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.80E+03	--	6.67E-05
Benzo(e)pyrene[d]	2.10E-02	--	5.40E+04	--	3.89E-07
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	1.70E-02	2.90E+02	--	5.86E-11	--
Fluoranthene	6.00E-03	--	3.00E+04	--	2.00E-07
n-Nitrosodiphenylamine	6.30E-02	5.00E+02	--	1.26E-10	--
Phenol	6.60E-01	--	1.00E+05	--	6.60E-06
Pyrene	6.00E-03	--	5.40E+04	--	1.11E-07
TPH Extractable					
Diesel	1.10E+01	--	--	--	--
Motor Oil	4.20E+01	--	--	--	--
Anions					
Nitrate	5.00E-01	--	--	--	--
Nitrite	1.70E-01	--	--	--	--
TOTAL				**7.4E-10**	**2.0E-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 2000).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	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 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.70E+04	--	1.00E+05	--	1.70E-01
Antimony	2.20E+00	--	8.20E+02	--	2.68E-03
Barium	4.30E+02	--	1.00E+05	--	4.30E-03
Beryllium	4.50E-01	2.20E+03	3.70E+03	2.05E-10	1.22E-04
Cadmium	4.70E-01	3.00E+03	8.10E+02	1.57E-10	5.80E-04
Chromium[b]	4.70E+01	--	1.00E+05	--	4.70E-04
Cobalt	1.70E+01	--	1.00E+05	--	1.70E-04
Copper	4.60E+01	--	7.60E+04	--	6.05E-04
Manganese	7.80E+02	--	3.20E+04	--	2.44E-02
Mercury	1.20E-01	--	6.10E+02	--	1.97E-04
Molybdenum	1.20E+00	--	1.00E+04	--	1.20E-04
Nickel[c]	7.70E+01	--	4.10E+04	--	1.88E-03
Selenium	4.70E-01	--	1.00E+04	--	4.70E-05
Silver	1.20E+00	--	1.00E+04	--	1.20E-04
Zinc	9.40E+01	--	1.00E+05	--	9.40E-04
Volatile Organic Compounds					
Chloroform	1.00E-03	5.20E-01	1.30E+00	1.92E-09	7.69E-04
O-xylene	1.40E-03	--	2.10E+02	--	6.67E-06
Toluene	2.30E-03	--	5.20E+02	--	4.42E-06
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.80E+03	--	6.67E-05
2-Chlorophenol	1.90E-01	--	2.40E+02	--	7.92E-04
2-Methylnaphthalene[d]	7.40E-02	--	1.90E+02	--	3.89E-04
Benzo(a)pyrene	1.90E-01	2.90E-01	--		
Benzo(b)fluoranthene	1.90E-01	2.90E+00	--		
Benzo(e)pyrene[e]	2.10E-02	--	5.40E+04	--	3.89E-07
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	2.10E-01	2.90E+02	--	7.24E-10	--
Fluoranthene	3.10E-02	--	3.00E+04	--	1.03E-06
n-Nitrosodiphenylamine	6.30E-02	5.00E+02	--	1.26E-10	--
Naphthalene	7.50E-02	--	1.90E+02		
Phenol	2.90E-01	--	1.00E+05	--	2.90E-06
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	1.20E+01	--	--	--	--
Motor Oil	2.60E+01	--	--	--	--
Anions					
Nitrate	8.10E-01	--	--	--	--
Nitrite	1.50E-01	--	--	--	--
TOTAL				**3.1E-09**	**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 2000).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for naphthalene, which was used as a surrogate chemical.
e	The PRG is for pyrene, which was used as a surrogate chemical.
--	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 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.60E+04	--	7.60E+04	--	2.11E-01
Antimony	2.40E+00	--	3.10E+01	--	7.74E-02
Barium	3.90E+02	--	5.40E+03	--	7.22E-02
Beryllium	4.10E-01	1.10E+03	1.50E+02	3.73E-10	2.73E-03
Cadmium	1.10E+00	9.00E+00	3.70E+01	1.22E-07	2.97E-02
Chromium[b]	4.00E+01	--	1.00E+05	--	4.00E-04
Cobalt	1.70E+01	--	4.70E+03	--	3.62E-03
Copper	5.80E+01	--	2.90E+03	--	2.00E-02
Manganese	8.30E+02	--	1.80E+03	--	4.61E-01
Mercury	1.10E-01	--	2.30E+01	--	4.78E-03
Nickel[c]	6.10E+01	--	1.50E+02	--	4.07E-01
Silver	7.30E+00	--	3.90E+02	--	1.87E-02
Zinc	2.10E+02	--	2.30E+04	--	9.13E-03
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.20E+02	--	1.00E-03
Benzo(e)pyrene[d]	2.10E-02	--	2.30E+03	--	9.13E-06
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	1.70E-02	6.20E+01	--	2.74E-10	--
Fluoranthene	6.00E-03	--	2.30E+03	--	2.61E-06
n-Nitrosodiphenylamine	6.30E-02	9.90E+01	--	6.36E-10	--
Phenol	6.60E-01	--	3.70E+04	--	1.78E-05
Pyrene	6.00E-03	--	2.30E+03	--	2.61E-06
TPH Extractable					
Diesel	1.10E+01	--	--	--	--
Motor Oil	4.20E+01	--	--	--	--
Anions					
Nitrate	5.00E-01	--	--	--	--
Nitrite	1.70E-01	--	--	--	--
TOTAL				**1.2E-07**	**1.3E+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 2000).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	4.67E-01
Liver	0.00E+00
Renal	2.97E-02
Lung	2.34E-01
Blood	9.13E-03
Skin	1.87E-02
Reproductive	1.78E-05
General	4.84E-01
None	7.26E-02
TOTAL	**1.3E+00**

TABLE B-4
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG[a] (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.70E+04	--	7.60E+04	--	2.24E-01
Antimony	2.20E+00	--	3.10E+01	--	7.10E-02
Barium	4.30E+02	--	5.40E+03	--	7.96E-02
Beryllium	4.50E-01	1.10E+03	1.50E+02	4.09E-10	3.00E-03
Cadmium	4.70E-01	9.00E+00	3.70E+01	5.22E-08	1.27E-02
Chromium[b]	4.70E+01	--	1.00E+05	--	4.70E-04
Cobalt	1.70E+01	--	4.70E+03	--	3.62E-03
Copper	4.60E+01	--	2.90E+03	--	1.59E-02
Manganese	7.80E+02	--	1.80E+03	--	4.33E-01
Mercury	1.20E-01	--	2.30E+01	--	5.22E-03
Molybdenum	1.20E+00	--	3.90E+02	--	3.08E-03
Nickel[c]	7.70E+01	--	1.50E+02	--	5.13E-01
Selenium	4.70E-01	--	3.90E+02	--	1.21E-03
Silver	1.20E+00	--	3.90E+02	--	3.08E-03
Zinc	9.40E+01	--	2.30E+04	--	4.09E-03
Volatile Organic Compounds					
Chloroform	1.00E-03	2.40E-01	3.90E-01	4.17E-09	2.56E-03
O-xylene	1.40E-03	--	2.10E+02	--	6.67E-06
Toluene	2.30E-03	--	5.20E+02	--	4.42E-06
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.20E+02	--	1.00E-03
2-Chlorophenol	1.90E-01	--	6.30E+01	--	3.02E-03
2-Methylnaphthalene[e]	7.40E-02	--	5.60E+01	--	1.32E-03
Benzo(a)pyrene	1.90E-01	6.20E-02	--		
Benzo(b)fluoranthene	1.90E-01	6.20E-01	--		
Benzo(e)pyrene[d]	2.10E-02	--	2.30E+03	--	9.13E-06
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	2.10E-01	6.20E+01	--	3.39E-09	--
Fluoranthene	3.10E-02	--	2.30E+03	--	1.35E-05
n-Nitrosodiphenylamine	6.30E-02	9.90E+01	--	6.36E-10	--
Naphthalene	7.50E-02	--	5.60E+01		
Phenol	2.90E-01	--	3.70E+04	--	7.84E-06
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	1.20E+01	--	--	--	--
Motor Oil	2.60E+01	--	--	--	--
Anions					
Nitrate	8.10E-01	--	--	--	--
Nitrite	1.50E-01	--	--	--	--
TOTAL				**6.1E-08**	**1.4E+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 2000)
b The PRG is for chromium III
c The PRG is for soluble salts of nickel.
d The PRG is for pyrene, which was used as a surrogate chemical.
-- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	4.40E-01
Liver	3.77E-03
Renal	1.28E-02
Lung	2.43E-01
Blood	4.09E-03
Skin	3.08E-03
Reproductive	3.02E-03
General	5.89E-01
None	8.01E-02
TOTAL	**1.4E+00**

TABLE B-5
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO GROUNDWATER
RESIDENT, RME SCENARIO
SITE 13 - BURN AREA
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 Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	4.70E-01	--	3.60E+04	--	1.31E-02
Barium	1.70E-01	--	2.60E+03	--	6.54E-02
Calcium	7.90E+01	--	--	--	--
Chromium[b]	5.40E-03	--	5.50E+04	--	9.82E-05
Cobalt	4.40E-04	--	2.20E+03	--	2.00E-04
Iron	1.30E+00	--	1.10E+04	--	1.18E-01
Magnesium	5.60E+01	--	--	--	--
Manganese	4.45E-01	--	8.80E+02	--	5.06E-01
Molybdenum	6.00E-02	--	1.80E+02	--	3.33E-01
Potassium	5.70E+00	--	--	--	--
Selenium	7.50E-03	--	1.80E+02	--	4.17E-02
Sodium	1.50E+02	--	--	--	--
Thallium	2.30E-03	--	2.40E+00	--	9.58E-01
Vanadium	7.50E-03	--	2.60E+02	--	2.88E-02
Zinc	1.40E-02	--	1.10E+04	--	1.27E-03
Semivolatile Organic Compounds					
4-Methylphenol	5.40E-03	--	1.80E+02	--	3.00E-02
TPH Extractable					
Diesel	7.10E-02	--	--	--	--
Anions					
Chloride	3.00E+02	--	--	--	--
Fluoride	5.80E-01	--	2.20E+03	--	2.64E-01
Nitrate	4.90E+00	--	1.00E+04	--	4.90E-01
Sulfate	1.40E+02	--	--	--	--
TOTAL				**0.0E+00**	**2.8E+00**

Notes:

µg/L	Microgram per liter
mg/L	Milligram per liter
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b	The PRG is for chromium III.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	5.06E-01
Liver	4.17E-02
Renal	0.00E+00
Lung	4.21E-02
Blood	1.27E-03
Skin	0.00E+00
Reproductive	0.00E+00
General	3.33E-01
None	6.55E-02
TOTAL	**2.8E+00**

TABLE B-6
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, 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)	Industrial Soil PRG[a] (mg/kg) Cancer	Industrial Soil PRG[a] (mg/kg) Noncancer	Cancer Risk (unitless)	Hazard Index (unitless)
Metals					
Aluminum	1.40E+04	--	1.00E+05	--	1.40E-01
Antimony	4.60E+00	--	8.20E+02	--	5.61E-03
Barium	1.40E+02	--	1.00E+05	--	1.40E-03
Beryllium	4.40E-01	2.20E+03	3.70E+03	2.00E-10	1.19E-04
Cadmium	3.10E+00	3.00E+03	8.10E+02	1.03E-09	3.83E-03
Chromium[b]	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	--	1.00E+05	--	1.60E-04
Copper	4.60E+01	--	7.60E+04	--	6.05E-04
Lead[c]	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	3.20E+04	--	1.78E-02
Mercury	9.40E-02	--	6.10E+02	--	1.54E-04
Molybdenum	7.50E-01	--	1.00E+04	--	7.50E-05
Nickel[d]	5.70E+01	--	4.10E+04	--	1.39E-03
Silver	2.70E+00	--	1.00E+04	--	2.70E-04
Vanadium	5.20E+01	--	1.40E+04	--	3.71E-03
Zinc	1.50E+02	--	1.00E+05	--	1.50E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.90E+00	--	3.00E-08	--
Benzo(a)pyrene	1.10E-01	2.90E-01	--	3.79E-07	--
Benzo(b)fluoranthene	1.10E-01	2.90E+00	--	3.79E-08	--
Benzo(g,h,i)perylene[d]	9.90E-02	--	5.40E+04	--	1.83E-06
Benzo(k)fluoranthene	1.30E-01	2.90E+01	--	4.48E-09	--
Chrysene	1.50E-01	2.90E+02	--	5.17E-10	--
Dibenz(a,h)anthracene	2.40E-02	2.90E-01	--	8.28E-08	--
Fluoranthene	1.60E-01	--	3.00E+04	--	5.33E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.90E+00	--	2.86E-08	--
Phenanthrene[d]	7.00E-02	--	5.40E+04	--	1.30E-06
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				**5.6E-07**	**1.8E-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 2000).
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 soluble salts of nickel.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	1.80E-02
Liver	0.00E+00
Renal	3.84E-03
Lung	1.44E-01
Blood	1.50E-03
Skin	2.70E-04
Reproductive	0.00E+00
General	7.08E-03
None	1.86E-03
TOTAL	**1.8E-01**

TABLE B-7
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 Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	1.00E+05	--	1.50E-01
Antimony	1.90E+00	--	8.20E+02	--	2.32E-03
Barium	1.70E+02	--	1.00E+05	--	1.70E-03
Beryllium	9.50E-01	2.20E+03	3.70E+03	4.32E-10	2.57E-04
Cadmium	1.10E+00	3.00E+03	8.10E+02	3.67E-10	1.36E-03
Chromium[b]	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	--	1.00E+05	--	1.60E-04
Copper	3.40E+01	--	7.60E+04	--	4.47E-04
Manganese	5.80E+02	--	3.20E+04	--	1.81E-02
Mercury	9.30E-02	--	6.10E+02	--	1.52E-04
Molybdenum	7.80E-01	--	1.00E+04	--	7.80E-05
Nickel[c]	5.50E+01	--	4.10E+04	--	1.34E-03
Silver	2.50E+01	--	1.00E+04	--	2.50E-03
Vanadium	5.50E+01	--	1.40E+04	--	3.93E-03
Zinc	7.50E+01	--	1.00E+05	--	7.50E-04
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.90E+00	--	3.00E-08	--
Benzo(a)pyrene	1.10E-01	2.90E-01	--	3.79E-07	--
Benzo(b)fluoranthene	1.10E-01	2.90E+00	--	3.79E-08	--
Benzo(g,h,i)perylene[d]	9.90E-02	--	5.40E+04	--	1.83E-06
Benzo(k)fluoranthene	1.30E-01	2.90E+01	--	4.48E-09	--
Chrysene	1.50E-01	2.90E+02	--	5.17E-10	--
Dibenz(a,h)anthracene	2.40E-02	2.90E-01	--	8.28E-08	--
Fluoranthene	1.60E-01	--	3.00E+04	--	5.33E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.90E+00	--	2.86E-08	--
Phenanthrene[d]	7.00E-02	--	5.40E+04	--	1.30E-06
Phenol	4.00E-01	--	1.00E+05		
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				**5.6E-07**	**1.8E-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 2000).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	Not available or not calculated because a PRG was not available.

TABLE B-8
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 Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.40E+04	--	7.60E+04	--	1.84E-01
Antimony	4.60E+00	--	3.10E+01	--	1.48E-01
Barium	1.40E+02	--	5.40E+03	--	2.59E-02
Beryllium	4.40E-01	1.10E+03	1.50E+02	4.00E-10	2.93E-03
Cadmium	3.10E+00	9.00E+00	3.70E+01	3.44E-07	8.38E-02
Chromium[b]	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	4.60E+01	--	2.90E+03	--	1.59E-02
Lead[c]	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	1.80E+03	--	3.17E-01
Mercury	9.40E-02	--	2.30E+01	--	4.09E-03
Molybdenum	7.50E-01	--	3.90E+02	--	1.92E-03
Nickel[d]	5.70E+01	--	1.50E+02	--	3.80E-01
Silver	2.70E+00	--	3.90E+02	--	6.92E-03
Vanadium	5.20E+01	--	5.50E+02	--	9.45E-02
Zinc	1.50E+02	--	2.30E+04	--	6.52E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.20E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.20E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.20E-01	--	1.77E-07	--
Benzo(g,h,i)perylene[e]	9.90E-02	--	2.30E+03	--	4.30E-05
Benzo(k)fluoranthene	1.30E-01	6.10E-01	--	2.13E-07	--
Chrysene	1.50E-01	6.20E+01	--	2.42E-09	--
Dibenz(a,h)anthracene	2.40E-02	6.20E-02	--	3.87E-07	--
Fluoranthene	1.60E-01	--	2.30E+03	--	6.96E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.20E-01	--	1.34E-07	--
Phenanthrene[e]	7.00E-02	--	2.30E+03	--	3.04E-05
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				**3.2E-06**	**1.3E+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 200
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 soluble salts of nickel.
e The PRG is for pyrene, which was used as a surrogate chemical.

-- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	3.21E-01
Liver	0.00E+00
Renal	8.40E-02
Lung	2.98E-01
Blood	6.52E-03
Skin	6.92E-03
Reproductive	0.00E+00
General	5.30E-01
None	2.64E-02
TOTAL	**1.3E+00**

TABLE B-9
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 Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.60E+04	--	1.97E-01
Antimony	1.90E+00	--	3.10E+01	--	6.13E-02
Barium	1.70E+02	--	5.40E+03	--	3.15E-02
Beryllium	9.50E-01	1.10E+03	1.50E+02	8.64E-10	6.33E-03
Cadmium	1.10E+00	9.00E+00	3.70E+01	1.22E-07	2.97E-02
Chromium[b]	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	3.40E+01	--	2.90E+03	--	1.17E-02
Manganese	5.80E+02	--	1.80E+03	--	3.22E-01
Mercury	9.30E-02	--	2.30E+01	--	4.04E-03
Molybdenum	7.80E-01	--	3.90E+02	--	2.00E-03
Nickel[c]	5.50E+01	--	1.50E+02	--	3.67E-01
Silver	2.50E+01	--	3.90E+02	--	6.41E-02
Vanadium	5.50E+01	--	5.50E+02	--	1.00E-01
Zinc	7.50E+01	--	2.30E+04	--	3.26E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.20E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.20E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.20E-01	--	1.77E-07	--
Benzo(g,h,i)perylene[d]	9.90E-02	--	2.30E+03	--	4.30E-05
Benzo(k)fluoranthene	1.30E-01	6.10E-01	--	2.13E-07	--
Chrysene	1.50E-01	6.20E+01	--	2.42E-09	--
Dibenz(a,h)anthracene	2.40E-02	6.20E-02	--	3.87E-07	--
Fluoranthene	1.60E-01	--	2.30E+03	--	6.96E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.20E-01	--	1.34E-07	--
Phenanthrene[d]	7.00E-02	--	2.30E+03	--	3.04E-05
Phenol	4.00E-01	--	3.70E+04		
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				**3.0E-06**	**1.2E+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 2000)
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	3.26E-01
Liver	0.00E+00
Renal	3.00E-02
Lung	3.12E-01
Blood	3.26E-03
Skin	6.41E-02
Reproductive	0.00E+00
General	4.30E-01
None	3.19E-02
TOTAL	1.2E+00

TABLE B-10
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 Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.60E+04	--	1.97E-01
Arsenic	5.70E+00	3.90E-01	2.20E+01	1.46E-05	2.59E-01
Barium	1.50E+02	--	5.40E+03	--	2.78E-02
Beryllium	4.00E-01	1.10E+03	1.50E+02	3.64E-10	2.67E-03
Chromium[b]	3.50E+01	--	1.00E+05	--	3.50E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	4.40E+01	--	2.90E+03	--	1.52E-02
Lead[c]	1.50E+01	--	--	--	--
Manganese	6.50E+02	--	1.80E+03	--	3.61E-01
Molybdenum	9.90E-01	--	3.90E+02	--	2.54E-03
Nickel[d]	5.80E+01	--	1.50E+02	--	3.87E-01
Thallium	2.10E-01	--	5.20E+00	--	4.04E-02
Vanadium	6.20E+01	--	5.50E+02	--	1.13E-01
Zinc	8.10E+01	--	2.30E+04	--	3.52E-03
TOTAL				**1.5E-05**	**1.4E+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 20
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 soluble salts of nickel.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	**Hazard Index**
CNS	3.61E-01
Liver	0.00E+00
Renal	0.00E+00
Lung	3.29E-01
Blood	3.52E-03
Skin	2.59E-01
Reproductive	0.00E+00
General	3.89E-01
None	2.81E-02
TOTAL	**1.4E+00**

TABLE B-11
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 Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	3.20E-01	--	3.60E+04	--	8.89E-03
Barium	1.30E-01	--	2.60E+03	--	5.00E-02
Calcium	6.90E+01	--	--	--	--
Chromium[b]	4.50E-03	--	5.50E+04	--	8.18E-05
Iron	4.20E-01	--	1.10E+04	--	3.82E-02
Magnesium	4.30E+01	--	--	--	--
Manganese	1.80E-02	--	8.80E+02	--	2.05E-02
Nickel[c]	2.00E-03	--	7.30E+02	--	2.74E-03
Potassium	3.00E+00	--	--	--	--
Selenium	2.90E-03	--	1.80E+02	--	1.61E-02
Sodium	6.10E+01	--	--	--	--
Vanadium	4.80E-03	--	2.60E+02	--	1.85E-02
Semivolatile Organic Compounds					
Bis(2-ethylhexyl)phthalate	3.00E-02	4.80E+00	7.30E+02	--	4.11E-02
TPH Extractable					
Diesel	5.20E-02	--	--	--	--
Motor Oil	6.40E-02	--	--	--	--
Anions					
Chloride	5.06E+01	--	--	--	--
Fluoride	1.70E-01	--	2.20E+03	--	7.73E-02
Nitrate	4.80E+00	--	1.00E+04	--	4.80E-01
Sulfate	1.28E+02	--	--	--	--
TOTAL				**0.0E+00**	**2.0E-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 2000).
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-12
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	0.19
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-13
LEAD CONCENTRATION IN BLOOD
EXPOSURE FROM SEDIMENT
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

INPUT	
MEDIUM	LEVEL
ead in Air (ug/m^3)	0.028
ead in Soil/Dust (ug/g)	15.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
espirable 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
ngestion constant	(ug/dl)/(ug/da	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
nhalation constant	(ug/dl)/(ug/da	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
ead 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).