Final

Record of Decision/ Final Remedial Action Plan for Installation Restoration Site 17 and Building 503 Area

Former Mare Island Naval Shipyard Vallejo, California

October 2016

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Department of the Navy
Base Realignment and Closure
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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	Micrograms per cubic meter
§	Section
ARAR	Applicable or relevant and appropriate requirement
ASG	Active soil gas
AST	Aboveground storage tank
BCT	Base Realignment and Closure Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of concern
CRUP	Covenant to Restrict Use of Property
CSM	Conceptual site model
DDT	Dichlorodiphenyltrichloroethane
DTSC	Department of Toxic Substances Control
EECA	Engineering evaluation and cost analysis
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
FS	Feasibility study
FFSRA	Federal Facility Site Remediation Agreement
HHRA	Human health risk assessment
HI	Hazard index
IC	Institutional control
IRAP	Interim remedial action plan
IR17	Installation Restoration Site 17
LNAPL	Light non-aqueous phase liquid
LUC RD	Land use control remedial design
Mare Island	Mare Island Naval Shipyard
mg/kg	Milligram per kilogram
MNA	Monitored natural attenuation
msl	Mean sea level

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NA	Not available
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	Non-time critical removal action
O&M	Operation and maintenance
OWS	Oil/water separator
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PSG	Passive soil gas
RAO	Remedial action objective
RAP	Remedial action plan
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
RG	Remediation goal
RI	Remedial investigation
ROD	Record of decision
SLERA	Screening-level ecological risk assessment
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TCE	Trichloroethene
VI	Vapor intrusion
VOC	Volatile organic compound

1.0 DECLARATION

This Record of Decision/Final Remedial Action Plan (ROD/Final RAP) presents the selected remedy for the Installation Restoration Site 17 (IR17) and Building 503 Area, the former paint manufacturing facility, at the former Mare Island Naval Shipyard (Mare Island), in Vallejo, California.

The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (Title 42 United States Code Section [§] 9601, et seq.), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 Code of Federal Regulations Part 300). The selected remedy also satisfies the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) RAP requirements for hazardous substance release sites pursuant to California Health and Safety Code § 25356.1. Mare Island has not been placed on the CERCLA National Priorities List. The CERCLA Information System identification number for Mare Island is CA7170024775.

The Department of the Navy (Navy) is the lead federal agency under CERCLA for Mare Island and has selected the remedy for the IR17 and Building 503 Area. The California Environmental Protection Agency (DTSC and the San Francisco Bay Regional Water Quality Control Board [Regional Water Board]) concur with the selected remedy. The decision documented in this ROD/Final RAP is based on and relies on the Administrative Record[1] file. Information that is not specifically summarized in this ROD/Final RAP or its references, but that is contained in the Administrative Record file, has been considered and is relevant to the selection of the remedy at the IR17 and Building 503 Area.

The Navy provides funding for site remediation at former Mare Island under the Base Realignment and Closure (BRAC) program. The Federal Facility Site Remediation Agreement (FFSRA) for Mare Island documents how the Navy intends to meet and implement the requirements of CERCLA in partnership with DTSC and the Regional Water Board.

The remedial action selected in this ROD/Final RAP makes a final determination for all chemicals detected at the IR17 and Building 503 Area and addresses the remaining residual risk at the site. The nature and extent of contamination for the IR17 and Building 503 Area is based on data collected during several investigations and removal actions between 1985 and 2014. Primary contaminants associated with historical activities at the IR17 and Building 503 Area are volatile organic compounds (VOC), coal tar distillates, semivolatile organic compounds (SVOC), polychlorinated biphenyls (PCB), polycyclic aromatic hydrocarbons (PAH), and metals in soil, VOCs in groundwater, and VOCs in soil gas.

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1 **Bold blue text** identifies detailed site information available in the Administrative Record (Attachment A) and listed in the References table (Attachment B). This ROD/Final RAP is also provided on CD, whereby **bold blue text** serves as a hyperlink to reference information. The hyperlink will open a text box at the top of the screen. A blue box surrounds applicable information in the hyperlink. To the extent there may be inconsistencies between the referenced information attached to the ROD/Final RAP via hyperlinks and the information in the ROD/Final RAP itself, the language in this ROD/Final RAP controls.

The Navy presented the Proposed Plan/Draft RAP for the IR17 and Building 503 Area at a public meeting on May 28, 2015. This ROD/Final RAP has been prepared to meet the requirements of the California Health and Safety Code § 25356.1 for hazardous substance release sites. The California Health and Safety Code requires preparation of a RAP for sites that are not listed on the National Priorities List, such as former Mare Island. Therefore, this document also serves as the final RAP to fulfill the public notice and comment requirement of the California Health and Safety Code. It incorporates all public comments received during the public meeting and Proposed Plan/Draft RAP review period.

1.1 FEASIBILITY STUDY ADDENDUM CONCLUSIONS

The IR17 and Building 503 Area was separated into four subareas for risk assessment in the feasibility study (FS) addendum. Unacceptable risk to human health was identified in Subareas 1 and 2. No unacceptable human health risk was identified in Subareas 3 and 4. Subarea 4 was not included in the revised risk assessment completed as part of the FS addendum because previous non-tidal wetland investigations concluded that further assessment and evaluation were unnecessary because there was no unacceptable risk to human health or the environment; DTSC concurred with these findings in December 2012. No action is necessary to protect the environment, including ecological receptors at the IR17 and Building 503 Area, because no significant ecological exposure will occur at Subareas 1, 2, or 3, and no ecological risks were identified at Subarea 4.

1.2 SELECTED REMEDY

Unacceptable risk to human health was identified at the site from exposure to chemicals of concern (COC) in soil and soil gas in Subareas 1 and 2. COCs and affected media include lead and PCBs in soil at Subarea 1; 1,2,4-trimethylbenzene, ethylbenzene, m,p-xylene, and o-xylene in soil gas at Subarea 1; and trichloroethene (TCE) and vinyl chloride in soil gas at Subarea 2. No further action is necessary for Subareas 3 and 4. The remedy selected in this ROD/Final RAP is necessary to protect public health from actual or potential releases of CERCLA hazardous substances at the site.

The selected remedy for Subareas 1 and 2 includes:

- Excavation and off-site disposal of contaminated soil;
- Monitored natural attenuation (MNA) of contamination in soil gas; and
- Institutional controls (ICs) to restrict specific land uses and activities.

The selected remedy will make the IR17 and Building 503 Area available for the future commercial/industrial reuse of the property identified in the Mare Island Specific Plan, as amended. The selected remedy is protective of human health and the environment, complies with federal and state statutes and regulations that are determined to be applicable or relevant and appropriate (ARAR), and is cost-effective. No source materials that constitute principal threat waste are present at the IR17 and Building 503 Area. The selected remedial action uses permanent solutions and alternative treatment technologies to the maximum extent practicable.

The remedy does not satisfy the statutory preference for treatment. Although concentrations of COCs in soil gas would be reduced through natural attenuation processes such as biodegradation, sorption, dispersion, and volatilization, MNA does not include engineered actions to actively reduce the toxicity, mobility, and volume of contaminants. Excavation and off-site disposal of contaminated soil is not treatment that would result in the destruction, transformation, or irreversible reduction in contaminant mobility.

CERCLA § 121 requires 5-year reviews (statutory reviews) of sites where the remedial action does not achieve concentrations of hazardous substances acceptable for unrestricted use. The remedy selected for Subareas 1 and 2 of the IR17 and Building 503 Area will not achieve unrestricted use. Therefore, the Navy expects to complete CERCLA 5-year reviews for Subareas 1 and 2 of the IR17 and Building 503 Area.

1.3 DATA CERTIFICATION CHECKLIST

The following information is included in Section 2.0 of this ROD/Final RAP. Additional information can be found in the Administrative Record file for this site, Attachment A.

DATA	ROD/FINAL RAP SECTION
COCs	Section 2.5
Risk represented by the COCs	Section 2.5
Cleanup goals established for COCs and the basis for these goals	Section 2.8
Principal threat wastes	Section 2.7
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater	Section 2.4
Estimated capital costs, operation and maintenance, and total present-worth costs; discount rate; and the number of years over which the remedy cost estimate is projected	Table 4
Key factors that led to selecting the remedy	Section 2.10.1

If contamination posing an unacceptable risk to human health or the environment is discovered after this ROD/Final RAP is executed, the Navy will undertake all necessary actions to ensure continued protection of human health and the environment.

1.4 AUTHORIZING SIGNATURES

Under Executive Order 12580, the Navy is the lead agency responsible for the cleanup effort, and the DTSC, with support from the Regional Water Board, provides regulatory oversight. The U.S. Environmental Protection Agency (EPA) Region 9 also provides regulatory support to DTSC on the CERCLA work conducted at the former Mare Island Naval Shipyard.

This signature page documents the Navy's selected remedy of excavation and off-site disposal, MNA, and ICs at the IR17 and Building 503 Area. In addition, the signatures from the State of California (DTSC and Regional Water Board) document concurrence with the ROD/Final RAP.

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2.0 DECISION SUMMARY

2.1 SITE DESCRIPTION AND HISTORY

The Mare Island peninsula is in the City of Vallejo in Solano County, California, northeast of San Francisco (Figure 1). The Napa River (Mare Island Strait) lies to the east and separates the peninsula from the remainder of the City of Vallejo; the peninsula is bounded by Highway 37 to the north, the Carquinez Strait to the south, and San Pablo Bay to the west. A causeway bridge crosses the Napa River and connects Mare Island to the City of Vallejo at Tennessee Street. A second access point is at the northern end of Mare Island, where Railroad and Walnut Avenues connect to Highway 37. The primary mission of Mare Island Naval Shipyard during its 142 years of operation was ship and submarine construction, overhauls, repair, and maintenance. In 1993, the Defense Base Realignment and Closure Commission recommended closure of Mare Island, and the facility was subsequently closed on April 1, 1996.

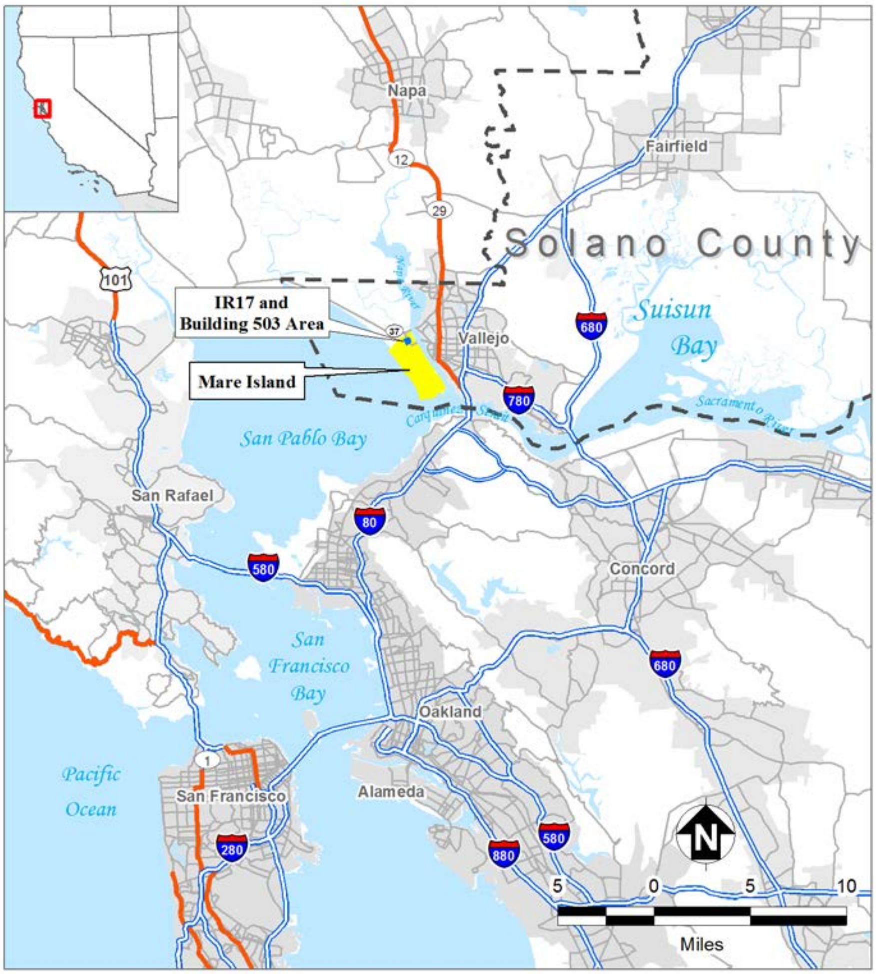

Figure 1. Location of Former Mare Island Naval Shipyard and the IR17 and Building 503 Area

The IR17 and Building 503 Area is a former paint manufacturing facility located at the northern end of the Mare Island peninsula (Figure 1). Paints and varnishes were manufactured at the site in support of ship construction and maintenance from the 1940s to the mid-1950s. Figure 2 shows the conceptual site model (CSM) of the IR17 and Building 503 Area as it was in the 1940s. Figure 3 shows the site features that are currently present. Paints and varnishes were produced in Building 503 and former Building 519, while the drums used to store the paints were manufactured in former Building 567. Building 519-A was used as a covered loading dock. Railroad cars were used in the area to transport raw materials and manufactured paints and varnishes on and off site. Raw materials and finished paints and varnishes were apparently stored in Buildings 499 and 601.

Other features at the former paint manufacturing facility included two former aboveground storage tank (AST) farms (one between Building 503 and Azuar Drive and one southwest of the intersection of Azuar Drive and J Street), associated pipelines, and a former 4,000-gallon heating oil AST adjacent to Building 503. The facility also included a former underground oil/water separator (OWS) north of former Building 519, a former electrical substation northeast of former Building 567, and an existing electrical substation at Building 517. Building 499, most of Building 601, and an adjacent tin canopy (Building 499-A) are also within the facility boundary. Building 499 was used to store paints and associated oils until the former manufacturing facility closed in the 1950s; later, it was used to store bottled gases.

Materials used in the paint manufacturing process, which included oils, solvents, and resins, were stored at the two former tank farms. The former northern tank farm consisted of 21 ASTs and was located between Building 503 and Azuar Drive. The former southern tank farm consisted of six ASTs and was located southwest of the intersection of Azuar Drive and J Street. The 21 ASTs in the former northern tank farm included a battery of 16 horizontal ASTs enclosed in a concrete secondary containment adjacent to Building 503 and five larger ASTs east of Azuar Drive that stood on concrete pads enclosed by soil berms. The six ASTs in the former southern tank farm (south of J Street) stood on concrete pads, surrounded by soil berms. A set of former underground product distribution pipelines connected the two tank farms with Building 503.

The paint manufacturing facility was closed in the mid-1950s and most building structures were demolished during subsequent years.

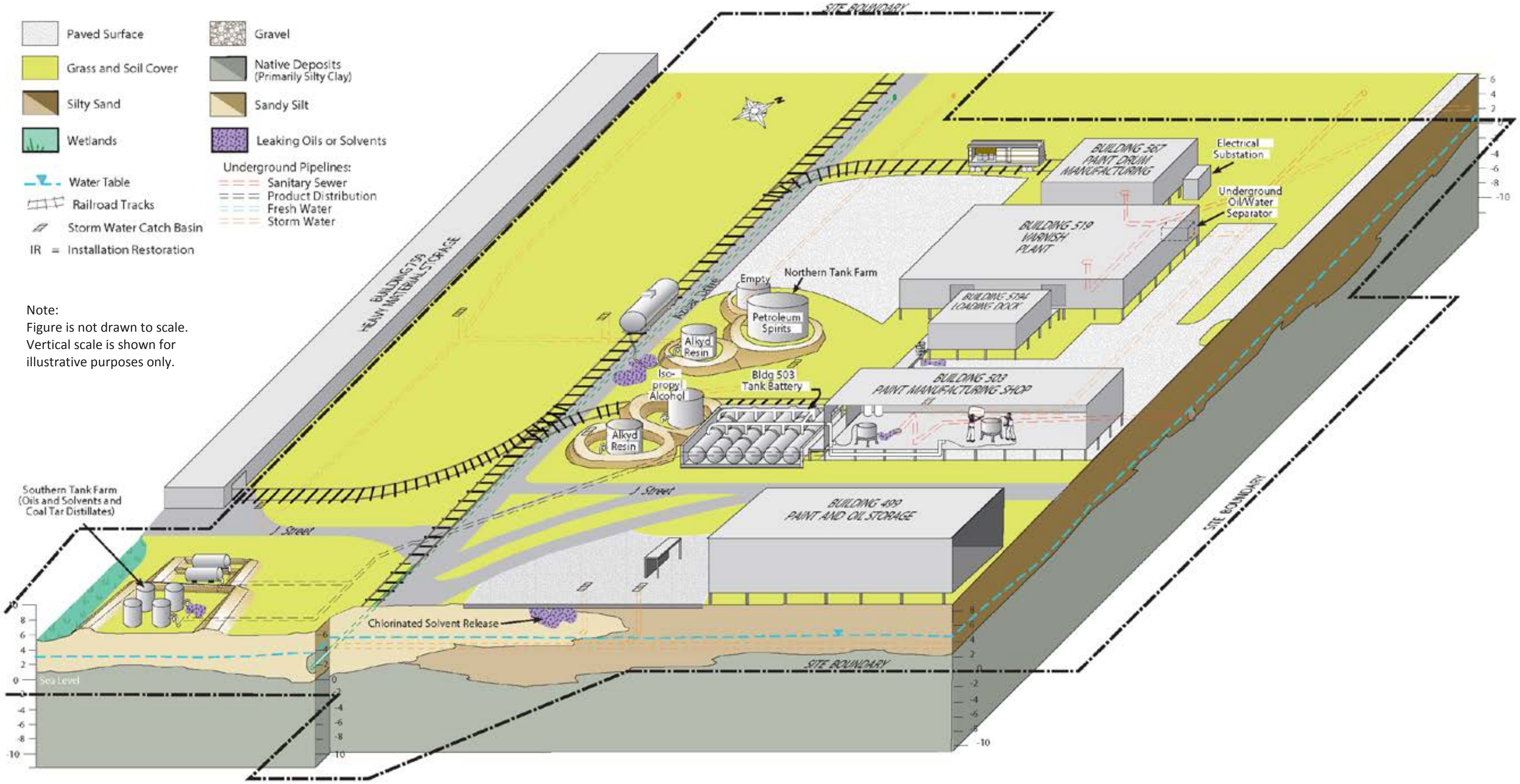

Figure 2. Late 1940s Conceptual Site Model (CSM) for the IR17 and Building 503 Area

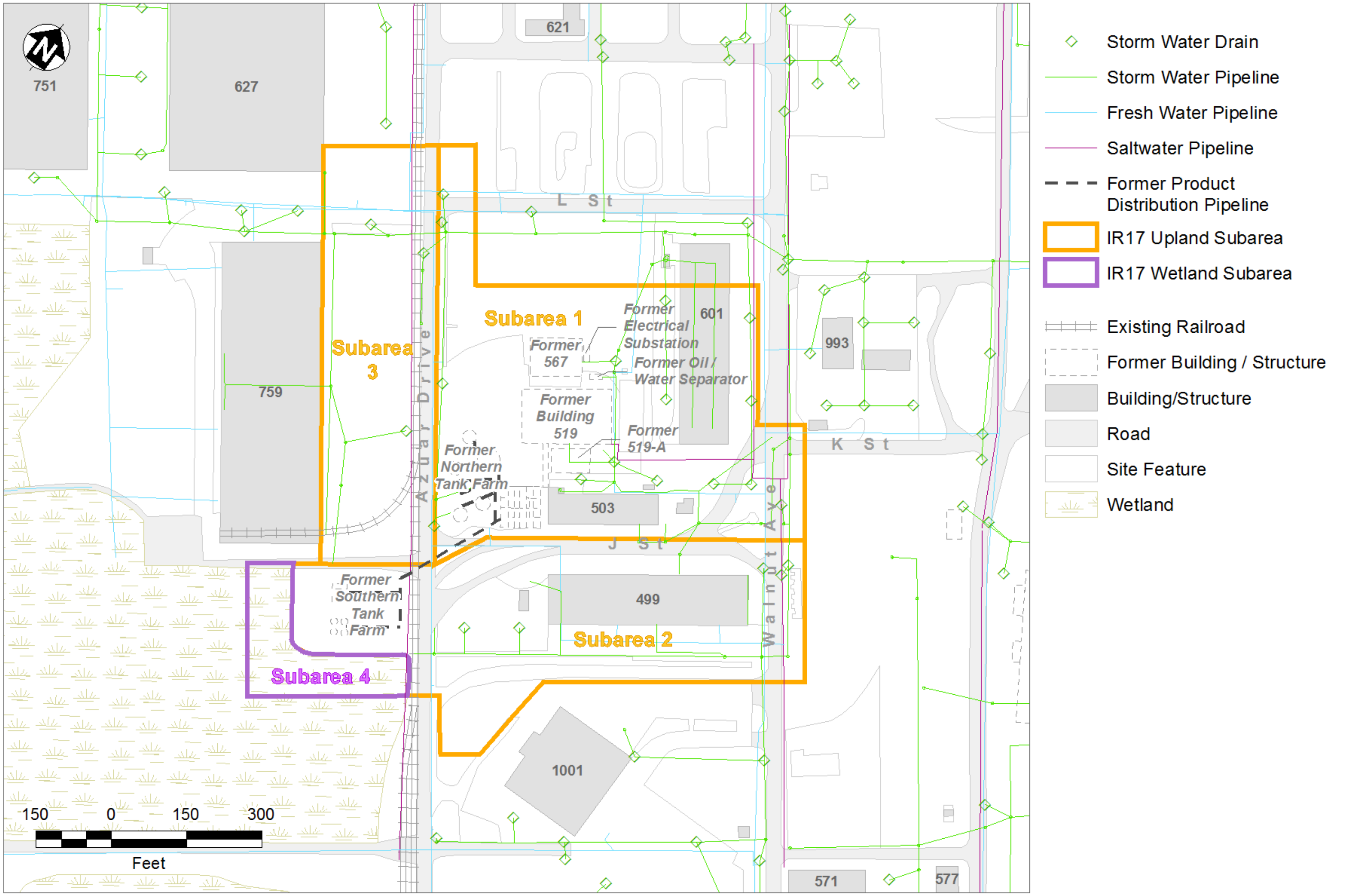

Figure 3. Current Site Features for the IR17 and Building 503 Area

2.2 SITE CHARACTERISTICS

Land occupied by the IR17 and Building 503 Area was originally part of a tidal marshlands area near the shoreline of Mare Island Strait. Between 1911 and 1938, the upland area that is currently occupied by the IR17 and Building 503 Area was created with dredge fill material (primarily clay and silt). Coarser-grained fill also was imported to create the land occupied by the IR17 and Building 503 Area, resulting in the site's current ground surface elevation of 7 to 9 feet above mean sea level (msl). A seasonal non-tidal wetland is in the southern corner of the site. Much of the rest of the site is covered by buildings, asphalt, and concrete.

Groundwater at the IR17 and Building 503 Area(1) is encountered at depths ranging between approximately 3 and 10 feet below ground surface (bgs) in the upland area; measured groundwater elevations range from 0.5 foot below msl to 7.25 feet above msl. Groundwater elevations range from 0.5 foot to 3 feet above msl in the non-tidal wetland area, or 3 to 6 feet bgs. Water level data exhibit moderate seasonal variation. Groundwater flows toward the wetland from north to the south in the southern portion of the site; groundwater in the northern portion of the site flows to the north.

The human health risk assessment (HHRA) for the IR17 and Building 503 Area evaluated potential exposure pathways (such as ingestion, skin contact, and inhalation) to chemicals in soil, soil gas, and groundwater. The Navy provided data to show that the shallow groundwater at a depth of 3 to 15 feet bgs meets an exception to State Water Resources Control Board Resolution 88-63, the Sources of Drinking Water Policy. The shallow groundwater at this depth is high in total dissolved solids (greater than 3,000 milligrams per liter) and is not reasonably expected to supply a public water system in the foreseeable future. The **Regional Water Board concurred with the Navy's conclusion(2)**. For these reasons, use of groundwater as drinking water was not considered a complete exposure pathway and was not evaluated in the HHRA.

During manufacturing, paints and varnishes were released to soil and groundwater from the former paint manufacturing facility. Materials released included oils, solvents, and resins. Constituents that make up these paint manufacturing materials including, but not limited to, VOCs, SVOCs, and metals, were analyzed in soil, groundwater, and soil gas samples and were subsequently addressed through a combination of removal actions, post-removal sampling, and risk assessments. An FS addendum was prepared in 2014 to update the HHRA for the IR17 and Building 503 Area. An incremental risk evaluation was conducted in the HHRA to determine which chemicals were statistically present at the site above ambient concentrations and conservative risk-based screening criteria. Based on the incremental risk evaluation, the FS addendum identified remaining contaminants in soil and soil gas at the site that warranted remedial action. Those remaining contaminants where additional action is required include chlorinated solvents (TCE and vinyl chloride), VOCs (1,2,4-trimethylbenzene, ethylbenzene, m,p-xylene, and o-xylene), metals (lead), and PCBs (total Aroclors). Figure 2 shows the CSM for releases associated with the manufacturing process.

There is limited potential for off-site migration of hazardous substances from the site because the COC sources have been removed, contamination remaining at the site is primarily residual, and organic chemicals in soil, soil gas, and groundwater appear to be naturally attenuating. Additionally, portions of the site are covered by buildings, asphalt, and concrete, limiting surface exposure and migration of chemicals in storm water runoff and wind dispersion. Chemicals in groundwater at the site tend to remain near the point of release because of the flat gradient and seasonably variable flow directions and because storm water drainage lines and surface inlets are above the typical groundwater elevation, limiting the potential migration of groundwater.

2.3 PREVIOUS INVESTIGATIONS

This ROD/Final RAP addresses CERCLA contaminants at the IR17 and Building 503 Area. Table 1 summarizes the previous studies and investigations conducted at the IR17 and Building 503 Area. This ROD/Final RAP does not address those portions of Solid Waste Management Unit (SWMU) 93 (storm sewer system line) and SWMU 106 (sanitary sewer system line) that are located within the IR17 and Building 503 Area (see Figure 3). On October 11, 2013, the Navy submitted a closure request with supporting documentation to DTSC for the portions of **SWMU 93 and SWMU 106(3)** within the IR17 and Building 503 Area and within the remaining portions of Parcel XV-B(1), requesting that they be closed under the authority of the Resource Conservation and Recovery Act. **DTSC(4)** concurred in a letter dated March 28, 2014.

TABLE 1. SUMMARY OF PREVIOUS STUDIES AND INVESTIGATIVE ACTIVITIES

Previous Investigation / Removal Action	Date	Investigation / Removal Action Activities
Verification Study at Buildings 519 and 567	1985	A verification study was conducted to assess soil and groundwater conditions at IR17. The verification study included assessment of soil and groundwater quality beneath Buildings 519 and 567 in Subarea 1. Analytical results indicated the presence of PCBs, total organic halides, SVOCs, and metals compounds in both soil and groundwater. As a result, further investigation of soil and groundwater quality at IR17 was recommended.
Preliminary Surface Contamination Investigation at Buildings 519 and 567	1986	An investigation was conducted to evaluate the environmental condition of the Buildings 519 and 567 concrete slabs in Subarea 1. Based on the results, it was concluded that the concrete cores did not contain significant concentrations of any chemicals.
Phase I of the Remedial Investigation	1991-1992	Phase I of the remedial investigation (RI) was conducted at IR17 to assess the extent of organic and metals contamination in soil and groundwater. As part of this investigation, soil samples were collected in the vicinity of and underneath the concrete slabs of former Buildings 519 and 567. Five borings were completed as monitoring wells in Subarea 1, and groundwater samples were collected.
Phase II of the Remedial Investigation	1993-1996	Phase II of the RI at IR17 was conducted to further assess the extent of contamination identified during the Phase I RI. The investigation included installing and sampling monitoring wells and collecting soil samples from direct-push borings and vacuum borings in Subarea 1. The sample results indicated that contaminants were present at concentrations requiring further analysis through an HHRA.

TABLE 1. SUMMARY OF PREVIOUS STUDIES AND INVESTIGATIVE ACTIVITIES

Previous Investigation / Removal Action	Date	Investigation / Removal Action Activities
Baseline Human Health Risk Assessment	1996	The HHRA evaluated human health risks in Subarea 1 based on a residential reuse scenario. The results of the HHRA indicated that metals, PCBs, and PAHs were present in surface soil at concentrations that could pose a threat to human health (under a residential scenario) and the environment. This HHRA was superseded by the HHRA in the RI report.
Group II/III Accelerated Study	1997-2000	The Group II/III Accelerated Study was conducted to assess potential contamination at identified Group II/III sites including the Building 503 Area in all four subareas. The Building 503 Area was included in the Group II/III Accelerated Study because of the possibility of leaks or spills from former ASTs and their associated piping. The Building 503 Area was combined with IR17.
Basewide Groundwater Monitoring Program	1992-2000	**Monitoring wells installed at the IR17 and Building 503 area(5)** in all four subareas were sampled as part of the basewide quarterly groundwater sampling program, and later included in the 2006 RI report. Sample results indicated VOCs, SVOCs, organotins, formaldehyde, and metals were detected consistently above comparison criteria in groundwater collected from monitoring wells or grab groundwater locations.
Basewide Polychlorinated Biphenyl Confirmation Sampling	1998	PCB confirmation samples were collected at the IR17 and Building 503 Area under the basewide PCB confirmation sampling program (referred to as the basewide PCB study). PCBs were not detected above the comparison criterion of 1 milligram per kilogram (mg/kg) in any of the soil or concrete samples.
Confirmation and Characterization Sampling for the IR17 Removal Action and Product Distribution Pipeline Excavation	1998-1999	**Removal actions were conducted(6)** in Subareas 1 and 2 to reduce the threat to human health from PCBs, PAHs, and metals in surface soil at the IR17 and Building 503 Area. Soil was excavated and removed from (1) beneath the entire footprint of former Building 519, (2) along the eastern and southern sides of the former electrical substation (adjacent to Building 567), and (3) at other isolated locations in the vicinity of Buildings 503 and former Building 519. In addition, the product distribution pipeline and associated soil extending between the two former tank farms and the OWS just north of former Building 519 were excavated to remove these potential sources of contamination. After these removal activities, discrete soil samples were collected from the excavations for characterization. The confirmation sample results verified that the time-critical removal action goals for heavy metals, PAHs, and PCBs had been achieved.
Treatability Study	1999	A treatability study was conducted in Subareas 1 and 2 to evaluate whether chemical oxidation injection could be used to remediate benzene, toluene, ethylbenzene, and total xylenes (BTEX) and phenols in groundwater to below target concentrations. Results indicated that chemical oxidation injection did not reduce BTEX concentrations in groundwater.
Groundwater Data Gap Investigation	2002	Field activities were conducted at the IR17 and Building 503 Area to obtain additional information needed to more fully delineate the extent of VOC and metals contamination in soil, sediment, and groundwater and to further refine the site hydrogeologic conceptual model. A thin layer (0.01 foot) of light non-aqueous phase liquids (LNAPL) was encountered at monitoring well 17W15 in the southwest corner of Subarea 1, and trace quantities (less than 0.01 foot) were observed in monitoring well 17W12, located west of Azuar Drive in Subarea 2. Although VOCs were detected in groundwater around the storm pipeline downgradient and outside of the IR17 and Building 503 Area, no indication of a significant release was apparent, and the detections were below comparison criteria developed in the RI report.

Table 1. Summary of Previous Studies and Investigative Activities		
Previous Investigation / Removal Action	**Date**	**Investigation / Removal Action Activities**
Onshore Ecological Risk Assessment	2002	A screening-level ecological risk assessment (SLERA) was completed for the site using site-specific data for the IR17 and Building 503 Area. Food-chain modeling conducted in the 2002 SLERA indicated that the salt marsh harvest mouse was not at immediate or significant risk from chemicals in the wetland (Subarea 4).
Remedial Investigation for IR Site 17 and the Building 503 Area, Investigation Area A1	2006	The primary objectives of the final RI for all the subareas were to identify potential contaminants resulting from past activities at the site, characterize the nature and extent of contaminants identified in all investigations previous to the RI, assess baseline risks to both human and ecological receptors, and provide recommendations for conducting an FS. The RI concluded that no action was required based on risk. However, the RI concluded that the apparent presence of residual free-phase product (coal tar distillates) may continue to represent a long-term source of soil and groundwater contamination. The **RI recommended**(7) that remedial alternatives should be evaluated in an FS to reduce the apparent occurrence of residual free-phase product (coal tar distillates).
Feasibility Study for the IR Site 17 and Building 503 Area, Investigation Area A1	2006	The FS evaluated a total of six alternatives to address the apparent presence of residual free-phase product (coal tar distillates) at the site. However, the Navy, in agreement with the BRAC cleanup team (BCT) revised the overall strategy for the IR17 and Building 503 Area to include performance of a non-time critical removal action for residual free-phase product (coal tar distillates), and evaluation of the vapor intrusion (VI) pathway using soil gas data before a ROD would be finalized for the site.
Additional Soil, Groundwater, and Soil Gas Sampling Investigation	2008	The Navy collected additional soil, groundwater, and soil gas samples in all four subareas. The additional sampling investigation was conducted to identify the location and extent of potential free-phase product (coal tar distillates) in soil and groundwater, as well as to collect soil gas data for use in a VI risk evaluation. The investigation was conducted in two phases: first a passive soil gas (PSG) survey was conducted, followed by active soil gas (ASG) sampling. Soil, groundwater, and ASG data collected during this investigation were **presented in a 2009 summary report**(8). The ASG data were used in a VI risk evaluation in the summary report, which concluded there was elevated VI risk at four locations.
Engineering Evaluation and Cost Analysis/Interim RAP (EECA/IRAP)	2009	An EECA/IRAP was prepared to develop potential removal action alternatives to address and reduce the apparent occurrence of residual free-phase product (coal tar distillates) in Subareas 1, 2, and 3 that were previously identified and further delineated during the 2008 sampling investigation. The recommended alternative was to excavate contaminated soil, dispose the soil at an off-site landfill, then backfill with clean soil. The recommended remedy was later officially selected and approved in a 2009 action memorandum.
Non-Time Critical Removal Action	2010	The Navy **completed a non-time critical removal action**(9) (NTCRA), which included two excavations to reduce the apparent occurrence of residual free-phase product (coal tar distillates) to the maximum extent practicable in Subareas 1, 2, and 3, as well as an additional excavation to address an area affected by chlorinated solvents that was identified as posing an unacceptable risk to human health in the VI risk evaluation completed using 2008 ASG data. Approximately 9,500 cubic yards of soil were removed during the NTCRA.

TABLE 1. SUMMARY OF PREVIOUS STUDIES AND INVESTIGATIVE ACTIVITIES		
Previous Investigation / Removal Action	**Date**	**Investigation / Removal Action Activities**
Post-Removal Groundwater, Soil, and Soil Gas Sampling	2010-2011	The Navy conducted four quarters of groundwater monitoring in Subareas 1, 2, and 3 to confirm the effectiveness of the NTCRA in meeting the removal action goals. Results of the groundwater monitoring showed chemical **concentrations in groundwater were reduced(10)** to below the removal action goals and other risk-based comparison criteria within 1 year after the NTCRA, with the exception of vinyl chloride at one well.
Non-tidal Wetland Investigation	2010-2012	The Navy conducted an investigation in the IR17 and Building 503 Area non-tidal wetlands (Subarea 4) to evaluate the nature and extent of contamination in the sediment, groundwater, and soil gas, and to assess potential risk to human health and the environment. Additional step-out sediment and soil gas samples were collected in December 2011. The SLERA identified total dichlorodiphenyltrichloroethanes (DDT) as a risk driver for ecological receptors. However, the non-tidal wetland investigation concluded that concentrations of total DDTs represent normal historical application of pesticides. No point sources were identified, and the mobility was expected to be limited. The investigation concluded that chemicals in the sediment, groundwater, and soil gas in the **non-tidal wetlands area do not pose a significant risk(11)** to human health or the environment. Sediment, groundwater, and soil gas data indicated that the non-tidal wetland area has not been contaminated by historical activities at the IR17 and Building 503 Area. No further action was recommended for the non-tidal wetland area and the **DTSC concurred(12)** with the findings of the report.
Molybdenum Technical Memorandum	2012	The Navy prepared a technical memorandum to first develop an ambient fill data set for molybdenum at Mare Island, and then evaluate molybdenum concentrations in sediment at the IR17 and Building 503 Area (Subarea 4) against the concentrations in ambient fill at Mare Island. The analysis demonstrated that the molybdenum concentrations in sediment at the non-tidal wetland are within the range of molybdenum concentrations in ambient fill at Mare Island.
Upland Chlorinated Solvents Investigation	2012	The Navy conducted a chlorinated solvents investigation to assess the nature and extent of residual chlorinated solvents near the NTCRA excavations in Subarea 2 located south of J Street and east of Azuar Drive (chlorinated solvent area). **Chlorinated solvents were detected(13)** in soil gas at concentrations that were above risk-based concentrations that indicate a potential risk to human health.
Additional Soil Sampling at Location IR17GB033	2014	The Navy collected soil samples to confirm that concentrations of BTEX compounds have decreased significantly near the northeastern end of Building 503 in Subarea 1. Results indicated a **significant decrease in BTEX(14)** concentrations over 20 years.

Table 1. Summary of Previous Studies and Investigative Activities

Previous Investigation / Removal Action	Date	Investigation / Removal Action Activities
FS Addendum	2014	The FS addendum was developed to evaluate and address the residual contaminants in the soil, soil gas, and groundwater that remained after the NTCRA in Subareas 1, 2, and 3. The HHRA identified chemicals of concern in soil and soil gas; thus, the FS addendum evaluated several technologies to address the soil and soil gas contamination at the site, including in situ treatment and capping. The HHRA did not identify chemicals of concern in groundwater because there were no complete exposure pathways for dermal contact with groundwater or drinking water. Therefore, the only technology evaluated to address groundwater was ICs to prohibit extraction or removal of groundwater intended for drinking water or other uses. The FS addendum presents figures showing **sampling locations and recent concentrations in soil and soil gas(15)** for HHRA risk drivers in soil and soil gas compared with risk-based screening levels. Four remedial action alternatives were developed for the IR17 and Building 503 Area using a combination of three technologies (excavation, MNA, and ICs).

Note:

The documents listed in the table above are available in the Administrative Record file and provide detailed information used to support remedy selection at the IR17 and Building 503 Area.

2.4 Current and Potential Future Site Uses

Currently, the IR17 and Building 503 Area contains four buildings (499, 503, 601, and 617) that are not occupied. Most of the site is not currently in use, with the exception of the parking lot for Building 759 (Subarea 3) that is used as employee parking for the building occupant, Earthquake Protection Systems, Inc.

The IR17 and Building 503 Area is partly located in the North Island Industrial Park (Reuse Area 1A, property north and east of Azuar Drive) and the Northwest Industrial Area (Reuse Area 1B, property west of and including Azuar Drive), as defined in the **Mare Island Specific Plan as amended(16)**. Proposed reuse of the North Island Industrial Park is as an employment area with light industrial, commercial, office or research and development, and warehouse uses. The Northwest Industrial Area is proposed for warehousing and light and heavy industrial uses. Based on the reasonably anticipated future land use of the site, people who have potential to be on site include commercial/industrial and construction workers in the light industry areas (Subareas 1 through 3); reuse is designated as Open Space for Subarea 4. Hypothetical future residential and other sensitive uses (such as hospitals, schools for persons under 21 years of age, and day care facilities) are not planned for the site and will be prohibited using ICs.

As noted above in Section 2.2, shallow groundwater at the IR17 and Building 503 Area meets an exception to the Sources of Drinking Water Policy, and no other uses of groundwater are planned at the IR17 and Building 503 Area. The City of Vallejo supplies drinking water to Mare Island.

2.5 SUMMARY OF SITE RISKS

The Navy evaluated potential risks to human health and ecological receptors from chemicals released at the IR17 and Building 503 Area using data from current site conditions (post-removal actions), and using updated methodology and toxicity criteria. These human health and ecological risks are discussed in Section 2.5.1 and Section 2.5.2.

2.5.1 Human Health Risk Assessment

The HHRA provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed to prevent potential risk to human health. A quantitative baseline HHRA was completed in 2006 as part of the remedial investigation (RI) report. However, additional investigations have been conducted and there have been updates to risk assessment guidance since the RI report was finalized.

A **screening-level HHRA(17)** was conducted as part of the 2012 non-tidal wetland investigation report for Subarea 4. Potential future receptors evaluated in the screening-level HHRA included a future recreational user who may visit the non-tidal wetland area and a future construction worker who may be present at the site to install or conduct maintenance on utilities. Commercial/industrial reuse of the non-tidal wetland area is not a planned use and was not evaluated in this screening-level HHRA. Though future residential use was also not a planned use for the non-tidal wetland area, an evaluation of a hypothetical future residential use scenario was conducted to evaluate whether the property can be transferred by the Navy without restriction. The results of the screening-level HHRA for Subarea 4 are shown in the following table.

Scenario	Exposure Medium[a]	Cancer Risk	Noncancer Hazard
Future Recreational User	Surface sediment	5E-07	--
	Subsurface sediment	2E-06	0.4
Future Construction Worker	Subsurface sediment, groundwater	8E-07	0.9
Hypothetical Future Resident	Surface sediment, soil gas	2E-06	0.001
	Subsurface sediment, soil gas	5E-06	0.8

Note:

Risk results shown in the table are based on the incremental risk evaluation following a federal toxicity criteria hierarchy.

a Surface sediment was evaluated from 0 to 0.5 foot below ground surface (bgs); subsurface sediment was evaluated from 0 to 3 feet bgs. The absence of a medium (such as groundwater or soil gas) indicates the exposure to that medium is incomplete.

-- Not calculated; no chemicals having noncarcinogenic effects were detected in surface sediment.

Results of the screening-level HHRA(18) indicate that no action is required at Subarea 4 for exposure to sediment, groundwater, or soil gas. DTSC concurred with the findings of the non-tidal wetland investigation report in December 2012.

An **updated baseline HHRA(19)** was prepared in conjunction with the 2014 FS addendum for Subareas 1 through 3. The updated baseline HHRA evaluated potential human receptors, including construction workers who could be present during development of the site, and commercial/industrial workers who could be present at the site in the future. Residential use of the site is not planned and will be prohibited using ICs. Therefore, residential exposure will not occur. However, a hypothetical future residential exposure scenario was evaluated for Subareas 1 through 3 for comparative purposes and to assess whether residential and other sensitive uses were appropriate. The updated baseline HHRA supersedes the previous HHRAs completed for Subareas 1 through 3 and is used as the basis for evaluating all remaining residual risk at the IR17 and Building 503 Area that must be addressed by the remedial action.

The following exposure pathways were quantified in the baseline HHRA for Subareas 1 through 3 for all receptors, unless noted below:

- Incidental ingestion of soil;
- Dermal contact with soil;
- Inhalation of airborne soil particles as dust;
- Inhalation of VOCs released directly from soil to outdoor air;
- Inhalation of VOCs released from soil gas to indoor air (vapor intrusion) (commercial/industrial worker and hypothetical resident only); and
- Inhalation of VOCs released from groundwater to trench air (future construction worker only).

As discussed above in Section 2.2, groundwater as a source of drinking water was not evaluated in the HHRA. Dermal contact with groundwater in a construction trench was not considered a significant exposure pathway and was not evaluated in the HHRA. Groundwater was not encountered in the NTCRA excavations conducted to 8 feet below ground surface, and current construction practices include methods to limit groundwater accumulation in areas where work will occur below the ground surface and proximate to the groundwater table.

Surface soil was considered to be from 0 to 0.5 foot bgs for Subareas 1 and 2, and 0 to 2 feet bgs for Subarea 3. Subsurface soil was considered to be from 0 to 10 feet bgs for all three subareas. Chemicals of potential concern evaluated in the updated baseline HHRA included metals, PAHs, VOCs, SVOCs, PCBs, and pesticides.

Baseline HHRAs follow an established process recognized by U.S. EPA, DTSC, and other agencies. Potential risks to human health are characterized as either causing cancer (carcinogenic) or causing other adverse health effects (noncancer). Cancer risks are calculated in terms of the additional number of cancer cases that may result within a given population. A 1 in 1,000,000 (expressed as 10^{-6}) risk means that, for every 1,000,000 people, one additional cancer case may occur as a result of exposure to site contaminants. Typically, no further action is required at this risk level. Risks greater than 1 in 10,000 (10^{-4}) may indicate the need for further action. When risks fall between 10^{-4} and 10^{-6}, referred to as the risk management range, decisions about site cleanup are made based on site-specific circumstances.

Noncancer risks are expressed as a number called the hazard index (HI). An HI value of 1 or less indicates that adverse noncancer human health effects are not expected to occur. If the total HI exceeds 1, further evaluation of the HI via a target organ analysis is performed to better define the route and level of risk to human health. Target organ HIs greater than 1 may indicate a potential adverse effect.

The **estimated HHRA cancer risks and noncancer hazards(20)** and **chemicals of concern(21)** for Subareas 1 through 3 are discussed below.

SUBAREA 1

- Future Commercial/Industrial Worker: Unacceptable risks.
  - Cancer risks were within the risk management range and noncancer hazards were equal to or less than the threshold of 1.
  - The majority of the risk is from lead in surface soil.

- Future Construction Worker: No unacceptable risks.
  - Cancer risk was within the risk management range. The noncancer hazard was greater than 1; however, no target organ segregated HIs were above the threshold of 1.

- Hypothetical Future Resident: Unacceptable risks.
  - Cancer risks were greater than $1x10^{-4}$, and the noncancer hazards were greater than the threshold of 1.
  - The majority of the risk is from lead in surface soil; lead and PCBs in subsurface soil; and 1,2,4-trimethylbenzene, ethylbenzene, m,p-xylene, and o-xylene in soil gas.

SUBAREA 2

- Future Commercial/Industrial Worker: Unacceptable risks.
  - Cancer risks were within the risk management range; however, the noncancer hazards were greater than the threshold of 1.
  - The majority of the risk is from TCE in soil gas.

- Future Construction Worker: No unacceptable risks.
  - Cancer risks were within the risk management range, and noncancer hazards were equal to or less than the threshold of 1.

- Hypothetical Future Resident: Unacceptable risks.
  - Cancer risks for subsurface soil and soil gas were greater than $1x10^{-4}$, and the noncancer hazards for surface and subsurface soil and soil gas were greater than the threshold of 1.
  - The majority of the risk is from TCE and vinyl chloride (which is a degradation product of TCE) in soil gas.

SUBAREA 3

- Future Commercial/Industrial Worker: No unacceptable risks.
  - Cancer risks were less than or within the risk management range and noncancer hazards were equal to or less than the threshold of 1.
- Future Construction Worker: No unacceptable risks.
  - Cancer risks were less than the risk management range and noncancer hazards were equal to or less than the threshold of 1.
- Hypothetical Future Resident: No unacceptable risks.
  - Cancer risks were within the risk management range. Noncancer hazards were greater than 1; however, the risk drivers were ambient concentrations of thallium present in approved, clean backfill material used during the 2010 NTCRA. Thus, upon further evaluation, the noncancer hazards from the site were determined to be associated with ambient conditions and there were no unacceptable risks.

The results of the 2014 baseline HHRA are summarized in Table 2.

TABLE 2. HUMAN HEALTH RISK ASSESSMENT RESULTS

Receptor	Exposure Medium [a]	Cancer Risk	Noncancer Hazard
Subarea 1			
Future Commercial/Industrial Worker	Surface soil, soil gas	2×10^{-5}	1 [b]
	Subsurface soil, soil gas	4×10^{-5}	0.9
Future Construction Worker	Subsurface soil, groundwater	4×10^{-6}	2 [c]
Hypothetical Future Resident (Sensitive Uses)	Surface soil, soil gas	**3×10^{-4}**	**12** [b]
	Subsurface soil, soil gas	**4×10^{-4}**	**9** [b]
Subarea 2			
Future Commercial/Industrial Worker	Surface soil, soil gas	9×10^{-6}	**2**
	Subsurface soil, soil gas	1×10^{-5}	**3**
Future Construction Worker	Subsurface soil, groundwater	1×10^{-6}	1
Hypothetical Future Resident (Sensitive Uses)	Surface soil, soil gas	1×10^{-4}	**24**
	Subsurface soil, soil gas	**2×10^{-4}**	**27**
Subarea 3			
Future Commercial/Industrial Worker	Surface soil, soil gas	8×10^{-7}	0.3
	Subsurface soil, soil gas	2×10^{-6}	0.3
Future Construction Worker	Subsurface soil, groundwater	3×10^{-7}	0.9
Hypothetical Future Resident (Sensitive Uses)	Surface soil, soil gas	1×10^{-5}	**4** [d]
	Subsurface soil, soil gas	2×10^{-5}	**4** [d]

Notes:

Risk results shown in the table are based on the incremental risk evaluation following a federal toxicity criteria hierarchy.

Bold font indicates cancer risk above the risk management range of 1×10^{-6} to 1×10^{-4} or the noncancer hazard threshold of 1.

a Surface soil is from 0 to 0.5 foot bgs for Subareas 1 and 2, and 0 to 2 feet bgs for Subarea 3; subsurface soil is 0 to 10 feet bgs for all subareas. The absence of a medium (such as groundwater or soil gas) indicates the exposure to that medium is incomplete.

b Lead was identified as a risk driver in soil at Subarea 1. Exposure to lead is evaluated using a biomarker (blood lead levels) and a quantitative risk estimate cannot be calculated; thus, potential risk associated with lead is not represented in this numerical estimate.

c Risk estimate is above noncancer hazard threshold of 1 but was considered acceptable because no chemical-specific hazard quotients were above the threshold of 1.

d Risk estimate is above noncancer hazard threshold of 1 but was considered acceptable because the risk driver was determined to be associated with ambient conditions and not from historical site activities.

2.5.2 Ecological Risk Assessment

No action is necessary to protect ecological receptors in the IR17 and Building 503 Area. The onshore ecological risk assessment (ERA) conducted in 2002 and the **screening-level ecological risk assessment**(22) (SLERA) conducted in 2012 as part of the non-tidal wetland investigation for Subarea 4 identified no ecological risks associated with the site. Much of Subareas 1, 2, and 3 is covered by buildings, asphalt, and concrete and does not provide suitable ecological habitat. The anticipated future industrial land use is not likely to generate suitable habitat for wildlife and will involve expansion of building footprints and paved surfaces. The 2006 RI report concluded that there are no significant contaminant migration pathways from the upland area to the non-tidal wetland area of the site. In addition, the 2012 SLERA conducted as part of the non-tidal wetland investigation found that no further evaluation or action was required for Subarea 4.

2.6 BASIS FOR REMEDIAL ACTION

The remedial alternative selected in this ROD/Final RAP is necessary to protect public health from actual or potential releases of hazardous substances. The Navy, in partnership with DTSC and the Regional Water Board, considered all pertinent factors in accordance with CERCLA and NCP remedy selection criteria and concluded that remedial action is necessary to address chemical contamination at Subareas 1 and 2 of the IR17 and Building 503 Area. The basis for the remedies evaluated at the IR17 and Building 503 Area is the risk to commercial/industrial workers from exposure to lead in soil at Subarea 1 and TCE in soil gas in the chlorinated solvent area at Subarea 2 and the risk to hypothetical future residents or other sensitive users from exposure to lead and PCBs in soil at Subarea 1, 1,2,4-trimethylbenzene, ethylbenzene, m,p-xylene, and o-xylene in soil gas at Subarea 1, and TCE and vinyl chloride in soil gas in the chlorinated solvent area at Subarea 2. As explained in Section 2.5.1, risk from groundwater as a source of drinking water was not evaluated in the HHRA. The Navy will implement ICs to prohibit the unauthorized use of groundwater at Subareas 1 and 2. ICs prohibiting unauthorized use of groundwater are not required for Subareas 3 and 4 because groundwater analytical data evaluated in the FS addendum and non-tidal wetland area report do not warrant further action. In addition, evaluations of volatile chemicals inhaled in a construction trench by a construction worker in Subareas 3 and 4, and in indoor air by a hypothetical resident in Subarea 4, do not indicate a risk to human health.

2.7 PRINCIPAL THREAT WASTE

When a remedy is selected, the NCP establishes the expectation that the remedy should use treatment to address the principal threats posed by a site if practicable. “Principal threat” is a concept applied to characterization of source materials at a site. Principal threats are generally considered highly toxic or highly mobile source materials that cannot be contained in a reliable manner, or source materials that would pose significant risk to human health and/or the environment if exposure would occur. No source materials that constitute principal threat waste are present at the IR17 and Building 503 Area.

2.8 REMEDIAL ACTION OBJECTIVES

After the decision that remedial action is necessary, remedial action objectives (RAO) are established to address potential risks posed by a site, and to assess the ability of a technology to address those risks. RAOs are environmental, medium-specific goals that will protect human health and the environment.

The Navy developed the following RAOs to address exposures to future commercial/industrial workers and hypothetical future residents or other sensitive users at the IR17 and Building 503 Area:

- The following RAOs were developed for soil and soil gas at Subarea 1 (the former paint manufacturing area and northern tank farm):
  - Prevent direct contact by future commercial/industrial workers with concentrations of lead in surface soil (0 to 0.5 foot bgs) underneath Building 503 that pose a potential risk.
  - Prevent direct contact by hypothetical future residents or other sensitive users with concentrations of lead in surface soil (0 to 0.5 feet bgs) and subsurface soil (0 to 10 feet bgs) that pose a potential risk.
  - Prevent exposure of hypothetical future residents or other sensitive users to PCBs in subsurface soil at concentrations that pose a potential risk.
  - Prevent exposure of hypothetical future residents or other sensitive users to concentrations of 1,2,4-trimethylbenzene, ethylbenzene, m,p-xylene, and o-xylene in soil gas that may pose a potential risk through vapor intrusion into indoor air.
- The following RAOs were developed for soil gas at Subarea 2 (chlorinated solvent area):
  - Prevent exposure of future commercial/industrial workers with concentrations of TCE in soil gas that may pose a potential risk through vapor intrusion to indoor air.
  - Prevent exposure of hypothetical future residents or other sensitive users with concentrations of TCE and vinyl chloride in soil gas that may pose a potential risk through vapor intrusion to indoor air.
- In addition to the RAOs above, the following RAO was developed for groundwater at Subareas 1 and 2:
  - Prohibit extraction or removal of groundwater intended for drinking water or other uses without authorization.

The Navy **developed numerical remediation goals (RG)(23)** to meet the RAOs for soil and soil gas. Table 3 summarizes the RGs for Subareas 1 and 2. RAOs and RGs were not developed for Subareas 3 and 4 because no further cleanup action is required for those areas.

TABLE 3. HUMAN HEALTH REMEDIATION GOALS			
Exposure Medium	**Land Use**	**Chemical of Concern**	**Remediation Goal**
Subarea 1			
Surface Soil (0 to 0.5 feet bgs)	Commercial/Industrial	Lead	346 mg/kg
	Hypothetical Residential or Other Sensitive Uses	Lead	106 mg/kg
Subsurface Soil (0 to 10 feet bgs)	Hypothetical Residential or Other Sensitive Uses	Total PCBs	1 mg/kg
		Lead	106 mg/kg
Soil Gas	Hypothetical Residential or Other Sensitive Uses	1,2,4-Trimethylbenzene	8,026 $\mu g/m^3$
		Ethylbenzene	941 $\mu g/m^3$
		m,p-Xylene	104,956 $\mu g/m^3$
		o-Xylene	92,732 $\mu g/m^3$
Subarea 2			
Soil Gas	Commercial/Industrial	Trichloroethene	7,081 $\mu g/m^3$
	Hypothetical Residential or Other Sensitive Uses	Trichloroethene	405 $\mu g/m^3$
		Vinyl chloride	129 $\mu g/m^3$

Notes:

$\mu g/m^3$ Microgram per cubic meter
bgs Below ground surface
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl

2.9 DESCRIPTION AND COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

The FS addendum evaluated several technologies to address the contamination at the site, including in situ treatment and capping. Four remedial alternatives were developed for the IR17 and Building 503 Area using a combination of excavation, MNA, and ICs. These alternatives were developed to address potentially unacceptable risk to human receptors at Subareas 1 and 2:

- **Alternative 1**: No Action;
- **Alternative 2**: ICs;
- **Alternative 3**: Excavation and Off-Site Disposal, MNA, and ICs; and
- **Alternative 4**: Excavation and Off-Site Disposal and MNA.

The Navy identified Alternative 3 as the preferred alternative in the Proposed Plan/Draft RAP.

2.9.1 Description of Remedial Alternatives

Table 4 provides the major components, details, and **cost of each remedial alternative(24)** identified in the FS addendum. The preferred alternative is shown with blue shading.

TABLE 4. SUMMARY OF REMEDIAL ALTERNATIVES

Remedial Alternative	Components	Details	Cost*
1 No Action	None	No actions or costs. This alternative is required by CERCLA as a baseline for comparison with other alternatives. Under this alternative, no further remediation would be performed at the site. Alternative 1 does not provide protection to human health or the environment. Therefore, Alternative 1 cannot be selected as the remedial action.	Capital Cost: $0 O&M Cost: $0 Total Future Value: $0 Total Present Value: $0
2 Institutional Controls	− ICs	This alternative consists of ICs that would be implemented to prevent exposure to contaminants in soil and soil gas and to prohibit certain uses of Subareas 1 and 2. No further action is necessary for Subareas 3 and 4. Before future commercial/industrial buildings could be constructed in the chlorinated solvent area of Subarea 2, ICs would require an evaluation and (if needed) mitigation of potential vapor intrusion into buildings. ICs also would prohibit extraction or removal of groundwater intended for drinking water or other uses without proper authorization at Subareas 1 and 2. The ICs would be monitored to ensure protectiveness of the remedy.	Capital Cost: $303,000 O&M Cost: $430,000 Total Future Value: $733,000 Total Present Value: $802,000
3 Excavation and Off-Site Disposal, MNA, and Institutional Controls (Future Commercial /Industrial Use)	− Excavation − ICs − MNA	This alternative consists of excavation of soil beneath Building 503 (Subarea 1) to an approximate depth of 0.5 foot bgs contaminated with lead and soil west of Building 499 (chlorinated solvent area in Subarea 2) to a maximum depth of 20 feet bgs that is the source of TCE in soil gas. No further action is necessary for Subareas 3 and 4. The excavated soil would be disposed of off site at a permitted disposal facility. Excavated areas would be backfilled with clean material. The TCE excavation would be followed by soil gas monitoring for 5 years or until remediation goals for commercial/industrial land use included in Table 3 are achieved. This alternative includes an IC restricting soil disturbance in Subarea 1 and groundwater disturbance in Subareas 1 and 2 without a groundwater and soil management plan approved by DTSC, a commercial/industrial use IC to require an evaluation and (if needed) mitigation of potential vapor intrusion into new commercial/industrial buildings within the chlorinated solvent area in Subarea 2, and an IC to prohibit residential and other sensitive uses (such as hospitals, schools for persons under 21 years of age, and day care facilities for children) within Subareas 1 and 2. It also includes monitoring the ICs to ensure the protectiveness of the remedy. Also as in Alternative 2, ICs also would prohibit extraction or removal of groundwater intended for drinking water or other uses without proper authorization at Subareas 1 and 2.	Capital Cost: $5,837,000 O&M Cost: $709,000 Total Future Value: $6,546,000 Total Present Value: $6,842,000

TABLE 4. SUMMARY OF REMEDIAL ALTERNATIVES			
Remedial Alternative	**Components**	**Details**	**Cost***
4 Excavation and Off-Site Disposal and MNA	− Excavation − ICs − MNA	This alternative consists of excavation of soil to approximately 10 feet bgs contaminated with lead and PCBs (Subarea 1) and excavations of soil to maximum depths of 10 (Subarea 1) and 20 (Subarea 2) feet bgs that is contaminated with VOCs. No further action is necessary for Subareas 3 and 4. The excavated soil would be disposed of off site at a permitted disposal facility. Excavated areas would be backfilled with clean soil. Three areas (Subareas 1 and 2) are identified for soil gas monitoring for 10 years or until remediation goals for residential and other sensitive uses included in Table 3 are achieved. The difference between Alternative 4 and Alternative 3 is that this alternative would ultimately clean up the site to allow residential and other sensitive uses. **Alternative 4(25)** includes commercial/industrial and residential and other sensitive uses ICs to require an evaluation and (if needed) mitigation of potential vapor intrusion into new buildings within portions of Subareas 1 and 2, until remediation goals have been met. It also includes monitoring the ICs to ensure the protectiveness of the remedy. Also as in Alternatives 2 and 3, ICs also would prohibit extraction or removal of groundwater intended for drinking water or other uses without proper authorization at Subareas 1 and 2.	Capital Cost: $10,551,000 O&M Cost: $929,000 Total Future Value: $11,480,000 Total Present Value: $11,976,000

Notes:

* Future value O&M costs are presented above for the 30-year (Alternatives 2 and 3) or 10-year (Alternative 4) O&M periods. The discount rate used for the 30-year present value calculations was 1.1 percent and the discount rate used for the 10-year present value calculation was 0.1 percent.

bgs	Below ground surface	MNA	Monitored natural attenuation
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	O&M	Operation and maintenance
		PCB	Polychlorinated biphenyl
DTSC	Department of Toxic Substances Control	TCE	Trichloroethene
IC	Institutional control	VOC	Volatile organic compound

2.9.2 Comparative Analysis of Alternatives

The Navy completed a comparative analysis of the remedial alternatives with respect to the **nine evaluation criteria(26)** that are required by the NCP. The no action alternative was included in the comparisons as required by the NCP. The following subsections present the results of this analysis, including the two threshold criteria, the five balancing criteria, and the two modifying criteria. Table 5 presents a summary of the results from analysis using the first seven of the nine evaluation criteria for alternatives.

TABLE 5. COMPARATIVE ANALYSIS OF SOIL AND SOIL GAS REMEDIAL ALTERNATIVES

Remedial Alternatives	Threshold Criteria		Primary Balancing Criteria				
	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness/ Permanence	Reduction of Mobility, Toxicity, or Volume through Treatment	Short-Term Effectiveness	Implement-ability	Cost ($Million)
Alternative 1: No Action	**No**	NA	Poor	Poor	Excellent	Excellent	$0
Alternative 2: ICs**	Yes	Yes	Good	Poor	Excellent	Good	$0.80
Alternative 3*: Excavation and Off-Site Disposal, MNA, and ICs**	Yes	Yes	Very Good	Poor	Poor	Good	$6.84
Alternative 4: Excavation and Off-Site Disposal and MNA**	Yes	Yes	Excellent	Poor	Poor	Good	$11.98

Notes: Selected alternative indicated in table by blue shading.

Poor ◐ Good ◑ Very Good ◕ Excellent ●

* The Navy selected Alternative 3 based on this comparative analysis and the additional modifying criteria of state and community acceptance.

** Alternative applies to only Subareas 1 and 2.

ARAR Applicable or Relevant and Appropriate Requirement

IC Institutional Control

MNA Monitored Natural Attenuation

NA Not Applicable

2.9.2.1 Threshold Criteria

This section addresses the first two of these criteria: overall protection of human health and the environment, and compliance with ARARs.

Overall Protection of Human Health and the Environment

As shown in Table 5, the no action Alternative 1 does not address any risks at the site and does not provide protection to human health or the environment. Therefore, Alternative 1 cannot be selected as the remedial action. The remaining alternatives (Alternatives 2, 3, and 4) protect human health and the environment at the IR17 and Building 503 Area. Thus, these alternatives were ranked equally based on this criterion.

Compliance with ARARs

ARARs are federal environmental standards, requirements, criteria, or limitations that must be attained by final remedial actions. State standards may also be ARARs if they are more stringent than federal requirements. There are no ARARs associated with Alternative 1. The remaining alternatives (Alternatives 2, 3, and 4) comply with identified ARARs. ARARs for the selected remedial actions are listed in Attachment C.

2.9.2.2 Primary Balancing Criteria

This section addresses the remaining five criteria shown in Table 5 for Alternatives 2 through 4 in Subareas 1 and 2. Alternative 1 failed a threshold criterion and is thus excluded from further consideration. These five criteria include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

Long-Term Effectiveness and Permanence

Alternatives 2 through 4 would provide a range of long-term effectiveness in meeting the RAOs for Subareas 1 and 2. Alternative 2 is rated good because the exposure pathway would be eliminated, but adequacy and reliability depend on ICs. Alternative 3 is rated as very good because the risk is reduced by source removal, but the IC restricting commercial/industrial uses in the chlorinated solvent area in Subarea 2 would remain in place unless an evaluation and, if needed, mitigation of potential vapor intrusion or until the soil gas RG for commercial/industrial uses is met. ICs to prohibit residential or other sensitive uses will remain in place in Subareas 1 and 2. Alternative 4 is rated as excellent because there is greater risk reduction through an increased volume of source removal. Under Alternative 4, the ICs to prohibit residential and other sensitive uses in Subareas 1 and 2 will remain in place until soil and soil gas concentrations can be shown to have been reduced to the RGs presented in Table 3. Under Alternatives 2 through 4, there would be an IC to prohibit groundwater uses in Subareas 1 and 2.

Reduction in Toxicity, Mobility, or Volume through Treatment

Alternatives 2 through 4 are rated as poor because they do not include treatment to reduce the mobility, toxicity, or volume of contamination.

Short-Term Effectiveness

Alternative 2 is rated excellent, as commercial/industrial workers and the off-site community would be protected because COCs in soil and soil gas that pose a potential risk to human health would not be disturbed during implementation of ICs. Transportation of equipment and personnel associated with periodic inspections of the site as required for monitoring of the ICs and the CERCLA 5-year reviews would result in minimal energy consumption and little to no worker safety issues. Alternative 3 is rated poor because it would result in short-term risk to the environment, community, and site workers during excavation and transportation of contaminated soils off site; however, these risks would be minimized by implementing construction management controls, such as monitoring for and suppression of dust during excavation, limiting hours of operation, minimizing truck idling, and covering truck loads. Alternative 4 is also rated poor and is similar to Alternative 3, except that more soil would be excavated under this alternative, potentially resulting in an increased risk of exposure of workers and the surrounding community to contaminated soil. However, as with Alternative 3, the risks would be minimized by implementing construction management controls, such as monitoring for and suppression of dust during excavation, limiting hours of operation, minimizing truck idling, and covering truck loads.

Implementability

Alternative 2 is rated good based on the ease of implementation of ICs. Similarly, Alternatives 3 and 4 are very implementable and also rated good because the soil remediation component for each alternative is straightforward and easily accomplished.

Cost

Alternative 2 would incur the second-lowest cost because it would only include ICs. Alternative 3 would incur moderate costs, and Alternative 4 would incur higher costs because of the greater extent of the excavation.

2.9.2.3 Modifying Criteria

This section addresses the two criteria that are not included in the FS addendum report. They are state acceptance and community acceptance.

State Acceptance

The State of California concurs with the Navy's preferred remedy, Alternative 3, for the IR17 and Building 503 Area identified in the Proposed Plan/Draft RAP.

Community Acceptance

A Proposed Plan/Draft RAP describing the Navy's proposed alternatives was released to the public on May 26, 2015, and was presented to the community at a public meeting on May 28, 2015. In addition, a public comment period was held from May 26, 2015, to June 25, 2015. Comments received on the IR17 and Building 503 Area from the community did not warrant a revision to the preferred alternative for the IR17 and Building 503 Area.

2.10 SELECTED REMEDY

The Navy, with concurrence from the state, has selected Alternative 3, excavation and off-site disposal, MNA, and ICs, as the remedy for Subareas 1 and 2, and has concluded that no further action is necessary for Subareas 3 and 4 within the IR17 and Building 503 Area.

2.10.1 Rationale for Selected Remedy

Key factors in selecting the remedy is that the remedy will:

- Provide protection to human health and the environment by removing contaminated soil and the source of soil gas that pose risks to future receptors at the IR17 and Building 503 Area;
- Meet federal and state ARARs;
- Provide long-term protection of the environment through permanent removal of contaminated soil;
- Result in relatively minor short-term risk to the environment, community, and site workers;
- Allow redevelopment of the site in a manner most consistent with the City of Vallejo's 2008 Mare Island Specific Plan as amended; and
- Address community concerns that the remedy does not rely solely on ICs.

2.10.2 Description of Selected Remedy

The Navy's selected remedial alternative is **Alternative 3(27): Excavation and Off-Site Disposal, Monitored Natural Attenuation, and Institutional Controls**. Figure 4 shows a conceptual view of this remedy for Subareas 1 and 2. No further action would be necessary for Subareas 3 and 4. The Navy estimates that approximately 82 in-place cubic yards of soil containing lead above the commercial/industrial RG will be excavated to the maximum depth of 1.0 foot in Subarea 1. (It is assumed that the soil under Building 503 will be excavated by hand and that the building would not be demolished.) This shallow excavation will remove lead concentrations that exceed the commercial/industrial RG in the surface soil; however, lead concentrations above the commercial/industrial RG will remain in Subarea 1 in the deeper soil. Further, approximately 8,243 in-place cubic yards of soil that is the source of TCE contamination in soil gas in the chlorinated solvent area in Subarea 2 will be excavated to a depth of approximately 15 feet bgs. After excavation is complete, residual concentrations of TCE in soil gas at the Subarea 2 chlorinated solvent area will be monitored for attenuation through natural processes, such as biodegradation, volatilization, and dispersion for 5 years or until the RG for commercial/industrial land use included in Table 3 is achieved.

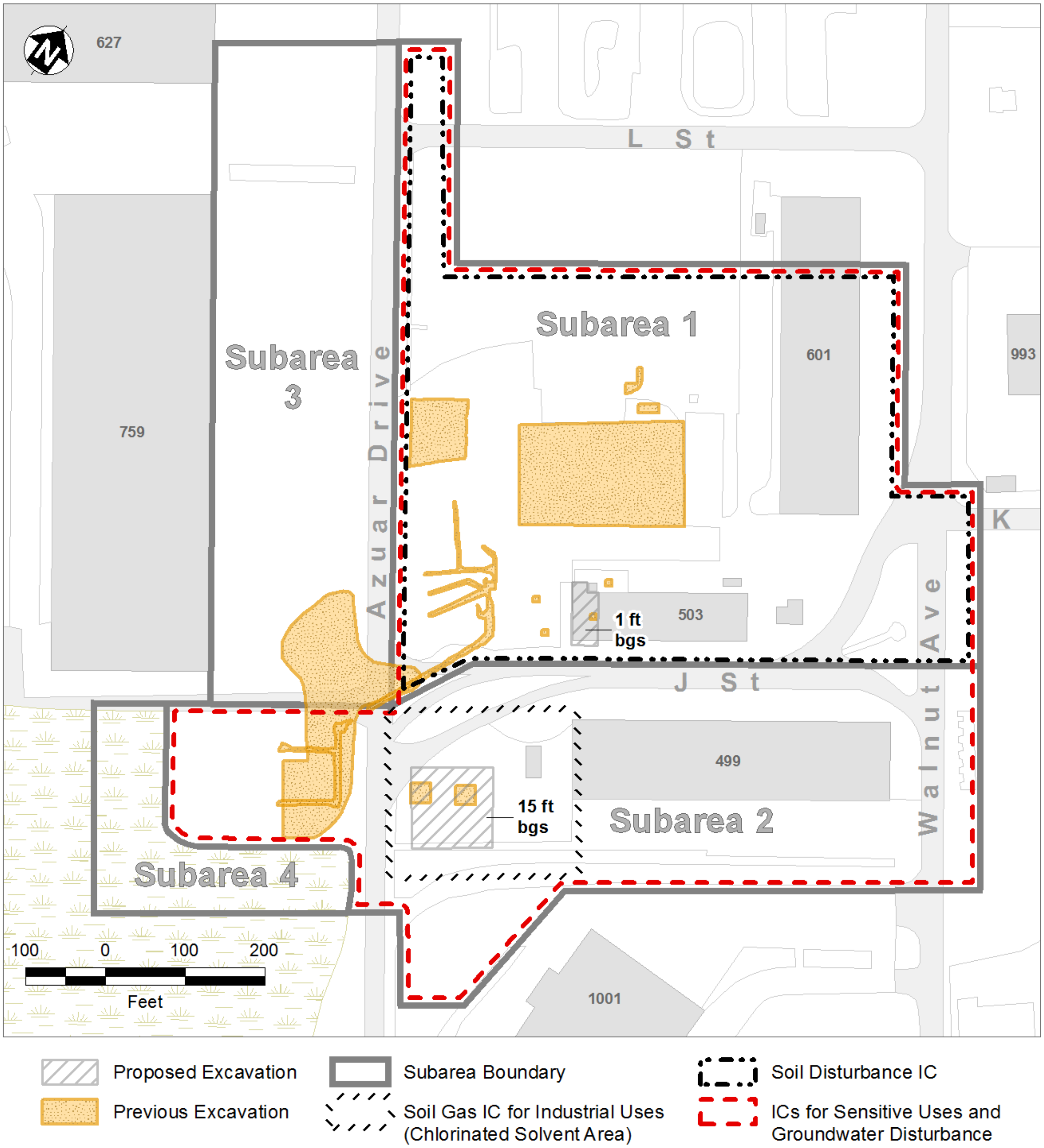

Figure 4. Alternative 3: Excavation and Off-Site Disposal, MNA, and ICs

The selected remedy for Subareas 1 and 2 is designed to achieve RAOs. As a result, ICs will be implemented at Subareas 1 and 2 to prohibit the following uses:

1. A residence, including any mobile home or factory-built housing, constructed or installed for use as residential habitation;

2. A hospital for humans;

3. A school for persons under 21 years of age; or

4. A day care for children.

The following activities will be prohibited unless the conditions, as noted below, are achieved; notice must be provided to the Navy and DTSC and any related submittals must be approved in writing in advance by DTSC:

1. Soil disturbance in Subarea 1 and groundwater disturbance in Subareas 1 and 2 without a groundwater and soil management plan;

2. Occupancy of new commercial/industrial buildings in the chlorinated solvent area of Subarea 2 without a vapor intrusion risk evaluation and, if required, mitigation of potential vapor intrusion, until the TCE soil gas RG is met; and

3. Extraction or removal of groundwater intended for drinking water or other uses in Subareas 1 and 2. This condition must receive proper authorization from the Regional Water Board, as well as DTSC.

The ICs would be monitored to ensure protectiveness of the remedy. The specifics of the ICs and monitoring requirements will be described in the remedial design document that will be developed after this ROD/Final RAP has been finalized. In addition, CERCLA requires a periodic review of cleanup remedies including ICs. These reviews are conducted in 5-year intervals to evaluate whether remedies remain protective of human health and the environment.

Alternative 3 presented in this ROD/Final RAP differs from that presented in the Proposed Plan/Draft RAP, as the IC component of the remedy has been expanded to restrict soil disturbance in Subarea 1 and groundwater disturbance in Subareas 1 and 2 without a groundwater and soil management plan approved by DTSC. This change ensures that subsurface soil in Subarea 1 and groundwater in Subareas 1 and 2 that may be disturbed by construction activities is properly handled and disposed.

The Navy has concluded that it will rely on proprietary controls in the form of environmental restrictive covenants. More specifically, land use and activity restrictions (ICs discussed above) will be incorporated into restrictive covenants included in one or more Quitclaim Deeds from the Navy to the property recipient.

In addition, restrictive covenants included in one or more Covenant(s) to Restrict Use of Property (CRUP[s]) may be entered into by the Navy and DTSC in accordance with the "Memorandum of Agreement between the United States Department of the Navy and the California Department of Toxic Substances Control" and consistent with the substantive provisions of *California Code of Regulations* Title 22 § 67391.1.

The CRUP(s) will incorporate ICs consistent with the selected remedy into environmental restrictive covenants that run with the land and that are enforceable by DTSC against future transferees and users. The Quitclaim Deed(s) will include ICs consistent with the selected remedy in environmental restrictive covenants that run with the land and that will be enforceable by the Navy against future transferees. ICs in the CRUP(s) and Quitclaim Deed(s) will be in accordance with a Land Use Control Remedial Design (LUC RD) report that will be reviewed and approved by the FFSRA signatories. The LUC RD will describe ICs that will be implemented, identify specific IC implementation actions, and will identify the areas of the IR17 and Building 503 Area that will be subject to ICs. Legal descriptions for these areas will be developed prior to property transfer.

If the RG for TCE for commercial/industrial land use is not met at the time of transfer, a future landowner may develop the chlorinated solvent area in Subarea 2 for commercial or industrial land use contingent upon the landowner's completion of a site-specific vapor intrusion evaluation and implementation of engineering controls approved by DTSC. The future landowner would be required to maintain these controls to effectively prevent commercial/industrial worker exposure to TCE through vapor intrusion to indoor air. Alternatively, if TCE concentrations can be shown to have been reduced to the RG presented in Table 3, a future land owner may seek to remove or modify an IC with the approval of DTSC.

Statutory 5-year reviews pursuant to CERCLA § 121 and the NCP are required within 5 years after initiation of the remedial action, and every 5 years thereafter until concentrations of hazardous substances are acceptable for unlimited use and unrestricted exposure, to ensure that the selected remedy for soil, soil gas, and groundwater continues to be protective of human health and the environment.

2.10.3 Expected Outcomes of the Selected Remedy

When the RAOs have been achieved, the remedy will allow Subareas 1 and 2 to be redeveloped and used as a commercial/industrial property in a manner consistent with the City of Vallejo's 2008 Mare Island Specific Plan as amended. Until the RAO and RG is met for commercial/industrial worker exposure to TCE vapor intrusion risk at Subarea 2, certain precautions would have to be taken in the future if commercial/industrial buildings are built in the chlorinated solvent area within Subarea 2. The IC requiring vapor intrusion assessment or vapor mitigation may be removed or modified with the approval of DTSC.

Because the remedy will not achieve COC concentrations that would allow for hypothetical residential or other sensitive uses, ICs will be implemented in Subareas 1 and 2 to prohibit hypothetical residential and other sensitive uses of the property and to prohibit extraction or removal of groundwater intended for drinking water or other uses without proper authorization.

2.10.4 Statutory Determinations

In accordance with the NCP, the Navy makes the following statutory determinations:

- **Protection of Human Health and the Environment –** The selected remedy will protect human health and the environment by preventing exposure to COCs in soil and soil gas, and to groundwater in Subareas 1 and 2 through a combination of soil excavation and off-site disposal, MNA (soil gas monitoring), and ICs;

- **Compliance with ARARs –** The selected remedy will meet all ARARs. The ARARs that will be met by the selected remedy are summarized in Attachment C;

- **Cost-Effectiveness –** The selected remedy will provide overall protectiveness and is considered cost-effective;

- **Utilization of Permanent Solution and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable –** The selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a cost-effective manner at the IR17 and Building 503 Area;

- **Preference for Treatment as a Principal Element –** The selected remedy for the IR17 and Building 503 Area does not satisfy the statutory preference for treatment as a principal element of the remedy; and,

- **Five-Year Review Requirements –** CERCLA § 121 requires 5-year reviews (statutory reviews) of sites where the remedial action does not achieve concentrations of hazardous substances acceptable for unlimited use and unrestricted exposure. A statutory review will follow the schedule of the on-going basewide 5-year reviews to ensure the remedy is protective of human health and the environment because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure.

2.10.5 Documentation of Significant Changes

The Proposed Plan/Draft RAP for the IR17 and Building 503 Area was released for public comment in May 2015. The Proposed Plan/Draft RAP identified Alternative 3 for COCs (excavation and off-site disposal of source area soil, MNA, and ICs) as the preferred alternative for remediation of the IR17 and Building 503 Area. The Navy reviewed all written and verbal comments submitted during the public comment period. The Navy concluded that significant changes to the IC component of the remedy, as originally presented in the Proposed Plan/Draft RAP, were necessary and appropriate. Concentrations of lead in some deeper soil samples in Subarea 1 exceed the commercial/industrial RG for lead in surface soil and there is a possibility this soil could be brought to the surface of the site in the future. In addition, although groundwater was not encountered previously in excavations in Subareas 1 and 2, there is a potential for exposure to residual contaminants in groundwater during future construction activities. Risk from dermal contact with groundwater was not evaluated in the HHRA; thus, the IC component of the selected remedy has been expanded to restrict disturbance to soil in Subarea 1 and disturbance to groundwater in Subareas 1 and 2 without a groundwater and soil management plan approved by DTSC.

2.11 COMMUNITY PARTICIPATION

In accordance with CERCLA §§ 113 and 117, the Navy provided a public comment period from May 26 to June 25, 2015, for the proposed remedial action described in the Proposed Plan/Draft RAP. A public meeting to present the Proposed Plan/Draft RAP was held from 7:00 to 8:30 p.m. on May 28, 2015. Public notice of the meeting and availability of documents appeared in the *Vallejo Times Herald*, *Benicia Herald*, and the *Daily Republic* on May 24, 2015. Attachment D includes the public meeting notices and the transcript of the public meeting, which includes a list of attendees.

Community acceptance of the Navy's preferred alternative was evaluated after the public meeting and the public comment period. Comments received from the public are addressed in a responsiveness summary that is attached to this ROD/Final RAP for the IR17 and Building 503 Area as Attachment E. The responsiveness summary is further discussed in Section 3.0. After this final ROD/Final RAP has been signed and published, the Navy will publish a public notice of the availability of the ROD/Final RAP in the *Vallejo Times Herald*, *Benicia Herald*, and the *Daily Republic* newspapers, and will make the ROD/Final RAP available for public inspection before any remedial action begins.

2.12 NON-BINDING ALLOCATION OF RESPONSIBILITY

Pursuant to *California Health and Safety Code* § 25356.1(e) for remedial action plans prepared for DTSC-listed sites, DTSC is to prepare a preliminary nonbinding allocation of responsibility among all identifiable potentially responsible parties. Based on the available information regarding the former Mare Island Naval Shipyard, DTSC has determined that the Navy is the only identified responsible party.

3.0 RESPONSIVENESS SUMMARY

The purpose of the responsiveness summary is to summarize information about the views of the public and support agencies on both the remedial alternatives and general concerns about the site submitted during the public comment period. The responsiveness summary documents in the public record how public comments were integrated into the decision-making process.

The participants in the public meeting held on May 28, 2015, included community members, Restoration Advisory Board members, and representatives of the Navy, DTSC, and the Regional Water Board. Questions and concerns raised during the meeting were addressed at the meeting and are documented in the meeting transcript (Attachment D). In addition, the Navy has provided further information and responses to comments raised at the meeting and has provided responses to comments received during the public comment period (Attachment E). Based on the comments received from the community, no revision to the proposed remedy for the IR17 and Building 503 Area is warranted.

In compliance with the California Environmental Quality Act, DTSC prepared an Initial Study to evaluate potential impact of the proposed project on the environment. The findings of the Initial Study indicated the project would not have a significant effect on public health or the environment. Therefore, DTSC prepared a draft Negative Declaration for the IR17 and Building 503 Area cleanup. The Initial Study and the draft Negative Declaration were available for review and comment during a public comment period from August 19, 2016, to September 19, 2016. No public comments were received during the comment period.

ATTACHMENT A
ADMINISTRATIVE RECORD INDEX

(*Provided on CD*)

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000384 REPORT 100	**02-01-1976**	METCALF AND EDDY, INC.	ENVIRONMENTAL ENGINEERING SURVEY	NO	"EETP - BLDG 225" SEARCH BLDG 0000121 BLDG 0000151 BLDG 0000225 BLDG 0000503 BLDG 0000627 BLDG 0000737 BLDG 0000740 BLDG 0000795 BLDG 0000866 BLDG 0000900 BLDG H-79 PIER 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000235 REPORT 93	**10-03-1988**	IT CORPORATION	FINAL WORK PLAN FOR REMEDIAL INVESTIGATION, VOLUME IV: QUALITY ASSURANCE PROJECT PLAN (SEE RECORD # 231 - MARE ISLAND TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000231 CORRESPONDENCE 2	**11-08-1988**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE FINAL WORK PLAN FOR REMEDIAL INVESTIGATION, VOLUME IV: QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE IS RECORD # 235)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000368 REPORT 100	**11-29-1988**	IT CORPORATION	HEALTH AND SAFETY PLAN (SEE RECORD # 293 - MARE ISLAND TRANSMITTAL LETTER)	NO	BERTH 0004 BERTH 0005 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

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AR_N00221_000293 CORRESPONDENCE 2	**12-08-1988**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE HEALTH AND SAFETY PLAN (ENCLOSURE IS RECORD # 368)	NO	BERTH 0004 BERTH 0005 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

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AR_N00221_000269 CORRESPONDENCE 2	**09-06-1989**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE DRAFT REMEDIAL INVESTIGATION PLAN, VOLUME III: HEALTH AND SAFETY PLAN; VOLUME IV: QUALITY ASSURANCE PROJECT PLAN; AND VOLUME V: COMMUNITY RELATIONS PLAN (ENCLOSURES ARE RECORDS # 270 THROUGH # 272)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000339 MINUTES 25	**05-21-1990**	NAVFAC - WESTERN DIVISION	08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (INCLUDES VARIOUS HANDOUTS)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

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AR_N00221_000329 CORRESPONDENCE 1	**05-30-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000340 CORRESPONDENCE 1	**06-26-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000341 CORRESPONDENCE 1	**06-26-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

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AR_N00221_000343 CORRESPONDENCE 1	**06-26-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

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AR_N00221_000345 CORRESPONDENCE 1	**06-26-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

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AR_N00221_000346 CORRESPONDENCE 1	**06-26-1990**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE 08 MAY 1990 TECHNICAL REVIEW COMMITTEE (TRC) MEETING MINUTES (ENCLOSURE IS RECORD # 339)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 SITE 00025

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AR_N00221_000901 REPORT 200	**10-01-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME III: HEALTH AND SAFETY PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

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AR_N00221_000902 REPORT 150	**10-19-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME IV: QUALITY ASSURANCE PROJECT PLAN, REVISION 3	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

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AR_N00221_000904 REPORT 150	**10-23-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME VI: DATA MANAGEMENT PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017

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AR_N00221_000899 REPORT 300	**10-24-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME I: PROJECT WORK PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017

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AR_N00221_000900 REPORT 200	**10-24-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME II: SAMPLING AND ANALYSIS PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000903 REPORT 150	**10-24-1990**	IT CORPORATION	SITE INVESTIGATION AND REMEDIAL INVESTIGATION, VOLUME V: COMMUNITY RELATIONS PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000666 CORRESPONDENCE 23	**11-14-1990**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE 1) COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION PLAN: VOLUME I - PROJECT WORK PLAN; VOLUME II - SAMPLING AND ANALYSIS PLAN; VOLUME IV - QUALITY ASSURANCE PROJECT PLAN; AND 2) DEPARTMENT OF HEALTH SERVICES LETTER, DATED 7 NOVEMBER 1990	NO	BLDG 0000225 BLDG 0000291 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000471 BLDG 0000473 BLDG 0000478 BLDG 0000505 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000637 BLDG 0000639 BLDG 0000680 BLDG 0000686 BLDG 0000831 BLDG 0000866 BLDG 0000987 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000360 CORRESPONDENCE 4	**11-26-1990**	CALIFORNIA DEPARTMENT OF HEALTH SERVICES - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION, VOLUME III: HEALTH AND SAFETY PLAN; AND VOLUME V: COMMUNITY RELATIONS PLAN (SEE RECORD # 270 - VOLUME III: HEALTH AND SAFETY PLAN; AND RECORD # 272 - VOLUME V: COMMUNITY RELATIONS PLAN)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000249 BLDG 0000250 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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AR_N00221_000473 REPORT 150	**12-17-1990**	IT CORPORATION	FIELD ACTIVITY DAILY LOGS PHASE 006 WELL DEVELOPMENT, PHASE I REMEDIAL INVESTIGATION	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000372 CORRESPONDENCE 2	**02-05-1991**	MARE ISLAND - VALLEJO, CA	TRANSMITTAL OF THE FINAL SITE INVESTIGATION AND REMEDIAL INVESTIGATION PLAN, VOLUMES I THROUGH VI: PROJECT WORK PLAN; SAMPLING AND ANALYSIS PLAN; HEALTH AND SAFETY PLAN; QUALITY ASSURANCE PROJECT PLAN; COMMUNITY RELATIONS PLAN; AND DATA MANAGEMENT PLAN	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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AR_N00221_000474 REPORT 43	**02-27-1991**	IT CORPORATION	FIELD ACTIVITY DAILY LOGS PHASE 006 WELL TESTING, PHASE I REMEDIAL INVESTIGATION	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000470 REPORT 68	**03-15-1991**	IT CORPORATION	WELL DEVELOPMENT LOGS PHASE I REMEDIAL INVESTIGATION	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00023
AR_N00221_000520 REPORT 50	**04-01-1991**	NAVFAC - WESTERN DIVISION	FIELD ACTIVITY LOGS FOR PHASE 8, SHALLOW SOIL AND OTHER SAMPLING (SEE RECORD # 508 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000426 CORRESPONDENCE 30	**11-06-1991**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE REMEDIAL INVESTIGATION WORK PLAN, VOLUMES I THROUGH V	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000291 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000471 BLDG 0000473 BLDG 0000478 BLDG 0000505 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000637 BLDG 0000639 BLDG 0000680 BLDG 0000686 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000450 REPORT 7500	**01-29-1992**	MARTIN MARIETTA ENERGY SYSTEMS, INC.	SITE CHARACTERIZATION SUMMARY FOR PHASE I REMEDIAL INVESTIGATION, VOLUMES I THROUGH IX OF IX (SEE RECORD # 449 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000449 CORRESPONDENCE 2	**02-03-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE SITE CHARACTERIZATION SUMMARY FOR PHASE I REMEDIAL INVESTIGATION, VOLUMES I THROUGH IX OF IX (ENCLOSURE IS RECORD # 450)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000466 CORRESPONDENCE 5	**02-11-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE REMEDIAL INVESTIGATION WORK PLAN (W/ ENCLOSURE; CORRECTED FIGURE 5-13; NAVY LETTER REQUESTING COMMUNITY PARTICIPATION; AND LIST OF QUESTIONS ASKED DURING COMMUNITY INTERVIEW)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 UST 0000772
AR_N00221_000508 CORRESPONDENCE 1	**04-01-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE FIELD ACTIVITY DAILY LOGS FOR PHASE 8, SHALLOW SOIL AND OTHER SAMPLING (ENCLOSURE IS RECORD # 520)	NO	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000517 REPORT 75	**04-01-1992**	MARTIN MARIETTA ENERGY SYSTEMS, INC.	SITE CHARACTERIZATION SUMMARY, ADDENDUM I - DATA VALIDATION INTERPRETATION (SEE RECORD # 514 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000518 REPORT 1500	**04-01-1992**	MARTIN MARIETTA ENERGY SYSTEMS, INC.	SITE CHARACTERIZATION SUMMARY ADDENDUM II, VOLUMES I AND II OF II - DATA VALIDATION SUMMARY (SEE RECORD # 514 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000514 CORRESPONDENCE 1	**04-23-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE SITE CHARACTERIZATION SUMMARY REPORTS 1) ADDENDUM I - DATA VALIDATION INTERPRETATION; 2) ADDENDUM II - DATA VALIDATION SUMMARY, VOLUME I; AND 3) ADDENDUM II - DATA VALIDATION SUMMARY, VOLUME II	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000547 CORRESPONDENCE 1	**06-17-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE DRAFT WORK PLAN, INVESTIGATION DERIVED WASTE MANAGEMENT PLAN (ENCLOSURE IS RECORD # 562)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000567 CORRESPONDENCE 31	**06-30-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE SITE CHARACTERIZATION SUMMARY REPORT (W/ ENCLOSURE)	NO	SITE 00001 SITE 00003 SITE 00005 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000568 CORRESPONDENCE 2	**06-30-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE DRAFT PHASE II REMEDIAL INVESTIGATION WORK PLANS 1) FIELD SAMPLING AND ANALYSIS PLAN; 2) PROJECT WORK PLAN; 3) HEALTH AND SAFETY PLAN; 4) QUALITY ASSURANCE PLAN; 5) COMMUNITY RELATIONS PLAN; AND 6) DATA MANAGEMENT PLAN	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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AR_N00221_000582 CORRESPONDENCE 1	**06-30-1992**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE DRAFT QUALITY ASSURANCE PROJECT PLAN, PHASE II REMEDIAL INVESTIGATION MISTAKENLY OMITTED FROM THE 30 JUNE 1992 SUBMISSION	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000664 REPORT 80	**10-28-1992**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL DATA MANAGEMENT PLAN, PHASE II REMEDIAL INVESTIGATION	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000665 REPORT 250	**10-29-1992**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL QUALITY ASSURANCE PROJECT PLAN, PHASE II REMEDIAL INVESTIGATION	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000659 REPORT 500	**10-30-1992**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL HEALTH AND SAFETY PLAN	NO	"EETP - BLDG 225" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 866" SEARCH BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000660 REPORT 220	**01-12-1993**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL PROJECT WORK PLAN, REMEDIAL INVESTIGATION/FEASIBILITY STUDY	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000661 REPORT 550	**01-25-1993**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL FIELD SAMPLING AND ANALYSIS PLAN, PHASE II REMEDIAL INVESTIGATION, VOLUMES I THROUGH III OF III	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000684 CORRESPONDENCE 1	**01-27-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE FINAL REPORT PREPARATION OF WORK PLANS FOR PHASE II REMEDIAL INVESTIGATION/FEASIBILITY STUDY (ENCLOSURES ARE RECORDS # 660, # 661, # 664, AND # 665)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000732 CORRESPONDENCE 69	**01-27-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT WORK PLANS FOR PHASE II REMEDIAL INVESTIGATION/FEASIBILITY STUDY (W/ ENCLOSURE)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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AR_N00221_000740 REPORT 200	**02-22-1993**	PRC ENVIRONMENTAL MANAGEMENT, INC.	BASEWIDE SURVEY OF GROUNDWATER MONITORING WELLS, VOLUME II - BORING LOGS	NO	BLDG 0000225 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG A-076 SITE 00001 SITE 00005 SITE 00009 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002536 MINUTES 5	**03-03-1993**	PRC ENVIRONMENTAL MANAGEMENT, INC.	02 FEBRUARY 1993 AGENCY MEETING MINUTES	NO	"EETP - BLDG 225" SEARCH BLDG 0000225 BLDG 0000900 SITE 00004 SITE 00008 SITE 00014 SITE 00015 SITE 00017
AR_N00221_000741 CORRESPONDENCE 80	**03-09-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE FACILITY LANDFILL SITE COMPREHENSIVE GROUNDWATER MONITORING PLAN (W/ ENCLOSURE)	NO	IA H SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000744 CORRESPONDENCE 2	**03-31-1993**	NAVFAC - WESTERN DIVISION	REQUEST FOR EXTENSION FOR SUBMITTAL OF DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES REPORT	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000748 CORRESPONDENCE 1	**04-21-1993**	NAVFAC - WESTERN DIVISION	REQUEST FOR AN EXTENSION FOR SUBMITTAL OF THE DETAILED ANALYSIS OF ALTERNATIVES	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

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AR_N00221_000754 CORRESPONDENCE 2	**04-29-1993**	NAVFAC - WESTERN DIVISION	REQUEST FOR EXTENSION ON THE SUBMITTAL OF FINAL FIELD SAMPLING AND ANALYSIS PLAN	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00013 SITE 00017 SITE 00019 SITE 00020 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000756 CORRESPONDENCE 2	**05-17-1993**	NAVFAC - WESTERN DIVISION	RESPONSE TO LETTER DATED 06 MAY 1993 REGARDING QUANTITATION LIMITS FOR CHEMICAL ANALYSES	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000757 CORRESPONDENCE 2	**06-04-1993**	NAVFAC - WESTERN DIVISION	RESPONSE TO LETTER DATED 20 MAY 1993 REGARDING SUBMISSION OF THE DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES; AND NOTICE THAT THE NAVY INVOKES DISPUTE RESOLUTION	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000760 CORRESPONDENCE 1	**06-14-1993**	NAVFAC - WESTERN DIVISION	LETTER CONFIRMING THE REVISED SUBMITTAL DATE OF 02 JULY 1993 FOR DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000864 CORRESPONDENCE 1	**06-24-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES REPORT, VOLUMES I AND II OF II (ENCLOSURE IS RECORD # 861)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000779 CORRESPONDENCE 6	**07-30-1993**	CRWQCB - OAKLAND, CA	RESOLUTION OF DISPUTE OVER QUANTITATION LIMITS AND ACCEPTANCE OF FINAL PHASE II SAMPLING AND ANALYSIS PLAN (SEE RECORD # 756 - LETTER DATED 17 MAY 1993)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000801 CORRESPONDENCE 4	**08-26-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE FINAL FIELD SAMPLING AND ANALYSIS PLAN, PHASE II REMEDIAL INVESTIGATION, VOLUMES I, II, AND III OF III (W/ ENCLOSURE)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000802 CORRESPONDENCE 1	**08-26-1993**	NAVFAC - WESTERN DIVISION	EXTENSION OF THE COMMENT PERIOD FOR THE DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000939 REPORT 900	**10-01-1993**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL FIELD SAMPLING AND ANALYSIS PLAN, PHASE II REMEDIAL INVESTIGATION, VOLUMES I AND II OF II (SEE RECORD # 912 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000912 CORRESPONDENCE 1	**10-14-1993**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE FINAL FIELD SAMPLING AND ANALYSIS PLAN, PHASE II REMEDIAL INVESTIGATION, VOLUMES I AND II (ENCLOSURE IS RECORD # 939)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000914 CORRESPONDENCE 10	**10-29-1993**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT INITIAL SCREENING OF REMEDIAL ALTERNATIVES (INCLUDES COMMENTS BY HUMAN AND ECOLOGICAL RISK SECTION, DATED 21 OCTOBER 1993; AND CRWQCB, DATED 28 OCTOBER 1993)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002485 REPORT 324	**02-11-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	BASEWIDE QUARTERLY GROUNDWATER SAMPLING REPORT, DECEMBER 1992	YES	"EETP - BLDG 225" SEARCH "EETP - BLDG 386" SEARCH BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000520 BLDG 0000814 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021

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AR_N00221_000923 CORRESPONDENCE 2	**03-25-1994**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE DRAFT DETAILED WORK PLAN FOR THE BASELINE HUMAN HEALTH RISK ASSESSMENT (ENCLOSURE IS RECORD # 924)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000926 REPORT 78	**04-07-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	INTERIM FINAL INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN (SEE RECORD # 925 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000925 CORRESPONDENCE 1	**04-13-1994**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE INTERIM FINAL INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN (ENCLOSURE IS RECORD # 926)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002486 REPORT 308	**04-25-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	BASEWIDE QUARTERLY GROUNDWATER SAMPLING REPORT, APRIL 1993	YES	"EETP - BLDG 225" SEARCH "EETP - BLDG 386" SEARCH BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000463 BLDG 0000463A BLDG 0000814 BLDG 0000999 BLDG 0001013 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00009 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000934 REPORT 600	**06-14-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL REPORT BASEWIDE SURVEY OF GROUNDWATER MONITORING WELLS (SEE RECORD # 933 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000933 CORRESPONDENCE 2	**06-22-1994**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE FINAL REPORT BASEWIDE SURVEY OF GROUNDWATER MONITORING WELLS (ENCLOSURE IS RECORD # 934)	NO	SITE 00001 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000944 REPORT 150	**08-08-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TECHNICAL REPORT INTERIM SITE DESCRIPTION REPORT (SEE RECORD # 943 - NAVFAC WDIV TRANSMITTAL LETTER)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000936 REPORT 250	**08-23-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FEBRUARY 1994 BASEWIDE QUARTERLY GROUNDWATER SAMPLING REPORT	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000943 CORRESPONDENCE 2	**09-22-1994**	NAVFAC - WESTERN DIVISION	TRANSMITTAL OF THE TECHNICAL REPORT INTERIM SITE DESCRIPTION REPORT (ENCLOSURE IS RECORD # 944)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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AR_N00221_000948 REPORT 200	**09-22-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	MAY 1994 BASEWIDE QUARTERLY GROUNDWATER SAMPLING REPORT	NO	BLDG 0000999 DRY DOCK 0003 SITE 00001 SITE 00003 SITE 00005 SITE 00006 SITE 00008 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000955 CORRESPONDENCE 2	**10-04-1994**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (ENCLOSURE IS RECORD # 956)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003010 CORRESPONDENCE 33	**10-17-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT DETAILED WORK PLAN FOR THE BASELINE HUMAN HEALTH RISK ASSESSMENT	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

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AR_N00221_000969 CORRESPONDENCE 84	**11-03-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL INVESTIGATION DERIVED WASTE MANAGEMENT PLAN (SEE RECORD # 4101 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000968 CORRESPONDENCE 9	**11-04-1994**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE INTERIM FINAL INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN (SEE RECORD # 4101 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004101 CORRESPONDENCE 2	**11-04-1994**	NAVFAC - EFA WEST	TRANSMITTAL OF THE 1) FINAL INVESTIGATION DERIVED WASTE MANAGEMENT PLAN; AND 2) RESPONSES TO COMMENTS ON THE INTERIM FINAL INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN (ENCLOSURE 1 IS RECORD # 969 AND ENCLOSURE 2 IS RECORD # 968)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

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AR_N00221_002069 CORRESPONDENCE 2	**12-01-1994**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE TECHNICAL REPORT INTERIM SITE DESCRIPTION REPORT (SEE RECORD # 944 - TECHNICAL REPORT INTERIM SITE DESCRIPTION REPORT)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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AR_N00221_002070 CORRESPONDENCE 56	**12-01-1994**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE TECHNICAL REPORT INTERIM SITE DESCRIPTION REPORT (INCLUDES GUIDANCE FOR ECOLOGICAL RISK ASSESSMENT AT HAZARDOUS WASTE SITES AND PERMITTED FACILITIES, PARTS A AND B)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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AR_N00221_003011 CORRESPONDENCE 4	**12-05-1994**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE 1) DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS; AND 2) RESPONSES TO COMMENTS ON THE DRAFT	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000972 CORRESPONDENCE 5	**12-07-1994**	DTSC - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENT (SEE RECORD # 956 - DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENT)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000978 CORRESPONDENCE 3	**12-30-1994**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE 1) FINAL INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN; AND 2) RESPONSES TO COMMENTS ON THE INTERIM FINAL	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000986 CORRESPONDENCE 2	**02-15-1995**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (ENCLOSURE IS RECORD # 987)	NO	BLDG A-249 BLDG A-250 IA A IA B IA C IA D IA E IA F IA G IA H IA I OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001704 CORRESPONDENCE 2	**03-24-1995**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT RESPONSES TO COMMENTS ON THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (ENCLOSURE IS RECORD # 1019)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004124 CORRESPONDENCE 2	**03-24-1995**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT RESPONSES TO COMMENTS ON THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (ENCLOSURE IS RECORD # 1020)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001031 CORRESPONDENCE 4	**04-03-1995**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN, PHASE 1 ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 987 - DRAFT WORK PLAN, PHASE 1 ECOLOGICAL RISK ASSESSMENT)	NO	IA A IA B IA C IA D IA E IA F IA G IA H IA I OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003012 CORRESPONDENCE 2	**04-14-1995**	U.S. DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN PHASE I ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 987 - DRAFT WORK PLAN PHASE I ECOLOGICAL RISK ASSESSMENT)	NO	BLDG A-249 BLDG A-250 IA A IA B IA C IA D IA E IA F IA G IA H IA I OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001078 CORRESPONDENCE 11	**04-18-1995**	ARC ECOLOGY	REVIEW AND COMMENTS ON THE DRAFT PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 987 - DRAFT PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000505 BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003013 CORRESPONDENCE 14	**04-19-1995**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN PHASE I ECOLOGICAL RISK ASSESSMENT (INCLUDES COMMENTS BY HUMAN AND ECOLOGICAL RISK SECTION, DATED 29 MARCH 1995; AND CRWQCB, DATED 11 APRIL 1995)	NO	BLDG A-249 BLDG A-250 IA A IA B IA C IA D IA E IA F IA G IA H IA I OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001030 CORRESPONDENCE 1	**05-04-1995**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT RESPONSES TO COMMENTS ON THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (SEE RECORD # 1019 - DRAFT RESPONSE TO COMMENTS)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001029 CORRESPONDENCE 2	**06-02-1995**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT RESPONSES TO COMMENTS ON THE DRAFT FINAL DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENT (SEE RECORD # 1019 - DRAFT RESPONSES TO COMMENTS)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000433 BLDG 0000455 BLDG 0000463 BLDG 0000463A BLDG 0000503 BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002085 CORRESPONDENCE 2	**07-03-1995**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY (SEE RECORD # 2081 - DRAFT TECHNICAL MEMORANDUM EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002086 CORRESPONDENCE 1	**07-13-1995**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY (SEE RECORD # 2081 - DRAFT TECHNICAL MEMORANDUM EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001083 REPORT 92	**07-24-1995**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL SUPPLEMENT TO DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (SEE RECORD # 1082 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001082 CORRESPONDENCE 2	**07-25-1995**	NAVFAC - EFA WEST	TRANSMITTAL OF THE FINAL SUPPLEMENT TO DETAILED WORK PLAN FOR BASELINE HUMAN HEALTH RISK ASSESSMENTS (ENCLOSURE IS RECORD # 1083)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001084 CORRESPONDENCE 12	**07-27-1995**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 1034 - DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001088 CORRESPONDENCE 3	**09-11-1995**	NAVFAC - EFA WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (W/ ENCLOSURE) [SEE RECORD # 1078 - REVIEW AND COMMENTS]	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000505 BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001090 CORRESPONDENCE 2	**10-10-1995**	NAVFAC - EFA WEST	TRANSMITTAL OF THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (ENCLOSURE IS RECORD # 1091)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001094 CORRESPONDENCE 2	**10-27-1995**	RESTORATION ADVISORY BOARD MEMBER	REVIEW AND COMMENTS ON THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 1091 - REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002090 CORRESPONDENCE 4	**11-01-1995**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY (SEE RECORD # 2085 - REVIEW AND COMMENTS; AND RECORD # 4175 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

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AR_N00221_001065 CORRESPONDENCE 3	**11-13-1995**	NAVFAC - EFA WEST	REQUEST FOR IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY	NO	IA A IA B IA C IA D IA F1 IA F2 IA G IA H OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018

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AR_N00221_001095 CORRESPONDENCE 5	**11-13-1995**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 1091 - REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

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AR_N00221_002033 CORRESPONDENCE 28	**11-13-1995**	NAVFAC - EFA WEST	REQUEST FOR IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (INCLUDES SITE DESCRIPTIONS)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009

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AR_N00221_004175 CORRESPONDENCE 2	**11-14-1995**	NAVFAC - EFA WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, EXAMINATION OF GROUNDWATER FOR MUNICIPAL AND DOMESTIC SUPPLY (ENCLOSURE IS RECORD # 2090)	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

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AR_N00221_001096 CORRESPONDENCE 8	**11-16-1995**	ARC ECOLOGY	REVIEW AND COMMENTS ON THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 1091 - REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001097 CORRESPONDENCE 2	**11-24-1995**	RESTORATION ADVISORY BOARD	REVIEW AND COMMENTS ON THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 1091 - REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001098 CORRESPONDENCE 13	**11-29-1995**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE REVISED DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (INCLUDES COMMENTS BY HUMAN AND ECOLOGICAL RISK SECTION, DATE 28 NOVEMBER 1995; AND CRWQCB, DATED 14 NOVEMBER 1995)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002001 CORRESPONDENCE 48	**01-19-1996**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT FINAL PHASE I ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 4055 - NAVFAC EFAW TRANSMITTAL LETTER; AND RECORDS # 1084 AND # 2088 - REVIEW AND COMMENTS)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002040 CORRESPONDENCE 99	**01-19-1996**	DTSC - BERKELEY, CA	APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	NO	SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002041 CORRESPONDENCE 38	**02-20-1996**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE REVISED DRAFT FINAL ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 4123 - NAVFAC EFAW TRANSMITTAL LETTER; AND RECORDS # 1094, # 1095, AND # 1098 - REVIEW AND COMMENTS)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000519 BLDG 0000565 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002043 CORRESPONDENCE 2	**03-07-1996**	NAVFAC - EFA WEST	TRANSMITTAL OF THE FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT WORK PLAN (ENCLOSURE IS RECORD # 2044)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002044 REPORT 90	**03-07-1996**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT WORK PLAN (SEE RECORD # 2043 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002028 CORRESPONDENCE 4	**04-25-1996**	NAVFAC - EFA WEST	REQUEST FOR INVESTIGATION OF ADDITIONAL PRELIMINARY ASSESSMENT/SITE INVESTIGATION SITES	NO	BERTH 0002 BERTH 0003 BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000593 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-216
					BLDG A-222
					BLDG A-248
					BLDG A-258
					BLDG A-265
					BLDG A-266
					BLDG A-267
					BLDG A-271
					BLDG A-278
					BLDG A-280
					BLDG A-288
					DREDGE POND 0001
					DREDGE POND 0002M
					DREDGE POND 0002N
					DREDGE POND 0002S
					DREDGE POND 0003E
					DREDGE POND 0003W
					DREDGE POND 0004M
					DREDGE POND 0004N
					DREDGE POND 0004S
					DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00004

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002049 CORRESPONDENCE 2	**05-22-1996**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT HEALTH AND SAFETY PLAN, ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 2050)	NO	BERTH 0004 BERTH 0005 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000463A BLDG 0000516 BLDG 0000519 BLDG 0000565 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002065 CORRESPONDENCE 3	**05-30-1996**	NAVFAC - EFA WEST	RESPONSE TO DISCUSSIONS THAT TOOK PLACE DURING THE 25 APRIL 1996 RESTORATION ADVISORY BOARD (RAB) REGARDING TIMELY RESPONSE TO RECOMMENDATIONS AND COMMENTS	NO	BLDG 0000047A BLDG 0000052 BLDG 0000062 BLDG 0000085 BLDG 0000087 BLDG 0000089 BLDG 0000091 BLDG 0000101 BLDG 0000108 BLDG 0000116 BLDG 0000117 BLDG 0000121 BLDG 0000128 BLDG 0000155 BLDG 0000213 BLDG 0000273 BLDG 0000334 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000505 BLDG 0000535 BLDG 0000593 BLDG 0000629 BLDG 0000637-1

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					BLDG 0000637-2
					BLDG 0000672
					BLDG 0000678
					BLDG 0000680
					BLDG 0000686
					BLDG 0000690
					BLDG 0000735
					BLDG 0000746
					BLDG 0000746A
					BLDG 0000759
					BLDG 0000765
					BLDG 0000796
					BLDG 0000810
					BLDG 0000831
					BLDG 0000855
					BLDG 0000866
					BLDG 0000900
					BLDG 0000981
					BLDG 0000983
					BLDG 0000985
					BLDG 0000987
					BLDG 0000993-4
					BLDG 0001310
					BLDG A-017
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					BLDG A-075
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					BLDG A-080

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-159
					BLDG A-187
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					BLDG A-215
					BLDG A-216
					BLDG A-222
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					BLDG A-280
					BLDG A-288
					BLDG H-73
					SITE 00001
					SITE 00002
					SITE 00004
					SITE 00005
					SITE 00006
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SWMU 00007 SWMU 00008 SWMU 00009 SWMU 00010 SWMU 00011 SWMU 00012 SWMU 00013 SWMU 00014 SWMU 00015 SWMU 00016 SWMU 00017 SWMU 00018 SWMU 00019 SWMU 00020 SWMU 00021 SWMU 00022 SWMU 00023 SWMU 00024 SWMU 00025 SWMU 00026

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SWMU 00027 SWMU 00028 SWMU 00029 SWMU 00030 SWMU 00031 SWMU 00032 SWMU 00033 SWMU 00034 SWMU 00035 SWMU 00036 SWMU 00037 SWMU 00038 SWMU 00039 SWMU 00040 SWMU 00041 SWMU 00042 SWMU 00043 SWMU 00044 SWMU 00045 SWMU 00046 SWMU 00047 SWMU 00048 SWMU 00049 SWMU 00050 SWMU 00051 SWMU 00052 SWMU 00053 SWMU 00054

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SWMU 00055 SWMU 00056 SWMU 00057 SWMU 00058 SWMU 00059 SWMU 00060 SWMU 00061 SWMU 00062 SWMU 00063 SWMU 00064 SWMU 00065 SWMU 00066 SWMU 00067 SWMU 00068 SWMU 00069 SWMU 00070 SWMU 00071 SWMU 00072 SWMU 00073 SWMU 00074 SWMU 00075 SWMU 00076 SWMU 00077 SWMU 00078 SWMU 00079 SWMU 00080 SWMU 00081 SWMU 00082

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SWMU 00083 SWMU 00084 SWMU 00085 SWMU 00086 SWMU 00087 SWMU 00088 SWMU 00089 SWMU 00090 SWMU 00091 SWMU 00092 SWMU 00093 SWMU 00094 SWMU 00095 SWMU 00096 SWMU 00097 SWMU 00098 SWMU 00099 SWMU 00100 SWMU 00101 SWMU 00102 SWMU 00103 SWMU 00104 SWMU 00105 SWMU 00106 SWMU 00107 SWMU 00109 SWMU 00110 SWMU 00111

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SWMU 00112
					SWMU 00113
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					SWMU 00117
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					SWMU 00119
					SWMU 00120
					SWMU 00125
					SWMU 00126
					SWMU 00127
					SWMU 00128

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003031 CORRESPONDENCE 2	**09-16-1996**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT GROUP II AND GROUP III ACCELERATED STUDY, QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE IS RECORD # 3032)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 SITE 00011 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003027 CORRESPONDENCE 2	**09-25-1996**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT FINAL HEALTH AND SAFETY PLAN, ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 3028)	NO	BERTH 0003 BERTH 0004 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000629 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 IA A IA B IA C IA D IA E IA F IA G IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003063 CORRESPONDENCE 2	**10-16-1996**	NAVFAC - EFA WEST	TRANSMITTAL OF THE DRAFT PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (ENCLOSURE IS RECORD # 3064)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772
AR_N00221_003067 REPORT 250	**11-20-1996**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TECHNICAL MEMORANDUM MONITORING WELL RECONDITIONING, REPLACEMENT, ABANDONMENT, AND DREDGE SPOILS MONITORING	NO	DRY DOCK 0003 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003087 REPORT 56	**12-20-1996**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL FEDERAL FACILITIES SITE REMEDIATION AGREEMENT SCHEDULE (SEE RECORD # 3086 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	"EETP - BLDG 225" SEARCH "EETP - BLDG 386" SEARCH BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000433 BLDG 0000461 BLDG 0000503 BLDG 0000516 BLDG 0000569 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071

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					BLDG A-288
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					IA J OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003046 CORRESPONDENCE 3	**12-26-1996**	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT PHASE 1 ECOLOGICAL RISK ASSESSMENT, FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (SEE RECORD # 3064 - DRAFT PHASE 1 ECOLOGICAL RISK ASSESSMENT, FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003086 CORRESPONDENCE 2	**01-24-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE FINAL FEDERAL FACILITIES SITE REMEDIATION AGREEMENT SCHEDULE (ENCLOSURE IS RECORD # 3087)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000433 BLDG 0000461 BLDG 0000503 BLDG 0000516 BLDG 0000569 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003096 CORRESPONDENCE 2	**02-06-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, METHODOLOGY TO DETERMINE NATURAL ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER FOR THE ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 3097)	NO	AOC 000001 AOC 000004 AOC 000006 SITE 00001 SITE 00004 SITE 00005 SITE 00010 SITE 00013 SITE 00016 SITE 00017 SITE 00018 SITE 00023
AR_N00221_003097 CORRESPONDENCE 34	**02-06-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, METHODOLOGY TO DETERMINE NATURAL ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER FOR THE ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 3096 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	AOC 000001 AOC 000004 AOC 000006 SITE 00001 SITE 00004 SITE 00005 SITE 00010 SITE 00013 SITE 00016 SITE 00017 SITE 00018 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003117 CORRESPONDENCE 2	**03-10-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT FINAL PROPOSED METHODOLOGY TO ESTIMATE THE DILUTION AND ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER TECHNICAL MEMORANDUM (ENCLOSURE IS RECORD # 3118)	NO	IA A IA B IA C IA D IA F1 IA F2 SITE 00003 SITE 00004 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003124 CORRESPONDENCE 2	**03-20-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	LETTER NOTIFYING THE RESPONSES TO COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS WILL BE SUBMITTED WITH THE DRAFT FINAL	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772
AR_N00221_003127 CORRESPONDENCE 7	**03-20-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE TECHNICAL MEMORANDUM MONITORING WELL RECONDITIONING, REPLACEMENT, AND ABANDONMENT, AND DREDGE SPOILS MONITORING (W/ ENCLOSURE)	NO	DRY DOCK 0003 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00009 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003128 CORRESPONDENCE 5	**03-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT GROUP II AND GROUP III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (SEE RECORD # 3170 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 SITE 00011 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003170 CORRESPONDENCE 2	**03-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT GROUP II AND GROUP III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE IS RECORD # 3128)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004178 CORRESPONDENCE 2	**03-24-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT BASELINE HUMAN HEALTH RISK ASSESSMENT, VOLUMES 1 THROUGH 5 OF 5 (ENCLOSURE IS RECORD # 3134)	NO	OU 0000003 SITE 00001 SITE 00003 SITE 00004 SITE 00005 SITE 00007 SITE 00009 SITE 00012 SITE 00014 SITE 00015 SITE 00017 SITE 00019 SITE 00020 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003143 CORRESPONDENCE 2	**04-10-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE FINAL GROUP II AND III ACCELERATED STUDY DATA MANAGEMENT PLAN (ENCLOSURE IS RECORD # 3144)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000593 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000793 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003149 CORRESPONDENCE 3	**04-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (ENCLOSURE IS RECORD # 3150)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N DREDGE POND 0008N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					DREDGE POND 0008S
					DREDGE POND 0009N
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					SITE 00001
					SITE 00002
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					SITE 00004
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					SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003151 CORRESPONDENCE 2	**04-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE IS RECORD # 3152)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003153 CORRESPONDENCE 2	**04-22-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE OMITTED FIGURES 4-1, 4-2, AND 4-3, TO THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE INSERTED IN RECORD # 3152)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003154 CORRESPONDENCE 42	**04-25-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE 1 ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 3046 - REVIEW AND COMMENTS; AND RECORD # 4201 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004201 CORRESPONDENCE 2	**04-25-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE 1 ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 3154)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000463 BLDG 0000516 BLDG 0000565 BLDG 0000814 BLDG 0000831 BLDG 0000866 BLDG A-249 BLDG A-250 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003172 CORRESPONDENCE 1	**04-29-1997**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND CONCURRENCE WITH THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (SEE RECORD # 3152 - DRAFT FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186 BLDG A-187 BLDG A-215

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003173 CORRESPONDENCE 2	**05-09-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT GROUP II AND III ACCELERATED STUDY FIELD SAMPLING AND ANALYSIS PLAN (SEE RECORD # 3069 - DRAFT GROUP II AND III ACCELERATED STUDY FIELD SAMPLING AND ANALYSIS PLAN)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003174 CORRESPONDENCE 2	**05-13-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT WORK PLAN PHASE II QUARTERLY GROUNDWATER MONITORING PROGRAM (ENCLOSURE IS RECORD # 3175)	NO	OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004200 CORRESPONDENCE 5	**05-20-1997**	U.S. DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE 1 ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 3150 - DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0007N DREDGE POND 0008N DREDGE POND 0008S

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					DREDGE POND 0009N DREDGE POND 0009S SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003165 CORRESPONDENCE 12	**05-21-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE I ECOLOGICAL RISK ASSESSMENT (INCLUDES COMMENTS BY HUMAN AND ECOLOGICAL RISK DIVISION, DATED 12 MAY 1997; AND CRWQCB)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000691 BLDG 0000715 BLDG 0000814 BLDG 0000831 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N DREDGE POND 0008N DREDGE POND 0008S DREDGE POND 0009N DREDGE POND 0009S OU 0000001 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003183 CORRESPONDENCE 2	**05-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (ENCLOSURE IS RECORD # 3184)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000793 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003184 REPORT 1000	**05-21-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL GROUP II AND III ACCELERATED STUDY QUALITY ASSURANCE PROJECT PLAN (SEE RECORD # 3183 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER; AND RECORD # 3335 - DRAFT FINAL LANDFILL GAS QUALITY ASSURANCE PLAN ADDENDUM)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000491 BLDG 0000503 BLDG 0000569 BLDG 0000575 BLDG 0000589 BLDG 0000591 BLDG 0000593 BLDG 0000597 BLDG 0000641 BLDG 0000643 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000723 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-121 BLDG A-147 BLDG A-148 BLDG A-149 BLDG A-150 BLDG A-151 BLDG A-152 BLDG A-155 BLDG A-159 BLDG A-166 BLDG A-172 BLDG A-173 BLDG A-174 BLDG A-175 BLDG A-178 BLDG A-179 BLDG A-180 BLDG A-181 BLDG A-182 BLDG A-183 BLDG A-184 BLDG A-185 BLDG A-186

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A IA B IA C IA D IA E IA F2 IA H SITE 00001 SITE 00002 SITE 00004 SITE 00014 SITE 00016 SITE 00017 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003167 CORRESPONDENCE 2	**06-02-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT FINAL QUALITY ASSURANCE PROJECT PLAN ADDENDUM, ONSHORE AREAS ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 3166)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000691 BLDG 0000715 BLDG 0000814 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					DREDGE POND 0004S
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					DREDGE POND 0008S
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003168 CORRESPONDENCE 3	**06-02-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE REVISIONS TO THE DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE 1 ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 3169)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000691 BLDG 0000715 BLDG 0000814 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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AR_N00221_003191 CORRESPONDENCE 2	**06-09-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT TECHNICAL MEMORANDUM, ASSESSMENT OF BENEFICIAL USES OF GROUNDWATER (ENCLOSURE IS RECORD # 3192)	NO	SITE 00001 SITE 00005 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004202 CORRESPONDENCE 3	**06-11-1997**	DTSC - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE REVISIONS TO THE DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS PHASE 1 ECOLOGICAL RISK ASSESSMENT (SEE RECORD # 3169 - DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN)	NO	BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000691 BLDG 0000715 BLDG 0000814 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003197 CORRESPONDENCE 2	**06-19-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (ENCLOSURE IS RECORD # 3198)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003198 CORRESPONDENCE 34	**06-19-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003199 CORRESPONDENCE 8	**06-19-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE REVISED DRAFT FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (SEE RECORD # 4122 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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					SITE 00022 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003200 CORRESPONDENCE 3	**06-19-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (ENCLOSURE IS RECORD # 3201)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003201 REPORT 425	**06-19-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	FINAL PHASE 1 ECOLOGICAL RISK ASSESSMENT FIELD SAMPLING AND ANALYSIS PLAN, ONSHORE AREAS (SEE RECORD # 3200 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	BLDG 0000691 BLDG 0000715 BLDG 0000831 BLDG 0000871 BLDG 0000900 BLDG A-249 BLDG A-250 DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0004S DREDGE POND 0005NW DREDGE POND 0007N

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003222 CORRESPONDENCE 2	**08-05-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY FIELD SAMPLING AND ANALYSIS PLAN (ENCLOSURE IS RECORD # 3223)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000569 BLDG 0000593 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 SITE 00001 SITE 00002 SITE 00009 SITE 00014 SITE 00016 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003232 REPORT 150	**09-05-1997**	URIBE AND ASSOCIATES	HEALTH AND SAFETY PLAN ADDENDUM, GROUP II AND III INVESTIGATIONS	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000593 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-222

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003235 CORRESPONDENCE 6	**09-19-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE 1) DRAFT FINAL GROUP II AND III ACCELERATED STUDY, FIELD SAMPLING AND ANALYSIS PLAN; AND 2) RESPONSES TO COMMENTS ON THE DRAFT	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000569 BLDG 0000593 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001310 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-280 BLDG A-288
AR_N00221_003248 CORRESPONDENCE 7	**10-31-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, ASSESSMENT OF BENEFICIAL USES OF GROUNDWATER (SEE RECORD # 4190 - PRC ENVIRONMENTAL MANAGEMENT, INC. TRANSMITTAL LETTER)	NO	SITE 00001 SITE 00005 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00023
AR_N00221_004190 CORRESPONDENCE 2	**10-31-1997**	PRC ENVIRONMENTAL MANAGEMENT, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, ASSESSMENT OF BENEFICIAL USES OF GROUNDWATER (ENCLOSURE IS RECORD # 3248)	NO	SITE 00001 SITE 00005 SITE 00015 SITE 00017 SITE 00018 SITE 00019 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003249 CORRESPONDENCE 57	**11-04-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN PHASE II QUARTERLY GROUNDWATER MONITORING PROGRAM (INCLUDES COMMENTS BY CRWQCB, DATED 12 JULY 1997) [SEE RECORD # 3175 - DRAFT WORK PLAN PHASE II QUARTERLY GROUNDWATER MONITORING PROGRAM]	NO	OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003252 CORRESPONDENCE 51	**11-07-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION REPORT (SEE RECORD # 3047 - DRAFT REMEDIAL INVESTIGATION REPORT)	NO	OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00012 SITE 00014 SITE 00015 SITE 00017 SITE 00019 SITE 00020 SITE 00021 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003253 CORRESPONDENCE 8	**11-09-1997**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL TECHNICAL MEMORANDUM PROPOSED METHODOLOGY TO ESTIMATE THE DILUTION AND ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER (INCLUDES COMMENTS BY CRWQCB, DATED 25 SEPTEMBER 1997)	NO	IA A IA B IA C IA D IA F1 IA F2 SITE 00003 SITE 00004 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003254 CORRESPONDENCE 9	**11-10-1997**	TETRA TECH EM, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY FIELD SAMPLING AND ANALYSIS PLAN (W/ ENCLOSURE) [SEE RECORD # 3235 - REVIEW AND COMMENTS]	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000569 BLDG 0000593 BLDG 0000633 BLDG 0000635A BLDG 0000635B BLDG 0000635C BLDG 0000637 BLDG 0000647 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000811 BLDG 0000866 BLDG 0000900 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 OU 0000002 OU 0000003 SITE 00001 SITE 00002 SITE 00009 SITE 00014 SITE 00016 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003258 CORRESPONDENCE 7	**12-08-1997**	TETRA TECH EM, INC.	RESPONSES TO COMMENTS ON THE DRAFT FINAL TECHNICAL MEMORANDUM PROPOSED METHODOLOGY TO ESTIMATE THE DILUTION AND ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER **SEE COMMENTS**	NO	IA A IA B IA C IA D IA F1 IA F2 SITE 00003 SITE 00004 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004186 CORRESPONDENCE 2	**12-08-1997**	TETRA TECH EM, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT FINAL TECHNICAL MEMORANDUM PROPOSED METHODOLOGY TO ESTIMATE THE DILUTION AND ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER (ENCLOSURE IS RECORD # 3258)	NO	IA A IA B IA C IA D IA F1 IA F2 SITE 00003 SITE 00004 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003264 CORRESPONDENCE 2	**01-09-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE FINAL PROPOSED METHODOLOGY TO ESTIMATE THE DILUTION AND ATTENUATION OF CONTAMINANTS IN SOILS AND GROUNDWATER TECHNICAL MEMORANDUM	NO	IA A IA B IA C IA D IA F1 IA F2 SITE 00003 SITE 00004 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003277 CORRESPONDENCE 2	**02-02-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT WORK PLAN PHASE II QUARTERLY GROUNDWATER MONITORING PROGRAM (ENCLOSURE IS RECORD # 3278)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000455 DRY DOCK 0003 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003278 CORRESPONDENCE 28	**02-02-1998**	TETRA TECH EM, INC.	RESPONSES TO COMMENTS ON THE DRAFT WORK PLAN PHASE II QUARTERLY GROUNDWATER MONITORING PROGRAM (SEE RECORD # 3277 - TETRA TECH EM, INC. TRANSMITTAL LETTER; AND RECORD # 3249 - REVIEW AND COMMENTS)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000455 DRY DOCK 0003 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003276 REPORT 1000	**03-09-1998**	TETRA TECH EM, INC.	NOVEMBER 1997 PHASE II QUARTERLY GROUNDWATER SAMPLING REPORT	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000409 BLDG 0000455 DRY DOCK 0003 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003301 CORRESPONDENCE 2	**05-26-1998**	NAVFAC - EFA WEST	TRANSMITTAL OF THE REVISED RESPONSES TO COMMENTS ON THE DRAFT FINAL GROUP II AND III ACCELERATED STUDY FIELD SAMPLING AND ANALYSIS PLAN	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000463 BLDG 0000503 BLDG 0000569 BLDG 0000593 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000759 BLDG 0000796 BLDG 0000866 BLDG 0000900 BLDG 0001300 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 SITE 00001 SITE 00002 SITE 00009 SITE 00014 SITE 00016 SITE 00021

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003302 MINUTES 30	**05-26-1998**	TETRA TECH EM, INC.	07 MAY 1998 ONSHORE ECOLOGICAL RISK ASSESSMENT CHEMICAL METHODOLOGY; AND OFFSHORE ECOLOGICAL RISK ASSESSMENT RESULTS MEETING MINUTES (INCLUDES ATTENDANCE LIST; AGENDA; AND VARIOUS HANDOUTS) [SEE RECORD # 4206 - TETRA TECH EM, INC. TRANSMITTAL LETTER]	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0000900 BLDG 0001310 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA F2 IA G IA H

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004206 CORRESPONDENCE 2	**05-26-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE 07 MAY 1998 ONSHORE ECOLOGICAL RISK ASSESSMENT CHEMICAL METHODOLOGY; AND OFFSHORE ECOLOGICAL RISK ASSESSMENT RESULTS MEETING MINUTES (ENCLOSURE IS RECORD # 3302)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0000900 BLDG 0001310 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA F2 IA G IA H

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003298 CORRESPONDENCE 2	**06-04-1998**	NAVFAC - EFA WEST	TRANSMITTAL OF THE 1) DRAFT ACTION MEMORANDUM/REMEDIAL ACTION WORK PLAN; AND 2) TECHNICAL WORK DOCUMENT FOR THE TIME CRITICAL REMOVAL ACTION, FORMER PAINT MANUFACTURING FACILITY (ENCLOSURE 2 IS RECORD # 3299)	NO	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003303 CORRESPONDENCE 4	**06-04-1998**	TETRA TECH EM, INC.	RESPONSE TO ISSUES IDENTIFIED AT THE 07 MAY 1998 MEETING PRESENTATION OF THE DRAFT ECOLOGICAL RISK ASSESSMENT, OFFSHORE AREAS; AND TRANSMITTAL OF THE REPLACEMENT PAGES	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0000900 BLDG 0001310 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA F2 IA G IA H

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004188 CORRESPONDENCE 2	**06-26-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE DRAFT LONG-TERM GROUNDWATER MONITORING PLAN (ENCLOSURE IS RECORD # 3309)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000814 BLDG 0000831 BLDG 0000900 BLDG A-190 BLDG A-249 BLDG A-250 DRY DOCK 0003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 UST 0000117 UST 0000772 UST 0000999
AR_N00221_004191 CORRESPONDENCE 2	**06-26-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE DRAFT CONFIRMATION FIELD SAMPLING AND ANALYSIS PLAN FOR INSTALLATION RESTORATION SITE AND PRODUCT DISTRIBUTION PIPELINE REMOVAL ACTION (ENCLOSURE IS RECORD # 3306)	NO	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004181 CORRESPONDENCE 2	**07-03-1998**	ARC ECOLOGY	REVIEW AND ADDITIONAL COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, OFFSHORE AREAS, VOLUMES 1 AND 2 OF 2 (SEE RECORD # 3287 - DRAFT ECOLOGICAL RISK ASSESSMENT, OFFSHORE AREAS)	NO	BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0000910 BLDG 0001310 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA F2 IA G IA H

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003313 REPORT 200	**07-09-1998**	TETRA TECH EM, INC.	FEBRUARY/MARCH 1998 PHASE II QUARTERLY GROUNDWATER SAMPLING REPORT	NO	SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00021 SITE 00023
AR_N00221_003320 REPORT 38	**07-17-1998**	SSPORTS ENVIRONMENTAL DETACHMENT - VALLEJO, CA	FINAL REMOVAL ACTION WORK PLAN/ACTION MEMORANDUM, FORMER PAINT MANUFACTURING FACILITY (SEE RECORD # 3319 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00017
AR_N00221_003321 REPORT 83	**07-21-1998**	SSPORTS ENVIRONMENTAL DETACHMENT - VALLEJO, CA	FINAL TECHNICAL WORK DOCUMENT, SOIL REMOVAL ACTION, FORMER PAINT MANUFACTURING FACILITY (SEE RECORD # 3319 - NAVFAC EFAW TRANSMITTAL LETTER)	NO	SITE 00017
AR_N00221_003319 CORRESPONDENCE 2	**07-22-1998**	NAVFAC - EFA WEST	TRANSMITTAL OF THE 1) FINAL REMOVAL ACTION WORK PLAN/ACTION MEMORANDUM, FORMER PAINT MANUFACTURING FACILITY; AND 2) FINAL TECHNICAL WORK DOCUMENT, SOIL REMOVAL ACTION, FORMER PAINT MANUFACTURING FACILITY	NO	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003332 CORRESPONDENCE 17	**08-07-1998**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT LONG-TERM GROUNDWATER MONITORING PLAN (SEE RECORD # 3309 - DRAFT LONG-TERM GROUNDWATER MONITORING PLAN)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000814 BLDG 0000831 BLDG 0000900 BLDG A-190 BLDG A-249 BLDG A-250 DRY DOCK 0003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 UST 0000117 UST 0000772 UST 0000999

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003336 CORRESPONDENCE 4	**08-10-1998**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT LONG-TERM GROUNDWATER MONITORING PLAN (SEE RECORD # 3309 - DRAFT LONG-TERM GROUNDWATER MONITORING PLAN)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000433 BLDG 0000516 BLDG 0000814 BLDG 0000831 BLDG 0000900 BLDG A-190 BLDG A-249 BLDG A-250 DRY DOCK 0003 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 UST 0000117 UST 0000772 UST 0000999
AR_N00221_003343 REPORT 30	**09-17-1998**	TETRA TECH EM, INC.	FINAL CONFIRMATION FIELD SAMPLING AND ANALYSIS PLAN FOR PRODUCT DISTRIBUTION PIPELINE REMOVAL ACTION	NO	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017
AR_N00221_003344 CORRESPONDENCE 22	**09-23-1998**	NAVFAC - EFA WEST	REQUEST FOR THE IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	NO	BLDG 0000503 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003349 CORRESPONDENCE 2	**10-02-1998**	TETRA TECH EM, INC.	TRANSMITTAL OF THE MAY/JUNE 1998 PHASE II QUARTERLY GROUNDWATER SAMPLING REPORT (ENCLOSURE IS RECORD # 3350)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000516 DRY DOCK 0003 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003350 REPORT 500	**10-05-1998**	TETRA TECH EM, INC.	MAY/JUNE 1998 PHASE II QUARTERLY GROUNDWATER SAMPLING REPORT (SEE RECORD # 3349 - TETRA TECH EM, INC. TRANSMITTAL LETTER)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000516 DRY DOCK 0003 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003384 CORRESPONDENCE 9	**12-04-1998**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT INTERIM GROUNDWATER MONITORING PLAN	NO	BLDG 0000117 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00024
AR_N00221_003369 REPORT 500	**12-21-1998**	TETRA TECH EM, INC.	FINAL TREATABILITY STUDY WORK PLAN	NO	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003392 REPORT 500	**01-01-1999**	TETRA TECH EM, INC.	AUGUST 1998 PHASE II QUARTERLY GROUNDWATER SAMPLING AND ANNUAL SUMMARY REPORT (SEE RECORD # 3391 - TETRA TECH EM, INC. TRANSMITTAL LETTER)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003391 CORRESPONDENCE 2	**01-26-1999**	TETRA TECH EM, INC.	TRANSMITTAL OF THE AUGUST 1998 PHASE II QUARTERLY GROUNDWATER SAMPLING AND ANNUAL SUMMARY REPORT (ENCLOSURE IS RECORD # 3392)	NO	BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 SITE 00001 SITE 00006 SITE 00007 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003376 CORRESPONDENCE 2	**01-27-1999**	TETRA TECH EM, INC.	TRANSMITTAL OF THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (ENCLOSURE IS RECORD # 3377)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000796 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003400 CORRESPONDENCE 1	**03-03-1999**	RESTORATION ADVISORY BOARD MEMBER	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT ONSHORE AREAS (SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT ONSHORE AREAS)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000686 BLDG 0000690 BLDG 0000746 BLDG 0000796 BLDG 0000810 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003407 CORRESPONDENCE 2	**03-11-1999**	NAVFAC - EFA WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE 1998 TO 1999 INTERIM GROUNDWATER MONITORING PLAN (ENCLOSURE IS RECORD # 3459)	NO	BLDG 0000017 BLDG 0000225 BLDG 0000334 BLDG 0000519 BLDG 0000567 BLDG 0000814 BLDG 0000866 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003412 CORRESPONDENCE 2	**03-17-1999**	TETRA TECH EM, INC.	TRANSMITTAL OF THE SUMMARY OF ANALYTES FOR THE 1999 BASEWIDE GROUNDWATER MONITORING EVENT (W/ ENCLOSURE)	NO	BERTH 0004 BERTH 0005 BLDG 0000117 BLDG 0000121 BLDG 0000225 BLDG 0000334 BLDG 0000386 BLDG 0000516 BLDG 0000519 BLDG 0000567 BLDG 0000629 BLDG 0000814 BLDG 0000866 SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00019 SITE 00020 SITE 00021 SITE 00023 SITE 00024 UST 0000772

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003405 CORRESPONDENCE 4	**03-20-1999**	RESTORATION ADVISORY BOARD MEMBER	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (W/ ENCLOSURES) [SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000746 BLDG 0000796 BLDG 0000810 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003408 CORRESPONDENCE 5	**03-30-1999**	RESTORATION ADVISORY BOARD MEMBER	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (W/ ENCLOSURES) [SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE]	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000686 BLDG 0000690 BLDG 0000746 BLDG 0000796 BLDG 0000810 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00004 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003416 CORRESPONDENCE 4	**04-12-1999**	RESTORATION ADVISORY BOARD MEMBER	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000796 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003417 CORRESPONDENCE 7	**04-27-1999**	ARC ECOLOGY	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000796 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003418 CORRESPONDENCE 9	**04-28-1999**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (INCLUDES COMMENTS BY HUMAN AND ECOLOGICAL RISK DIVISION, DATED 27 APRIL 1999) [SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE]	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000796 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003420 CORRESPONDENCE 10	**06-01-1999**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE (SEE RECORD # 3377 - DRAFT ECOLOGICAL RISK ASSESSMENT, ONSHORE)	NO	BLDG 0000116 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000796 BLDG 0000866 IA A1 IA A2 IA B IA C1 IA C2 IA D IA F1 IA H IA I IA J SITE 00001 SITE 00002 SITE 00003 SITE 00004 SITE 00005 SITE 00006 SITE 00007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024
AR_N00221_002532 REPORT 31	**07-26-1999**	TETRA TECH EM, INC.	SUMMARY OF CONFIRMATION AND CHARACTERIZATION SAMPLING FOR REMOVAL ACTION AND FUEL OIL PIPELINE EXCAVATION (SEE RECORD # 3437 - NAVFAC SWDIV TRANSMITTAL LETTER)	YES	BLDG 0000519 IA A1 SITE 00017
AR_N00221_003437 CORRESPONDENCE 2	**08-09-1999**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE SUMMARY OF CONFIRMATION AND CHARACTERIZATION SAMPLING FOR REMOVAL ACTION AND FUEL OIL PIPELINE EXCAVATION (ENCLOSURE IS RECORD # 2532)	NO	BLDG 0000519 IA A1 SITE 00017
AR_N00221_002699 CORRESPONDENCE 1	**09-03-1999**	SSPORTS ENVIRONMENTAL DETACHMENT - VALLEJO, CA	TRANSMITTAL OF THE DRAFT SUMMARY REPORT, FORMER PAINT MANUFACTURING FACILITY (ENCLOSURE IS RECORD # 3448)	YES	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003447 CORRESPONDENCE 2	**09-13-1999**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT SUMMARY REPORT, FORMER PAINT MANUFACTURING FACILITY (ENCLOSURE IS RECORD # 3448)	NO	SITE 00017
AR_N00221_002429 REPORT 77	**09-14-1999**	TETRA TECH EM, INC.	FINAL TECHNICAL MEMORANDUM GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1	YES	BLDG 0000503 SITE 00017
AR_N00221_002700 MINUTES 3	**10-06-1999**	TETRA TECH EM, INC.	06 OCTOBER 1999 GROUP II/III SCOPING MEETING MINUTES FOR INVESTIGATION AREAS	YES	"EETP - BLDG 121" SEARCH "EETP - BLDG 461" SEARCH BLDG 0000121 BLDG 0000213 BLDG 0000461 BLDG 0000503 BLDG 0000569 SITE 00003 SITE 00007 SITE 00017 SITE 00020
AR_N00221_003453 CORRESPONDENCE 1	**11-04-1999**	NAVFAC - SOUTHWEST DIVISION	REQUEST FOR STATE ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, AND FINAL REQUEST FOR IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	NO	BLDG 0000503 IA A1 SITE 00017
AR_N00221_003451 REPORT 150	**12-23-1999**	TETRA TECH EM, INC.	FINAL TECHNICAL MEMORANDUM TREATABILITY STUDY (SEE RECORD # 4141 - TETRA TECH EM, INC. TRANSMITTAL LETTER)	NO	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004141 CORRESPONDENCE 2	**12-23-1999**	TETRA TECH EM, INC.	TRANSMITTAL OF THE FINAL TECHNICAL MEMORANDUM TREATABILITY STUDY (ENCLOSURE IS RECORD # 3451)	NO	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003459 CORRESPONDENCE 44	**01-25-2000**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE 1998 TO 1999 INTERIM GROUNDWATER MONITORING PLAN (W/ ENCLOSURE)	NO	"EETP - BLDG 225" SEARCH "EETP - BLDG 866" SEARCH BLDG 0000017 BLDG 0000225 BLDG 0000334 BLDG 0000519 BLDG 0000567 BLDG 0000814 BLDG 0000866 OU 0000003 SITE 00001 SITE 00002 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00008 SITE 00009 SITE 00011 SITE 00012 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021

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					SITE 00023 SITE 00024 WELL 00001-W-015 WELL 00001-W-026 WELL 00001-W-028 WELL 00001-W-032 WELL 00001-W-037B WELL 00001-W-038C WELL 00001-W-042 WELL 00001-W-045 WELL 00001-W-047A WELL 00001-W-047C WELL 00001-W-048A WELL 00001-W-051 WELL 00006-W-001 WELL 00006-W-002 WELL 00006-W-003

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					WELL 00006-W-004 WELL 00006-W-005 WELL 00006-W-006 WELL 00006-W-007 WELL 00008-P-001 WELL 00008-W-001 WELL 00008-W-002 WELL 00012-W-001 WELL 00012-W-002 WELL 00012-W-003 WELL 00016-P-001 WELL 00016-W-006

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AR_N00221_002538 REPORT 95	**02-29-2000**	TETRA TECH EM, INC.	FINAL TECHNICAL MEMORANDUM GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1	YES	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000629 PARCEL 0001A PARCEL 0001E PARCEL 0001F PARCEL 0001G PARCEL 0001J-3 PARCEL 0001J-4 PARCEL 0001K PARCEL 0001L-3 PARCEL 0001M PARCEL 0001O PARCEL 0001P PARCEL 0001Q-1 SITE 00008 SITE 00017
AR_N00221_002431 REPORT 165	**03-07-2000**	TETRA TECH EM, INC.	FINAL TECHNICAL MEMORANDUM GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1, REVISED	YES	BLDG 0000503 SITE 00008 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003456 REPORT 750	**03-20-2000**	TETRA TECH EM, INC.	JUNE/JULY 1999 INTERIM FACILITY-WIDE GROUNDWATER MONITORING PROGRAM QUARTERLY REPORT (3 VOLUMES)	NO	AREA 00001 AREA 00002 AREA 00003 AREA 00004 AREA 00005 AREA 00006 AREA 00007 AREA 00008 AREA 00009 SITE 00001 SITE 00003 SITE 00005 SITE 00006 SITE 00007 SITE 00012 SITE 00015 SITE 00016B-1 SITE 00016B-2 SITE 00016B-3 SITE 00016B-4 SITE 00016B-5 SITE 00017 SITE 00018 SITE 00020 SITE 00021 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000312 CORRESPONDENCE 1	**03-27-2000**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND CONCURRENCE WITH THE FINAL TECHNICAL MEMORANDUM, GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1, REVISED (SEE RECORD # 2431 - FINAL TECHNICAL MEMORANDUM GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1, REVISED)	NO	BLDG 0000503 SITE 00008 SITE 00017
AR_N00221_000415 CORRESPONDENCE 1	**04-07-2000**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE FINAL TECHNICAL MEMORANDUM, GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1, REVISED (SEE RECORD # 2431 - FINAL TECHNICAL MEMORANDUM GROUNDWATER ASSESSMENT FOR PROPERTY TRANSFER IN REUSE ZONE 1, REVISED)	NO	BLDG 0000503 SITE 00008 SITE 00017
AR_N00221_000009 MINUTES 24	**04-11-2000**	NAVFAC - SOUTHWEST DIVISION	27 JANUARY 2000 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	YES	BLDG 0000505 SITE 00008 SITE 00017

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AR_N00221_002543 REPORT 232	**05-22-2000**	TETRA TECH EM, INC.	OCTOBER 1999 FACILITY-WIDE GROUNDWATER MONITORING PROGRAM QUARTERLY REPORT (SEE RECORD # 2 - NAVFAC SWDIV TRANSMITTAL LETTER)	YES	"EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH BLDG 0000108 BLDG 0000386 BLDG 0000388 BLDG 0000690 BLDG 0000900 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-267 SITE 00001 SITE 00004 SITE 00005 SITE 00007 SITE 00014 SITE 00017 SITE 00020 SITE 00021

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AR_N00221_000012 MINUTES 25	**07-03-2000**	NAVFAC - SOUTHWEST DIVISION	27 APRIL 2000 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	YES	"EETP - UST 231" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000655 PARCEL 0010 PARCEL 0015 SITE 00002 SITE 00008 SITE 00015 SITE 00017 UST 0000231 UST 0000243 UST 0000637

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AR_N00221_000013 MINUTES 26	**08-21-2000**	NAVFAC - SOUTHWEST DIVISION	25 MAY 2000 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	YES	BLDG 0000099 BLDG 0000571 BLDG 0000655 BLDG H IA A1 IA E PARCEL 0010 PARCEL 0015 SITE 00001 SITE 00004 SITE 00017 SITE 00022 UST 0000655-1 UST 0000993 UST 0000999
AR_N00221_002548 REPORT 42	**10-10-2000**	ROY F. WESTON, INC.	FINAL SUMMARY REPORT, FORMER PAINT MANUFACTURING FACILITY	YES	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017

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AR_N00221_000050 MINUTES 16	**12-14-2000**	NAVFAC - SOUTHWEST DIVISION	14 DECEMBER 2000 RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	BLDG 0000503 EETP IA A1 IA A2 IA H1 PARCEL 0007A SITE 00017 SITE 00022 UST 0000655 UST 0000993
AR_N00221_004104 CORRESPONDENCE 6	**02-21-2001**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT REMEDIAL INVESTIGATION REPORT, VOLUMES I THROUGH III OF III (ENCLOSURE IS RECORD # 45)	NO	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000567 IA A1 SITE 00017
AR_N00221_000064 MINUTES 22	**02-22-2001**	NAVFAC - SOUTHWEST DIVISION	22 FEBRUARY 2001 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	IA H1 PARCEL 0007A SITE 00017 SITE 00022
AR_N00221_000059 MINUTES 25	**04-26-2001**	NAVFAC - SOUTHWEST DIVISION	26 APRIL 2001 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	IA H1 PARCEL VII SITE 00005 SITE 00017

MARE ISLAND

DRAFT ENVIRONMENTAL RESTORATION RECORD PUBLIC / IR INDEX - UPDATE (SORTED BY RECORD DATE/RECORD NUMBER)

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AR_N00221_000352 CORRESPONDENCE 17	**05-15-2001**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION (SEE RECORD # 45 - DRAFT REMEDIAL INVESTIGATION)	NO	BLDG 0000503 IA A1 SITE 00017
AR_N00221_000441 CORRESPONDENCE 4	**06-12-2001**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION REPORT (SEE RECORD # 45 - DRAFT REMEDIAL INVESTIGATION REPORT)	NO	BLDG 0000503 IA A1 SITE 00017

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AR_N00221_000366 CORRESPONDENCE 44	**08-01-2001**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL ONSHORE AREAS ECOLOGICAL RISK ASSESSMENT [SEE RECORD # 38 - DRAFT FINAL ONSHORE AREAS ECOLOGICAL RISK ASSESSMENT]	NO	\DREDGE POND 0004S DREDGE POND 0001 DREDGE POND 0002M DREDGE POND 0002N DREDGE POND 0002S DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0003W DREDGE POND 0004M DREDGE POND 0004N DREDGE POND 0005NW DREDGE POND 0007 DREDGE POND 0009 IA F1 IA H IA I IA J SITE 00001 SITE 00005

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00008 SITE 00010 SITE 00013 SITE 00014 SITE 00016 SITE 00017
AR_N00221_000082 REPORT 66	**08-24-2001**	TETRA TECH EM, INC.	TECHNICAL MEMORANDUM, RESULTS OF THE PRELIMINARY ASSESSMENT AND SITE INSPECTION AT THE FORMER SKEET RANGE AND RECOMMENDATION FOR CLOSURE	YES	SITE 00017
AR_N00221_001799 CORRESPONDENCE 4	**08-24-2001**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE 1) RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION; AND 2) RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION, FORMER NORTH BUILDING WAYS (ENCLOSURE 1 IS RECORD # 81, AND ENCLOSURE 2 IS RECORD # 80)	NO	BLDG 0000503 IA A1 IA A2 SITE 00017
AR_N00221_000081 CORRESPONDENCE 35	**08-27-2001**	TETRA TECH EM, INC.	RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION (SEE RECORD # 352 AND RECORD # 440 - COMMENTS, AND RECORD # 1799 - NAVFAC SWDIV TRANSMITTAL LETTER)	YES	BLDG 0000503 IA A1 SITE 00017

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AR_N00221_000484 CORRESPONDENCE 15	**09-24-2001**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL ONSHORE ECOLOGICAL RISK ASSESSMENT REPORT	NO	IA H IA I IA J SITE 00001 SITE 00005 SITE 00008 SITE 00010 SITE 00013 SITE 00014 SITE 00016 SITE 00017
AR_N00221_004081 CORRESPONDENCE 6	**12-05-2001**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR GROUNDWATER DATA GAP INVESTIGATION ACTIVITIES (ENCLOSURE IS RECORD # 94)	NO	BLDG 0000503 SITE 00017
AR_N00221_000624 CORRESPONDENCE 2	**01-02-2002**	ARC ECOLOGY	REVIEW AND COMMENTS ON THE DRAFT SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER DATA GAP INVESTIGATION ACTIVITIES (SEE RECORD # 94 - DRAFT SAMPLING AND ANALYSIS PLAN)	NO	BLDG 0000503 SITE 00017
AR_N00221_000583 CORRESPONDENCE 2	**02-05-2002**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION (SEE RECORD # 81 - RESPONSES TO COMMENTS)	NO	BLDG 0000503 IA A1 SITE 00017
AR_N00221_000584 CORRESPONDENCE 2	**02-05-2002**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE TECHNICAL MEMORANDUM - RESULTS OF THE PRELIMINARY ASSESSMENT AND SITE INSPECTION AT THE FORMER SKEET RANGE AND RECOMMENDATION FOR CLOSURE (SEE RECORD # 82 - TECHNICAL MEMORANDUM)	NO	SITE 00017

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AR_N00221_004173 CORRESPONDENCE 1	**02-18-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE RESTORATION ADVISORY BOARD (RAB) ORIENTATION PACKET (ENCLOSURE IS RECORD # 194)	NO	"EETP - BLDG 116" SEARCH "EETP - BLDG 121" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 461" SEARCH "EETP - BLDG 678" SEARCH "EETP - BLDG 866" SEARCH "EETP - IA H2" SEARCH AST 0000636 BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690

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					BLDG 0000866
					BLDG 0000900
					BLDG 0001310
					IA A1
					IA A2
					IA B
					IA C1
					IA C2
					IA D
					IA E
					IA F1
					IA F2
					IA G
					IA H1
					IA H2
					IA I
					IA J
					IA K
					IA L
					SITE 00001
					SITE 00002
					SITE 00003
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					SITE 00006
					SITE 00007
					SITE 00008
					SITE 00009

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					SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772

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AR_N00221_004117 CORRESPONDENCE 5	**02-20-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT RESPONSES TO COMMENTS ON THE DRAFT FINAL ONSHORE ECOLOGICAL RISK ASSESSMENT (ENCLOSURE IS RECORD # 192)	NO	"EETP - IA H2" SEARCH IA F2 IA H1 IA H2 IA I IA J SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00008 SITE 00010 SITE 00013 SITE 00014 SITE 00016 SITE 00017 SITE 00024

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AR_N00221_000194 CORRESPONDENCE 150	**02-22-2002**	TETRA TECH EM, INC.	RESTORATION ADVISORY BOARD (RAB) ORIENTATION PACKET (CD COPY ENCLOSED) [SEE RECORD # 4173 - NAVFAC SWDIV TRANSMITTAL LETTER]	NO	"EETP - BLDG 116" SEARCH "EETP - BLDG 121" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 461" SEARCH "EETP - BLDG 678" SEARCH "EETP - BLDG 866" SEARCH "EETP - IA H2" SEARCH AST 0000636 BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690

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					BLDG 0000866
					BLDG 0000900
					BLDG 0001310
					IA A1
					IA A2
					IA B
					IA C1
					IA C2
					IA D
					IA E
					IA F1
					IA F2
					IA G
					IA H1
					IA H2
					IA I
					IA J
					IA K
					IA L
					SITE 00001
					SITE 00002
					SITE 00003
					SITE 00004
					SITE 00005
					SITE 00006
					SITE 00007
					SITE 00008
					SITE 00009

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016 SITE 00017 SITE 00018 SITE 00019 SITE 00020 SITE 00021 SITE 00022 SITE 00023 SITE 00024 UST 0000772
AR_N00221_004085 CORRESPONDENCE 5	**03-18-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR GROUNDWATER DATA GAP INVESTIGATION ACTIVITIES (ENCLOSURE IS RECORD # 108)	NO	BLDG 0000503 SITE 00017
AR_N00221_000546 CORRESPONDENCE 2	**05-16-2002**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR GROUNDWATER DATA GAP INVESTIGATION ACTIVITIES (SEE RECORD # 108 - DRAFT FINAL SAMPLING AND ANALYSIS PLAN)	NO	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000157 MINUTES 38	**06-27-2002**	CDM FEDERAL PROGRAMS CORP.	27 JUNE 2002 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	BLDG 0000213 BLDG 0000759 IA A1 IA A3 IA I IA J SITE 00004 SITE 00008 SITE 00017 UST 0000627-1 UST 0000627-2 UST 0000759

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002389 CORRESPONDENCE 5	**07-22-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE FINAL ONSHORE ECOLOGICAL RISK ASSESSMENT, REVISION 1 (ENCLOSURE IS RECORD # 144)	YES	"EETP - BLDG 116" SEARCH "EETP - BLDG 121" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 461" SEARCH "EETP - BLDG 678" SEARCH "EETP - BLDG 866" SEARCH "EETP - IA H2" SEARCH BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000866 BLDG 0001310 IA A1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA A2 IA B IA C1 IA C2 IA D IA H1 IA H2 IA I IA J SITE 00001 SITE 00002 SITE 00005 SITE 00006 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00016 SITE 00017 SITE 00019 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000144 REPORT 3282	**07-23-2002**	TETRA TECH EM, INC.	FINAL ONSHORE ECOLOGICAL RISK ASSESSMENT, REVISION 1, VOLUMES 1 THROUGH 3 OF 3 (CD COPY ENCLOSED) [SEE RECORD # 2389 - NAVFAC SWDIV TRANSMITTAL LETTER]	NO	"EETP - BLDG 116" SEARCH "EETP - BLDG 121" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 461" SEARCH "EETP - BLDG 678" SEARCH "EETP - BLDG 866" SEARCH "EETP - IA H2" SEARCH BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000461 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0001310

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA A1 IA A2 IA B IA C1 IA C2 IA D IA H1 IA H2 IA I IA J SITE 00001 SITE 00002 SITE 00005 SITE 00006 SITE 00008 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00016 SITE 00017 SITE 00019 SITE 00021 SITE 00022 SITE 00023 SITE 00024

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004093 CORRESPONDENCE 1	**09-20-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE ATTACHMENT C - DRAFT SITE MANAGEMENT PLAN, FISCAL YEAR 2003 (ENCLOSURE IS RECORD # 173)	NO	BLDG 0000503 BLDG 0000900 BLDG A-155 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1 IA H2 IA I IA K SITE 00001 IA H1 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004115 CORRESPONDENCE 2	**10-03-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE ATTACHMENT C - DRAFT FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (ENCLOSURE IS RECORD # 179)	NO	"EETP - IA H2" SEARCH BLDG 0000503 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000603 CORRESPONDENCE 1	**10-10-2002**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 179 - DRAFT FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003)	NO	BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004116 CORRESPONDENCE 2	**10-16-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE ATTACHMENT C - FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (ENCLOSURE IS RECORD # 180)	NO	"EETP - IA H2" SEARCH BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000180 REPORT 40	**10-18-2002**	TETRA TECH EM, INC.	ATTACHMENT C - FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 188 - ATTACHMENT C - REVISED FINAL SITE MANAGEMENT PLAN FISCAL YEAR 2003; AND RECORD # 4116 - SW DIV TRANSMITTAL LETTER)	NO	"EETP - IA H2" SEARCH BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000604 CORRESPONDENCE 2	**10-26-2002**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 180 - FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003)	NO	BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000188 REPORT 60	**11-01-2002**	TETRA TECH EM, INC.	ATTACHMENT C - REVISED FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 180 - ATTACHMENT C - FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003; AND RECORD # 4114 - SW DIV TRANSMITTAL LETTER)	NO	"EETP - IA H2" SEARCH BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H1 IA H2 IA I IA K SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004114 CORRESPONDENCE 4	**11-01-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE 1) ATTACHMENT C - REVISED FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003; AND 2) SUMMARY OF REVISION IN REVISED FINAL SITE MANAGEMENT PLAN (W/ ENCLOSURE 2; AND ENCLOSURE 1 IS RECORD # 188)	NO	"EETP - IA H2" SEARCH BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H1 IA H2 IA I IA K SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000607 CORRESPONDENCE 1	**11-15-2002**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE REVISED FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 188 - REVISED FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003)	NO	BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K PARCEL I PARCEL III PARCEL XIII PARCEL XVI SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000536 CORRESPONDENCE 2	**12-06-2002**	CRWQCB - OAKLAND, CA	REVIEW AND CONCURRENCE WITH THE REVISED DRAFT FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003 (SEE RECORD # 188 - REVISED DRAFT FINAL SITE MANAGEMENT PLAN FOR FISCAL YEAR 2003)	NO	BLDG 0000503 BLDG 0000900 BLDG A-017 BLDG A-071 BLDG A-075 BLDG A-076 BLDG A-080 BLDG A-159 BLDG A-187 BLDG A-215 BLDG A-216 BLDG A-222 BLDG A-248 BLDG A-258 BLDG A-265 BLDG A-266 BLDG A-267 BLDG A-271 BLDG A-278 BLDG A-280 BLDG A-288 IA A1 IA A2 IA C2 IA F1 IA F2 IA G IA H1

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA H2 IA I IA K SITE 00001 SITE 00002 SITE 00004 SITE 00005 SITE 00006 SITE 00014 SITE 00016 SITE 00017
AR_N00221_004163 CORRESPONDENCE 6	**12-12-2002**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT FINAL REMEDIAL INVESTIGATION, VOLUMES I AND II OF II (ENCLOSURE IS RECORD # 212)	NO	BLDG 0000503 BLDG 0000519 BLDG 0000567 IA A1 SITE 00017
AR_N00221_004161 CORRESPONDENCE 6	**01-08-2003**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT FEASIBILITY STUDY (ENCLOSURE IS RECORD # 214)	NO	BLDG 0000503 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000265 MINUTES 30	**02-27-2003**	CDM FEDERAL PROGRAMS CORP.	27 FEBRUARY 2003 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	BLDG 0000503 IA A1 IA H1 IA J SITE 00002 SITE 00005 SITE 00007 SITE 00016 SITE 00017 SITE 00018 SITE 00020
AR_N00221_000266 MINUTES 37	**03-27-2003**	CDM FEDERAL PROGRAMS CORP.	27 MARCH 2003 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	NO	BLDG 0000680 IA A2 IA D1 IA D2 IA H1 PIER 00034 PIER 00035 SITE 00005 SITE 00017 SITE 00018

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000570 CORRESPONDENCE 2	**03-28-2003**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT SITE CONTROL PLAN FOR NAVY RETAINED PROPERTY (SEE RECORD # 218 - DRAFT SITE CONTROL PLAN)	NO	BLDG 0000213 BLDG 0000503 BLDG 0000505 DREDGE POND 0003E DREDGE POND 0003NE DREDGE POND 0005NW DREDGE POND 0007 IA A1 IA A2 IA B IA C1 IA C2 IA D IA E IA F1 IA F2 IA G IA H1 IA H2 IA I IA J IA K IA L PARCEL 0017 PARCEL VII-A

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00004 SITE 00005 SITE 00017 UXO 000004 UXO 000008

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_000234 CORRESPONDENCE 7	**04-11-2003**	NAVFAC - SOUTHWEST DIVISION	REQUEST FOR CONCURRENCE OR COMMENTS ON THE FINAL ONSHORE ECOLOGICAL RISK ASSESSMENT (INCLUDES ECOLOGICAL RISK ASSESSMENT RESULTS)	YES	"EETP - BLDG 116" SEARCH "EETP - BLDG 121" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 678" SEARCH "EETP - BLDG 866" SEARCH BLDG 0000108 BLDG 0000116 BLDG 0000121 BLDG 0000213 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000455 BLDG 0000503 BLDG 0000569 BLDG 0000678 BLDG 0000680 BLDG 0000690 BLDG 0000866 BLDG 0001310 SITE 00001 SITE 00002 SITE 00003

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00006 SITE 00007 SITE 00009 SITE 00010 SITE 00011 SITE 00012 SITE 00013 SITE 00014 SITE 00015 SITE 00016B-3 SITE 00016B-5 SITE 00019 SITE 00020 SITE 00021 SITE 00023 SITE 00024
AR_N00221_000576 CORRESPONDENCE 9	**05-28-2003**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL REMEDIAL INVESTIGATION (SEE RECORD # 212 - DRAFT FINAL REMEDIAL INVESTIGATION)	NO	BLDG 0000503 BLDG 0000519 BLDG 0000567 IA A1 SITE 00017
AR_N00221_000577 CORRESPONDENCE 4	**05-28-2003**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FEASIBILITY STUDY (SEE RECORD # 214 - DRAFT FEASIBILITY STUDY)	NO	BLDG 0000503 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004162 CORRESPONDENCE 5	**08-26-2003**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE REVISED DRAFT FINAL REMEDIAL INVESTIGATION, VOLUMES I AND II OF II (ENCLOSURE IS RECORD # 212)	NO	BLDG 0000503 BLDG 0000519 BLDG 0000567 IA A1 SITE 00017
AR_N00221_000770 CORRESPONDENCE 8	**10-14-2003**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT FEASIBILITY STUDY (SEE RECORD # 214 - DRAFT FEASIBILITY STUDY)	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_003621 CORRESPONDENCE 2	**06-23-2004**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE 1) DRAFT FINAL REMEDIAL INVESTIGATION, AND 2) DRAFT FEASIBILITY STUDY [SEE RECORD # 214 - DRAFT FEASIBILITY STUDY] {DRAFT FINAL REMEDIAL INVESTIGATION, DATED 12 DECEMBER 2002, WAS NOT RECEIVED IN THE RESTORATION RECORDS FILE.}	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_001828 CORRESPONDENCE 5	**06-25-2004**	NAVFAC - SOUTHWEST DIVISION	TRANSMITTAL OF THE DRAFT FINAL FEASIBILITY STUDY (ENCLOSURE IS RECORD # 3488)	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_003526 CORRESPONDENCE 9	**11-24-2004**	BRAC PMO WEST	NAVY'S PROPOSED STRATEGY TO DEVELOP THE REMEDIAL ACTION	YES	BLDG 0000503 BLDG 0000517 BLDG 0000519 BLDG 0000519A BLDG 0000567 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002872 CORRESPONDENCE 2	**05-18-2005**	DTSC - BERKELEY, CA	REQUEST FOR EXTENSION ON THE FINAL SITE MANAGEMENT PLAN COMMENT DUE DATES TO ALLOW NEW PERSONNEL TO COME UP TO SPEED ON THESE PROJECTS	YES	SITE 00017
AR_N00221_002598 REPORT 81	**05-25-2005**	BRAC PMO WEST	DATA TO SUPPORT A POSITIVE MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL, ENVIRONMENTAL INDICATOR DETERMINATION (SEE RECORD # 2597 - BRAC PMO WEST TRANSMITTAL LETTER)	YES	"EETP - IA H2" SEARCH IA F1 IA F2 IA H1 IA H2 SITE 00005 SITE 00017 SITE 00028
AR_N00221_001202 CORRESPONDENCE 4	**07-14-2005**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FISCAL YEAR 2006 SITE MANAGEMENT PLAN WITH REVISED TABLES (SEE RECORD # 775 - DRAFT SITE MANAGEMENT PLAN, AND RECORD # 3615 - DRAFT FINAL SITE MANAGEMENT PLAN, WHICH INCLUDES REVISED TABLES)	YES	BLDG A-155 IA A2 IA F1 IA F2 IA K PARCEL III PARCEL XIII SITE 00005 SITE 00014 SITE 00017 UST A-071W UST A-190 UST A-225 UST A-226 UST A-246E

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003606 CORRESPONDENCE 1	**09-02-2005**	CRWQCB - OAKLAND, CA	REVIEW AND NO COMMENTS ON THE 1) NAVY LETTER FOR SITE PATH FORWARD; 2) WATERSHED CONTAMINATED SOURCE DOCUMENT; AND 3) GREENSAND HUMAN HEALTH RISK ASSESSMENT (HHRA)	YES	"EETP - GREEN SAND" SEARCH SITE 00017
AR_N00221_003609 CORRESPONDENCE 5	**09-06-2005**	DTSC - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL REMEDIAL INVESTIGATION (SEE RECORD # 212 - DRAFT FINAL REMEDIAL INVESTIGATION)	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_000783 CORRESPONDENCE 2	**01-19-2006**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE TECHNICAL REPORT, FEASIBILITY STUDY (SEE RECORD # 3488 - FINAL FEASIBILITY STUDY)	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_000212 REPORT 3792	**01-27-2006**	SULLIVAN CONSULTING GROUP - TETRA TECH EM, INC., JOINT VENTURE	FINAL REMEDIAL INVESTIGATION, VOLUMES I AND II OF II (INCLUDES REPLACEMENT PAGES CONVERTING THE REVISED DRAFT FINAL DATED 26 AUGUST 2003 TO FINAL; REPLACEMENT PAGES CONVERTING THE DRAFT FINAL DATED 12 DECEMBER 2002 TO REVISED DRAFT FINAL; AND CD COPY)	NO	BLDG 0000503 BLDG 0000519 BLDG 0000567 IA A1 SITE 00017
AR_N00221_000809 CORRESPONDENCE 5	**01-27-2006**	BRAC PMO WEST	TRANSMITTAL OF THE REPLACEMENT PAGES CONVERTING THE DRAFT FINAL FEASIBILITY STUDY, DATED 10 JUNE 2004 TO FINAL AND THE REVISED DRAFT FINAL REMEDIAL INVESTIGATION, DATED 26 AUGUST 2003, TO FINAL (ENCLOSURE INSERTED IN RECORD # 3488)	YES	BLDG 0000503 IA A1 SITE 00017
AR_N00221_003488 REPORT 310	**01-27-2006**	SULTECH	FINAL FEASIBILITY STUDY (INCLUDES REPLACEMENT PAGES CONVERTING THE DRAFT FINAL, DATED 01 JUNE 2004, TO FINAL; RESPONSE TO COMMENTS ON THE DRAFT; AND CD COPY)	YES	BLDG 0000503 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002913 CORRESPONDENCE 6	**05-16-2006**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (ENCLOSURE IS RECORD # 855)	YES	SITE 00017
AR_N00221_002930 CORRESPONDENCE 8	**07-20-2006**	DTSC - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 855 - DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION)	YES	SITE 00017
AR_N00221_002940 CORRESPONDENCE 2	**08-10-2006**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND CONCURRENCE ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 855 - DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION)	YES	SITE 00017
AR_N00221_002943 CORRESPONDENCE 5	**08-30-2006**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 855 - DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION)	YES	SITE 00017
AR_N00221_002931 CORRESPONDENCE 1	**09-29-2006**	SULTECH	TRANSMITTAL OF THE REPONSES TO COMMENTS ON THE DRAFT PROPOSED PLAN AT INVESTIGATION AREA (ENCLOSURE IS RECORD # 3666)	YES	IA A1 SITE 00017
AR_N00221_001207 CORRESPONDENCE 24	**11-16-2006**	BRAC PMO WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (W/ ENCLOSURE) {SEE RECORD # 3667 - REVISED RESPONSES TO COMMENTS}	YES	IA A1 SITE 00017
AR_N00221_003672 CORRESPONDENCE 2	**12-22-2006**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN AND RECORD OF DECISION (SEE RECORD # 1207 - RESPONSE TO COMMENTS)	YES	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002979 CORRESPONDENCE 2	**01-18-2007**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND CONCURRENCE WITH THE CRWQCB COMMENTS DATED 22 DECEMBER 2006 ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 855 - DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION; AND RECORD # 3672 - REVIEW AND COMMENTS)	YES	SITE 00017
AR_N00221_001103 MINUTES 25	**02-22-2007**	CDM FEDERAL PROGRAMS CORP.	22 FEBRUARY 2007 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES	YES	"EETP - BLDG 386" SEARCH BLDG 0000386 BLDG 0000680 SITE 00005 SITE 00017 UST 0000742
AR_N00221_002989 CORRESPONDENCE 1	**03-27-2007**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 1207 - RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION)	YES	SITE 00017
AR_N00221_002393 CORRESPONDENCE 5	**05-01-2007**	BRAC PMO WEST	TRANSMITTAL OF THE 1) RESPONSES TO COMMENTS ON THE DRAFT PROPOSED PLAN; 2) RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION; 3) REVISED DRAFT PROPOSED PLAN; AND 4) DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION	YES	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000576 BLDG 0000601 IA A1 SITE 00017 UST 0000503-1 UST 0000503-2

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AR_N00221_003667 CORRESPONDENCE 18	**05-01-2007**	SULTECH	REVISED RESPONSES TO COMMENTS ON THE DRAFT REMEDIAL ACTION PLAN/RECORD OF DECISION AT INVESTIGATION AREA (SEE RECORD # 1207 - BRAC PMO WEST TRANSMITTAL LETTER [W/ RESPONSES TO COMMENTS])	YES	IA A1 SITE 00017
AR_N00221_001138 CORRESPONDENCE 4	**08-27-2007**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION (SEE RECORD # 3668 - DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION)	YES	SITE 00017
AR_N00221_001131 CORRESPONDENCE 2	**08-30-2007**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION [SEE RECORD # 3668 - DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION]	YES	SITE 00017
AR_N00221_001144 CORRESPONDENCE 5	**10-30-2007**	BRAC PMO WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION (ENCLOSURE IS RECORD # 1145)	YES	SITE 00017
AR_N00221_001145 CORRESPONDENCE 13	**10-31-2007**	SULTECH	RESPONSES TO COMMENTS ON THE DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION [CD COPY ENCLOSED] (SEE RECORDS # 1138 AND # 1131 - COMMENTS; AND RECORD # 1144 - BRAC PMO WEST TRANSMITTAL LETTER}	YES	SITE 00017
AR_N00221_003693 CORRESPONDENCE 4	**12-07-2007**	BRAC PMO WEST	TRANSMITTAL OF THE 1) REPLACEMENT PAGES CONVERTING THE DRAFT FINAL EXPANDED SITE INSPECTION REPORT FOR FORMER DEGREASING PLANT TO FINAL; AND 2) RESPONSES TO COMMENTS ON THE DRAFT FINAL REMEDIAL ACTION PLAN/RECORD OF DECISION	YES	"EETP - BLDG 742" SEARCH BLDG 0000742 IA C2 SITE 00017

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AR_N00221_001251 CORRESPONDENCE 3	**07-14-2008**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT ACCIDENT PREVENTION PLAN, ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_001256 CORRESPONDENCE 3	**07-14-2008**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT HEALTH AND SAFETY PLAN, ADDITIONAL SOIL, GROUNDWATER, AND SOIL SAMPLING INVESTIGATION (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_001271 REPORT 293	**07-14-2008**	CHADUX - TT, JOINT VENTURE	FINAL ACCIDENT PREVENTION PLAN ADDITIONAL SOIL, GROUNDWATER, SOIL GAS SAMPLING INVESTIGATION (CD COPY ENCLOSED) {DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS} [SEE RECORD # 1272 - FINAL HEALTH AND SAFETY PLAN]	YES	BLDG 0000503 SITE 00017
AR_N00221_001272 REPORT 225	**07-14-2008**	CHADUX - TT, JOINT VENTURE	FINAL HEALTH AND SAFETY PLAN ADDITIONAL SOIL, GROUNDWATER, SOIL GAS SAMPLING INVESTIGATION (CD COPY ENCLOSED) [SEE RECORD # 1271 - FINAL ACCIDENT PREVENTION PLAN]	YES	BLDG 0000503 SITE 00017
AR_N00221_001366 CORRESPONDENCE 3	**07-24-2008**	NAVY ENVIRONMENTAL HEALTH CENTER - PORTSMOUTH, VA	TRANSMITTAL OF THE REVIEW AND COMMENTS ON THE DRAFT HEALTH AND SAFETY PLAN FOR ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION (W/ ENCLOSURE) [SEE RECORD # 1212 - DRAFT HEALTH AND SAFETY PLAN]	YES	BLDG 0000503 SITE 00017
AR_N00221_003718 CORRESPONDENCE 4	**09-12-2008**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SUBSURFACE VAPOR INTRUSION METHODOLOGY LETTER REPORT FOR PROPOSED ACTIVE SOIL GAS SAMPLING (ENCLOSURE IS RECORD # 1252)	YES	BLDG 0000503 SITE 00017
AR_N00221_001235 CORRESPONDENCE 5	**09-18-2008**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN) FOR ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION (ENCLOSURE IS RECORD # 1245)	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001278 CORRESPONDENCE 11	**09-22-2008**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE 1) DRAFT SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN) FOR ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION, AND (***SEE COMMENTS)	YES	BLDG 0000503 SITE 00017
AR_N00221_001570 CORRESPONDENCE 4	**09-24-2008**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2009	YES	"EETP - BLDG 742" SEARCH "EETP - IA H2" SEARCH BLDG 0000503 BLDG 0000742 IA A1 IA A2 IA C2 IA C3 IA F1 IA F2 IA G IA H2 PARCEL XVI SITE 00017
AR_N00221_003721 CORRESPONDENCE 3	**09-24-2008**	BRAC PMO WEST	LETTER REQUESTING ACCESS TO PROPERTY FOR COLLECTION OF SOIL, GROUNDWATER, AND SOIL GAS SAMPLES FOR A SURVEY THE NAVY IS CONDUCTING (INCLUDES DRAFT MAP WITH SAMPLING LOCATION)	YES	BLDG 0000759 SITE 00017
AR_N00221_001247 CORRESPONDENCE 4	**09-25-2008**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN) FOR ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION [ENCLOSURE IS RECORD # 1246]	YES	BLDG 0000503 SITE 00017

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AR_N00221_001246 REPORT 146	**09-26-2008**	CHADUX - TT, JOINT VENTURE	FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN) FOR ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION (CD COPY ENCLOSED) [SEE RECORD # 1247 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 SITE 00017 WELL 00002-IR-17-SB-006 WELL 00002-IR-17-SB-007 WELL 00002-IR-17-SB-008 WELL 00002-IR-17-SB-009 WELL 00002-IR-17-SB-010 WELL 00002-IR-17-SB-011 WELL 00002-IR-17-SB-012 WELL 00002-IR-17-SB-013 WELL 00002-IR-17-SB-014 WELL 00002-IR-17-SB-015 WELL 00002-IR-17-SB-016 WELL 00002-IR-17-SB-017 WELL 00002-IR-17-SB-018 WELL 00002-IR-17-SB-019 WELL 00002-IR-17-SB-020

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					WELL 00002-IR-17-SB-021
					WELL 00002-IR-17-SB-022
					WELL 00002-IR-17-SB-023
					WELL 00002-IR-17-SB-024
					WELL 00002-IR-17-SB-025
					WELL 00002-IR-17-SB-026
					WELL 00002-IR-17-SB-027
					WELL 00002-IR-17-SB-028
					WELL 00002-IR-17-SB-029
					WELL 00002-IR-17-SB-030
					WELL 00002-IR-17-SB-031
					WELL 00002-IR-17-SB-032
					WELL 00002-IR-17-SB-033
					WELL 00002-IR-17-SB-034
					WELL 00002-IR-17-SB-035
					WELL 00002-IR-17-SB-036

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					WELL 00002-IR-17-SB-037
					WELL 00002-IR-17-SB-038
					WELL 00002-IR-17-SG-001
					WELL 00002-IR-17-SG-002
					WELL 00002-IR-17-SG-003
					WELL 00002-IR-17-SG-004
					WELL 00002-IR-17-SG-005
					WELL 00002-IR-17-SG-006
					WELL 00002-IR-17-SG-007
					WELL 00002-IR-17-SG-008
					WELL 00002-IR-17-SG-009
					WELL 00002-IR-17-SG-010
					WELL 00002-IR-17-SG-011
					WELL 00002-IR-17-SG-012
					WELL 00002-IR-17-SG-013
					WELL 00002-IR-17-SG-014

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL 00002-IR-17-SG-015 WELL 00002-IR-17-SG-016 WELL 00002-IR-17-SG-017 WELL 00002-IR-17-SG-018 WELL 00002-IR-17-SG-019 WELL 00002-IR-17-SG-020 WELL 00002-IR-17-SG-021 WELL 00002-IR-17-SG-022 WELL 00002-IR-17-SG-023 WELL 00002-IR-17-SG-024 WELL 00002-IR-17-SG-025 WELL 00002-IR-17-SG-026 WELL 00002-IR-17-SG-027 WELL 00002-IR-17-SG-029 WELL 00002-IR-17-SG-030 WELL 00002-IR-17-SG-031

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL 00002-IR-17-SG-032 WELL 00002-IR-17-SG-033 WELL 00002-IR-17-SG-034 WELL 00002-IR-17-SG-035 WELL 00002-IR-17-SG-036 WELL 00002-IR-17-SG-037 WELL 00002-IR-17-SG-038 WELL 00002-IR-17-SG-039 WELL 00002-IR-17-SG-040 WELL 00002-IR-17-SG-041 WELL 00008-IR-17-TW-001 WELL 00008-IR-17-TW-002 WELL 00008-IR-17-TW-003 WELL 00008-IR-17-TW-004 WELL 00028-IR-GT-001 WELL 00028-IR-GT-002

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL 00028-IR-GT-003 WELL 02817-W-002 WELL 02817-W-003 WELL 02817-W-004 WELL 02817-W-005 WELL 02817-W-007 WELL 02817-W-010 WELL 02817-W-011 WELL 02817-W-012 WELL 02817-W-014 WELL 02817-W-015 WELL 02817-W-016 WELL 02817-W-018 WELL 02817-W-019 WELL 02817-W-020 WELL 02817-W-023

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					WELL 02817-W-024
AR_N00221_001253 CORRESPONDENCE 5	**10-10-2008**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT SUBSURFACE VAPOR INTRUSION METHODOLOGY LETTER REPORT FOR PROPOSED ACTIVE SOIL GAS SAMPLING (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_001254 CORRESPONDENCE 4	**10-10-2008**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SUBSURFACE VAPOR INTRUSION METHODOLOGY LETTER REPORT FOR PROPOSED ACTIVE SOIL GAS SAMPLING (ENCLOSURE IS RECORD # 1255)	YES	BLDG 0000503 SITE 00017
AR_N00221_001255 REPORT 11	**10-10-2008**	CHADUX - TT, JOINT VENTURE	FINAL SUBSURFACE VAPOR INTRUSION METHODOLOGY LETTER REPORT FOR PROPOSED ACTIVE SOIL GAS SAMPLING (CD COPY ENCLOSED) [SEE RECORD # 1254 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 SITE 00017

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AR_N00221_001302 REPORT 46	**11-01-2008**	CHADUX - TT, JOINT VENTURE	FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2009 (INCLUDES RESPONSES TO COMMENTS ON THE DRAFT FINAL SAMPLING AND ANALYSIS PLAN, AND CD COPY) [SEE RECORD # 1301 - BRAC TRANSMITTAL LETTER]	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 IA A2 IA F1 IA F2 IA H1 IA K PARCEL XVI SITE 00004 SITE 00005 SITE 00017 UST 0000505-2 UST 0000655 UST 0000993-4 UST A-016 UST A-025 UST A-058 UST A-194 UST A-195 UST A-225 UST A-266S UST A-267 UST A-296

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AR_N00221_001329 CORRESPONDENCE 4	**11-07-2008**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [ENCLOSURE IS RECORD # 1330]	YES	BLDG 0000503 SITE 00017
AR_N00221_003724 CORRESPONDENCE 6	**11-10-2008**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL SITE MANAGEMENT PLAN, FISCAL YEAR 2009 (SEE RECORD # 1250 - DRAFT FINAL SITE MANAGEMENT PLAN, FISCAL YEAR 2009)	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 IA A2 IA F1 IA F2 IA H1 IA K PARCEL XVI SITE 00004 SITE 00005 SITE 00017 UST 0000655 UST 0000993-4 UST A-025 UST A-058 UST A-195 UST A-225 UST A-266 UST A-267 UST A-296

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AR_N00221_001332 CORRESPONDENCE 7	**12-08-2008**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [SEE RECORD # 1330 - DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN]	YES	BLDG 0000503 SITE 00017
AR_N00221_001333 CORRESPONDENCE 25	**12-08-2008**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [INCLUDES COMMENTS BY HUMAN ECOLOGICAL RISK DIVISION, GEOLOGICAL SERVICES UNIT, AND DEPARTMENT OF FISH AND GAME	YES	BLDG 0000503 SITE 00017
AR_N00221_001339 CORRESPONDENCE 3	**12-08-2008**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [SEE RECORD # 1330 - DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN]	YES	BLDG 0000503 SITE 00017
AR_N00221_001276 CORRESPONDENCE 4	**01-06-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (ENCLOSURE IS RECORD # 1277)	YES	BLDG 0000503 SITE 00017
AR_N00221_001313 CORRESPONDENCE 5	**01-29-2009**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (SEE RECORD # 1277 - DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION)	YES	BLDG 0000503 SITE 00017
AR_N00221_001314 CORRESPONDENCE 4	**01-30-2009**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (SEE RECORD # 1277 - DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION)	YES	BLDG 0000503 SITE 00017

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AR_N00221_001312 CORRESPONDENCE 9	**02-10-2009**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (INCLUDES COMMENTS BY GEOLOGICAL SERVICES UNIT, AND HUMAN ECOLOGICAL RISK DIVISION)	YES	BLDG 0000503 SITE 00017
AR_N00221_001357 CORRESPONDENCE 13	**02-12-2009**	DTSC - BERKELEY, CA	RESPONSE TO THE REQUEST FOR THE IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	YES	BLDG 0000503 SITE 00017
AR_N00221_001358 CORRESPONDENCE 19	**03-03-2009**	BRAC PMO WEST	RESPONSES TO COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION	YES	BLDG 0000503 SITE 00017
AR_N00221_003736 CORRESPONDENCE 2	**03-05-2009**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE 1) CUMULATIVE RISKS; AND 2) RESPONSES TO COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION	YES	BLDG 0000503 SITE 00017
AR_N00221_003738 CORRESPONDENCE 2	**03-05-2009**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE CRWQCB REVIEW AND COMMENTS ON THE 1) CUMULATIVE RISKS; AND 2) RESPONSES TO COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (INCLUDES COMMENTS BY DTSC)	YES	BLDG 0000503 SITE 00017
AR_N00221_001359 CORRESPONDENCE 2	**03-06-2009**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003737 CORRESPONDENCE 2	**03-09-2009**	CRWQCB - OAKLAND, CA	REVIEW AND AMENDED COMMENTS ON THE 1) CUMULATIVE RISKS; AND 2) RESPONSES TO COMMENTS ON THE DRAFT FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION	YES	BLDG 0000503 SITE 00017
AR_N00221_001309 CORRESPONDENCE 5	**04-06-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT FINAL ENGINEERING EVALUATION AND COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [ENCLOSURE IS RECORD # 1310]	YES	BLDG 0000503 SITE 00017
AR_N00221_001334 CORRESPONDENCE 5	**04-06-2009**	BRAC PMO WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [ENCLOSURE IS RECORD # 1335]	YES	BLDG 0000503 SITE 00017
AR_N00221_001335 CORRESPONDENCE 17	**04-06-2009**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [CD COPY ENCLOSED]	YES	BLDG 0000503 SITE 00017
AR_N00221_003742 CORRESPONDENCE 4	**04-24-2009**	DTSC - CHATSWORTH, CA	REVIEW AND COMMENTS ON THE DRAFT FINAL ENGINEERING EVALUATION AND COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN (SEE RECORD # 1310 - DRAFT FINAL ENGINEERING EVALUATION AND COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN)	YES	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 IA A1 SITE 00017
AR_N00221_001351 CORRESPONDENCE 4	**05-15-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (ENCLOSURE IS RECORD # 1352)	YES	BLDG 0000503 SITE 00017

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AR_N00221_002441 CORRESPONDENCE 5	**05-22-2009**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL FIELD SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (ENCLOSURE IS RECORD # 2442)	YES	BLDG 0000503 SITE 00017
AR_N00221_002442 REPORT 375	**05-22-2009**	CHADUX - TT, JOINT VENTURE	FINAL FIELD INVESTIGATION SUMMARY REPORT AND VAPOR INTRUSION RISK EVALUATION (CD COPY ENCLOSED) [SEE RECORD # 2441 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 SITE 00017
AR_N00221_003752 CORRESPONDENCE 1	**06-01-2009**	CRWQCB - OAKLAND, CA	REVIEW AND CONCURRENCE WITH THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (SEE RECORD # 1352 - DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION)	YES	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017
AR_N00221_003753 CORRESPONDENCE 6	**06-02-2009**	DTSC - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN (SEE RECORD # 1274 - DRAFT ENGINEERING EVALUATION/COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN)	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 IA C2 SITE 00017
AR_N00221_001341 CORRESPONDENCE 5	**06-03-2009**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL ENGINEERING EVALUATION AND COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [ENCLOSURE IS RECORD # 1342]	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001342 REPORT 438	**06-03-2009**	CHADUX - TT, JOINT VENTURE	FINAL ENGINEERING EVALUATION AND COST ANALYSIS/INTERIM REMEDIAL ACTION PLAN [CD COPY ENCLOSED] {DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS} [SEE RECORD # 1341 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017 WELL 00017-W-001 WELL 00017-W-002 WELL 00017-W-003 WELL 00017-W-004 WELL 00017-W-005 WELL 00017-W-006 WELL 00017-W-007 WELL 00017-W-008 WELL 00017-W-009 WELL 00017-W-010 WELL 00017-W-011 WELL 00017-W-012 WELL 00017-W-013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL 00017-W-014 WELL 00017-W-015 WELL 00017-W-016 WELL 00017-W-017 WELL 00017-W-018 WELL 00017-W-019 WELL 00017-W-020 WELL 00017-W-021 WELL 00017-W-022
AR_N00221_003754 CORRESPONDENCE 5	**06-05-2009**	CALIFORNIA DEPARTMENT OF FISH GAME - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (SEE RECORD # 1352 - DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION)	YES	BLDG 0000503 SITE 00017
AR_N00221_001344 CORRESPONDENCE 5	**06-09-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2010 [ENCLOSURE IS RECORD # 1345]	YES	PARCEL XVI SITE 00017
AR_N00221_001353 CORRESPONDENCE 4	**08-17-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2010 [ENCLOSURE IS RECORD # 1354]	YES	BLDG 0000503 SITE 00017

DRAFT ENVIRONMENTAL RESTORATION RECORD PUBLIC / IR INDEX - UPDATE (SORTED BY RECORD DATE/RECORD NUMBER)

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001362 CORRESPONDENCE 6	**08-31-2009**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION [CD COPY ENCLOSED]	YES	BLDG 0000503 SITE 00017
AR_N00221_001375 REPORT 146	**08-31-2009**	CHADUX - TT, JOINT VENTURE	FINAL ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_001466 CORRESPONDENCE 4	**08-31-2009**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (ENCLOSURE IS RECORD # 1467)	YES	BLDG 0000503 SITE 00017
AR_N00221_001374 CORRESPONDENCE 4	**09-01-2009**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (ENCLOSURE IS RECORD # 1375)	YES	BLDG 0000503 SITE 00017
AR_N00221_001575 CORRESPONDENCE 2	**09-16-2009**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (SEE RECORD # 1467 - DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN)	YES	BLDG 0000503 SITE 00017
AR_N00221_003777 CORRESPONDENCE 4	**09-21-2009**	CALIFORNIA DEPARTMENT OF FISH AND GAME - SACRAMENTO, CA	REVIEW AND COMMENTS TO THE RESPONSES TO COMMENTS ON THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION (SEE RECORD # 1362 - RESPONSES TO COMMENTS ON THE DRAFT ACTION MEMORANDUM FOR A NON-TIME CRITICAL REMOVAL ACTION)	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001397 REPORT 60	**09-24-2009**	CHADUX - TT, JOINT VENTURE	FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2010 [CD COPY ENCLOSED] {SEE RECORDS # 1396 - BRAC PMO WEST TRANSMITTAL LETTER AND RECORD # 3688 - FEDERAL FACILITY SITE REMEDIATION AGREEMENT}	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 IA A2 IA F1 IA F2 IA H1 IA K PARCEL XVI SITE 00004 SITE 00017 UST 0000993-4 UST A-016 UST A-025 UST A-058 UST A-194 UST A-225 UST A-226S UST A-267 UST A-296
AR_N00221_001576 CORRESPONDENCE 4	**10-01-2009**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (SEE RECORD # 1467 - DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN)	YES	BLDG 0000503 SITE 00017
AR_N00221_001574 CORRESPONDENCE 3	**10-16-2009**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (SEE RECORD # 1467 - DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN)	YES	SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001490 REPORT 445	**11-01-2009**	WESTON SOLUTIONS, INC.	FINAL NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (INCLUDES FINAL SAMPLING AND ANALYSIS PLAN; AND CD COPY)	YES	BLDG 0000503 SITE 00017 WELL 00017-W-005 WELL 00017-W-012 WELL 00017-W-014 WELL 00017-W-015 WELL 00017-W-020
AR_N00221_001577 CORRESPONDENCE 10	**11-01-2009**	BRAC PMO WEST	RESPONSES TO COMMENTS ON THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN	YES	BLDG 0000503 SITE 00017
AR_N00221_001489 CORRESPONDENCE 4	**11-30-2009**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (ENCLOSURE IS RECORD # 1490)	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002626 CORRESPONDENCE 4	**12-03-2009**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SAMPLING AND ANALYSIS PLAN FOR THE NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (ENCLOSURE IS RECORD # 1490)	YES	BLDG 0000503 SITE 00017 WELL 00017-W-005 WELL 00017-W-012 WELL 00017-W-014 WELL 00017-W-015 WELL 00017-W-020
AR_N00221_001572 CORRESPONDENCE 5	**12-16-2009**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE FINAL NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (SEE RECORD # 1490 - FINAL NON-TIME CRITICAL REMOVAL ACTION WORK PLAN)	YES	SITE 00017
AR_N00221_001608 CORRESPONDENCE 5	**04-08-2010**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (ENCLOSURE IS RECORD # 1609)	YES	BLDG 0000503 SITE 00017
AR_N00221_003813 CORRESPONDENCE 3	**06-15-2010**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (SEE RECORD # 1609 - DRAFT WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING)	YES	BLDG 0000499 BLDG 0000503 BLDG 0000517 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000601 SITE 00017

MARE ISLAND

DRAFT ENVIRONMENTAL RESTORATION RECORD PUBLIC / IR INDEX - UPDATE (SORTED BY RECORD DATE/RECORD NUMBER)

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UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001548 MINUTES 27	**06-24-2010**	CDM SMITH	24 JUNE 2010 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	YES	"EETP - BLDG 742" SEARCH BLDG 0000007 BLDG 0000112 BLDG 0000142 BLDG 0000163 BLDG 0000503 BLDG 0000742 BLDG 0000832 BLDG A-080 BLDG A-159 BLDG A-248 BLDG A-271 BLDG A-278 PARCEL X-B(1) PARCEL X-B(2) PARCEL X-B(3) SITE 00014 SITE 00017 SITE 00021 UST 0000142 UST A-230

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001710 CORRESPONDENCE 5	**07-15-2010**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (SEE RECORD # 1609 - DRAFT WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING)	NO	BLDG 0000499 BLDG 0000503 BLDG 0000517 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000601 BLDG 0000759 SITE 00017

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AR_N00221_001579 MINUTES 37	**07-29-2010**	CDM SMITH	29 JULY 2010 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	YES	"EETP - BLDG 225" SEARCH "EETP - BLDG 742" SEARCH "EETP - IA D1" SEARCH "EETP - IA D1-2" SEARCH BLDG 0000101 BLDG 0000108 BLDG 0000163 BLDG 0000225 BLDG 0000273 BLDG 0000503 BLDG 0000589 BLDG 0000593 BLDG 0000643 BLDG 0000742 BLDG 0000832 IA 0000002 IA C3 IA D1 IA D1-2 IA H1 PARCEL II PARCEL X-B(1) PARCEL X-B(2) PARCEL X-B(3) SITE 00005

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					SITE 00009 SITE 00012 SITE 00017

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AR_N00221_001582 REPORT 61	**09-29-2010**	CHADUX - TT, JOINT VENTURE	FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2011 (CD COPY ENCLOSED) {DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS}	YES	"EETP - BLDG 742" SEARCH BLDG 0000163 BLDG 0000499 BLDG 0000503 BLDG 0000505A BLDG 0000505B BLDG 0000517 BLDG 0000589 BLDG 0000593 BLDG 0000641 BLDG 0000643 BLDG 0000742 BLDG 0000778 BLDG 0000782 BLDG 0000797 BLDG 0000832 BLDG 0000900 BLDG 0001300 BLDG A-149 IA A2 IA F1 IA G IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					PARCEL XV PARCEL XVI SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000003 UXO 000004 UXO 000005 UXO 000006 UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_001626 REPORT 440	**10-22-2010**	CHADUX - TT, JOINT VENTURE	FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (CD COPY ENCLOSED) [SEE RECORD # 1625 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000567 BLDG 0000601 SITE 00017
AR_N00221_002352 REPORT 305	**10-22-2010**	CHADUX - TT, JOINT VENTURE	FINAL ACCIDENT PREVENTION PLAN ADDENDUM ADDITIONAL SOIL, GROUNDWATER, AND SOIL GAS SAMPLING INVESTIGATION (CD COPY ENCLOSED) [SEE RECORD # 1271 - FINAL ACCIDENT PREVENTION PLAN ADDITIONAL SOIL, GROUNDWATER, SOIL GAS SAMPLING INVESTIGATION]	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001625 CORRESPONDENCE 5	**10-25-2010**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (ENCLOSURE IS RECORD # 1626)	YES	BLDG 0000503 SITE 00017
AR_N00221_001573 CORRESPONDENCE 7	**10-26-2010**	CALIFORNIA DEPARTMENT OF FISH AND GAME - SACRAMENTO, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN (SEE RECORD # 1467 - DRAFT NON-TIME CRITICAL REMOVAL ACTION WORK PLAN)	YES	BLDG 0000503 SITE 00005 SITE 00017
AR_N00221_001742 CORRESPONDENCE 2	**10-27-2010**	DTSC - BERKELEY, CA	REVIEW AND APPROVAL OF THE FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (CD COPY ENCLOSED) [SEE RECORD # 1626 - FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING]	NO	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000567 BLDG 0000601 SITE 00017
AR_N00221_001741 CORRESPONDENCE 2	**11-02-2010**	CRWQCB - OAKLAND, CA	REVIEW AND CONCURRENCE WITH THE FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING (CD COPY ENCLOSED) [SEE RECORD # 1626 - FINAL WORK PLAN FOR THE NON-TIDAL WETLAND INVESTIGATION AND POST-REMOVAL MONITORING]	NO	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000567 BLDG 0000601 SITE 00017

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AR_N00221_001730 MINUTES 26	**04-28-2011**	CDM SMITH	28 APRIL 2011 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	NO	"EETP - BLDG 207" SEARCH "EETP - BLDG 271" SEARCH "EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 461" SEARCH "EETP - BLDG 688" SEARCH "EETP - BLDG 84" SEARCH "EETP - IA H2" SEARCH BLDG 0000084 BLDG 0000085 BLDG 0000089 BLDG 0000163 BLDG 0000206 BLDG 0000207 BLDG 0000208 BLDG 0000271 BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000461 BLDG 0000503 BLDG 0000637 BLDG 0000680

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					BLDG 0000688
					BLDG 0000742
					BLDG 0000832
					BLDG 0000854
					BLDG A-080
					BLDG A-149
					BLDG A-216
					DREDGE POND 0003E
					DREDGE POND 0007S
					EETP
					IA A2
					IA B2-1
					IA B2-2
					IA C1
					IA C2
					IA C3
					IA D1-3
					IA H1
					IA H2
					IA J
					IA K
					PARCEL 0002
					PARCEL 0004
					PARCEL II
					PARCEL X-B(1)
					PARCEL X-B(2)
					PARCEL X-B(3)

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00004 SITE 00005 SITE 00010 SITE 00013 SITE 00015 SITE 00017 SITE 00021 UST 0000243 UST 0000993-4 UST A-225

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AR_N00221_001722 MINUTES 20	**05-26-2011**	CDM SMITH	26 MAY 2011 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	NO	"EETP - BLDG 206" SEARCH "EETP - BLDG 208" SEARCH BLDG 0000206 BLDG 0000208 BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000759 EETP SITE 00017 WELL 00017-W-002 WELL 00017-W-005 WELL 00017-W-012 WELL 00017-W-015 WELL 00017-W-020
AR_N00221_000003 CORRESPONDENCE 4	**06-27-2011**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION (ENCLOSURE IS RECORD # 111)	NO	BLDG 0000503 SITE 00017

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AR_N00221_001697 CORRESPONDENCE 4	**06-29-2011**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2012 (ENCLOSURE IS RECORD # 1698)	NO	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA K PARCEL X-B SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000003 UXO 000004 UXO 000006 UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_001707 CORRESPONDENCE 4	**07-19-2011**	NAVFAC - SOUTHWEST DIVISION	RESPONSES TO COMMENTS ON THE DRAFT FINAL REMEDIAL INVESTIGATION, AND DRAFT FINAL FEASIBILITY STUDY (SEE RECORDS # 3609 AND # 3621 - REVIEW AND COMMENTS)	NO	BLDG 0000503 IA A1 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003832 CORRESPONDENCE 3	**08-02-2011**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2012	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA K PARCEL X-B SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000003 UXO 000004 UXO 000006 UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002327 CORRESPONDENCE 3	**08-18-2011**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2012	NO	BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA F2 IA G IA H1 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006 UXO 000007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_001970 CORRESPONDENCE 28	**09-15-2011**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION	NO	BLDG 0000503 SITE 00017
AR_N00221_001971 CORRESPONDENCE 4	**09-15-2011**	CRWQCB - OAKLAND, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION [SEE RECORD # 111 - DRAFT NON-TIDAL WETLAND AREA INVESTIGATION]	NO	BLDG 0000503 SITE 00017

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AR_N00221_001844 MINUTES 30	**09-21-2011**	CDM SMITH	21 SEPTEMBER 2011 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	NO	"EETP - IA D1-2" SEARCH BLDG 0000047 BLDG 0000229 BLDG 0000237 BLDG 0000253 BLDG 0000497 BLDG 0000505A BLDG 0000521 BLDG 0000605 BLDG 0000671 BLDG 0000680 BLDG 0000746 BLDG 0000750 BLDG 0000759 BLDG 0000781 BLDG 0000782 BLDG 0000824 BLDG 0000900 BLDG 0000944 BLDG 0001300 BLDG 0001322 BLDG A-912 BLDG H-72 BLDG H-73 BLDG H-83 BLDG Q-01-7A EETP IA C2

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA D1-2 IA F1 IA H1 SITE 00004 SITE 00014 SITE 00017 UST 0000993-4
AR_N00221_001969 CORRESPONDENCE 1	**09-27-2011**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION (SEE RECORD # 111 - DRAFT NON-TIDAL WETLAND AREA INVESTIGATION)	NO	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001808 CORRESPONDENCE 2	**09-30-2011**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2012 (ENCLOSURE IS RECORD # 1809)	NO	BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA F2 IA G IA H1 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006 UXO 000007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001809 REPORT 55	**09-30-2011**	CDM SMITH	FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2012 (CD COPY ENCLOSED) [SEE RECORD # 1808 - BRAC PMO WEST TRANSMITTAL LETTER]	NO	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA F2 IA G IA H1 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003839 CORRESPONDENCE 2	**11-09-2011**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2012	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000742 BLDG A-149 IA A2 IA F1 IA F2 IA G IA H1 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_001849 CORRESPONDENCE 2	**12-20-2011**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT WORK PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION (ENCLOSURE IS RECORD # 1850)	NO	BLDG 0000503 SITE 00017
AR_N00221_002215 CORRESPONDENCE 5	**02-16-2012**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT TECHNICAL MEMORANDUM, AMBIENT FILL DATA SET FOR MOLYBDENUM AT MARE ISLAND AND COMPARISON TO THE MOLYBDENUM DATA SET FOR SEDIMENT AT THE NON-TIDAL WETLAND AREA (ENCLOSURE IS RECORD # 2215)	YES	BLDG 0000503 SITE 00017
AR_N00221_003846 CORRESPONDENCE 6	**03-28-2012**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT WORK PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION (SEE RECORD # 1850 - DRAFT WORK PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION)	YES	BLDG 0000503 SITE 00017
AR_N00221_003847 CORRESPONDENCE 2	**04-02-2012**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE 1) DRAFT POST-REMOVAL GROUNDWATER WELL INSTALLATION AND MONITORING REPORT; AND 2) DRAFT WORK PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION	YES	BLDG 0000503 SITE 00017
AR_N00221_003857 CORRESPONDENCE 12	**06-05-2012**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, AMBIENT FILL DATA SET FOR MOLYBDENUM AT MARE ISLAND AND COMPARISON TO THE MOLYBDENUM DATA SET FOR SEDIMENT AT THE NON-TIDAL WETLAND AREA	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003858 CORRESPONDENCE 13	**06-05-2012**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE 1) LETTER DATED 01 MARCH 2012 PROVIDING FIGURES WITH ANALYTICAL DATA FOR THE SEDIMENT AND SOIL GAS STEP-OUT SAMPLES; AND 2) LETTER DATED 04 APRIL 2012 PROVIDING ANALYTICAL RESULTS FOR THE SEDIMENT AND SOIL GAS STEP-OUT SAMPLES	YES	BLDG 0000503 SITE 00017
AR_N00221_003862 CORRESPONDENCE 4	**06-20-2012**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT WORK PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION (INCLUDES COMMENTS BY GEOLOGICAL SERVICES UNIT, DATED 14 JUNE 2012)	YES	BLDG 0000503 SITE 00017
AR_N00221_001972 CORRESPONDENCE 5	**07-06-2012**	BRAC PMO WEST	TRANSMITTAL OF THE RESPONSES TO COMMENTS ON THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION (ENCLOSURE IS RECORD # 1973)	YES	BLDG 0000503 SITE 00017
AR_N00221_001973 CORRESPONDENCE 60	**07-06-2012**	CHADUX - TT, JOINT VENTURE	RESPONSES TO COMMENTS ON THE DRAFT NON-TIDAL WETLAND AREA INVESTIGATION (CD COPY ENCLOSED) [SEE RECORDS # 1969 THROUGH 1971 - REVIEW AND COMMENTS]	YES	BLDG 0000503 SITE 00017
AR_N00221_001955 CORRESPONDENCE 5	**07-11-2012**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL WORK PLAN, UPLAND CHLORINATED SOLVENTS (ENCLOSURE IS RECORD # 1956)	YES	BLDG 0000503 SITE 00017
AR_N00221_001956 REPORT 388	**07-11-2012**	CKY, INC.	FINAL WORK PLAN, UPLAND CHLORINATED SOLVENTS (CD COPY ENCLOSED) [SEE RECORD # 1955 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 BLDG 0000517 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000759 SITE 00017

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AR_N00221_001951 REPORT 36	**07-18-2012**	CKY, INC.	FINAL CONTRACTOR QUALITY CONTROL PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_001952 REPORT 137	**07-18-2012**	CKY, INC.	FINAL ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN, UPLAND CHLORINATED SOLVENTS INVESTIGATION (CD COPY ENCLOSED) [DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS]	YES	BLDG 0000503 SITE 00017
AR_N00221_003867 CORRESPONDENCE 2	**07-27-2012**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE FINAL WORK PLAN, UPLAND CHLORINATED SOLVENTS (SEE RECORD # 1956 - FINAL WORK PLAN, UPLAND CHLORINATED SOLVENTS)	YES	BLDG 0000503 BLDG 0000517 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000759 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001960 CORRESPONDENCE 2	**08-17-2012**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2013 (ENCLOSURE IS RECORD # 1961)	NO	BLDG 0000503 BLDG 0000742 BLDG A-149 IA F1 IA F2 IA H1 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B PARCEL XV PARCEL XVI SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 UXO 000003 UXO 000004 UXO 000006 UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001647 CORRESPONDENCE 5	**09-12-2012**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL NON-TIDAL WETLAND AREA INVESTIGATION (ENCLOSURE IS RECORD # 1745)	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001745 REPORT 17513	**09-12-2012**	CHADUX - TT, JOINT VENTURE	FINAL NON-TIDAL WETLAND AREA INVESTIGATION (CD COPY ENCLOSED) [SEE RECORD # 1647 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 SITE 00017 WELL 00017-P-012A WELL 00017-P-012B WELL 00017-W-001 WELL 00017-W-002 WELL 00017-W-003 WELL 00017-W-004 WELL 00017-W-005 WELL 00017-W-006 WELL 00017-W-007 WELL 00017-W-008 WELL 00017-W-009 WELL 00017-W-010 WELL 00017-W-011 WELL 00017-W-012 WELL 00017-W-013

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					WELL 00017-W-014 WELL 00017-W-015 WELL 00017-W-016 WELL 00017-W-017 WELL 00017-W-018 WELL 00017-W-019 WELL 00017-W-020 WELL 00017-W-021 WELL 00017-W-022 WELL 00017-W-023 WELL 00017-W-024 WELL 00017-W-025 WELL 00017-W-026 WELL 00017-W-027 WELL 00017-W-028 WELL 00017-W-029

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL 00017-W-030 WELL IR-17-TW-005 WELL IR-17-TW-006 WELL IR-17-TW-007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001773 CORRESPONDENCE 3	**09-28-2012**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2013 (ENCLOSURE IS RECORD # 1790)	NO	BLDG 0000503 BLDG 0000505 BLDG 0000742 BLDG A-149 BLDG M-0162 IA A1 IA A2 IA F1 IA F2 IA G IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000003 UXO 000004 UXO 000005 UXO 000006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_001790 REPORT 51	**09-28-2012**	CAPE ENVIRONMENTAL MANAGEMENT, INC.	FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2013 (CD COPY ENCLOSED) [SEE RECORD # 1773 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000742 BLDG A-149 BLDG M-0162 IA A1 IA A2 IA F1 IA F2 IA G IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000003 UXO 000004 UXO 000005

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000006 UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003872 CORRESPONDENCE 2	**10-15-2012**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2013	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000742 BLDG A-149 BLDG M-0162 IA A1 IA A2 IA F1 IA F2 IA G IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL X-B(3) PARCEL XV PARCEL XVI SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000003 UXO 000004 UXO 000005

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000006 UXO 000007 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_003876 CORRESPONDENCE 2	**12-05-2012**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE FINAL NON-TIDAL WETLAND AREA INVESTIGATION (SEE RECORD # 1745 - FINAL NON-TIDAL WETLAND AREA INVESTIGATION)	YES	BLDG 0000503 SITE 00017
AR_N00221_000406 CORRESPONDENCE 5	**01-04-2013**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION (ENCLOSURE IS RECORD # 935)	YES	BLDG 0000503 SITE 00017
AR_N00221_003891 CORRESPONDENCE 2	**01-04-2013**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE FINAL HUMAN HEALTH RISK ASSESSMENT APPROACH SUMMARY, UPLAND AREA	YES	BLDG 0000503 SITE 00017
AR_N00221_003904 CORRESPONDENCE 3	**03-20-2013**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION (INCLUDES REVIEW AND COMMENTS BY CRWQCB) [SEE RECORD # 1304 - DRAFT INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION]	YES	BLDG 0000503 SITE 00017
AR_N00221_002191 CORRESPONDENCE 5	**06-07-2013**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION (ENCLOSURE IS RECORD # 2192)	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002192 REPORT 1461	**06-07-2013**	CKY, INC.	FINAL INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION (CD COPY ENCLOSED) [SEE RECORD # 2191 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	BLDG 0000503 SITE 00017
AR_N00221_003913 CORRESPONDENCE 2	**07-05-2013**	DTSC - BERKELEY, CA	REVIEW AND CONCURRENCE WITH THE FINAL INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION (SEE RECORD # 2192 - FINAL INVESTIGATION REPORT UPLAND CHLORINATED SOLVENTS INVESTIGATION)	YES	BLDG 0000503 SITE 00017
AR_N00221_002168 CORRESPONDENCE 5	**08-29-2013**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL DATA GAPS INVESTIGATION WORK PLAN FOR GROUNDWATER BENEFICIAL USE EXCEPTION REQUEST (ENCLOSURE IS RECORD # 2169)	NO	BLDG 0000503 BLDG 0000993 PARCEL XV-B(1) SITE 00017 UST 0000993-4

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AR_N00221_002169 REPORT 168	**08-29-2013**	MULTIMEDIA ENVIRONMENTAL COMPLIANCE GROUP	FINAL DATA GAPS INVESTIGATION WORK PLAN FOR GROUNDWATER BENEFICIAL USE EXCEPTION REQUEST (CD COPY ENCLOSED) [SEE RECORD # 2168 - BRAC PMO WEST TRANSMITTAL LETTER] {DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS}	YES	PARCEL XV-B(1) SITE 00017 UST 0000993-4 WELL 00017-W-001 WELL 00017-W-002 WELL 00017-W-003 WELL 00017-W-004 WELL 00017-W-005 WELL 00017-W-006 WELL 00017-W-007 WELL 00017-W-008 WELL 00017-W-009 WELL 00017-W-010 WELL 00017-W-011 WELL 00017-W-012 WELL 00017-W-013 WELL 00017-W-014 WELL 00017-W-015

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					WELL 00017-W-016
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					WELL 00017-W-028
					WELL 00017-W-029
					WELL 00017-W-030
					WELL UST-993-M-01

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					WELL UST-993-M-04 WELL UST-993-M-05 WELL UST-993-M-06 WELL UST-993-M-07 WELL UST-993-M-08
AR_N00221_002175 CORRESPONDENCE 4	**09-23-2013**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT FEASIBILITY STUDY ADDENDUM (ENCLOSURE IS RECORD # 2176)	NO	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 SITE 00017
AR_N00221_002239 CORRESPONDENCE 2	**09-25-2013**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2014 (ENCLOSURE IS RECORD # 2240)	NO	BLDG 0000503 SITE 00017
AR_N00221_002240 REPORT 48	**09-27-2013**	SULLIVAN - WESTON SERVICES, JOINT VENTURE	FINAL SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2014 (CD COPY ENCLOSED) [SEE RECORD # 2239 - BRAC PMO WEST TRANSMITTAL LETTER] {DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS}	YES	BLDG 0000503 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002199 CORRESPONDENCE 6	**10-11-2013**	BRAC PMO WEST	LETTER REQUESTING CLOSURE OF SOLID WASTE MANAGEMENT UNITS AND BUILDING AREA (INCLUDES SAMPLE COLLECTION LOCATIONS MAP, AND CD COPY) [DOCUMENT ALSO CONTAINS SENSITIVE STREET LEVEL MAPS]	YES	BLDG 0000503 PARCEL XV-B SITE 00017 SWMU 00093 SWMU 00106
AR_N00221_002248 MINUTES 25	**12-05-2013**	SULLIVAN - WESTON SERVICES, JOINT VENTURE	05 DECEMBER 2013 RESTORATION ADVISORY BOARD (RAB) MEETING MATERIALS (INCLUDES 05 DECEMBER 2013 AGENDA AND MEETING NOTICE; 26 SEPTEMBER 2013 DRAFT RAB MEETING MINUTES; VARIOUS HANDOUTS AND CD COPY)	YES	BLDG 0000503 IA C1 SITE 00015 SITE 00017
AR_N00221_003937 CORRESPONDENCE 3	**01-10-2014**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE DRAFT FEASIBILITY STUDY ADDENDUM (SEE RECORD # 2176 - DRAFT FEASIBILITY STUDY ADDENDUM)	YES	BLDG 0000503 SITE 00017
AR_N00221_004067 CORRESPONDENCE 3	**02-25-2014**	BRAC PMO WEST	REQUEST FOR IDENTIFICATION OF STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE FEASIBILITY STUDY ADDENDUM	NO	BLDG 0000503 SITE 00017
AR_N00221_003945 CORRESPONDENCE 6	**02-28-2014**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT FEASIBILITY STUDY ADDENDUM (SEE RECORD # 2176 - DRAFT FEASIBILITY STUDY ADDENDUM)	YES	BLDG 0000503 SITE 00017
AR_N00221_002267 CORRESPONDENCE 5	**03-11-2014**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT COMMUNITY INVOLVEMENT PLAN (ENCLOSURE IS RECORD # 2268)	YES	SITE 00004 SITE 00005 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003952 CORRESPONDENCE 4	**03-28-2014**	DTSC - BERKELEY, CA	RESPONSE TO LETTER, DATED 11 OCTOBER 2013, REQUESTING CLOSURE OF SOLID WASTE MANAGEMENT UNITS AND BUILDING AREA (SEE RECORD # 2199 - LETTER)	YES	BLDG 0000503 IA A1 PARCEL II PARCEL X-B(1) PARCEL X-B(2) PARCEL XV-B(1)-A PARCEL XV-B(1)-B SITE 00017 SWMU 00093 SWMU 00106
AR_N00221_003953 CORRESPONDENCE 38	**04-07-2014**	DTSC - BERKELEY, CA	APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR POTENTIAL REMEDIAL ALTERNATIVES BEING CONSIDERED IN THE FEASIBILITY STUDY (INCLUDES APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FROM CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE; AND CRWQCB)	YES	BLDG 0000503 SITE 00017
AR_N00221_003955 CORRESPONDENCE 5	**05-19-2014**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE DRAFT COMMUNITY INVOLVEMENT PLAN (SEE RECORD # 2268 - DRAFT COMMUNITY INVOLVEMENT PLAN)	YES	"EETP - IA H2" SEARCH BLDG 0000503 IA A2 IA H1 IA H2 SITE 00004 SITE 00005 SITE 00017

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AR_N00221_002420 MINUTES 34	**05-29-2014**	SULLIVAN - WESTON SERVICES, JOINT VENTURE	29 MAY 2014 FINAL RESTORATION ADVISORY BOARD MEETING MINUTES (CD COPY ENCLOSED)	YES	"EETP - BLDG 637" SEARCH "EETP - BLDG 688" SEARCH "EETP - BLDG 742" SEARCH "EETP - BLDG 746" SEARCH "EETP - IA H2" SEARCH BLDG 0000503 BLDG 0000637 BLDG 0000655 BLDG 0000688 BLDG 0000742 BLDG 0000746 IA B1 IA B2-2 IA C1 IA C2 IA F1 IA H1 IA H2 IA K SITE 00003 SITE 00004 SITE 00005 SITE 00015 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003956 CORRESPONDENCE 2	**05-30-2014**	U.S. EPA - SAN FRANCISCO, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT FEASIBILITY STUDY ADDENDUM (SEE RECORD # 2462 - RESPONSES TO COMMENTS, APPENDIX E OF THE FINAL FEASIBILITY STUDY ADDENDUM)	YES	BLDG 0000503 BLDG 0000759 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002333 CORRESPONDENCE 3	**07-09-2014**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2015 (ENCLOSURE IS RECORD # 2334)	NO	BLDG 0000142 BLDG 0000503 BLDG 0000505 BLDG 0000742 BLDG M-0162 DREDGE POND 0003E IA A1 IA C2 IA F1 IA F2 IA K PARCEL II PARCEL V PARCEL VI PARCEL VII PARCEL XV PARCEL XVI SITE 00004 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000003 UXO 000004 UXO 000005 UXO 000006 UXO 000007

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_003960 CORRESPONDENCE 4	**07-11-2014**	DTSC - BERKELEY, CA	REVIEW AND COMMENTS ON THE RESPONSES TO COMMENTS ON THE DRAFT FEASIBILITY STUDY REPORT (SEE RECORD # 2367 - APPENDIX H OF THE FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT)	YES	BLDG 0000503 SITE 00017

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AR_N00221_002463 MINUTES 36	**09-25-2014**	SULLIVAN - WESTON SERVICES, JOINT VENTURE	09 SEPTEMBER 2014 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	YES	"EETP - BLDG 386" SEARCH "EETP - BLDG 388" SEARCH "EETP - BLDG 637" SEARCH "EETP - BLDG 678" SEARCH BLDG 0000386 BLDG 0000388 BLDG 0000390 BLDG 0000637 BLDG 0000678 BLDG 0000755 DREDGE POND 0007S IA A2 IA C1 IA C2 IA C3 IA H1 PARCEL 0002 PARCEL XV-B(1) SITE 00015 SITE 00017 SITE 00021 UST 0000993-4 UST M-57

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002399 REPORT 79	**10-01-2014**	TRIECO - TETRA TECH EM, INC., JOINT VENTURE	FINAL COMMUNITY INVOLVEMENT PLAN (CD COPY ENCLOSED) [SEE RECORD # 2398 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	"EETP - IA H2" SEARCH BLDG 0000503 IA A2 IA H1 IA H2 SITE 00004 SITE 00005 SITE 00017
AR_N00221_002398 CORRESPONDENCE 4	**10-02-2014**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL COMMUNITY INVOLVEMENT PLAN (ENCLOSURE IS RECORD # 2399)	YES	"EETP - IA H2" SEARCH BLDG 0000503 IA A2 IA H1 IA H2 SITE 00004 SITE 00005 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002368 MINUTES 41	**12-04-2014**	SULLIVAN - WESTON SERVICES, JOINT VENTURE	04 DECEMBER 2014 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES PACKET (INCLUDES PUBLIC NOTICE; AGENDA; 25 SEPTEMBER 2014 DRAFT MEETING MINUTES; VARIOUS HANDOUTS; AND CD COPY)	YES	"EETP - BLDG 637" SEARCH "EETP - IA D1-2" SEARCH BLDG 0000637 BLDG 0000781 IA A2 IA D1-2 IA K PARCEL 0002 PARCEL XV-B(1) SITE 00017 UST 0000993-4
AR_N00221_002461 CORRESPONDENCE 4	**12-15-2014**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL FEASIBILITY STUDY ADDENDUM (ENCLOSURE IS RECORD # 2462)	YES	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000601 SITE 00017
AR_N00221_002462 REPORT 1516	**12-15-2014**	TRIECO - TETRA TECH EM, INC., JOINT VENTURE	FINAL FEASIBILITY STUDY ADDENDUM (CD COPY ENCLOSED) [SEE RECORD # 2461 - BRAC PMO WEST TRANSMITTAL LETTER; AND RECORD # 3488 - FINAL FEASIBILITY STUDY]	YES	BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000519A BLDG 0000567 BLDG 0000601 SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_002527 REPORT 16	**05-01-2015**	HELIOS RESOURCES, LTD.	FINAL PROPOSED PLAN, DRAFT REMEDIAL ACTION PLAN (CD COPY ENCLOSED)	YES	BLDG 0000503 SITE 00017
AR_N00221_003769 PUBLIC NOTICE 1	**05-21-2015**	DAILY REPUBLIC - FAIRFIELD, CA	PUBLIC NOTICE INVITING THE PUBLIC TO ATTEND A RESTORATION ADVISORY BOARD (RAB) MEETING ON THE PROPOSED PLAN/DRAFT REMEDIAL ACTION PLAN (CD COPY ENCLOSED)	YES	BLDG 0000503 EETP SITE 00017
AR_N00221_003770 PUBLIC NOTICE 1	**05-21-2015**	BENICIA HERALD - BENICIA, CA	PUBLIC NOTICE INVITING THE PUBLIC TO ATTEND A RESTORATION ADVISORY BOARD (RAB) MEETING ON THE PROPOSED PLAN/DRAFT REMEDIAL ACTION PLAN (CD COPY ENCLOSED)	YES	BLDG 0000503 EETP SITE 00017
AR_N00221_003771 PUBLIC NOTICE 1	**05-21-2015**	NAPA VALLEY REGISTER - SONOMA, CA	PUBLIC NOTICE INVITING THE PUBLIC TO ATTEND A RESTORATION ADVISORY BOARD (RAB) MEETING ON THE PROPOSED PLAN/DRAFT REMEDIAL ACTION PLAN (CD COPY ENCLOSED)	YES	BLDG 0000503 EETP SITE 00017
AR_N00221_003772 PUBLIC NOTICE 1	**05-21-2015**	TIMES-HERALD - VALLEJO, CA	PUBLIC NOTICE INVITING THE PUBLIC TO ATTEND A RESTORATION ADVISORY BOARD (RAB) MEETING ON THE PROPOSED PLAN/DRAFT REMEDIAL ACTION PLAN (CD COPY ENCLOSED)	YES	BLDG 0000503 EETP SITE 00017

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003982 MINUTES 34	**05-28-2015**	CONSTRUCTION ENGINEERING SERVICES, LLC	28 MAY 2015 FINAL RESTORATION ADVISORY BOARD (RAB) MEETING MINUTES (CD COPY ENCLOSED)	YES	"EETP - BLDG 121" SEARCH "EETP - BLDG 144" SEARCH "EETP - BLDG 637" SEARCH "EETP - BLDG 811" SEARCH "EETP - IA D1" SEARCH "EETP - IA D1-1" SEARCH "EETP - IA D1-2" SEARCH "EETP - IA D1-3" SEARCH "EETP - IA H2" SEARCH BLDG 0000121 BLDG 0000144 BLDG 0000499 BLDG 0000503 BLDG 0000519 BLDG 0000567 BLDG 0000637 BLDG 0000755 BLDG 0000759 BLDG 0000811 DREDGE POND 0007S EETP

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					IA B1 IA B2-2 IA C1 IA C2 IA C3 IA D1 IA D1-1 IA D1-2 IA D1-3 IA H1 IA H2 SITE 00003 SITE 00005 SITE 00017 UXO 000002 UXO 000008

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_003728 CORRESPONDENCE 2	**06-25-2015**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT SITE MANAGEMENT PLAN ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT FISCAL YEAR 2016 (ENCLOSURE IS RECORD # 3729)	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000742 BLDG A-001 BLDG A-002 BLDG A-003 BLDG A-004 BLDG A-005 BLDG A-006 BLDG A-008 BLDG A-015 BLDG A-017 BLDG A-044 BLDG A-058 BLDG A-065 BLDG A-071 BLDG A-085 BLDG A-103 BLDG A-136 BLDG A-142 BLDG A-144 BLDG A-145 BLDG A-153 BLDG A-154 BLDG A-161 BLDG A-162 BLDG A-163

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					BLDG A-191
					BLDG A-192
					BLDG A-194
					BLDG A-195
					BLDG A-215
					BLDG A-226
					BLDG A-227
					BLDG A-253
					BLDG A-260
					BLDG A-265
					BLDG A-266
					BLDG A-271
					BLDG M-0162
					DREDGE POND 0007S
					IA C2
					IA F1
					IA F2
					IA H1
					IA K
					PARCEL I
					PARCEL V
					PARCEL VI
					PARCEL VII-B
					PARCEL XIX
					PARCEL XV-B(1)
					PARCEL XVI
					PARCEL XVII
					SITE 00004

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 SWMU 00093 SWMU 00106 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006 UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004001 CORRESPONDENCE 2	**09-29-2015**	BRAC PMO WEST	TRANSMITTAL OF THE FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2016 [ENCLOSURE IS RECORD # 4002]	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000734 BLDG 0000742 IA C2 IA F1 IA F2 IA G IA H1 IA K PARCEL V PARCEL VI PARCEL VII PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
AR_N00221_004002 REPORT 54	**09-29-2015**	CONSTRUCTION ENGINEERING SERVICES, LLC	FINAL SITE MANAGEMENT PLAN, ATTACHMENT C TO THE FEDERAL FACILITY SITE REMEDIATION AGREEMENT, FISCAL YEAR 2016 (CD COPY ENCLOSED) [SEE RECORD # 4001 - BRAC PMO WEST TRANSMITTAL LETTER]	YES	"EETP - BLDG 742" SEARCH BLDG 0000503 BLDG 0000505 BLDG 0000734 BLDG 0000742 IA C2 IA F1 IA F2 IA G IA H1 IA K PARCEL V PARCEL VI PARCEL VII PARCEL XV PARCEL XVI SITE 00004 SITE 00005 SITE 00017 SITE 00028 SITE 00029 SITE 00030 SWMU 00078 UXO 000002 UXO 000003 UXO 000004 UXO 000005 UXO 000006

UIC No. _ Rec. No. Record Type Approx. # Pages	Record Date	Author Affiliation	Title	Imaged?	Sites
					UXO 000007 UXO 000008 UXO 000010 UXO 000011 UXO 000012 UXO 000013
AR_N00221_004013 CORRESPONDENCE 4	**10-15-2015**	BRAC PMO WEST	TRANSMITTAL OF THE DRAFT RECORD OF DECISION/FINAL REMEDIAL ACTION PLAN (ENCLOSURE IS RECORD # 4014)	YES	BLDG 0000503 SITE 00017

Total Estimated Record Page Count: 57,187

Total Records: 439

No Keywords
Sites=BLDG 0000503;SITE 00017
No Distribution
No FRC Box number
No Litigation Case Number

ATTACHMENT B
REFERENCES

(*Provided on CD*)

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
1	**Groundwater at the IR17 and Building 503 Area**	Section 2.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, December 15, 2014. Section 2.2.6.
2	**Regional Water Board concurred with the Navy's conclusion**	Section 2.2	Letter Regarding Concurrence with Exception to Sources of Drinking Water Policy, Shallow Groundwater at Installation Restoration (IR) Site 17 and Parcel XV-B(1), Former Mare Island Shipyard, Vallejo, Solano County. From Bruce H. Wolfe, Executive Officer. To Janet Lear, Navy Base Realignment and Closure Project Management Office West. Water Board. May 15, 2014.
3	**SWMU 93 and SWMU 106**	Section 2.3	Letter Regarding Closure Request for Solid Waste Management Units 93 and 106 within Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. From Janet M. Lear, Base Realignment and Closure Environmental Coordinator. To Ms. Janet Naito, California Environmental Protection Agency, Department of Toxic Substances Control. Navy. October 1, 2013.
4	**DTSC**	Section 2.3	Letter of Concurrence that No Further Action is Required for Solid Waste Management Units 93 and 106 within Parcel XV-B(1)a and XV-B(1)b, Former Mare Island Naval Shipyard, Vallejo, California. From Ms. Barbara J. Cook, P.E., Assistant Deputy Director, Brownfields and Environmental Restoration Program. To Janet Lear, Department of the Navy, Base Realignment and Closure Program Management Office West. Department of Toxic Substances Control. March 28, 2014.
5	**Monitoring wells installed at the IR17 and Building 503 area**	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Figure 2-3.
6	**Removal actions were conducted**	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Figure 2-1.
7	**RI recommended**	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Section 4.0.
8	**presented in a 2009 summary report**	Table 1	Final Field Investigation Summary Report and Vapor Intrusion Risk Evaluation for Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. May 22, 2009. Figure A-1 through A-12 of Appendix A.
9	**completed a non-time critical removal action**	Table 1	Final Non-Time-Critical Removal Action Completion Report, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. February 2011. Figure 6.
10	**concentrations in groundwater were reduced**	Table 1	Final Post-Removal Groundwater Well Installation and Monitoring Report, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard, Vallejo, California. August 16, 2012. Figures 9 and 10.
11	**non-tidal wetlands area do not pose a significant risk**	Table 1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Page ES-6 and Sections 3.0 and 4.0.
12	**DTSC concurred**	Table 1	Letter regarding the Non-Tidal Wetland Investigation, Installation Restoration Site 7 [IR17] and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, and dated September 12, 2012. From Barbara J. Cook, P.E., Assistant Deputy Director, Brownfields and Environmental Restoration Program. To Janet Lear, Navy Base Realignment and Closure Project Management Office West. December 5, 2012.
13	**Chlorinated solvents were detected**	Table 1	Final Investigation Report Upland Chlorinated Solvents Investigation IR17 and Building 503 Area Former Mare Island Naval Shipyard, Vallejo, CA. June 7, 2013. Figure 3.1.
14	**significant decrease in BTEX**	Table 1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, December 15, 2014. Table E-1, Response to Comments, Response to Department of Toxic Substance Control Specific Comment 7.a.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
15	**sampling locations and recent concentrations in soil and soil gas**	Table 1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Figures 9 thru 12.
16	**Mare Island Specific Plan as amended**	Section 2.4	Mare Island Specific Plan. Adopted March 1999; amended and restated December 2005; amended July 2007; and amended June 2008. City of Vallejo. 2008. Figure 3.1 and Sections 3.2.4, 3.3.1, 3.5.1, 3.5.2, and 3.5.18.
17	**screening-level HHRA**	Section 2.5.1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Pages G-1 thru G-34 of Appendix G.
18	**Results of the screening-level HHRA**	Section 2.5.1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Section 6.1.2 and Tables G-20 and G-21.
19	**updated baseline HHRA**	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Pages A-1 thru A-57 and Figure A-1 of Appendix A.
20	**estimated HHRA cancer risks and noncancer hazards**	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Table 2.
21	**chemicals of concern**	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Table 3.
22	**screening-level ecological risk assessment**	Section 2.5.2	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Page ES-6.
23	**developed numerical remediation goals (RG)**	Section 2.8	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Section 4.3.
24	**cost of each remedial alternative**	Section 2.9.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Appendix C Tables C-1 through C-7.
25	**Alternative 4**	Table 4	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Figure 15.
26	**nine evaluation criteria**	Section 2.9.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard Vallejo, California, December 15, 2014. Sections 6.0 and 6.1.
27	**Alternative 3**	Section 2.10.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard Vallejo, California. December 15, 2014. Section 5.3.

Note:

1 **Bold blue** text indicates hyperlinks available on reference CD to detailed site information contained in the publicly available Administrative Record.

For access to information contained in the Administrative Record for Mare Island, please contact:

Commanding Officer
Naval Facilities Engineering Command, Southwest
Attn: Ms. Diane Silva, Command Records Manager, Code EV33
1220 Pacific Highway (NBSD Building 3519)
San Diego, California 92132
Phone: (619) 556-1280
E-mail: diane.silva@navy.mil

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
1	Groundwater at the IR17 and Building 503 Area	Section 2.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, December 15, 2014. Section 2.2.6.

2.2.5 Geology

The two geologic units identified at the IR17 and Building 503 Area are (from top to bottom stratigraphically): (1) unconsolidated heterogeneous material, and (2) fine-grained, homogeneous, unconsolidated material with peat (known as the silty clay unit). The top unit and upper portion of the bottom unit (silty clay) appear to represent fill (that is, imported fill and dredge spoils). The lower portion of the silty clay unit appears to represent the unconsolidated natural deposit unit, referred to as Younger Bay Mud.

The top unit (unconsolidated heterogeneous material) consists of clay, silt, sand, gravel, and debris in varying proportions. Based on the available lithologic data, the fill material throughout the site consists primarily of silt and silty sand with localized gravelly zones. Debris encountered within the fill unit includes wood, brick, concrete, and metal fragments. The fill unit was generally encountered near ground surface and extends between 7 and 9 feet bgs. The fill unit is approximately 3 feet thick in the non-tidal wetland area due to lower surface elevation. Subsurface utilities are constructed within subsurface trenches excavated within fill material. Based on lithologic logs from vacuum excavation borings along utility pipelines at the site, the utility pipeline backfill is typically composed of coarser material than the fill material immediately beneath and adjacent to the utility trench.

The silty clay unit underlying the fill is predominantly composed of dark gray to olive gray clayey silt to clay with organic materials (partially decayed plant matter and wood) and brown to reddish brown peat. The organic content in the silty and clayey materials and the silt and clay content in peat vary significantly with depth and location. The silty clay with organic material, which may represent a marshy depositional environment, appears to correlate with the Younger Bay Mud found in other areas of San Francisco Bay. The unit was generally encountered between 7 and 9 feet bgs and extends to at least 50 feet bgs, based on cone penetrometer test (CPT) data collected from two borings in the western and southern portions of the site. The unit is encountered approximately 3 feet bgs and is comprised primarily of peat in the non-tidal wetland area.

2.2.6 Hydrogeology and Water Quality

Two hydrogeologic units have been identified at the IR17 and Building 503 Area: (1) the coarse-grained unconsolidated heterogeneous material, and (2) the fine-grained, unconsolidated heterogeneous material and underlying silty clay unit. The coarse-grained, unconsolidated heterogeneous material is composed of materials such as silty sand and gravel. These materials are relatively permeable. The second unit is the clayey and silty portion of the unconsolidated heterogeneous material and the underlying silty clay unit (including peat). These materials exhibit lower hydraulic conductivities than the coarse-grained, unconsolidated heterogeneous materials.

Hydraulic conductivities calculated from slug test results are within the expected range of conductivities for silty sand, silt, sandy silt, and clayey sands adjacent to the well screen (Fetter 1994). Although the results reflect the combined conductivities of the coarse-grained portions of the fill material and silty clays, the higher conductivities appear to represent sand and gravel materials. As expected, conductivities are higher in wells screened across the coarse-grained (silty sand) and fine-grained material (silty clay and peat) than in wells that were screened only adjacent to fine-grained material.

Groundwater at the IR17 and Building 503 Area historically has been encountered in on-site wells at depths ranging between approximately 3 and 10 feet bgs in the upland area; measured groundwater elevations range from 0.5 foot below msl to 7.25 feet above msl (SulTech 2006a, ChaduxTt 2009a). Groundwater elevations range from 0.5 foot to 3 feet above msl in the non-tidal wetland area, or 3 to 6 feet bgs. Water level data collected since 1992 indicate that the wells exhibit moderate seasonal variation (SulTech 2006a). In general, water levels in the wells were highest during the wet season (November to April) and lowest during the dry season (May to October) and varied by 0.11 to 3.35 feet over the annual hydrologic cycle in any one well.

Groundwater level measurements were taken from 29 well locations at the IR17 and Building 503 Area in January 2011 and December 2011 to represent site-wide groundwater elevations during wet and dry seasons (Figures 7 and 8). Based on quarterly monitoring conducted in 2010 and 2011, groundwater flows toward the wetland from north to the south in the southern portion of the site, near the former southern tank farm. Groundwater north of NTCRA Excavation B and east of Azuar Drive consistently flowed to the north.

A tidal influence study has not been conducted at the IR17 and Building 503 Area. However, based on the distances from Mare Island Strait and San Pablo Bay (about 1,500 feet and 5,200 feet respectively), the IR17 and Building 503 Area is not within a zone of tidal influence. A tidal influence study conducted for several sites adjacent to Mare Island Strait (PRC Environmental Management Inc [PRC] 1996) concluded that the maximum distance that significant tidal influence was observed in any well was 200 feet away from the Mare Island Strait. In addition, the invert elevations of the storm drains at the site are above the groundwater table and maximum tidal range of Mare Island Strait.

Historical use of groundwater at Mare Island has been limited by poor water quality and wells that seasonally ran dry. Currently, groundwater at Mare Island is not used for domestic or municipal purposes. No water supply wells are within 1,000 feet of the site and drinking water is provided by the City of Vallejo from off-island sources. The Navy evaluated site hydrogeology and natural water chemistry in the RI and concluded that groundwater is not suitable as a potential source of drinking water (SulTech 2006).

The Navy requested (Navy 2013, 2014), and received concurrence from Water Board (2014) for a domestic and municipal beneficial use exception from the Water Board for groundwater at the site based on the Navy's determination that site groundwater is not a potential source of drinking water.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
2	Regional Water Board concurred with the Navy's conclusion	Section 2.2	Letter Regarding Concurrence with Exception to Sources of Drinking Water Policy, Shallow Groundwater at Installation Restoration (IR) Site 17 and Parcel XV-B(1), Former Mare Island Shipyard, Vallejo, Solano County. From Bruce H. Wolfe, Executive Officer. To Janet Lear, Navy Base Realignment and Closure Project Management Office West. Water Board. May 15, 2014.

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for Environmental Protection

San Francisco Bay Regional Water Quality Control Board

May 15, 2014 (EKW)
GeoTracker Parent ID: T0609560708

Department of the Navy
BRAC Program Management Office
Attn. Ms. Janet Lear
1455 Frazee Road, Suite 900
San Diego, CA 92108-4301
Via Email: janet.lear@navy.mil

Subject: **Concurrence with Exception to Sources of Drinking Water Policy, Shallow Groundwater at Installation Restoration (IR) Site 17 and Parcel XV-B(1), Former Mare Island Shipyard, Vallejo, Solano County**

Dear Ms. Lear:

At the request of the Navy, Regional Water Board staff reviewed the Navy's November 15, 2013, and March 20, 2014, correspondence providing technical information with the purpose of assessing the potability and beneficial uses of shallow groundwater at Installation Restoration Site (IR) 17 and Parcel XV-B(1) (the Site). The Site's location is shown on Figure 1 (attached). Based on the information provided by the Navy, including lithology, well location, screen interval, and total dissolved solids (TDS) concentrations, Regional Water Board staff concur that groundwater in the shallow water-bearing zone (SWBZ) to a depth of 15 feet below ground surface (bgs) within the Site meets exception (a) of State Water Resources Control Board (State Water Board) Resolution No. 88-63 and is not likely to be used as a source of drinking water.

BASIS FOR CONCURRENCE

Regulatory Basis: Beneficial uses for groundwater and surface water are defined in the San Francisco Bay Basin Plan[1]. The Basin Plan states that, unless otherwise designated, all groundwater is considered suitable, or potentially suitable, for municipal or domestic supply (MUN) and that, in making exceptions, the Regional Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Regional Water Board Resolution No. 89-39, "Sources of Drinking Water," where:

a) The TDS exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, µS/cm, EC), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or

b) There is contamination either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices; or

c) The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or

[1] California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), 2013, San Francisco Bay Basin (Region 2), Water Quality Control Plan (Basin Plan), June 29.

d) The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

Site-specific Rationale: In support of its request, the Navy provided site-specific TDS concentrations for groundwater samples collected from a total of 42 temporary well points and monitoring wells screened in the SWBZ (see Figure 1). The SWBZ beneath the Site consists of artificial fill to a maximum depth of approximately 15 feet bgs. The average TDS concentration for the SWBZ is 10,748 mg/L, which is greater than the criterion of 3,000 mg/L. The data are summarized in Table 1, attached.

In addition, shallow groundwater beneath the parcel immediately adjacent to the Site to the west contains TDS greater than 3,000 mg/L and has received concurrence for an exception to sources of drinking water policy from the Regional Water Board.[2] The location of this parcel (Investigation Area A3) relative to the Site is shown on Figure 2.

Basis for Shallow Groundwater Depth Determination: Not part of the original Mare Island, the Site was created between 1911 and 1938 when this area of San Pablo Bay was filled. Dredge spoils generated from the dredging of Mare Island Strait and imported coarser grained fill material was placed to create usable land by the Navy.

Investigations across Mare Island reveal three principal geologic units in areas outside the original island (fill areas): artificial fill material, unconsolidated natural deposits, and bedrock. A description of these geologic units, as identified beneath the Site, is presented below from shallowest to deepest depth:

- Artificial fill material: The fill beneath the Site consists of clay, silt, sand, and gravel and is present from ground surface to between 3 and 15 feet bgs. This geologic unit generally comprises the SWBZ in these areas and is the zone that is the subject of the Navy's request.
- Unconsolidated natural deposits of silty clay (bay mud): The bay mud is present under the fill to a depth of at least 50 feet bgs. The naturally-occurring bay mud ensures that groundwater containing residual chemicals will not likely impact deeper groundwater and defines the extent of the SWBZ
- Bedrock: Though not encountered during drilling at the Site, bedrock consisting of sandstone and siltstone has been observed beneath the bay mud in other areas of Mare Island.

CLOSING

Based on review of the information presented above, Regional Water Board staff concur that shallow groundwater to 15 foot depth (within the SWBZ) of the Site (IR 17 and Parcel XV-B(1)) exceeds 3,000 mg/L TDS on average and meets State Water Board Resolution No. 88-63 and Regional Water Board Resolution No. 89-39, "Sources of Drinking Water," exception criterion

[2] San Francisco Bay Regional Water Quality Control Board, 2002, Response to Request for Drinking Water Source Exclusion, Investigation Area A3, Mare Island, Vallejo, Solano County, September 9.

(a) outlined above for the SWBZ at IR 17 and Parcel XV-B(1). Therefore groundwater cleanup standards for the SWBZ do not need to be based on criteria used for protection of drinking water sources.

Please note that State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," requires attainment of background levels of water quality, or the highest level of water quality that is reasonably achievable if background levels cannot be restored. Furthermore, State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," states that cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards. Where it is not possible to achieve background water quality, State Water Board Resolution 92-49 requires cleanup to the best level of water quality that is technologically and economically feasible.

If you have any questions, you can contact Elizabeth Wells of my staff via phone at (510) 622-2440 or via email at ewells@waterboards.ca.gov.

Sincerely,

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB, ou=Region 2, email=bwolfe@waterboards.ca.gov, c=US
Date: 2014.05.15 14:11:01 -07'00'

Bruce H. Wolfe
Executive Officer

Attachments: Table 1
Figures

cc (via Email):

Department of the Navy
Ms. Heather Wochnick – heather.wochnick@navy.mil
Mr. Chris Dirscherl – christopher.dirscher@navy.mil

Department of Toxic Substances Control
Ms. Janet Naito - jnaito@dtsc.ca.gov

Environmental Protection Agency
Ms. Carolyn d'Almeida - dAlmeida.Carolyn@epamail.epa.gov

Sullivan International Group
Ms. Jessica Cooper – jcooper@onesullivan.com

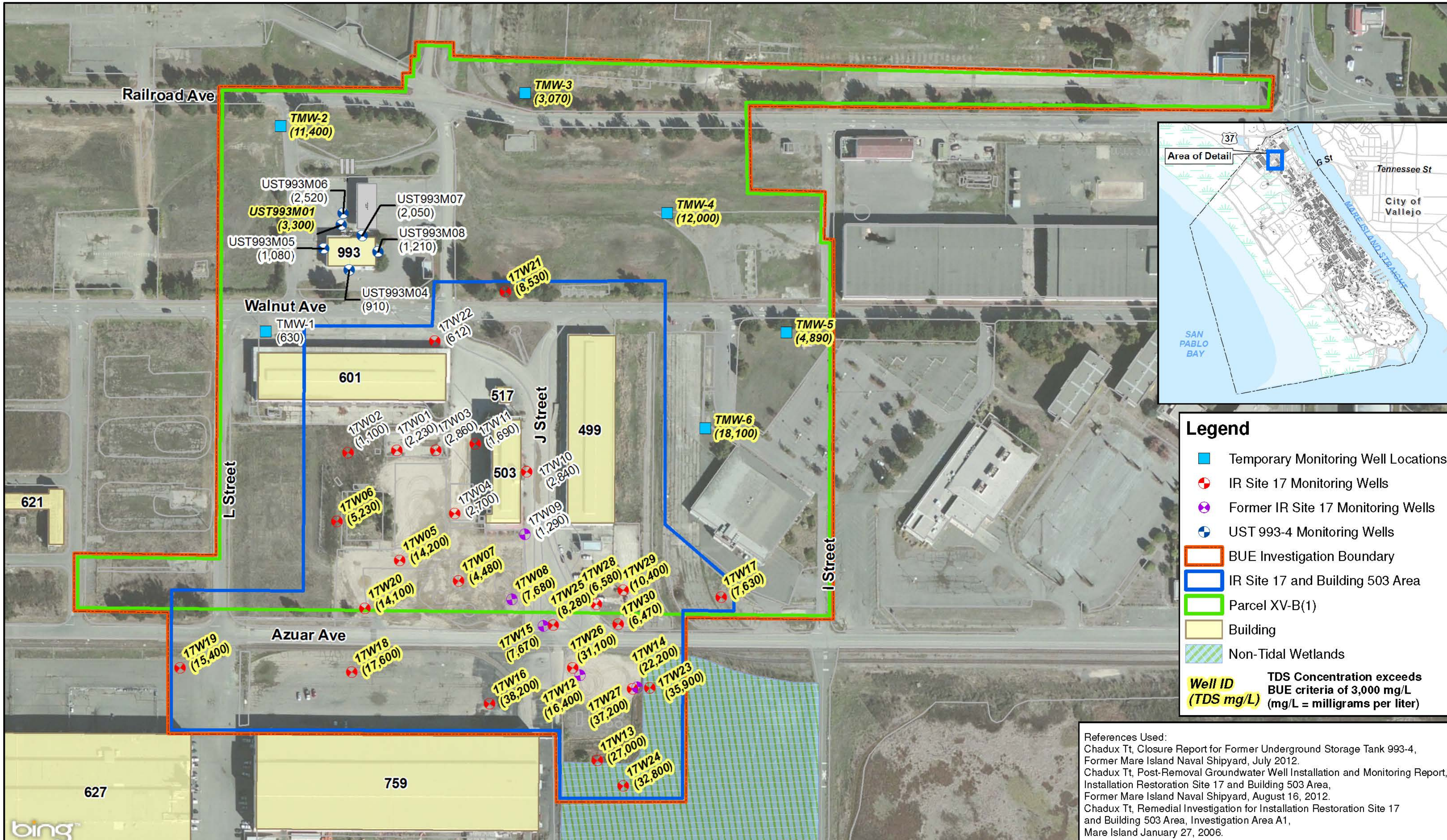
Table 1
Total Dissolved Solids Data in
Shallow Water-Bearing Zone Groundwater Samples
Installation Restoration (IR) Site 17 Parcel XV-B(1)

Well Number	Sample Date	TDS (mg/L)
17W01	4/5/99	2,320
17W02	4/9/99	1,100
17W03	4/9/99	2,860
17W04	4/7/99	2,700
17W05	11/5/10	14,200
17W06	4/9/99	5,230
17W07	6/15/99	4,480
17W08	6/15/99	7,680
17W09	4/2/99	1,290
17W10	6/15/99	2,840
17W11	4/2/99	1,690
17W12	2/2/00	10,400
17W13	11/9/10	27,000
17W14	10/8/99	22,000
17W15	6/15/99	7,760
17W16	11/9/10	38,200
17W17	2/3/00	7,630
17W18	1/31/00	17,600
17W19	2/1/00	15,400
17W20	11/8/10	14,100
17W21	2/1/00	8,530
17W22	2/1/00	612
17W23	11/8/10	35,900
17W24	11/12/10	32,800
17W25	11/8/10	8,280
17W26	11/22/10	31,100
17W27	11/22/10	37,200
17W28	11/6/10	6,580
17W29	11/8/10	10,400
17W30	11/6/10	6,470
UST993M01	3/1/12	3,300
UST993M04	2/29/23	910
UST993M05	2/29/12	1,080
UST993M06	3/1/12	2,520
UST993M07	2/29/12	2,050
UST993M08	2/29/12	1,210
TMW-1	9/30/13	630
TMW-2	9/30/13	11,400
TMW-3	9/30/13	3,070
TMW-4	9/30/13	12,000
TMW-5	9/30/13	4,890
TMW-6	9/30/13	18,100
Average for Site		**10,748**

Abbreviations: TDS = total dissolved solids; mg/L=milligrams per liter

Notes:

1. Most recent concentration for TDS for each well point/monitoring well presented.
2. Data from temporary wells points and monitoring wells screened in shallow water-bearing zone.



Legend

- Temporary Monitoring Well Locations
- IR Site 17 Monitoring Wells
- Former IR Site 17 Monitoring Wells
- UST 993-4 Monitoring Wells
- BUE Investigation Boundary
- IR Site 17 and Building 503 Area
- Parcel XV-B(1)
- Building
- Non-Tidal Wetlands
- Well ID (TDS mg/L) — TDS Concentration exceeds BUE criteria of 3,000 mg/L (mg/L = milligrams per liter)

References Used:
Chadux Tt, Closure Report for Former Underground Storage Tank 993-4, Former Mare Island Naval Shipyard, July 2012.
Chadux Tt, Post-Removal Groundwater Well Installation and Monitoring Report, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, August 16, 2012.
Chadux Tt, Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island January 27, 2006.

PROJECT NO.:	5023-13-6007
DATE:	NOVEMBER 2013
DRAWN BY:	RMH
CHECKED BY:	TG

0 250 Feet

1 in = 197 ft

MMEC GROUP

Groundwater Beneficial Use Exception Request for Parcel XV-B(1)
Former Mare Island Naval Shipyard

Parcel XV-B(1) Well Locations and TDS Concentrations

FIGURE 1

Figure 2 - Location Map

Note:
ESDWP - Exception to Sources of Drinking Water Policy

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

5090
Ser BPMOW.rfp/0517
OCT 11 2013

Ms. Janet Naito
California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2737

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
3	SWMU 93 and SWMU 106	Section 2.3	Letter Regarding Closure Request for Solid Waste Management Units 93 and 106 within Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. From Janet M. Lear, Base Realignment and Closure Environmental Coordinator. To Ms. Janet Naito, California Environmental Protection Agency, Department of Toxic Substances Control. Navy. October 1, 2013.

Dear Ms. Naito:

SUBJECT: CLOSURE REQUEST FOR SOLID WASTE MANAGEMENT UNITS 93 AND 106 WITHIN INSTALLATION RESTORATION SITE 17 AND BUILDING 503 AREA, FORMER MARE ISLAND NAVAL SHIPYARD, VALLEJO, CALIFORNIA

The Department of the Navy (Navy) requests closure of the portions of solid waste management units (SWMUs) 93 and 106 located within the Installation Restoration (IR) Site 17 and Building 503 Area on Parcel XV-B at Former Mare Island Naval Shipyard (MINS), Vallejo, California; Figure 2-3. The Navy evaluated SWMU 93, Storm Sewer System, and SWMU 106, Sanitary Sewer System, during the IR Site 17 and Building 503 Area remedial investigation (RI) and feasibility study (FS) and FS addendum.

The soil and groundwater analytical results did not show evidence of a release from the SWMUs. The RI results were reported in the Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1 dated January 27, 2006. The soil analytical results were then evaluated in the Final Feasibility Study for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1 dated January 27, 2006 and the Draft Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area dated September 23, 2013.

The Navy has incorporated SWMUs 93 and 106 into the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. As a result, the Navy requests the Department of Toxic Substances Control (DTSC) provide a letter concurring that SWMUs 93 and 106 within the IR Site 17 and Building 503 Area have been closed and that no further action (NFA) is required under the Resource Conservation and Recovery Act (RCRA).

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Ser BPMOW.rfp/0517
OCT 11 2013

Please provide your response no later than Tuesday, December 10, 2013. Please direct correspondence to me as follows:

Ms. Janet Lear
BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Should you have any questions or comments concerning this matter or if you need additional information, please contact Mr. Reginald Paulding at (619) 532-0943, or you can contact me at (619) 532-0976.

Sincerely,

Janet M. Lear
JANET M. LEAR
BRAC Environmental Coordinator
By direction of the Director

Enclosure: 1. Figure 2-3 Sample Collection Locations Map IR17 and Building 503 Area

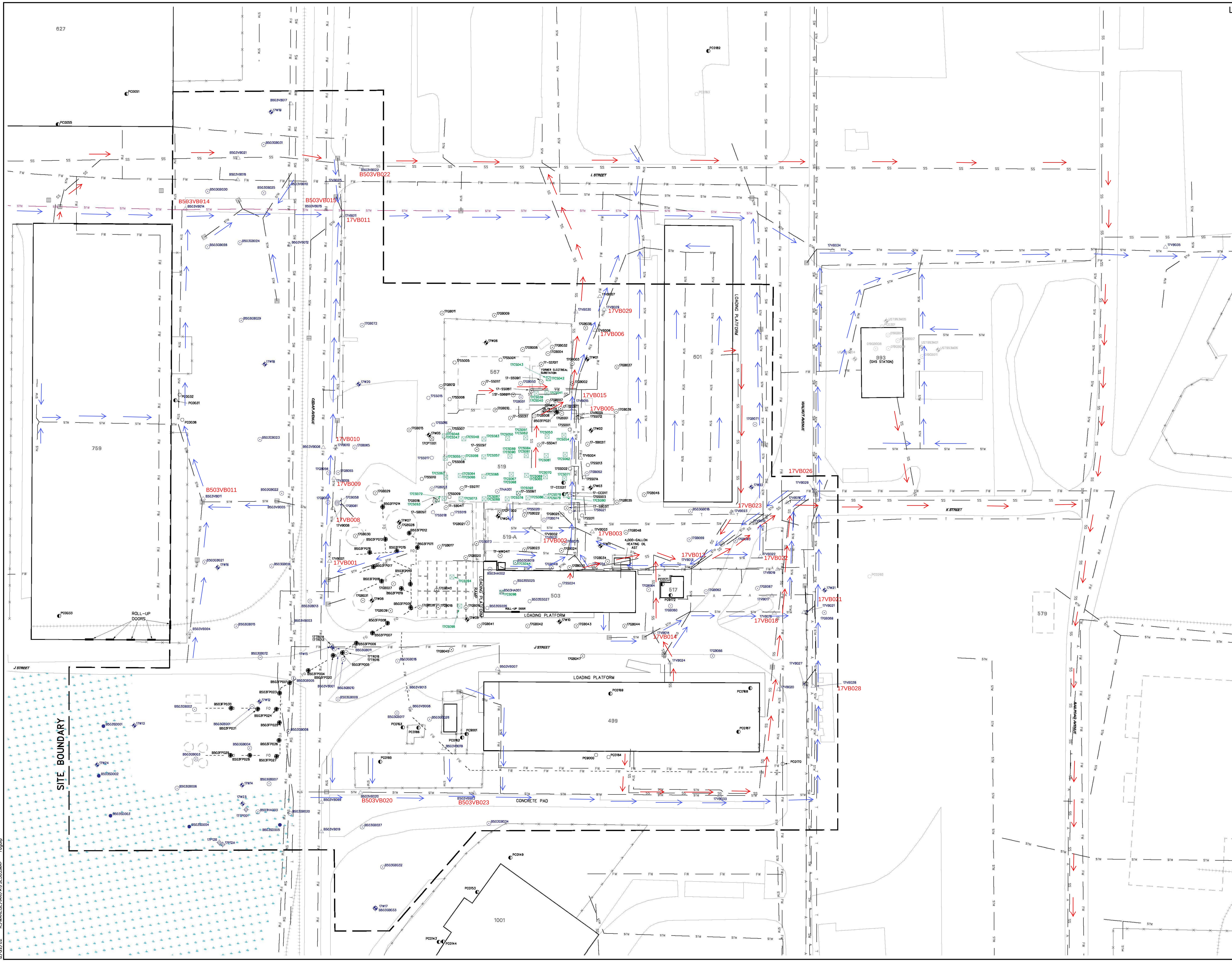
5090
Ser BPMOW.rfp/0517
OCT 11 2013

Copy to: (w/encl)

Ms. Carolyn d'Almeida U. S. Environmental Protection Agency Mail Code SFD 8-1 75 Hawthorne Street, 9th Floor San Francisco, CA 94105-3901	Ms. Elizabeth Wells Regional Water Quality Control Board San Francisco Bay Region 1515 Clay Street, Suite 1400 Oakland, CA 94612
Ms. Myrna Hayes (Electronic Copy Only) 816 Branciforte Street Vallejo, CA 94590	

Copy to: (w/o encl)

Mr. Gerald Karr 149 Garden Court Vallejo, CA 94591	Mr. Michael Coffey 6 Oriole Court American Canyon, CA 94503
Mr. Chris Rasmussen 1105 Azuar Ave. Vallejo, CA 94592	Mr. Wendell Quigley 601 Tisdale Avenue Vallejo, CA 94592
Ms. Paula Tygielski 456 East L Street Benicia, CA 94510	Mr. Miguel Buchwald 330 Crisp Avenue Vallejo, CA 94592
Mr. Maurice Campbell P.O. Box 4501 Vallejo, CA 94590	Mr. Mark O'Brien ERS Corporation 1600 Riviera Ave, Ste 310 Walnut Creek, CA 94596
Mr. Dan Marks City of Vallejo 555 Santa Clara Avenue Vallejo, CA 94590-5934	Ms. Jessica Cooper Sullivan International Group, Inc. 550 Kearny Street, Suite 520 San Francisco, CA 94108



LEGEND

- SURFACE SAMPLE LOCATION (GROUP II/III STUDY AND DATA GAP INVESTIGATION)
- NEAR-SURFACE SEDIMENT SAMPLE LOCATION (GROUP II/III STUDY)
- VACUUM EXCAVATION LOCATION (GROUP II/III STUDY AND DATA GAP INVESTIGATION)
- SOIL BORING LOCATION (GROUP II/III STUDY AND DATA GAP INVESTIGATION)
- MONITORING WELL LOCATION (GROUP II/III STUDY AND DATA GAP INVESTIGATION)
- WATER-LEVEL MONITORING STATION (GROUP II/III STUDY)
- PRODUCT DISTRIBUTION PIPELINE SAMPLE LOCATION
- SOIL SAMPLE LOCATION (PHASE II RI AND OTHER STUDIES)
- VACUUM EXCAVATION LOCATION (PHASE II RI)
- CONCRETE OR ASPHALT SAMPLE LOCATION (PHASE I RI AND BASEWIDE PCB STUDY)
- SOIL BORING LOCATION (PHASE I & II RI)
- MONITORING WELL LOCATION (PHASE I & II RI)
- CONFIRMATION SAMPLE LOCATION (OTHER STUDIES)
- PIEZOMETER LOCATION (OTHER STUDIES)
- DIRECT-PUSH BORING LOCATION (OFF-SITE)
- MONITORING WELL LOCATION (OFF-SITE)
- SURFACE SOIL OR CONCRETE SAMPLE LOCATION (OFF-SITE OR WITHIN BUILDING)
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- STORM WATER DRAIN
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- SS — SANITARY SEWER
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- FW — ABANDONED FRESH WATER PIPELINE
- SW — SALT WATER PIPELINE
- A — ABANDONED AIR LINE
- G — GAS LINE
- T — BURIED TELEPHONE LINE
- RAILROAD
- FENCE
- 503 — EXISTING BUILDING OR STRUCTURE
- 567 — FORMER BUILDING OR STRUCTURE

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SCALE IN FEET

Tetra Tech EM Inc.

INVESTIGATION AREA A1
MARE ISLAND, CALIFORNIA

FIGURE 2-3
SAMPLE COLLECTION LOCATIONS MAP
IR17 AND BUILDING 503 AREA

DS.B090.20509

12/02/02 K:/MAREISL/IAR/A1/S.503MAP rcapillo

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
700 Heinz Avenue
Berkeley, California 94710-2721

Edmund G. Brown Jr.
Governor

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
4	DTSC	Section 2.3	Letter of Concurrence that No Further Action is Required for Solid Waste Management Units 93 and 106 within Parcel XV-B(1)a and XV-B(1)b, Former Mare Island Naval Shipyard, Vallejo, California. From Ms. Barbara J. Cook, P.E., Assistant Deputy Director, Brownfields and Environmental Restoration Program. To Janet Lear, Department of the Navy, Base Realignment and Closure Program Management Office West. Department of Toxic Substances Control. March 28, 2014.

March 28, 2014

Janet Lear
Department of the Navy
BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Dear Ms. Lear:

Department of Toxic Substances Control (DTSC) staff have completed their review of the Navy's October 11, 2013 request for DTSC concurrence that Solid Waste Management Units (SWMUs) 93 and 106 on Parcels XV-B(1)a and XV-B(1)b have been closed and that no further action is required. SWMU 93 is the storm sewer system and SWMU 106 is the sanitary sewer system.

As part of our review of your request, we also reviewed the following pertinent documents:

- Group II/III Accelerated Study, Field Sampling and Analysis Plan, Internal Final, Mare Island, Vallejo, California, prepared by Tetra Tech EM Inc. and dated June 1, 1998.
- Quad maps provided by the Department of Navy on October 7, 2011 showing the location of sanitary sewer lines and storm sewer lines on Mare Island.
- Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California, prepared by SulTech and dated January 27, 2006.
- Final Investigation Report, Upland Chlorinated Solvents Investigation IR17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California prepared by CKY, Inc. and dated June 7, 2013.
- Draft Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California prepared by TriEcoTt and dated September 23, 2013.
- Final Finding of Suitability to Transfer for Parcels II, X-B(1), X-B(2), and Sanitary Sewage Treatment Plant Outfall of Parcel I dated September 2010.
- Final Remedial Action Plan for Investigation Area A3 prepared by CH2M Hill and dated November 2002.

- Department of Toxic Substances Control's (DTSC's) May 4, 2000 no further action concurrence letter for DOM-1 and DOM-2 located in Investigation Area A1.
- Final No Further Action Remedial Action Plan for Investigation Area IA A1 Clean Parcels at Mare Island Naval Shipyard, Vallejo, California prepared by DTSC and dated June 29, 2000.

Based upon the quad maps provided by the Navy, there are numerous catch basins, storm sewer lines and sanitary sewer lines within Parcel XV-B(1)a and XV-B(1)b.

1. An 8" sanitary sewer pipeline runs north from Building 759 to a 10" to 12" pipeline that runs between Buildings 759 northeast towards Railroad Avenue, then joins a 21" pipeline that parallels Railroad Avenue and flows to DOM-2.
2. 5" to 8" sanitary sewer pipelines run from Buildings 499, 503, 601 and 993 toward an 8" pipeline in M Street that flows northeast toward Railroad Avenue, where the pipeline connects to the 21" pipeline that parallels Railroad Avenue and flows to DOM-2.
3. Storm water is collected through numerous catch basins throughout Parcel XV-B(1), collecting in larger pipelines that flows across Parcel II toward Mare Island Strait.

Storm Sewer System: The Navy RPM indicated that the catch basins and storm sewer lines within Parcel XV-B(1)a and XV-B(1)b were cleaned out by the Navy subsequent to base closure on April 1, 1996. This cleaning would have been conducted in accordance with the *Cleaning of Storm Sewer Catch Basins at Mare Island* prepared by Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia, Environmental Detachment (SSPORTS) and dated September 30, 1997.

DTSC signed the Final Record of Decision/Remedial Action Plan for the downstream Investigation Area A2 in August 2010 concurring that no further action was required with respect to this Investigation Area, which includes the portions of SWMU 93 and 106 within IA A2. DTSC signed the Final Remedial Action Plan for the adjacent Investigation Area A3 and for the IA A1 Clean Parcels, concurring that no further action was required for the portions of the storm sewer system (SWMU 93) within the areas covered under these Remedial Action Plans. Closure of the storm sewer system within Parcel XV-B(1)a is consistent with this practice.

Compounds of concern (COCs) have been detected at concentrations above their respective remediation goals within Parcel XV-B(1)b. Under Alternative 4 in the Draft Feasibility Study Addendum Report, the Navy has proposed excavations in areas that overlap storm sewer system features west of Building 499 and in the vicinity of Buildings 503 and 519. However, based on the depth, distribution and location of the COCs, the detected concentrations of chlorinated volatile organic compounds (VOCs), lead, pesticides, and VOCs do not appear to be associated with the storm sewer system. Chlorinated VOCs were detected in soil gas and groundwater but not detected in soil samples west of Building 499. The detections in the vicinity of Buildings 503 and 519 are either not adjacent to a sewer line as in the case of IR17GB033 and IR17GB043, or deeper than the storm sewer line with a clean soil sample between the storm sewer line and the soil sample in question as in the case of IR17GB054. Further, none of the detections in the vicinity of Buildings 503 and 519 are wide spread or continuous along a sewer line which would indicate that the storm sewer line is not the source of COCs. Based on this information, closure of the storm sewer system within Parcel XV-B(1)b is consistent with previous closures at IA A1, A2, and A3.

Sanitary Sewer System: The sanitary sewer system is a gravity flow system, and flow within the pipelines is designed to flow toward the pump stations as the low point in the system. Therefore, the sanitary sewer pump stations, not the pipelines, were included in the Group II/III investigation.

Between 1997 and 1998, the Navy implemented the Group II/III investigation that included soil and groundwater sampling at selected sanitary sewer pump stations. Initial characterization efforts focused on those parts of the sanitary sewer system where there was reason to suspect potential contamination, targeting pump stations in the industrial areas of the shipyard with subsurface wet wells in poor or fair condition that were in operation prior to 1972.

DTSC concurred that no further investigation of the sanitary system was necessary for Sanitary Sewer Pump Station (DOM)-1 and DOM-2 in a May 4, 2000 letter from Chip Gribble, Remedial Project Manager, to Jerry Dunaway, Navy. No further action was identified for Final Record of Decision/Remedial Action Plans for the adjacent IA A1 Clean Parcels and Parcels A2 and A3. The remedial alternatives evaluated in the Draft Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area do not propose excavation in areas overlapping the sanitary sewer lines.

Based upon the information reviewed, DTSC concurs with the Navy's proposal to close SWMU #93 (the storm sewer system) and SWMU #106 (the sanitary sewer system) within Parcels XV-B(1)a and XV-B(1)b and that no further action is required for the storm sewer system and the sanitary sewer system within Parcel XV-B(1)a and XV-B(1)b. As always, DTSC reserves the right to require additional action with respect to these SWMUs in the future if additional information becomes available that indicates a hazardous material is present in or has been released from the sanitary sewer system or storm sewer system that could impact soil and/or groundwater. Additionally, the Finding of Suitability to Transfer for the portion of the Site currently proposed for transfer must contain the standard notification that abrasive blast materials may be present in the bedding or backfill around the sanitary sewer and storm sewer utility lines.

If you have any questions, please contact Janet Naito of my staff at (510) 540-3833 or janet.naito@dtsc.ca.gov.

Sincerely,

Barbara J. Cook, P.E.
Assistant Deputy Director
Brownfields and Environmental Restoration Program

cc: Elizabeth Wells (via electronic mail to: Elizabeth.wells@waterboards.ca.gov)
San Francisco Bay Region Regional Water Quality Control Board

Carolyn D' Almeida (via electronic mail to: dAlmeida.carolyn@epamail.epa.gov)
U.S. Environmental Protection Agency

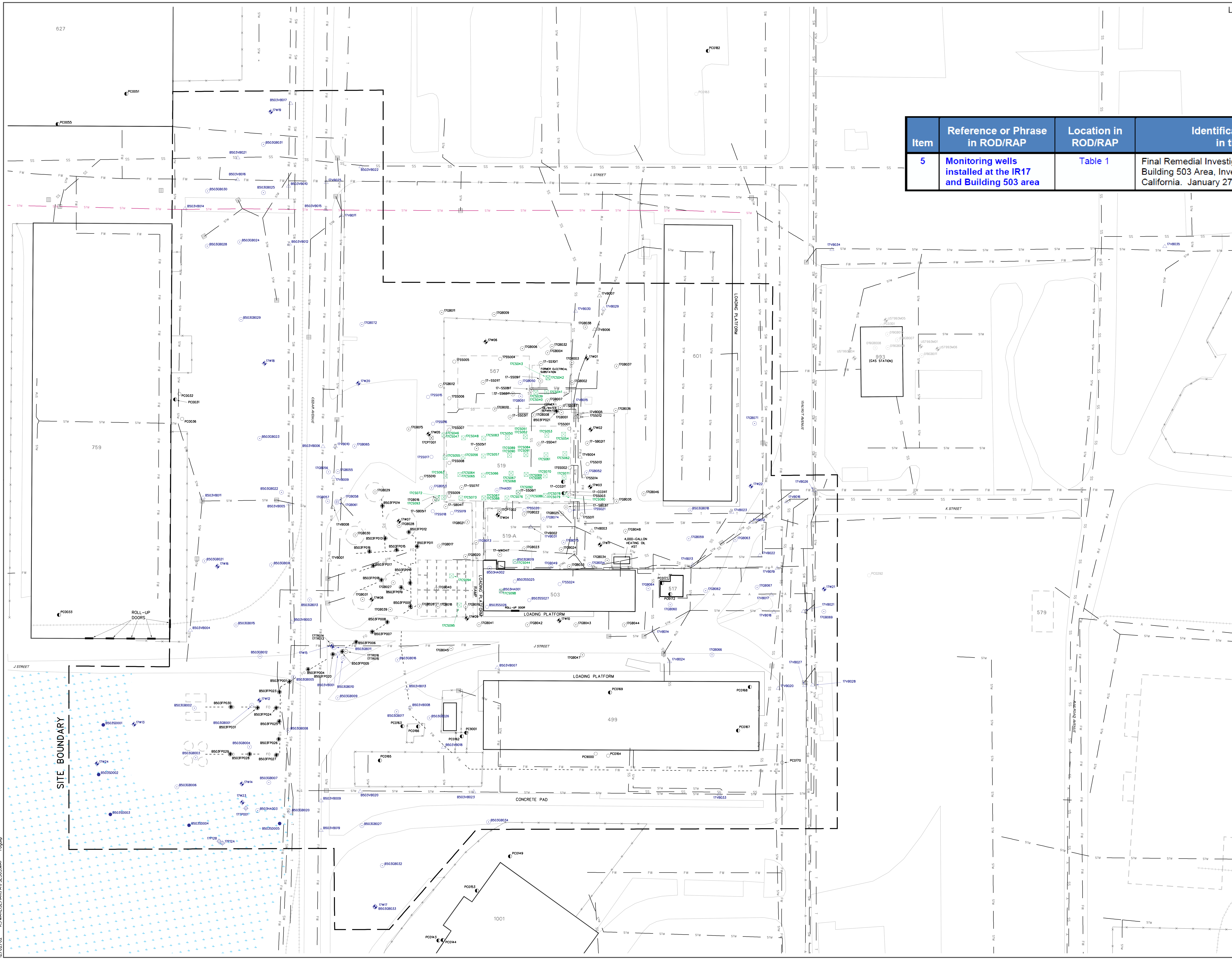
Tami Nakahara (via electronic mail to: Tami.Nakahara@wildlife.ca.gov)
California Department of Fish and Wildlife

Reginald Paulding (via electronic mail to: Reginald.paulding.ctr@navy.mil)
Heather Wochnick (via electronic mail to: Heather.wochnick@navy.mil)
Department of the Navy
BRAC Program Management Office West

Jessica Woloshun Cooper (via electronic mail to: jcooper@onesullivan.com)
Sullivan International Group, Inc.

Extracted from the Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California January 27, 2006

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
5	Monitoring wells installed at the IR17 and Building 503 area	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Figure 2-3.



LEGEND

- SURFACE SAMPLE LOCATION (GROUP II/III STUDY AND DATA GAP INVESTIGATION)
- NEAR-SURFACE SEDIMENT SAMPLE LOCATION (GROUP II/III STUDY)
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- RAILROAD
- FENCE
- 503 — EXISTING BUILDING OR STRUCTURE
- 567 — FORMER BUILDING OR STRUCTURE

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SCALE IN FEET

Tetra Tech EM Inc.

INVESTIGATION AREA A1
MARE ISLAND, CALIFORNIA

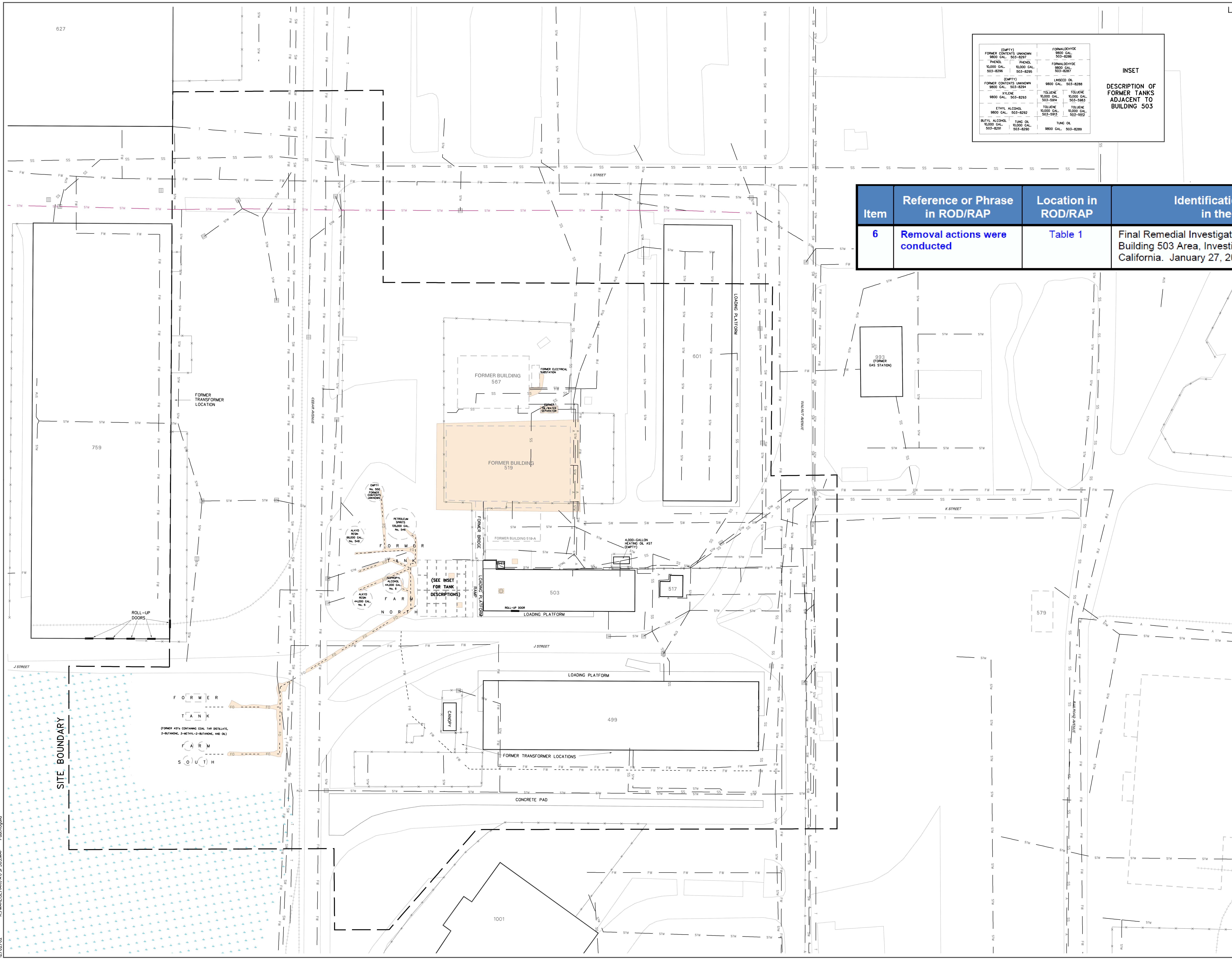
FIGURE 2-3
SAMPLE COLLECTION LOCATIONS MAP
IR17 AND BUILDING 503 AREA

12/02/02 K:/MAREISL/ARI/A1/SL503MAP rogo9p

DS.B090.20509

Extracted from the January 27, 2006 Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
6	**Removal actions were conducted**	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Figure 2-1.



LEGEND

FLOOR DRAIN
STORM WATER DRAIN
STORM WATER PIPELINE
SANITARY SEWER
SHARED STORM AND SANITARY SEWER
FORMER PRODUCT DISTRIBUTION PIPELINE
FRESH WATER PIPELINE
ABANDONED FRESH WATER PIPELINE
SALT WATER PIPELINE
ABANDONED AIR LINE
GAS LINE
BURIED TELEPHONE LINE
RAILROAD
FENCE
503 EXISTING BUILDING OR STRUCTURE
567 FORMER BUILDING OR STRUCTURE
SITE BOUNDARY
REMOVAL ACTION AREAS

NOTE: ALL EXISTING AND FORMER TANKS IDENTIFIED ARE OR WERE ABOVEGROUND.

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SCALE IN FEET

Tetra Tech EM Inc.

INVESTIGATION AREA A1
MARE ISLAND, CALIFORNIA

FIGURE 2-1
SITE FEATURES MAP
IR17 AND BUILDING 503 AREA

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
7	RI recommended	Table 1	Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Mare Island, Vallejo, California. January 27, 2006. Section 4.0.

4.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS OF THE REMEDIAL INVESTIGATION

This section summarizes the RI conducted at the IR17 and Building 503 Area and specifically summarizes identification and evaluation of the extent of potential contaminants, assessment of baseline risks to human health and the environment, and evaluation of the need for an FS. This section also presents conclusions and recommendations based on the RI results. Results and conclusions of investigations at other IA A1 sites conducted as part of CERCLA or basewide environmental compliance programs are summarized in Section 1.3.2 of this report.

4.1 SUMMARY

The IR17 and Building 503 Area consists of a 26-acre light industrial area at the northern end of Mare Island in IA AI. Most of the site currently consists of a relatively flat, grass-, soil- or asphalt-covered, upland area; a small portion of the site is within a seasonal wetland. The site was primarily used to manufacture paints and varnishes from the 1940s to the mid-1950s. Materials used in the paint manufacturing process (including oils, solvents, and resins) were stored at two former tank farms. With the exception of one building, all of the buildings and structures used to manufacture paints and varnishes have been removed. The site is not currently in use. The designated reuse of a majority of the site is as a light industrial area; a southern portion of the site near the wetland is designated as recreational/open space. To meet DQOs for this study, soil, concrete, sediment, and groundwater sampling were conducted during a series of investigations and removal activities at the IR17 and Building 503 Area.

The subsurface of the site consists of a heterogeneous artificial fill material overlying a silty clay unit, which is composed of both dredge spoil fill and naturally deposited materials. The thickness of the upper unit varies from 3 to 14 feet, with an average thickness of about 6 feet. The bottom of the silty clay unit was not encountered but extends to at least 50 feet bgs. Groundwater at the site was encountered between 0.5 and 9 feet bgs, generally at or near the top of the silty clay unit. Although flow directions vary significantly across the site, the primary flow direction over most of the site is to the north. Groundwater flow appears to be significantly influenced by variations in fill material lithology and by other manmade conduits such as underground utility pipeline corridors.

Based on the results of sampling activities conducted at the IR17 and Building 503 Area, a removal action was conducted in 1998 and 1999 to reduce potential human health risks associated with contaminated near-surface soil and to eliminate potential sources of contamination (such as the product distribution pipeline). Based on the results of confirmation soil sampling, the soil removal action achieved removal action goals. Primary site-related contaminants detected above comparison criteria that remain at the site subsequent to the removal action include VOCs, TPH, PAHs, and arsenic in soil and VOCs, TPH, phenolic compounds, formaldehyde, nickel, and zinc in groundwater. Contaminants were not detected above comparison criteria in concrete. Sediment samples collected in the wetland contain lead, mercury, and nickel above the ER-M. Potential risks to ecological receptors in the wetland area were evaluated during an onshore ecological risk assessment as discussed in the following text and do not pose a risk. Soil and groundwater contaminants were primarily detected in three areas of the IR17 and Building 503 Area: (1) near the former product distribution pipeline and along Cedar Avenue, (2) around and beneath Building 503, and (3) near the former OWS. The primary suspected sources of contamination include past leaks from the former product distribution pipeline, storm water pipelines, the OWS, and surface releases near Building 503.

Analysis of the fate and transport of these contaminants identified the following three active migration pathways: (1) migration of contaminants in the vadose zone to groundwater; (2) migration of contaminants in groundwater, specifically along preferential pathways with coarse-grained utility corridor backfill materials; and (3) volatilization of contaminants through the vadose zone. The first two active pathways are successfully transporting contaminants toward potential exposure points in Mare Island Strait, mostly along utility corridors and, to a lesser extent, toward the nearby wetland. Groundwater modeling results predicted, however, that transport toward Mare Island Strait would be limited by natural attenuation, and results concluded that contaminants are unlikely to reach the strait. Groundwater modeling also predicted that contaminants near the edge of the seasonal wetland would not extend appreciably into the wetland area. A pathway for contaminant transport from groundwater to surface water in the seasonal wetland does not appear to be complete. This conclusion is supported by several facts, including (1) the wetland is dry during most of the year, as is the case for a seasonal or nonpersistent emergent wetland; (2) the groundwater elevation measured in a nearby shallow piezometer (17P12A) was 3.6 feet bgs in August 2002, thereby preventing the discharge of groundwater to the surface or the wetland; and (3) the root zone in wetland soils is not effectively saturated based on criteria developed by the USACE (1997). Water level data collected in August 2002 suggest that the aquifer in the vicinity of the wetland area receives groundwater discharge and that an upward vertical component of groundwater flow exists near nested piezometers 17P12A and 17P12B. However, based on the depth to groundwater in August at the shallow piezometer, groundwater does not reach the surface. During periods of the year characterized by high precipitation and low evaporation-transpiration rates, a seasonal wetland (vernal pool wetland) is created. The wetland likely recharges the underlying groundwater system during periods of the year characterized by high precipitation. The third active migration pathway, volatilization, results in the release of contaminants to void spaces in vadose zone soils and to ambient air. This pathway is limited to porous soils (such as backfill in utility corridors) and unpaved areas at the site.

An HHRA was conducted for the IR17 and Building 503 Area. The objective of the HHRA was to provide a basis for risk management decisions regarding cancer risks and risk of adverse noncancer health effects associated with potential human exposure to contaminants in soil and groundwater. Based on the intended reuse of a majority of the site as light industry, the HHRA identified potential receptors as the commercial/industrial worker under an unchanged site configuration and the commercial/industrial worker and construction worker under a modified site configuration. For the unchanged site configuration (0- to 2- and 0- to 5-foot-bgs soil depth horizons and groundwater), the RME commercial/ industrial worker scenario total excess cancer risk estimate was 4.9×10^{-6}. For the modified site configuration (0- to 10-foot-bgs soil horizon and groundwater), the RME commercial/industrial worker scenario total excess cancer risk estimate was 8.1×10^{-6}, while the RME construction worker scenario total cancer risk estimate was 1.1×10^{-6}. The HIs were below 1 except for the commercial/industrial worker under the unchanged configuration, which had an HI of 1.1. Although this HI exceeded 1.0, no chemical-specific HI (across all pathways) exceeded 1. Excess cancer risk estimates were attributed primarily to the presence of benzo(a)pyrene in soil. Risk to human receptors (commercial/industrial worker and construction worker) is within the risk management range for industrial use (see Section 4.3).

Ecological studies have identified the seasonal wetland as the only viable habitat at the IR17 and Building 503 Area. Potential risks to ecological receptors in the wetland area were evaluated during an onshore ERA. Wetland sediment sample data were evaluated, and food chain modeling was conducted. Results of the food chain modeling indicate that no immediate or significant risk exists to ecological receptors from exposure to sediments in the wetland. Furthermore, fate and transport analysis concluded that no significant contaminant migration pathways exist from the upland area to surface sediment and water in the wetland.

4.2 CONCLUSIONS

Sufficient data have been collected at the IR17 and Building 503 Area to fulfill the study DQOs. The nature and extent of contaminants at the site and site geologic and hydrogeologic conditions have been adequately characterized. Contaminants remaining in soil and groundwater at the site are expected to continue to naturally attenuate; contaminants in groundwater are not expected to migrate off site at concentrations exceeding ecological comparison criteria. Potential risks to human receptors, primarily from exposure to soil contaminants, are within the risk management range. Ecological receptors are not at immediate or significant risk from chemicals present in wetland sediments.

4.3 MANAGEMENT CONSIDERATIONS

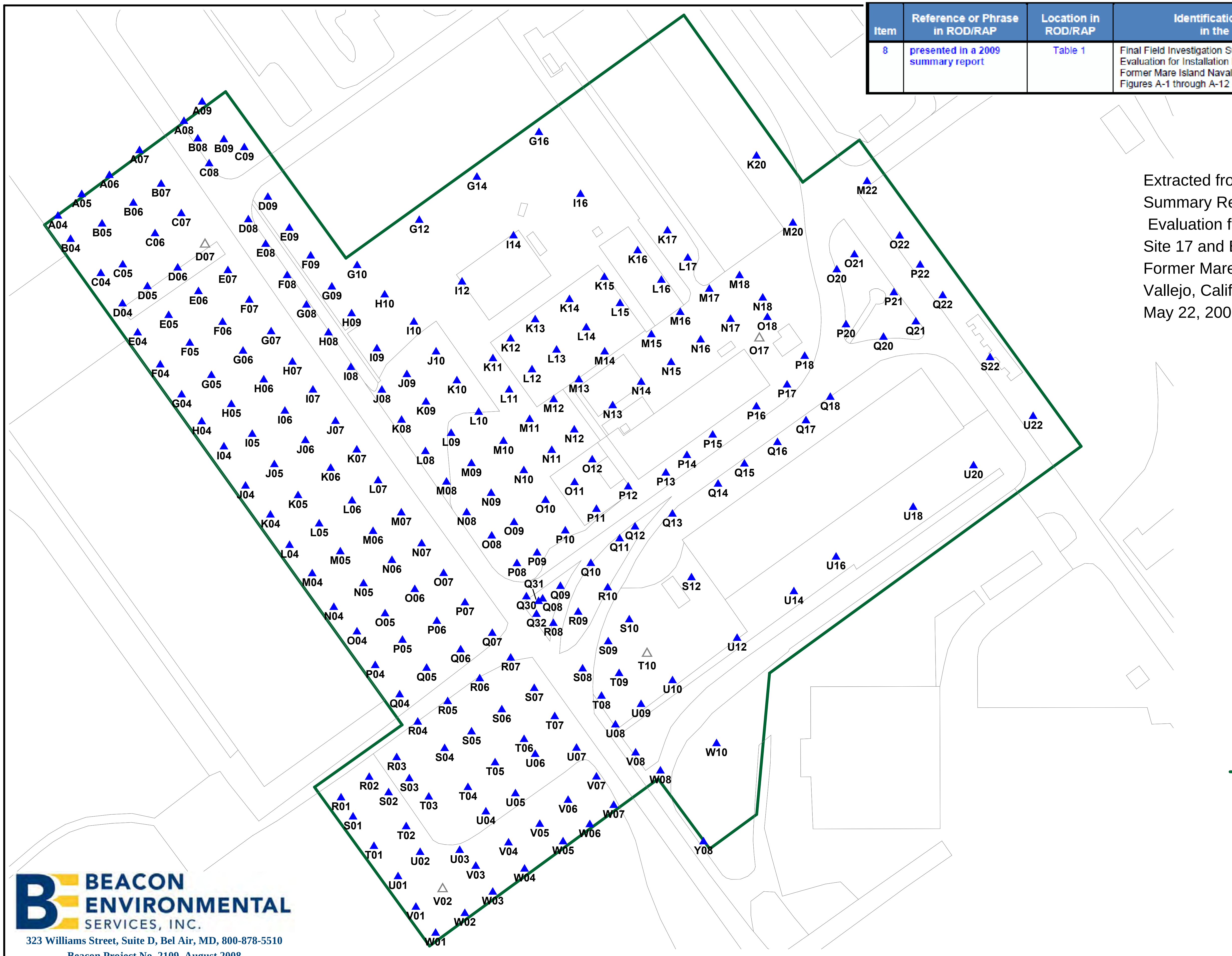
Based on the intended reuse of the site as light industry and the outcome of the HHRA, risks to human receptors from exposure to on-site contaminants fall within the target risk range. The National Oil and Hazardous Substance Pollution Contingency Plan and the EPA directive, "Memorandum Regarding the Role of Baseline Risk Assessment in Superfund Remedy Selection Decisions" (EPA 1991) state that "where cumulative cancer risks to an individual based on the RME for both current and future land use are less than 10^{-4} and no adverse noncancer effects exist, action generally is not warranted unless adverse environmental impacts occur." Based on the results of the fate and transport analysis and the draft onshore ERA, no current or future adverse environmental effects exist, given the intended land reuse.

Applicable or relevant and appropriate requirements (ARAR), which are regulations, standards, criteria, or other limitations promulgated under federal or state laws that must be attained or exceeded in remedial actions (pursuant to CERCLA Section 121[d], as amended by the Superfund Amendments and Reauthorization Act), have not been identified for IA A1 at this time. For sites where there is "no unacceptable risk to human health or the environment and where no remedial action is warranted, CERCLA Section 121 cleanup standards for selection of a Superfund remedy, including the requirement to meet ARARs, are not triggered" (EPA 1991). For sites where an unacceptable risk has been identified, remedial alternatives for mitigating that risk was developed and evaluated in an FS, and potential ARARs will be identified and analyzed for each alternative. In addition, the State of California, which is responsible for identifying and advising the Navy of potential state ARARs, has not identified state ARARs for IA A1. If an FS is undertaken, the Navy will solicit potential state ARARs from DTSC once remedial alternatives have been screened

4.4 RECOMMENDATIONS

The nature and extent of contaminants and subsurface conditions at the IR17 and Building 503 Area have been adequately characterized with the exception of lateral extent of nickel and NAPL. While cumulative cancer risks fall within the risk management range (10^{-6} to 10^{-4}) and HIs are below 1, indicating no human health risk is present at the site, remedial action is recommended to remove free product in the vicinity of wells 17W12 and 17W15 and to remove soil where elevated concentrations of VOCs are present. It is likely that the small discontinuous zones of NAPL present in soil at the site are contributing to the contamination of groundwater. Because these zones are discontinuous, these zones are not easily detected. Furthermore, due to the limitations of the inhalation model used in the HHRA to estimate vapor concentrations at the site, a post-remediation HHRA is recommended. The post-remediation site conditions should be designed to make the vapor model suitable for the site so that post-remediation concentrations can be estimated.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
8	presented in a 2009 summary report	Table 1	Final Field Investigation Summary Report and Vapor Intrusion Risk Evaluation for Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. May 22, 2009. Figures A-1 through A-12 of Appendix A.



Extracted from Final Field Investigation Summary Report and Vapor Intrusion Risk Evaluation for Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California
May 22, 2009

W10 PASSIVE SOIL-GAS SAMPLE LOCATION
D07 NO SAMPLE COLLECTED
SITE BOUNDARY

Scale in Feet
0 130 260

Figure A-1
Passive Soil-Gas Survey Sample Locations

IR17 and Building 503 Area
Former Mare Island, Vallejo, CA

BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008

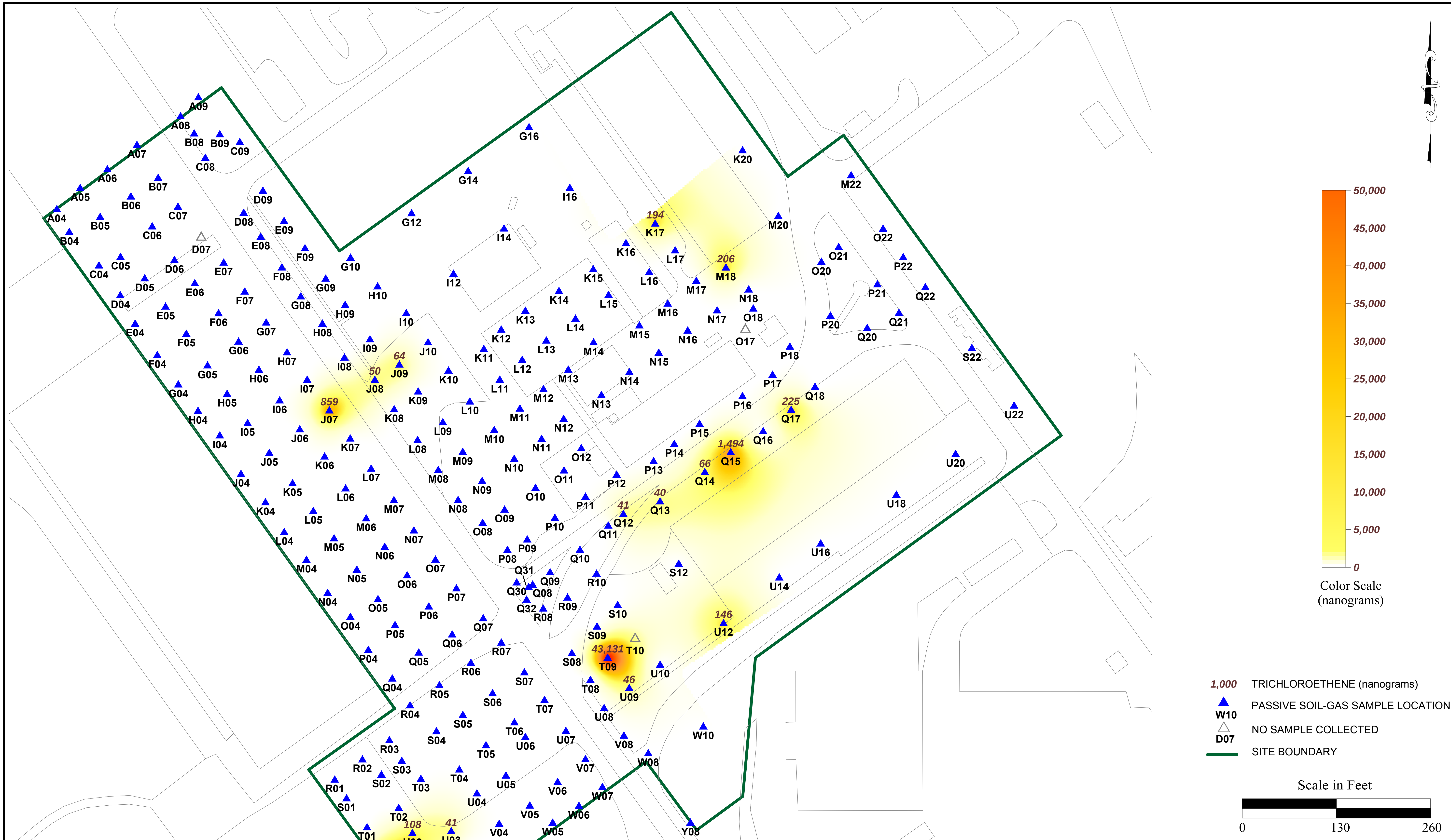
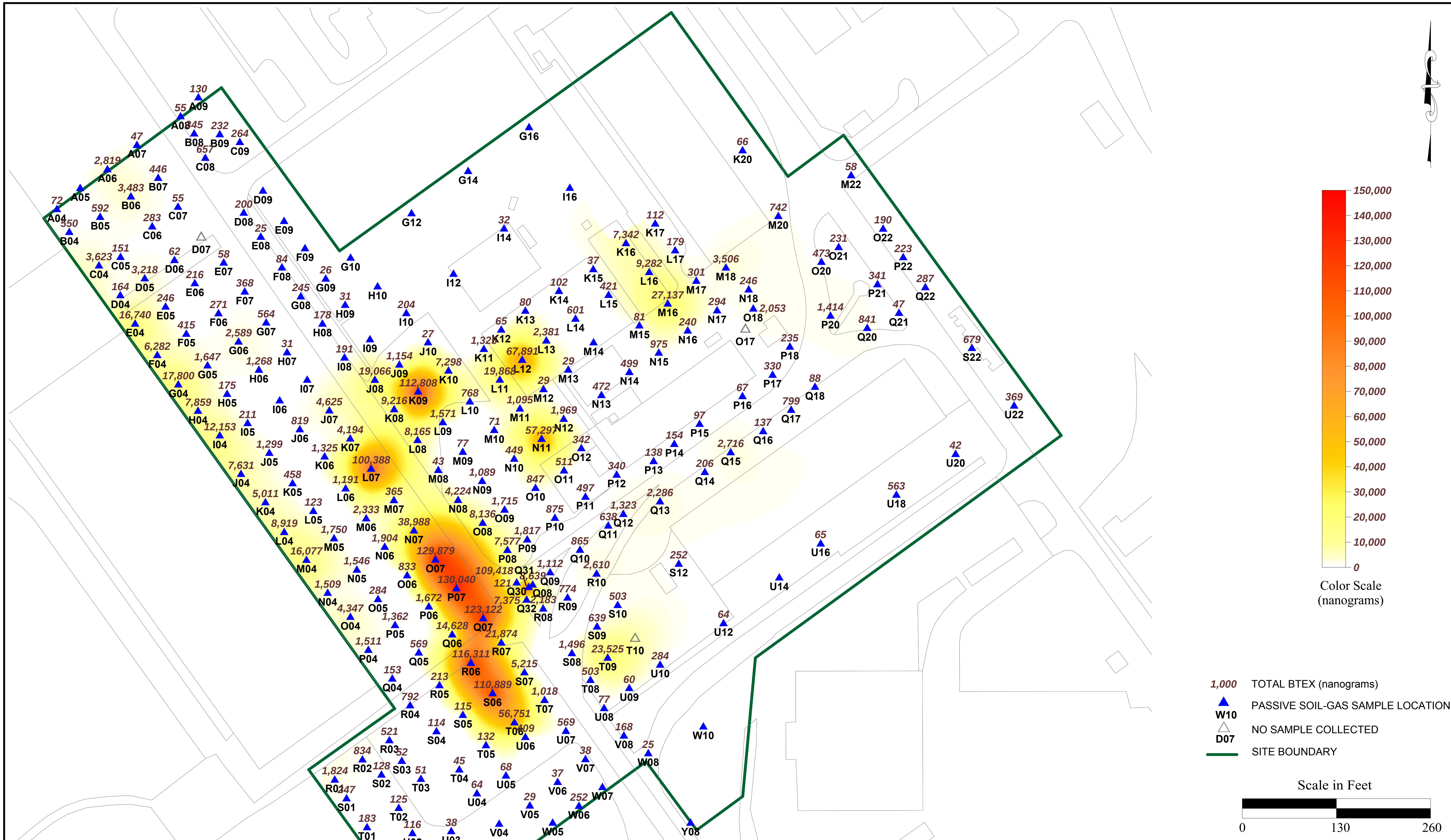


Figure A-2
Passive Soil-Gas Survey
Trichloroethene

IR17 and Building 503 Area
Former Mare Island, Vallejo, CA

BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008



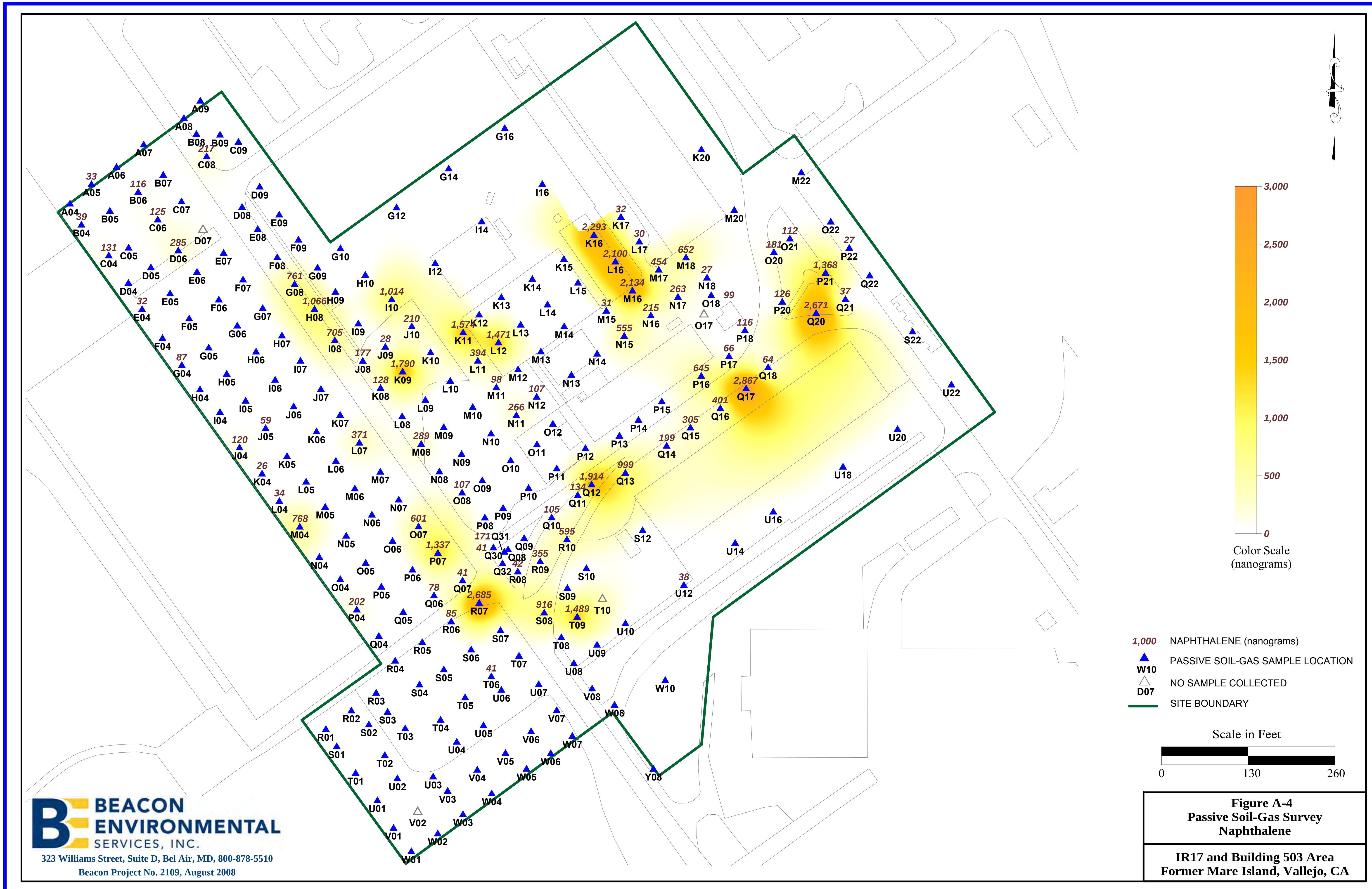
BEACON ENVIRONMENTAL SERVICES, INC.

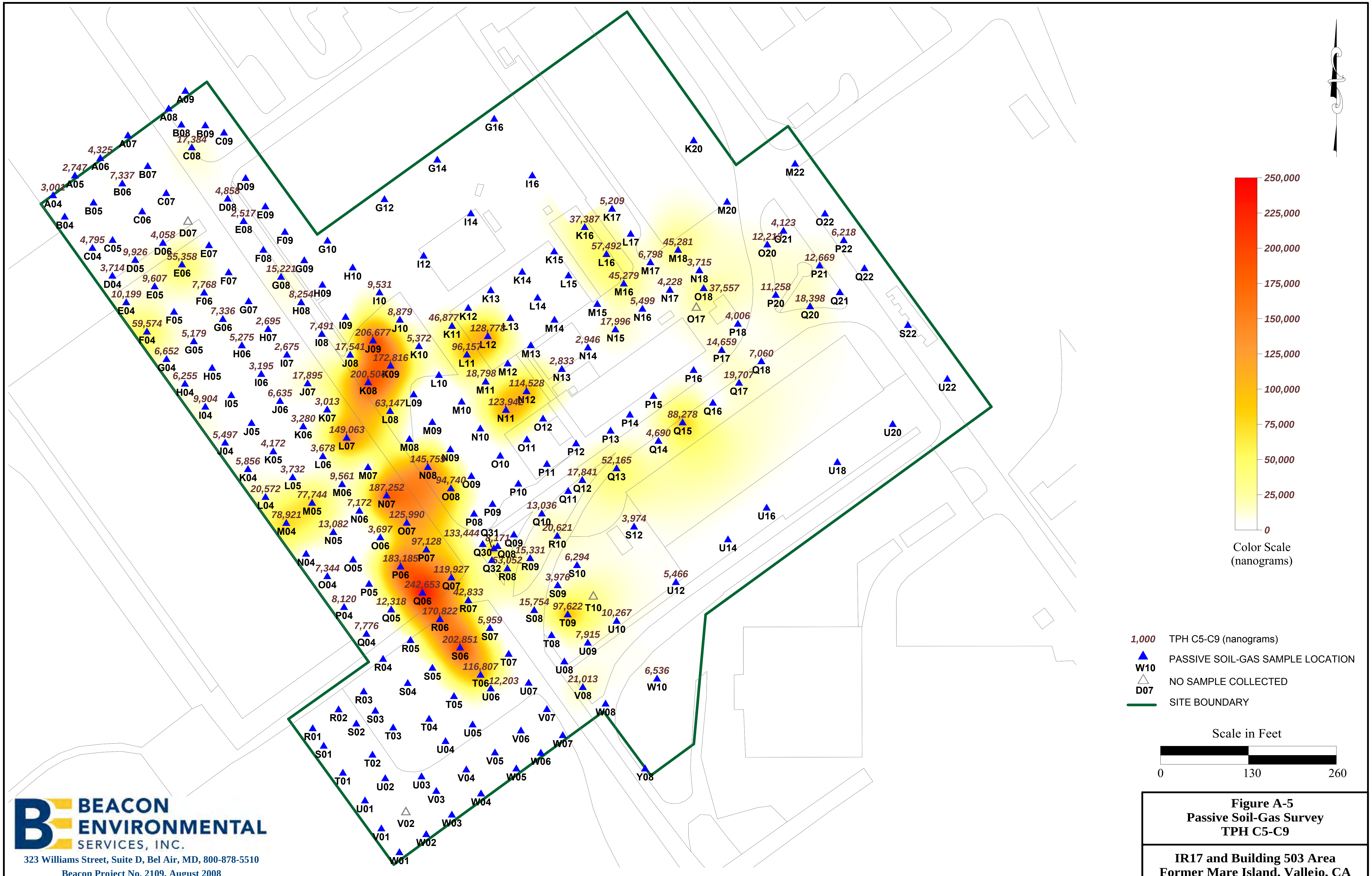
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510

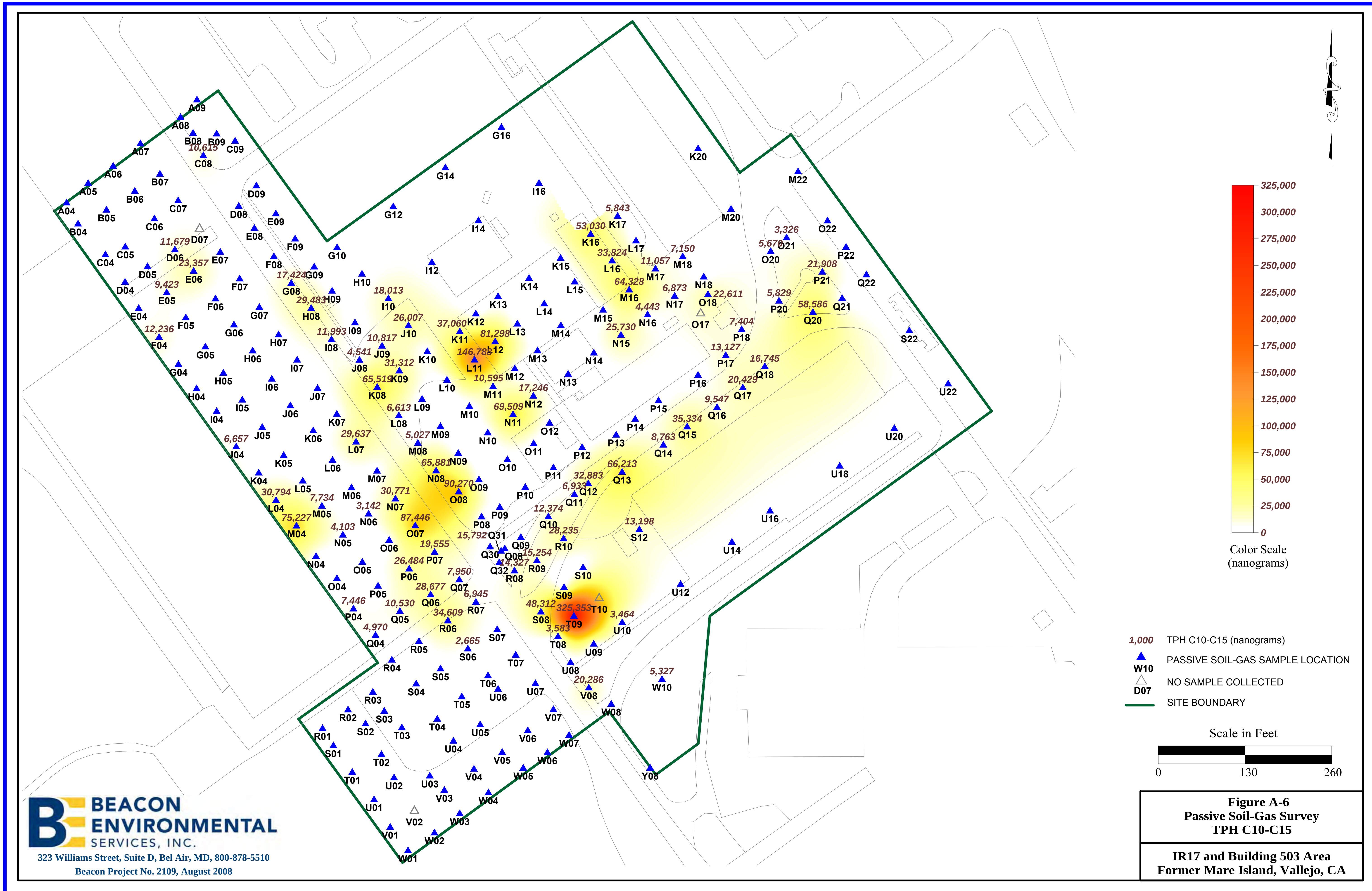
Beacon Project No. 2109, August 2008

Figure A-3
Passive Soil-Gas Survey
Total BTEX

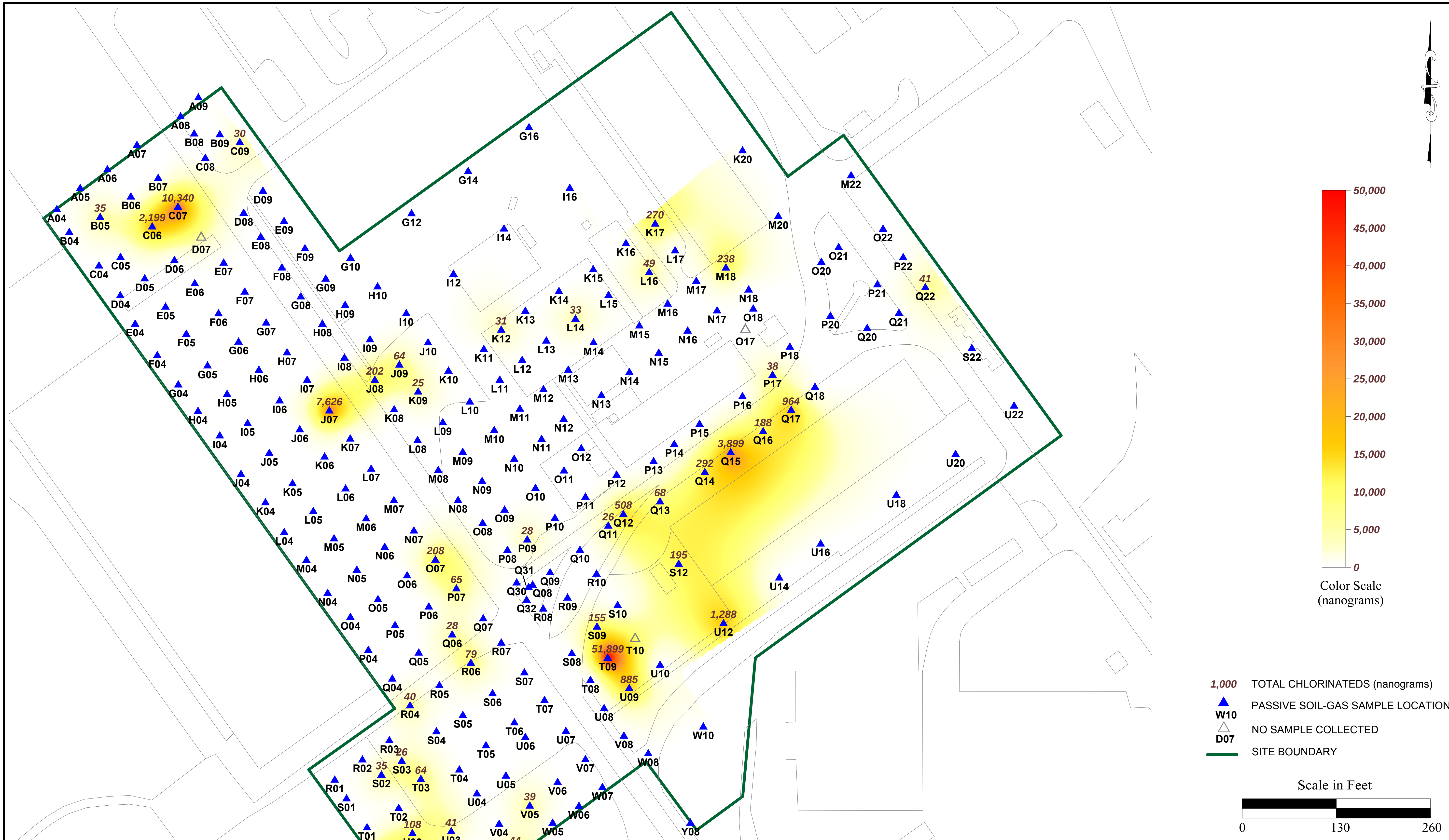
IR17 and Building 503 Area
Former Mare Island, Vallejo, CA


Color Scale
(nanograms)
3,000
2,500
2,000
1,500
1,000
500
0
1,000 NAPHTHALENE (nanograms)
W10 PASSIVE SOIL-GAS SAMPLE LOCATION
D07 NO SAMPLE COLLECTED
SITE BOUNDARY
Scale in Feet
0
130
260
BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008
Figure A-4
Passive Soil-Gas Survey
Naphthalene
IR17 and Building 503 Area
Former Mare Island, Vallejo, CA


Color Scale
(nanograms)
250,000
225,000
200,000
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
1,000 TPH C5-C9 (nanograms)
W10 PASSIVE SOIL-GAS SAMPLE LOCATION
D07 NO SAMPLE COLLECTED
SITE BOUNDARY
Scale in Feet
0
130
260
BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008
Figure A-5
Passive Soil-Gas Survey
TPH C5-C9
IR17 and Building 503 Area
Former Mare Island, Vallejo, CA



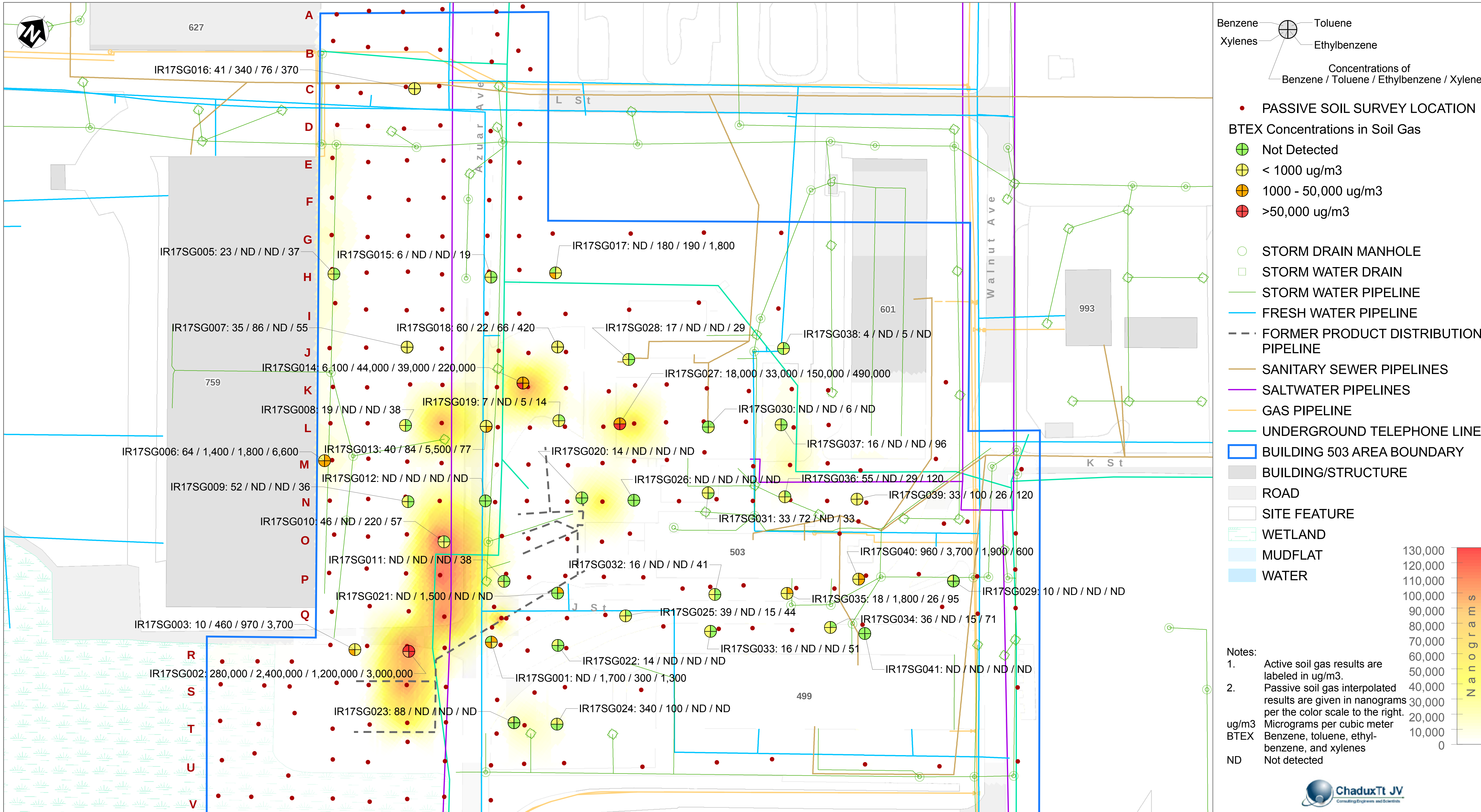
Color Scale
(nanograms)
325,000
300,000
275,000
250,000
225,000
200,000
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
1,000 TPH C10-C15 (nanograms)
W10 PASSIVE SOIL-GAS SAMPLE LOCATION
D07 NO SAMPLE COLLECTED
SITE BOUNDARY
Scale in Feet
0
130
260
BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008
Figure A-6
Passive Soil-Gas Survey
TPH C10-C15
IR17 and Building 503 Area
Former Mare Island, Vallejo, CA



BEACON ENVIRONMENTAL SERVICES, INC.
323 Williams Street, Suite D, Bel Air, MD, 800-878-5510
Beacon Project No. 2109, August 2008

Figure A-7
Passive Soil-Gas Survey
Total Chlorinateds

IR17 and Building 503 Area
Former Mare Island, Vallejo, CA



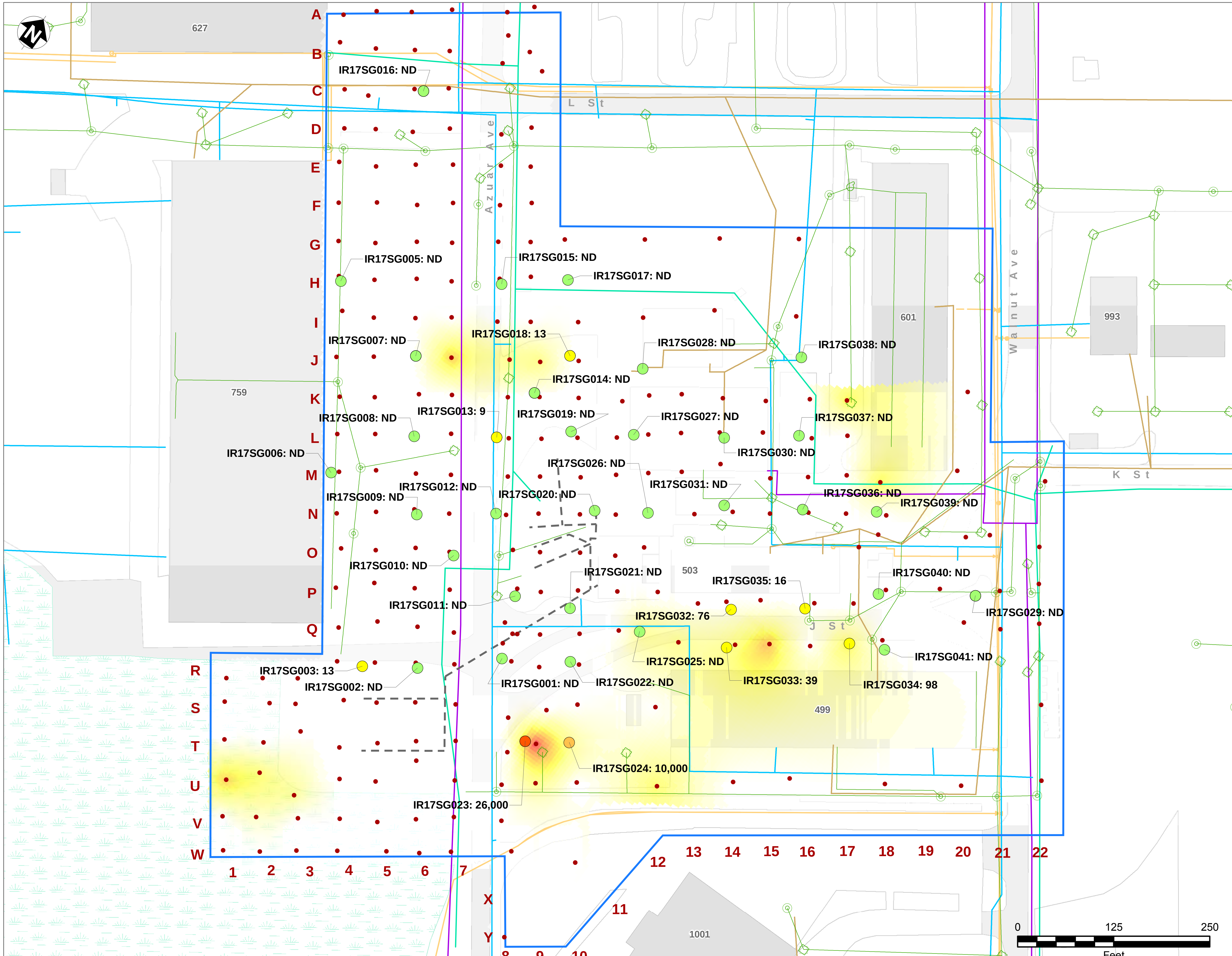
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-8
COMPARISON OF PASSIVE AND ACTIVE SOIL GAS SURVEY RESULTS BTEX COMPOUNDS

Installation Restoration Site 17 and Building 503 Area

2009-01-09 v:\mare island\projects\025_ir17_active_soil_gas\soilgas_btex.mxd TtEMI-AL simon.cardinale



- PASSIVE SOIL SURVEY LOCATION

TCE CONCENTRATION IN SOIL GAS

- Not Detected
- 8.5 - 98 ug/m3
- 10,000 ug/m3
- 26,000 ug/m3

- STORM DRAIN MANHOLE
- STORM WATER DRAIN
- STORM WATER PIPELINE
- FRESH WATER PIPELINE
- FORMER PRODUCT DISTRIBUTION PIPELINE
- SANITARY SEWER PIPELINES
- SALTWATER PIPELINES
- GAS PIPELINE
- UNDERGROUND TELEPHONE LINES
- BUILDING 503 AREA BOUNDARY
- BUILDING/STRUCTURE
- ROAD
- SITE FEATURE
- WETLAND
- MUDFLAT
- WATER

Nanograms: 22,000; 8,000; 3,000; 1,000; 400; 150; 50; 20; 7; 2.5; 0

Notes:

1. Active soil gas results are labeled in ug/m3.
2. Passive soil gas interpolated results are given in nanograms per the color scale to the right.

ug/m3 Micrograms per cubic meter
ND Not detected
TCE Trichloroethylene

ChaduxTt JV

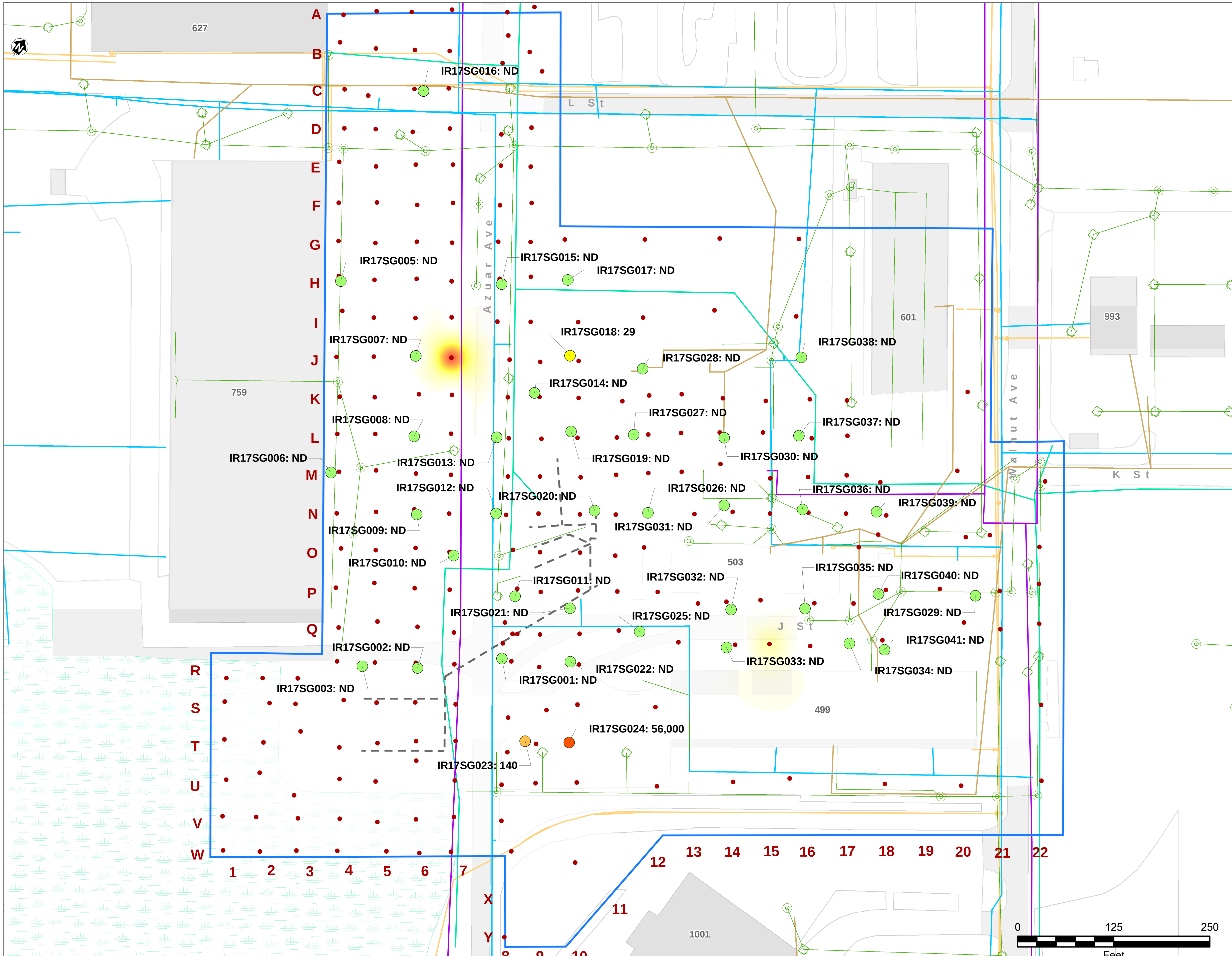
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-9
COMPARISON OF PASSIVE AND ACTIVE SOIL GAS SURVEY RESULTS TRICHLOROETHYLENE (TCE)

Installation Restoration Site 17 and Building 503 Area

2009-01-12 v:\mare island\projects\025_ir17_active_soil_gas\soilgas_tce.mxd TTEMI-AL simon.cardinale



PASSIVE SOIL SURVEY LOCATION

VINYL CHLORIDE IN SOIL GAS

- Not Detected
- 29 ug/m3
- 140 ug/m3
- 56,000 ug/m3

- STORM DRAIN MANHOLE
- STORM WATER DRAIN
- STORM WATER PIPELINE
- FRESH WATER PIPELINE
- FORMER PRODUCT DISTRIBUTION PIPELINE
- SANITARY SEWER PIPELINES
- SALTWATER PIPELINES
- GAS PIPELINE
- UNDERGROUND TELEPHONE LINES
- BUILDING 503 AREA BOUNDARY
- BUILDING/STRUCTURE
- ROAD
- SITE FEATURE
- WETLAND
- MUDFLAT
- WATER

600
500
400
300
200
100
ND
Nanograms

Notes:
1. Active soil gas results are labeled in ug/m3.
2. Passive soil gas interpolated results are given in nanograms per the color scale to the right.

ug/m3 Micrograms per cubic meter
ND Not detected
TCE Trichloroethylene

ChaduxTt JV

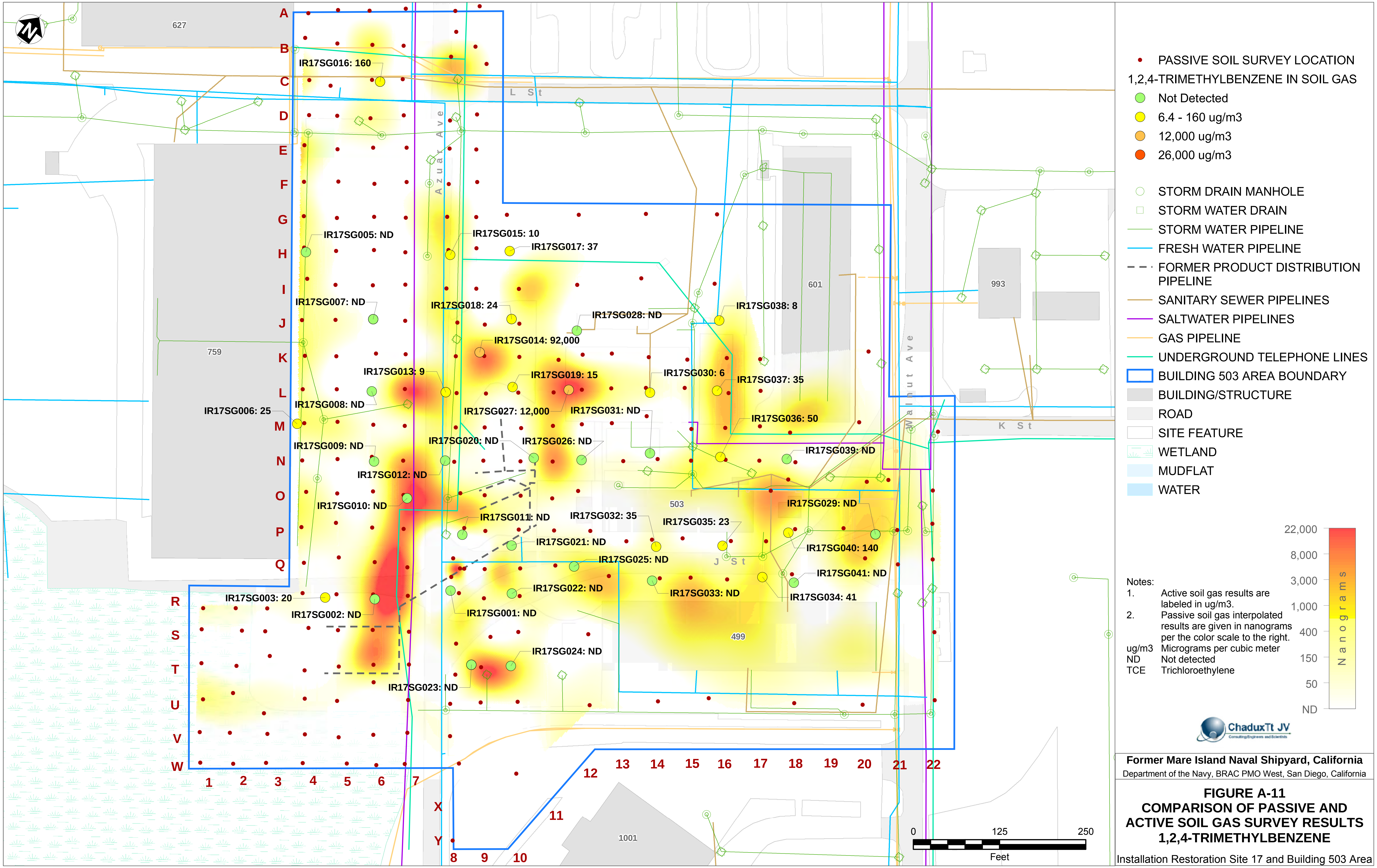
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-10 COMPARISON OF PASSIVE AND ACTIVE SOIL GAS SURVEY RESULTS VINYL CHLORIDE

Installation Restoration Site 17 and Building 503 Area

2009-01-12 v:\mare island\projects\025_ir17_active_soil_gas\soilgas_vinylchloride.mxd TtEMI-AL simon.cardinale



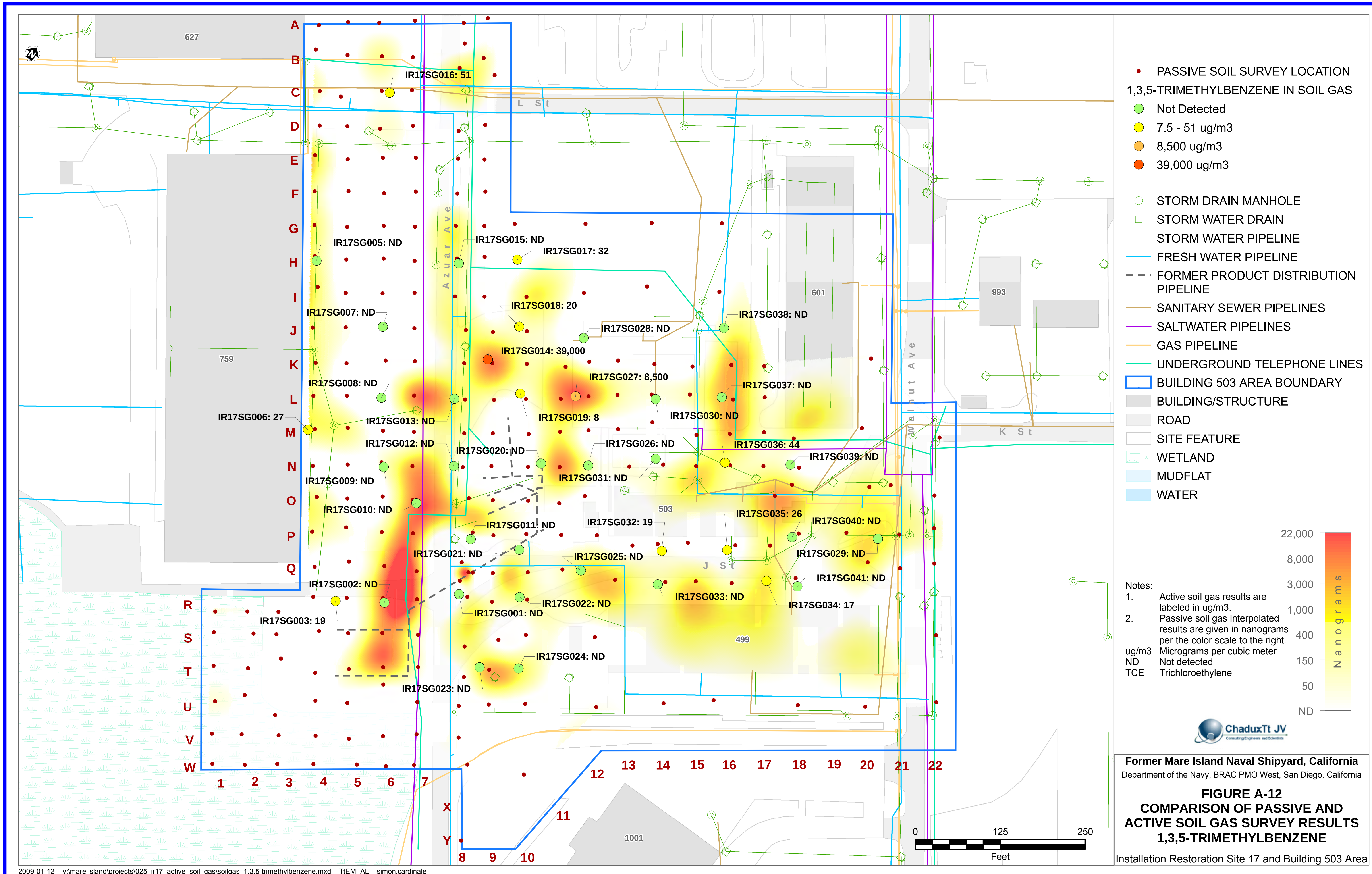
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-11
COMPARISON OF PASSIVE AND ACTIVE SOIL GAS SURVEY RESULTS
1,2,4-TRIMETHYLBENZENE

Installation Restoration Site 17 and Building 503 Area

2009-01-12 v:\mare island\projects\025_ir17_active_soil_gas\soilgas_1,2,4-trimethylbenzene.mxd TtEMI-AL simon.cardinale



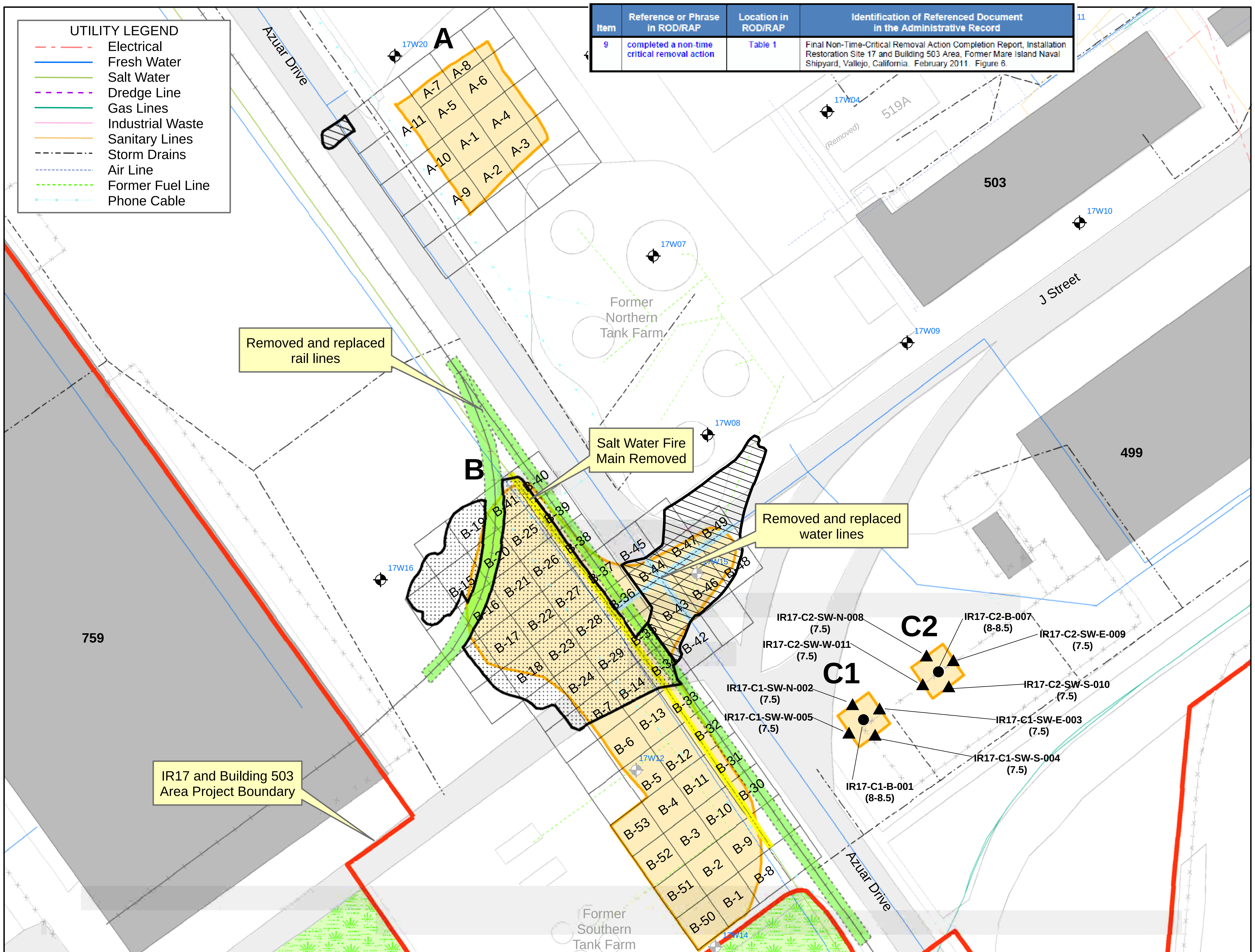
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-12
COMPARISON OF PASSIVE AND ACTIVE SOIL GAS SURVEY RESULTS 1,3,5-TRIMETHYLBENZENE

Installation Restoration Site 17 and Building 503 Area

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
9	completed a non-time critical removal action	Table 1	Final Non-Time-Critical Removal Action Completion Report, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. February 2011. Figure 6.



LEGEND
- Buildings/Structures
- Paved Roads
- Rail Lines
- Fences
- Site Features
- Wetlands
- IR17 and Building 503 Area Project Boundary
- Excavated Areas (8 feet below ground surface)
- Bottom Sampling Location (depth feet below ground surface)
- Sidewall Sampling Location (depth feet below ground surface)
- Groundwater Monitoring Wells
- Abandoned Groundwater Monitoring Wells
- Roadway Removed and Replaced
- Parking Lot Area Removed and Replaced

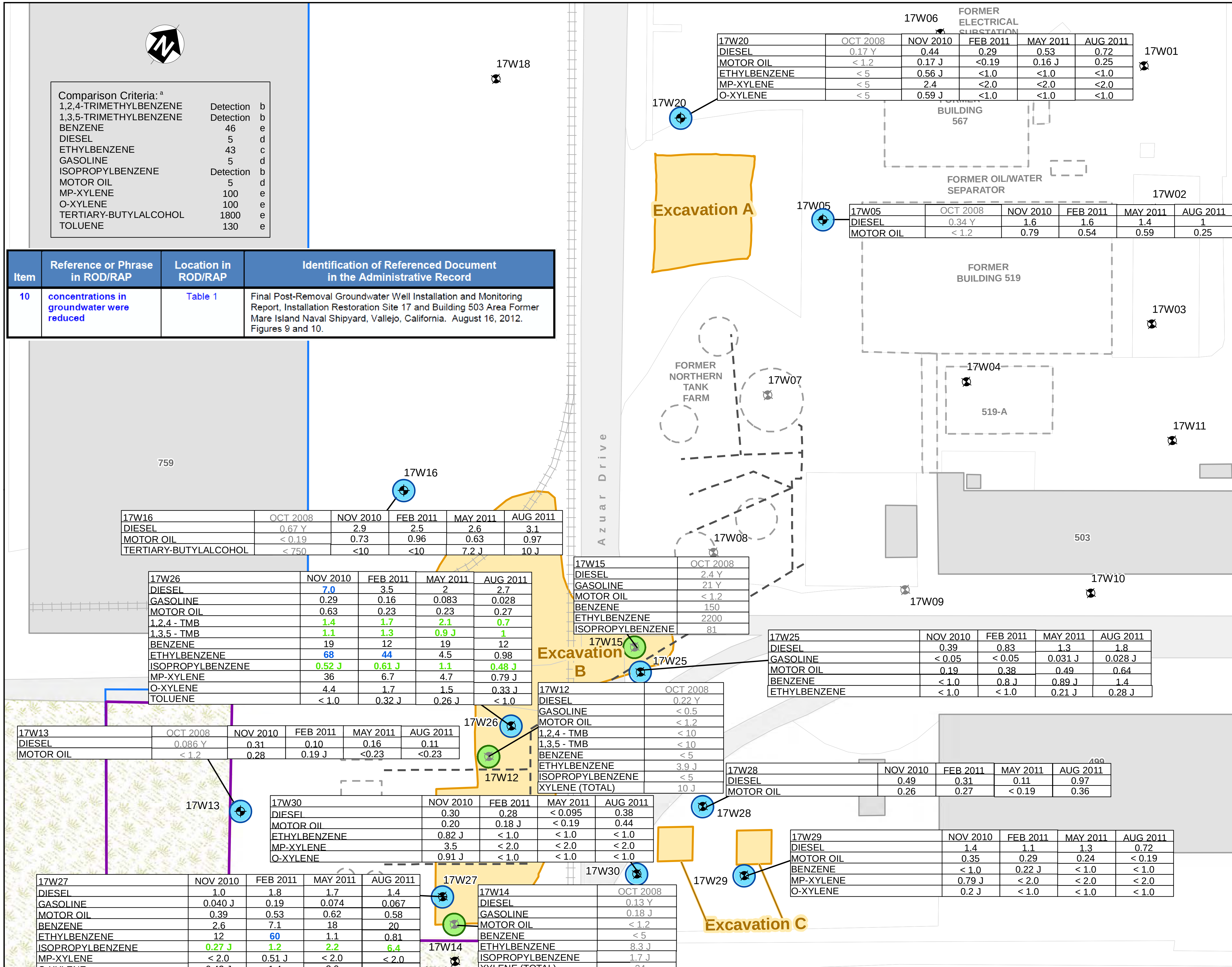
N

0 15 30 60 90 120 150 Feet

BRAC Program Management Office West
San Diego, California

FIGURE 6
IR17 AND BUILDING 503 AREA
EXCAVATION AREAS

NTCRA IR17 and Building 503 Area
Former Mare Island Naval Shipyard, Vallejo, California



Comparison Criteria:[a]

1,2,4-TRIMETHYLBENZENE	Detection	b
1,3,5-TRIMETHYLBENZENE	Detection	b
BENZENE	46	e
DIESEL	5	d
ETHYLBENZENE	43	c
GASOLINE	5	d
ISOPROPYLBENZENE	Detection	b
MOTOR OIL	5	d
MP-XYLENE	100	e
O-XYLENE	100	e
TERTIARY-BUTYLALCOHOL	1800	e
TOLUENE	130	e

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
10	concentrations in groundwater were reduced	Table 1	Final Post-Removal Groundwater Well Installation and Monitoring Report, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard, Vallejo, California. August 16, 2012. Figures 9 and 10.

17W20	OCT 2008	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.17 Y	0.44	0.29	0.53	0.72
MOTOR OIL	< 1.2	0.17 J	<0.19	0.16 J	0.25
ETHYLBENZENE	< 5	0.56 J	<1.0	<1.0	<1.0
MP-XYLENE	< 5	2.4	<2.0	<2.0	<2.0
O-XYLENE	< 5	0.59 J	<1.0	<1.0	<1.0

17W05	OCT 2008	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.34 Y	1.6	1.6	1.4	1
MOTOR OIL	< 1.2	0.79	0.54	0.59	0.25

17W16	OCT 2008	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.67 Y	2.9	2.5	2.6	3.1
MOTOR OIL	< 0.19	0.73	0.96	0.63	0.97
TERTIARY-BUTYLALCOHOL	< 750	<10	<10	7.2 J	10 J

17W26	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	**7.0**	3.5	2	2.7
GASOLINE	0.29	0.16	0.083	0.028
MOTOR OIL	0.63	0.23	0.23	0.27
1,2,4 - TMB	**1.4**	**1.7**	**2.1**	**0.7**
1,3,5 - TMB	**1.1**	**1.3**	**0.9 J**	**1**
BENZENE	19	12	19	12
ETHYLBENZENE	**68**	**44**	4.5	0.98
ISOPROPYLBENZENE	**0.52 J**	**0.61 J**	**1.1**	**0.48 J**
MP-XYLENE	36	6.7	4.7	0.79 J
O-XYLENE	4.4	1.7	1.5	0.33 J
TOLUENE	< 1.0	0.32 J	0.26 J	< 1.0

17W15	OCT 2008
DIESEL	2.4 Y
GASOLINE	21 Y
MOTOR OIL	< 1.2
BENZENE	150
ETHYLBENZENE	2200
ISOPROPYLBENZENE	81

17W25	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.39	0.83	1.3	1.8
GASOLINE	< 0.05	< 0.05	0.031 J	0.028 J
MOTOR OIL	0.19	0.38	0.49	0.64
BENZENE	< 1.0	0.8 J	0.89 J	1.4
ETHYLBENZENE	< 1.0	< 1.0	0.21 J	0.28 J

17W12	OCT 2008
DIESEL	0.22 Y
GASOLINE	< 0.5
MOTOR OIL	< 1.2
1,2,4 - TMB	< 10
1,3,5 - TMB	< 10
BENZENE	< 5
ETHYLBENZENE	3.9 J
ISOPROPYLBENZENE	< 5
XYLENE (TOTAL)	10 J

17W13	OCT 2008	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.086 Y	0.31	0.10	0.16	0.11
MOTOR OIL	< 1.2	0.28	0.19 J	<0.23	<0.23

17W28	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.49	0.31	0.11	0.97
MOTOR OIL	0.26	0.27	< 0.19	0.36

17W30	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	0.30	0.28	< 0.095	0.38
MOTOR OIL	0.20	0.18 J	< 0.19	0.44
ETHYLBENZENE	0.82 J	< 1.0	< 1.0	< 1.0
MP-XYLENE	3.5	< 2.0	< 2.0	< 2.0
O-XYLENE	0.91 J	< 1.0	< 1.0	< 1.0

17W29	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	1.4	1.1	1.3	0.72
MOTOR OIL	0.35	0.29	0.24	< 0.19
BENZENE	< 1.0	0.22 J	< 1.0	< 1.0
MP-XYLENE	0.79 J	< 2.0	< 2.0	< 2.0
O-XYLENE	0.2 J	< 1.0	< 1.0	< 1.0

17W27	NOV 2010	FEB 2011	MAY 2011	AUG 2011
DIESEL	1.0	1.8	1.7	1.4
GASOLINE	0.040 J	0.19	0.074	0.067
MOTOR OIL	0.39	0.53	0.62	0.58
BENZENE	2.6	7.1	18	20
ETHYLBENZENE	12	**60**	1.1	0.81
ISOPROPYLBENZENE	**0.27 J**	**1.2**	**2.2**	**6.4**
MP-XYLENE	< 2.0	0.51 J	< 2.0	< 2.0
O-XYLENE	0.42 J	1.4	2.0	0.8

17W14	OCT 2008
DIESEL	0.13 Y
GASOLINE	0.18 J
MOTOR OIL	< 1.2
BENZENE	< 5
ETHYLBENZENE	8.3 J
ISOPROPYLBENZENE	1.7 J
XYLENE (TOTAL)	24

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- GROUNDWATER SAMPLE LOCATION
- FORMER MONITORING WELL SAMPLED DURING OCTOBER 2008
- EXISTING MONITORING WELL
- FORMER MONITORING WELL
- EXISTING RAILROAD
- FORMER PRODUCT DISTRIBUTION PIPELINE
- NON-TIME CRITICAL REMOVAL ACTION EXCAVATION
- NON-TIDAL WETLAND PROJECT BOUNDARY
- INSTALLATION RESTORATION SITE 17 AND BUILDING 503 AREA PROJECT BOUNDARY
- FORMER BUILDING OR STRUCTURE
- BUILDING/STRUCTURE
- ROAD
- SITE FEATURE
- NON-TIDAL WETLAND

Notes:

* Concentrations are reported in micrograms per liter (ug/L), except for petroleum compounds (diesel, gasoline, motor oil) that are reported in milligrams per liter (mg/L).
**Results are presented for only detected chemicals.
*** Pre-removal data is not available for wells 17W25 through 17W30. These wells were installed close to the wells 17W12, 17W14 and 17W15 which were destroyed during the NTCRA.

Grayed out column Includes data collected during the 2008 additional sampling event and is used as the pre-removal data. Only chemicals detected during the post-removal monitoring are included for comparison purposes.

1,2,4 - TMB	1,2,4 - Trimethylbenzene
1,3,5 - TMB	1,3,5 - Trimethylbenzene
BTEX	Benzene, toluene, ethylbenzene, and xylenes
J	Estimated concentration
MG/L	Milligram per liter
ND	Not detected
NTCRA	Non-time Critical Removal Action
TPH	Total pertroleum hydrocarbons
UG/L	Microgram per liter
Y	Chromatographic pattern resembles hydrocarbon fuel pattern and was quantitated using the standard it resembled most.

a - Blue bold text indicates the chemicals was detected above the applicable National Ambient Water Quality (NAWQC) or above the Water Board Environmental Screening Level (ESL) for groundwater. Green bold text indicates the chemical was detected but there is no applicable NAWQC screening criteria or Water Board ESL available.
b – Detection is used for the criterion because there is no applicable screening criterion.
c – The lower of the marine and freshwater chronic NAWQC values (Water Board 2011).
d – Water Board ESL gross contamination ceiling level for non-drinking water sources (Water Board 2008).
e – Water Board ESL final groundwater screening level (Table F-1b in Water Board 2008)

0 70 140
Feet

ChaduxTt JV

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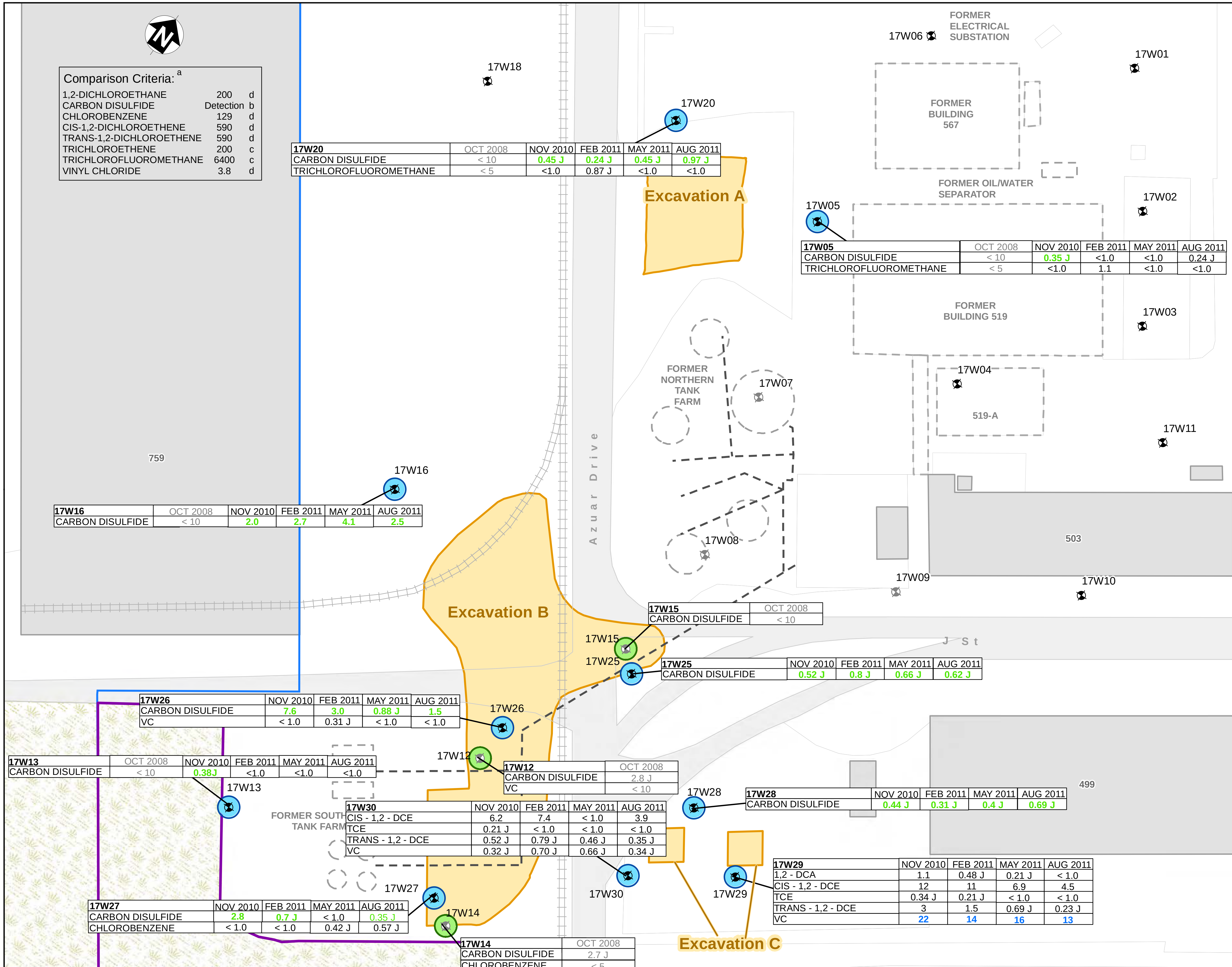
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 9
DETECTED GROUNDWATER RESULTS FOR TPH AND BTEX COMPOUNDS

Groundwater Monitoring Report
IR17 Post-Removal Monitoring



GROUNDWATER SAMPLE LOCATIONS
FORMER MONITORING WELL SAMPLED DURING OCTOBER 2008
EXISTING MONITORING WELL
FORMER MONITORING WELL
EXISTING RAILROAD
FORMER PRODUCT DISTRIBUTION PIPELINE
NON-TIME CRITICAL REMOVAL ACTION EXCAVATION
NON-TIDAL WETLAND PROJECT BOUNDARY
INSTALLATION RESTORATION SITE 17 AND BUILDING 503 AREA PROJECT BOUNDARY
Former Building/Structure
Building/Structure
Road
Non-Tidal Wetland

Notes:

* Concentrations are reported in micrograms per liter (ug/L).
** Results are presented for only detected chemicals.
*** Pre-removal data is not available for wells 17W25 through 17W30. These wells were installed close to the wells 17W12, 17W14 and 17W15 which were destroyed during the NTCRA.

Grayed out column Includes data collected during the 2008 additional sampling event and is used as the pre-removal data. Only chemicals detected during the post-removal monitoring are included for comparison purposes.

1,2-DCA	1,2-Dichloroethane
cis-1,2-DCE	cis-1,2-Dichloroethene
J	Estimated concentration
ND	Not detected
NTCRA	Non-time Critical Removal Action
TCE	Trichloroethene
trans-1,2-DCE	trans-1,2-Dichloroethene
UG/L	Microgram per liter
VC	Vinyl chloride

a – Blue bold text indicates the chemicals was detected above the applicable National Ambient Water Quality (NAWQC) or above the Water Board Environmental Screening Level (ESL) for groundwater. Green bold text indicates the chemical was detected but there is no applicable NAWQC screening criteria or Water Board ESL available.
b – Detection is used for the criterion because there is no applicable screening criterion.
c – The lower of the marine and freshwater chronic NAWQC values (Water Board 2011).
d – Water Board ESL gross contamination ceiling level for non-drinking water sources (Water Board 2008).

0 70 140
Feet

ChaduxTt JV

Former Mare Island Naval Shipyard, California
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 10
DETECTED GROUNDWATER RESULTS FOR OTHER ORGANICS

Groundwater Monitoring Report
IR17 Post-Removal Monitoring

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CONCLUSIONS AND RECOMMENDATIONS

Sufficient data have been collected at the non-tidal wetland area at the IR17 and Building 503 Area to fulfill the project objectives and DQOs. The nature and extent of chemicals in the non-tidal wetland area and local geologic and hydrogeologic conditions have been adequately characterized. Organic chemicals remaining in sediment, groundwater, and soil gas at the site are expected to continue to naturally attenuate as the upland sources were removed during the 2010 NTCRA.

Chemical concentrations in sediment, groundwater, and soil gas at the site do not pose an unacceptable risk to human health. The HHRA identified BAP as a risk driver in sediment; however, BAP is ubiquitous and the average concentration within the non-tidal wetland is less than the ambient screening level for the Bay Area. Consequently, excess cancer risks associated with BAP are considered representative of non-point atmospheric deposition at Mare Island, among other factors. Total DDTs was identified as a risk driver for ecological receptors. However, concentrations of these chemicals most likely represent normal historical application of pesticides and no point sources were identified. The mobility of BAP, lead, and total DDTs is most likely dependent on the rates of wind and water erosion of sediments, and these erosion rates are expected to be low due to the densely vegetated surface in the non-tidal wetland area. Therefore, no further evaluation or action is warranted to address risk to human health or ecological receptors.

Based on results and conclusions of the non-tidal wetland area investigation, the nature and extent of chemicals at the site have been adequately characterized and these chemicals do not pose a significant risk to human health or the environment. Furthermore, sediment, groundwater, and soil gas data do not suggest the non-tidal wetland area has been contaminated by historical activities in the upland area. Therefore, a feasibility study to evaluate remedial alternatives is not warranted for the non-tidal wetland area at the IR17 and Building 503 Area, and no further action is recommended.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
11	non-tidal wetlands area do not pose a significant risk	Table 1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Page ES-6 and Sections 3.0 and 4.0.

3.0 RESULTS OF THE INVESTIGATION

The following sections present the environmental setting and nature and extent of chemicals of concern for the non-tidal wetland area.

3.1 ENVIRONMENTAL SETTING

This section discusses the environmental setting of the non-tidal wetland area of the IR17 and Building 503 Area.

3.1.1 Site and Surrounding Land Use

The IR17 and Building 503 Area is planned for transfer to the City of Vallejo after site cleanup is complete. The majority of the upland area is located in the North Island Industrial Park (Reuse Area 1A), although property west of Azuar Drive is located in the Northwest Industrial Area (Reuse Area 1B), as defined in the Mare Island Specific Plan (City of Vallejo 2008). A portion of the non-tidal wetland area, located in the southwestern corner of the site, is located in a Wetlands Area specified in the reuse plan. According to the Mare Island Specific Plan (City of Vallejo 2008), reuse of the North Island Industrial Park would primarily be light industrial, warehouse, and offices in a contemporary office park. The Northwest Industrial Area would be developed for industrial uses, including light industrial and warehousing mixed use and heavy industrial. The reasonably anticipated future land use for the upland portion of the IR17 and Building 503 Area is light industrial; while the non-tidal wetland area would remain as open space/recreational.

Currently, the non-tidal wetland area and adjacent upland area of the IR17 and Building 503 Area are not used. Building 759 is located adjacent to the southwestern boundary of the IR17 and Building 503 Area and directly north of the non-tidal wetland area. Building 759 is currently occupied by Earthquake Protection Systems, Inc.

3.1.2 Site Topography and Surface Water Drainage

The non-tidal wetland portion of the IR17 and Building 503 Area is relatively flat, and ground surface elevations generally slope downward from the southwest to the northeast, with surface elevations generally ranging from 3.0 to 5.5 feet above msl. The northeastern portion of the site is the lowest. Within the non-tidal wetland are several shallow and narrow dry channels, which may provide surface water drainage during storms. The adjacent upland area of the IR17 and Building 503 Area includes surface elevations ranging from 4.4 to 9.3 feet above msl.

Mare Island Strait is located approximately 1,500 feet northeast of the IR17 and Building 503 Area (Figure 2). Surface water is intermittent and seasonal within the non-tidal wetland area and is attributed mostly to seasonal precipitation. Areas of seasonal standing water dry out during the summer.

3.1.3 Geology

The primary geologic units identified at the non-tidal wetland area are, from top to bottom: medium-stiff sandy silt and clay (0 to 4 feet bgs), and soft clay and clay with peat (4 to 13 feet bgs). The top unit and upper portion of the underlying unit appear to represent artificial fill (dredge spoils). The lower portion of the clay unit and clay with peat appears to represent the unconsolidated natural deposit unit, referred to as Younger Bay Mud.

The top unit (unconsolidated fine-grained with localized coarse-grained heterogeneous material) consists of clay, silt, sand, and gravel. Based on the available lithologic data, the fill material throughout the non-tidal wetland area consists primarily of silt and silty sand with localized gravelly zones. One gravelly zone was observed in the northeast part of the wetland in boring 17W23. The top unit is approximately 3 to 4 feet thick in the non-tidal wetland area.

The soft clay and clay with peat units underlying the artificial fill is predominantly composed of dark gray to olive gray clay with brown to reddish brown peat. The organic content in the clayey materials varies significantly with depth and location. The clay with peat represents a marshy depositional environment, and appears to correlate with the Younger Bay Mud found in other areas of San Francisco Bay. The unit was generally encountered at approximately 4 feet bgs and extended to at least 12 to 13 feet bgs, based on the boreholes that were installed during the temporary well construction. Cross-sections for the non-tidal wetland area are presented in Figures 6A and 6B.

3.1.4 Climate and Meteorology

The climate at Mare Island is moderated by the proximity of the San Francisco Bay. It is generally warm and dry in the summer and cool and wet in the winter. The average daily air temperature, as recorded at the Mare Island power plant, was 58 °F between 1984 and 1988 (Mare Island 1996). The average temperature range (minimum and maximum) for summer is 49 to 95°F, while the average temperate range for winter is 38 to 74°F (Mare Island 1996).

Daily average wind speeds measured at the power plant at Mare Island were typically 5 to 10 knots (Mare Island 1996). Maximum velocities of 20 to 30 knots were often recorded, particularly during the winter. Winds are typically from the west and increase in velocity in the afternoon.

Average annual rainfall at Mare Island, based on daily measurements between 1878 and 1994, was 18.1 inches per year (NAVFAC, Engineering Field Activity West 1995). The minimum recorded annual rainfall at Mare Island was 6.0 inches in 1976; the maximum was 37.5 inches in 1998. Measurable precipitation typically occurs 50 to 60 days each year. Approximately 95 percent of the total precipitation occurs between October and April. Precipitation at Napa County Airport, approximately 7 miles north of the site, over the last 2 water years (July 1-June 30 of 2009-2010 and 2010-2011) has been at 123 and 139 percent of average since record keeping began at that monitoring station in 1998.

3.1.5 Hydrogeology and Water Quality

Based on the borehole logs and soil types, two hydrogeologic units were identified at the greater IR17 and Building 503 Area: (1) the fine and localized coarse-grained unconsolidated heterogeneous material primarily in the upland area, and (2) the fine-grained, unconsolidated heterogeneous material and underlying silty clay unit in the upland and non-tidal wetland areas. The coarse-grained, unconsolidated heterogeneous material is composed of materials such as silty sand and gravel. In the wetland area, the gravel was encountered above the water table in only three of the 33 borings and was only 6 inches to 1 foot thick. Although not extensive over the wetland area, these materials are relatively permeable. The second unit is the clayey and silty portion of the unconsolidated heterogeneous material and the underlying silty clay unit (including peat). This material exhibits lower hydraulic conductivity than the coarse-grained, unconsolidated heterogeneous material found in the upland area.

Hydraulic conductivities calculated from slug test results were presented in the RI report (SulTech 2006a). The values are within the range of conductivities for silty sand, silt, sandy silt, and clayey sands (Fetter 1994). Although the results reflect the combined conductivities of the coarse-grained portions of the fill material and silty clays, the higher hydraulic conductivities appear to represent sand and gravel materials. As expected, hydraulic conductivities are higher in wells screened across the coarse-grained (silty sand and gravel) and fine-grained material (silty clay and peat) than in wells that were screened only adjacent to fine-grained material.

Depth to groundwater in the non-tidal wetland area ranged from the ground surface to approximately 3.9 feet bgs. Groundwater elevations in the non-tidal wetland ranged from 0.3 to 4.3 feet above msl. The average ground surface elevation in the non-tidal wetland is approximately 4.3 feet above msl. Higher groundwater (4.3 feet above msl) was measured at a time when 1 to 2 feet of surface water was standing in the wetland at an elevation of approximately 5 to 6 feet above msl. These observations suggest that surface water recharges groundwater during the wet season and groundwater does not discharge to the surface at the non-tidal wetland over the remainder of the year.

Groundwater in the upland portion of the IR17 and Building 503 Area was encountered at depths ranging between 1.02 and 10.61 feet bgs during the dry season (November 2010 and August 2011) and 1.50 to 7.60 feet bgs during the wet season (February and May 2011) (ChaduxTt 2012b). In general, water levels in the upland area wells were highest during the wet season (generally November to April) and lowest during the dry season (generally May to October), and varied by 0.11 to 3.35 feet over the annual hydrologic cycle in any one well (SulTech 2006a). General similarities in water level fluctuations among the upland wells during the various monitoring periods suggest that the zones where the wells are screened are in hydrologic communication and respond to seasonal recharge (SulTech 2006a).

Although flow directions vary significantly across the upland portion of the IR17 and Building 503 Area, the primary flow direction over most of the non-tidal wetland area is to the north and northeast (Figure 7A). The flow direction appears to be relatively consistent over time; however, the flow direction can vary locally as a result of recharge from precipitation.

As shown on Figure 7A, the depth to water was measured site-wide on January 25, 2011, when the non-tidal wetland was inundated with surface water after a series of heavy rain events. Water levels were measured in the non-tidal wetland area at wells 17W23 and IR17TW07 (Figure 6A) and piezometers 17P12A and 17P12B when surface water was present. The groundwater piezometric surface rises above the topographic ground surface only when the wetland fills and recharges groundwater. Groundwater typically flows south from the upland area toward the non-tidal wetland area during the dry season. Once the wetland area fills with surface water and recharges groundwater during the wet season, then groundwater flows north toward the upland area. When ponding occurred during the wet season (January 2011), groundwater flowed to the north (Figure 7A). During the late dry season, when there was no ponding (December 2011), the groundwater flowed to the south (Figure 7B).

Upland wells 17W26 and 17W27 exhibited water levels that were deeper than in nearby wells in January 2011. These wells also had poor recharge during well development in November 2010. These wells were installed within the footprint of NTCRA Excavation Area B, which was excavated to a depth of approximately 8 feet and intersected the water table at a depth of approximately 5 feet bgs in the upland area. The excavation was subsequently backfilled with moist densely compacted silty, sandy gravel. Even though water levels in wells adjacent to the excavation are approximately 4 to 6 feet bgs, the water levels in wells within the excavation footprint were likely depressed until groundwater and precipitation migrated into the compacted backfill. Based on the December 2011 water, levels there is no longer a depression in the water table in the NTCRA Excavation B area (Figure 7B).

A tidal influence study has not been conducted at the IR17 and Building 503 Area. However, the Navy prepared a tidal influence study technical memorandum for several Mare Island sites (IR01, IR03, IR05, IR07/20, IR09, and IR15), many of which were located adjacent to the Mare Island Strait shoreline (PRC 1996). The tidal influence study concluded that the maximum distance of significant tidal influence observed in any well was 200 feet away from the Mare Island Strait. IR17 is located 1,500 feet away from Mare Island Strait and 5,200 feet away from San Pablo Bay; thus, the site is not expected to be located within a zone of tidal influence.

Historical use of groundwater at Mare Island has been limited by poor water quality and wells that seasonally ran dry. As noted in Section 2.4.4, the Navy evaluated site hydrogeology and natural water chemistry in the RI (SulTech 2006a) and concluded that groundwater is not suitable as a potential source of drinking water; however, groundwater may be suitable for freshwater replenishment. The Navy will prepare a separate technical memorandum to formally seek regulatory agency concurrence on this issue.

3.1.6 Ecology

The seasonal non-tidal wetland area of the IR17 and Building 503 Area consists of a low-lying, relatively flat area southwest of Azuar Drive and is not likely tidally influenced. The dominant vegetation in this habitat includes sedges and pickleweed (*Salicornia virginica*). The non-tidal wetland habitat is likely to support various species of invertebrates (including snails and insects), birds, small mammals (including the salt marsh harvest mouse [*Reithrodontomys raviventris*]), reptiles, and amphibians. A detailed description of non-tidal wetland habitat and species is presented in Section 3.2 of the basewide onshore ERA (Tetra Tech 2002c).

Biological monitoring was conducted during soil boring and monitoring well installation in 2010 and 2011 to implement appropriate avoidance and minimization measures to protect sensitive species potentially present at the non-tidal wetland area, specifically the SMHM. A summary of the biological monitoring conducted during the 2010 sampling investigation is provided in Appendix A.

3.2 DATA QUALITY REVIEW

The sections below describe the media and laboratory analyses of samples collected within the non-tidal wetland area since 1998, a summary of the data validation process, and the findings of the data quality review.

3.2.1 Sample Media and Analyses

The sample analytical program varied throughout the environmental investigations described in Sections 2.3 and 2.4. Chemicals detected at the non-tidal wetland area were evaluated using risk-based comparison criteria (Table 5). Tables 6, 7, and 8 provide information on how many samples were tested for each analyte under the detection frequency column. A total of 52 sediment and 19 groundwater samples were collected in the non-tidal wetland and analyzed for one or more of the following: VOCs, SVOCs, PAHs, pesticides, PCB congeners, metals, TPH-e, and TPH-p (Tables 6 and 7). Table 6 summarizes sediment data for samples collected from 26 sediment boring locations within the non-tidal wetland from 1998 to 2011. Table 7 summarizes all groundwater data for samples collected from the two monitoring wells, three temporary wells, and two grab groundwater locations (collected from a direct push and hand auger boring) within the non-tidal wetland from 1998 to 2010. Table 8 summarizes the 14 soil gas samples that were collected in 2010 and 2011 and analyzed for VOCs only. Sample locations within the non-tidal wetland are shown in Figure 5.

Complete analytical results for sediment, soil, groundwater, and soil gas samples collected from the non-tidal wetland area during the RI and subsequent investigations are presented in Appendix E. Full laboratory reports for data collected in 2010 and 2011 are included in Appendix J. A summary of the data validation process and data quality review findings for all data collected within the non-tidal wetland area of the IR17 and Building 503 Area is discussed below in Sections 3.2.2 and 3.2.3.

3.2.2 Data Validation Process

Data validation of all collected data occurred in two stages: (1) a cursory review of the analytical reports and the quality assurance and quality control (QA/QC) information was conducted on 100 percent of the chemical data, and (2) an additional, full review of the analytical reports, the QA/QC information, and the associated raw data was conducted on a subset of 10 percent of the chemical data. The cursory review evaluated the effect of the most critical QA/QC information, such as holding times, calibration requirements, and spiking accuracy, on the data. The full review evaluated additional QA/QC criteria and used the raw data to check calculations and analyte identifications. All data validation was conducted by a third-party reviewer. At each stage of validation, qualifiers were assigned to the results in the electronic database in accordance with the work plan and SAP documents that guided samples collection.

Assignment of data qualification flags conformed to EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 2008) and Inorganic Data Review (EPA 2010a). Data validation specifications require that various data qualifiers be assigned when a deficiency is detected or when a result is less than its detection limit. If no qualifier is assigned to a result that has been validated, the data user is assured that no technical deficiencies were identified during validation. The qualification flags used are defined as follows:

- U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

- UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

- J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory-reported concentration is considered an estimate of the true concentration.

- R – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (for example, a holding time missed by a factor of two times the specified time limit, severe calibration non-compliance, or extremely low analyte recovery in QC spike samples).

The preceding data qualifiers may be categorized as indicating major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “R” qualifiers. These data are considered invalid and are not used for decision-making unless they are used in a qualitative way and the use is justified and documented. Minor problems are defined as issues resulting in the estimation of data and qualification with “J” and “UJ” qualifiers. Estimated analytical results are considered suitable for decision-making unless the data use requirements are stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. A “U” qualifier does not indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

Data validation reports were developed by the third-party reviewers to present qualification of the data, if necessary, and the rationale for assigning these qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validation reports for data collected in 2010 and 2011 are included in Appendix J.

3.2.3 Data Quality Review Findings

The inorganic data quality review for data collected since 1998 found that QA/QC objectives for accuracy and precision were met for most analytical results, with the following exceptions:

- As a result of severe matrix spike (MS)/matrix spike duplicate (MSD) recovery problems, 13 sediment and groundwater results were "R" qualified, indicating the result has been rejected. The results for antimony were rejected in 10 sediment samples, and the results for selenium were rejected in three water samples. All the rejected inorganic data represent less than 1 percent of the non-tidal wetland data.

- MS/MSD recovery deficiencies resulted in qualification of results as "estimated" ("J") for several metals in multiple sediment and groundwater samples. Approximately 24 percent of the inorganic sediment data and 4 percent of the inorganic groundwater data were affected.

- Inductively coupled plasma serial dilution criteria violations resulted in "J" qualification in 12 metals in several sediment samples (approximately 15 percent of the inorganic sediment data), and five metals in several groundwater samples (approximately 11 percent of the inorganic groundwater data).

- Ninety-six inorganic sediment and 59 groundwater sample results were estimated because they were reported at concentrations between the method detection limit (MDL) and the quantitation limit (QL). The analytical instrument can make reliable qualitative identification of analytes above the MDL but below the QL; however, detected results below the QL are considered quantitatively uncertain. Less than 5 percent of the non-tidal wetland data was affected.

The organic data quality review for data collected since 1998 found that QA/QC objectives for accuracy and precision were met for most analytical results with the following exceptions:

- As a result of severe MS/MSD recovery problems, one groundwater result was "R" qualified indicating the result has been rejected. The results for 2,4-dinitrophenol was rejected in one groundwater sample. In addition, based on severe surrogate recovery violations, results for PAHs were rejected in one groundwater sample. All the rejected organic data represented less than 1 percent of the non-tidal wetland data.

- MS/MSD recovery deficiencies and relative percent difference percentages between the MS and MSD resulted in qualification of results as estimated ("J") for carbon disulfide and tertiary-butyl alcohol in two sediment samples and for 4,6-dinitro-2-methylphenol and 4-nitrophenol in one groundwater sample. Less than 1 percent of the organic data was affected.

- Several organic results were "J" qualified as estimated based on calibration and surrogate QC violations in sediment (1,394 results), groundwater (144 results), and soil gas (22 results) samples. Most of these QC violations were due to low surrogate recoveries in the sediment matrix. In addition, 154 sediment and 11 groundwater sample results required qualifications as a result of internal standard problems. Most of these internal standard violations were in the volatile analysis. In addition, holding time violations resulted in qualification of 480 organic sediment and 102 groundwater sample results. Approximately 18 percent of all the non-tidal wetland data were qualified based on calibration, surrogate, internal standard, or holding time criteria violations.

- As a result of compound confirmation problems, 102 pesticide and PCB results in sediment were "J" qualified or considered nondetect ("UJ" qualified). Less than 1 percent of the non-tidal wetland data was qualified based on confirmation problems.

- The results for several organic compounds in several sediment and groundwater samples were estimated because they were reported at a concentration between the MDL and the QL. The analytical instrument can make reliable qualitative identification of analytes above the MDL but below the QL; however, detected results below the QL are considered quantitatively uncertain. Less than 5 percent of the non-tidal wetland data was affected.

No matrix effects or method performance problems were noted in the data validation reports that affected method sensitivity relative to SAP requirements or project risk screening criteria. Most laboratory reporting limits for the analytical parameters in the non-tidal wetland investigation were less than the screening levels used in the risk evaluation. Some project reporting limits were higher than the screening benchmarks; however, the data were being collected to ascertain the presence or absence of compounds. The reporting limit is used as the project screening criterion for data with reporting limits that are higher than applicable screening values because no grounds have been established for pursuing non-routine methods (ChaduxTt 2010). Section G10.5 of Appendix G and Section H6.2 of Appendix H provide discussions regarding the uncertainty associated with human health and ecological risk estimates based on elevated detection limits.

3.3 NATURE AND EXTENT OF CHEMICALS OF CONCERN

This section summarizes potential sources of contamination and the analytical data collected during environmental investigations at the non-tidal wetland area and describes the nature and extent of contamination in sediment, groundwater, and soil gas. Chemicals that were detected at concentrations exceeding the comparison criteria are included in the nature and extent discussion. A number of removal actions have been conducted in the upland area of the IR17 and Building 503 Area and sources that may have released chemicals to soil, sediment, and groundwater are no longer believed to remain on site. Therefore, continued releases associated with historical operations in the upland are unlikely.

3.3.1 Potential Sources

Upland Area

Based on the evaluation presented in the Final RI (SulTech 2006a) and subsequent investigation (ChaduxTt 2009a), the highest chemical concentrations of contaminants in soil were found in the upland generally near Building 503, adjacent to the former OWS, along and near the former product distribution line, and adjacent to the former tank farms. In these areas, concentrations of VOCs (in the form of BTEX) and TPH (related to light and heavy distillates) were generally detected above comparison criteria in samples collected near or below the groundwater table (SulTech 2006a). The likely source of BTEX compounds are former ASTs or product distribution pipelines containing coal tar distillates (a source of benzene, toluene, and xylenes), toluene, and solvent grade xylenes containing ethylbenzene that were historically stored in the former northern and southern tank farms. Light distillates are typically comprised of aromatic ring structures (BTEX, cresols and phenols) and short-chained alkanes (similar to the volatile end of gasoline); while heavy distillates are typically comprised of multiple aromatic ring structures and long-chain alkanes (similar to the less volatile end of gasoline and diesel).

Previous investigations identified groundwater in the upland area as contaminated by VOCs, TPH, and phenolic compounds in three primary areas of the IR17 and Building 503 Area: near the former product distribution pipelines (between the former tank farms), along Azuar Drive, north of Building 503, and near the former OWS. In general, areas of high chemical concentrations in soil and soil gas correlated with high chemical concentrations in groundwater (SulTech 2006a; ChaduxTt 2009a). Results for groundwater and soil gas from the additional investigation in October 2008 suggested the presence of residual free-phase product (likely originating from former ASTs and product distribution pipelines containing coal tar distillates) near the former northern tank farm and near the former southern tank farm, which is adjacent to the non-tidal wetland (ChaduxTt 2009b). As noted in Section 2.3.6, the Navy conducted an NTCRA in July 2010 to remove residual free-phase product (coal tar distillates) near the former northern and southern tank farms and former product distribution pipelines.

Results of four quarters of groundwater monitoring after the NTCRA indicated that chemical concentrations in groundwater at the IR17 and Building 503 Area have been reduced to below the removal action goals and other risk-based comparison criteria (ChaduxTt 2012b). The chemicals detected at the site appear to be decreasing or stable at most wells after four quarters of post-removal groundwater monitoring. However, based on persistent concentrations of chlorinated solvents in wells 17W29 and 17W30, the Navy is conducting an additional investigation to characterize the potential source area for chlorinated solvents in the vicinity of NTCRA Excavation C (ChaduxTt 2012b).

Non-Tidal Wetland Area

Sediment and groundwater samples were collected within the non-tidal wetland area during the RI to estimate the potential migration of chemicals in soil and groundwater from the upland former southern tank farm. Sediment and groundwater samples collected during the RI indicated that BTEX compounds did not migrate from the adjacent former southern tank farm to the non-tidal wetland area (SulTech 2006a).

The Navy collected additional sediment, groundwater, and soil gas samples within the non-tidal wetland area in November 2010 to further characterize the non-tidal wetland area and conduct an HHRA and SLERA. No point sources were identified within the non-tidal wetland area during the investigation.

A summary of the samples included in the nature and extent evaluation is presented below in Section 3.3.2. The nature and extent of contamination in sediment, groundwater, and soil gas is discussed below in Sections 3.3.3 through 3.3.5.

3.3.2 Sample Summary

As described above in Section 3.2.1, sediment, groundwater, and soil gas samples were collected within the non-tidal wetland area. Sampling locations within the wetland are shown on Figure 5.

All sediment data that were not rejected for data quality issues were included in the evaluation for the nature and extent of contamination. Comparison criteria for sediment are presented on Table 5 and were described in Section 2.4.4. Table 6 provides a statistical summary for analytical results of the sediment samples. The table lists all chemicals that were detected in sediment samples and compares the data with risk-based comparison criteria and background concentrations for metals.

Grab groundwater samples were collected from two sediment borings in 1998. Groundwater samples were collected from monitoring wells 17W23 and 17W24 six times between 2002 and 2003. These two monitoring wells and three new temporary groundwater wells (IR17TW05, IR17TW06, and IR17TW07) were sampled in November 2010. All groundwater data that were not rejected for data quality issues are included in the nature and extent evaluation. A summary of chemicals detected in groundwater and applicable comparison criteria, including risk-based comparison criteria and background concentrations for metals, is presented in Table 7.

Soil gas data evaluated in this section were collected in November 2010 and December 2011; no previous soil gas samples had been collected. A summary of chemicals detected in soil gas and applicable comparison criteria is presented in Table 8.

3.3.3 Sediment

Figure 5 presents all sediment sample locations. Chemicals detected in sediment within the non-tidal wetland area are presented in Table 6. This section focuses on chemicals that may be of potential concern for human health or ecological receptors or chemicals that were detected in the adjacent upland area that could migrate to the non-tidal wetland. The human health and ecological risk assessments considered sediment from the ground surface to 3 feet bgs because of the limited exposure of receptors to saturated sediments at the depth of the groundwater table; however, this nature and extent section discusses sediment sample results from all depth intervals. Detected concentrations in sediment were compared with residential and industrial soil RSLs (EPA 2010c), unless a more conservative "Cal-modified" 2004 EPA Region 9 preliminary remediation goal or DTSC's Office of Environmental Health Hazard Assessment California Human Health Screening Level (CHHSL) (DTSC 2009b) was available for comparison (Table 5). For the discussion of nature and extent, metals were first compared with Mare Island ambient values (Tetra Tech 2002b) and then to residential and industrial risk-based comparison criteria. Although ecological criteria were not used for comparison in Table 6, the COEC, total DDTs, is discussed in Section 3.3.3.5. Ecological risk is fully evaluated in Appendix H.

Physical properties (such as grain size, organic matter content, and moisture content) and chemical properties (such as anaerobic reduced conditions) of sediment in the non-tidal wetland contribute to the types of chemicals detected at concentrations above comparison criteria and ambient values. VOCs, PCB congeners, pesticides, and TPH were not detected in sediment at concentrations above residential and industrial comparison criteria, with exception of the pesticide 4,4'-dichlorodiphenyldichloroethane (DDD) that exceeded the residential criterion. The PAH benzo(a)pyrene (BAP) was detected in sediment at concentrations above the industrial and residential comparison criteria, and was also identified as a chemical of concern (COC) in the HHRA for future recreational users and hypothetical future residents. Although TPH and VOCs in sediment were detected below residential and industrial comparison criteria, TPH and VOCs are discussed in the following sections because they were contaminants identified in the adjacent former southern tank farm located in the upland area. Isomers of dichlorodiphenyltrichloroethane (DDT) and its metabolites DDD and dichlorodiphenyldichloroethylene (DDE) are termed "total DDTs" in this report. Total DDTs is also discussed in the section below because it was identified as a COEC. The following sections provide further details about the analytical groups that had chemicals above comparison criteria, or were identified as risk drivers for human health and ecological receptors.

Chemicals detected in sediment within the non-tidal wetland area of the IR17 and Building 503 Area have been delineated both horizontally and vertically.

3.3.3.1 Polycyclic Aromatic Hydrocarbons

PAHs were detected in most sediment samples collected at the non-tidal wetland area (ranging from 10 to 38 out of 40 samples). BAP was the only PAH detected at a concentration that exceeded both the residential and industrial comparison criteria, and was also identified as a COC in the HHRA for a future recreational user and hypothetical future resident. Other PAHs were detected above residential comparison criteria (benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]perylene); however, none of those chemicals exceeded industrial criteria and discussion of these chemicals are limited to the BAP equivalency quotients (EQ) evaluation below.

Detected BAP concentrations ranged from 0.004 to 0.91 milligrams per kilogram (mg/kg) with an arithmetic average detected concentration of 0.09 mg/kg (Figure 8). BAP exceeded the industrial comparison criterion of 0.21 mg/kg in four samples, all collected at 2.5 feet bgs.

- B503SD007 at 0.91 mg/kg
- B503SD013 at 0.26 mg/kg
- B503SD015 at 0.24 mg/kg
- B503SD016 at 0.34 mg/kg

BAP was identified as a COC in the HHRA and exceeds the residential criterion of 0.015 mg/kg in 27 samples and exceeds the industrial criterion of 0.21 mg/kg in four samples; locations of the samples that exceed the residential and industrial criteria are shown in Figure 8. The distribution of PAH detections and corresponding concentrations does not indicate a release from a point source. The data do show a pattern that the subsurface soil samples (1 to 5 feet bgs) tend to have higher BAP concentrations than the surface samples (0 feet bgs) taken directly above them. The figure included as Attachment I1 to Appendix I presents a graph of concentrations of BAP EQ by sample depth, which indicates the concentration tends to increase with depth. Since the non-tidal wetland was a former dredge pond, it is possible that the dredge spoils from this time period contained more PAHs.

In addition, PAHs in sediment were evaluated relative to BAP EQ (see Section G10.6 of Appendix G). The BAP EQs were calculated by multiplying the detected concentrations of the carcinogenic PAHs—benzo(a)anthracene, BAP, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene—by a relative potency factor (RPF), then adding the resulting values to obtain a total BAP EQ value for each individual sample (Figure 9). BAP EQ concentrations were calculated using two methods: one based on EPA (2010c) RPFs for PAHs, and the other based on DTSC (2009b) RPFs. The average BAP EQ across the non-tidal wetland area is 0.14 mg/kg based on the EPA RPFs and 0.13 mg/kg based on the DTSC RPFs, both of which are less than the ambient comparison criterion of 0.62 mg/kg that is used at other Bay Area sites (see Table G-26 of Appendix G). The BAP EQ concentration was greater than this ambient comparison level at only one sample location (B503SD007) (Figure 9).

PAHs are detected in soil at low levels throughout the Bay Area associated with incomplete combustion from industrial processes and vehicle traffic through deposition from the atmosphere and runoff from streets (Greenfield and Davis 2005). PAHs have low solubility in water and tend to sorb to smaller grain size and higher organic content sediment such as that found in the non-tidal wetland area. Sediment sample results at the non-tidal wetland area indicate PAHs at low concentrations are widespread throughout the area. Based on the ubiquitous detections of PAHs at the non-tidal wetland area and the corresponding low site-wide average BAP EQ, the detected concentrations of PAHs at the non-tidal wetland area may be caused by non-point atmospheric deposition, among other factors.

3.3.3.2 Total Petroleum Hydrocarbons

Light and heavy distillates, analyzed as TPH-e and TPH-p and reported as TPH-gr and TPH-dr, were detected in the non-tidal wetland area. TPH-mr was also detected in the non-tidal wetland area. While the detections of TPH-gr and TPH-dr in the non-tidal wetland area were within the carbon ranges typical for petroleum hydrocarbons, review of the chromatograms show the detected compounds do not follow a true petroleum hydrocarbon standard pattern as heavy distillates are different than refined petroleum products. In addition, detections of TPH-mr also did not follow a true petroleum hydrocarbon standard pattern and the detected compounds were likely associated with both heavy distillates and humic and fulvic acids in peat and soil organic matter. Biogenic and other compounds from nonpetroleum sources present in a sample can contribute to the total TPH analytical measurement (Zemo and others 1995). Chromatograms for both TPH-dr and TPH-mr samples collected in the non-tidal wetland area indicate matrix interference.

Detected concentrations of TPH-gr, TPH-dr, and TPH-mr compounds were compared to Tier 2 screening levels (CH2M Hill 2009), which were adopted from the gross contamination ceiling level ESL for industrial areas where groundwater is not a current or potential source of drinking water (Water Board 2008). The analyses for TPH cover carbon ranges for the heavy distillates as well as petroleum products, thus TPH ESLs are most applicable and were used as comparison criteria for TPH results at the non-tidal wetland area. All concentrations of TPH-gr, TPH-dr, and TPH-mr compounds in the non-tidal wetland were below the Tier 2 screening levels (Table 6 and Figures 10 through 12).

As presented in the RI report (SulTech 2006a), TPH-gr was detected along the former fuel pipeline in the southern tank farm and in soil at former well 17W14 at concentrations up to 15,000 mg/kg. However, TPH-gr was detected in only one of the 40 non-tidal wetland sediment samples at 0.80 mg/kg (Figure 10). TPH-dr was detected in the southern tank farm at concentrations up to 1,300 mg/kg; however, TPH-dr within the non-tidal wetland was detected in 28 of 40 sediment samples at concentrations ranging from 2 to 45 mg/kg (Figure 11). TPH-mr was detected in the southern tank farm at concentrations up to 760 mg/kg; however, TPH-mr within the non-tidal wetland was detected in 39 of 40 sediment samples at concentrations ranging from 7.9 to 400 mg/kg (Figure 12). Concentrations of TPH detected at the non-tidal wetland area indicate that any release(s) of light and heavy distillates from the ASTs or product distribution pipelines in the upland did not significantly impact the non-tidal wetland sediments.

3.3.3.3 Volatile Organic Compounds

Detected concentrations of VOCs were compared with EPA residential and industrial comparison criteria for soil; all concentrations of VOCs were below the residential and industrial criteria. However, VOCs are discussed in this section because they were a primary contaminant (particularly ethylbenzene and xylenes) in the adjacent former southern tank farm. In the past there was concern that the former southern tank farm may have impacted the non-tidal wetland. As presented in the RI report (SulTech 2006a), ethylbenzene was detected in the southern tank farm at concentrations up to 860 mg/kg. However, ethylbenzene was not detected in 44 sediment samples collected from the non-tidal wetland. Xylenes were detected in the southern tank farm area at concentrations up to 3,500 mg/kg; however, xylenes were only found in 2 of 44 samples collected from the non-tidal wetland at a maximum concentration of 0.001 mg/kg. The detected concentrations of VOCs at the non-tidal wetland area indicate that VOCs from the former southern tank farm did not significantly impact the non-tidal wetland sediments and the residual concentrations will likely continue to naturally attenuate.

3.3.3.4 Metals

Concentrations of metals detected in sediment samples collected at the non-tidal wetland area were compared with Mare Island ambient values and residential and industrial comparison criteria for soil. Aluminum, beryllium, and mercury were detected above Mare Island 95th ambient values (Tetra Tech 2002b); however, they were not detected above the Mare Island 99th ambient values (Tetra Tech 2002b) or residential and industrial comparison criteria for soil (EPA 2010c) (Table 6). Copper, manganese, and zinc were detected above the Mare Island 95th and 99th percentile ambient values, but were below the residential and industrial comparison criteria for soil (Table 6). Arsenic and lead were detected above the residential and industrial soil comparison criteria and are discussed in more detail below.

Arsenic was detected in sediment above the EPA residential and industrial comparison criteria (0.062 and 0.25 mg/kg) in all 46 sediment samples. However, the maximum detected concentration in sediment did not exceed the Mare Island 95th percentile ambient value of 36 mg/kg. The concentrations of arsenic in sediment range from 3.8 to 32.8 mg/kg, which are below the 95th percentile ambient value and do not indicate a point source for arsenic contamination in the non-tidal wetland.

Lead was detected above the Mare Island 95th and 99th percentile ambient levels (59 mg/kg) in 15 of 46 sediment samples (see Figure 13), above the industrial (325.6 mg/kg) comparison criteria (EPA 2010c) in two samples, and above the residential (105.6 mg/kg) comparison criteria in four samples including the two samples that exceeded the industrial criteria:

- 17W23 at 870 mg/kg from 3.5 feet bgs
- B503SD007 at 869 mg/kg from 2.5 feet bgs
- B503SD014 at 167 mg/kg at 2.5 feet
- B503SD017 at 200 mg/kg at 2.5 feet

The arithmetic average concentration of lead in soil within the non-tidal wetland area is 87 mg/kg. Excluding the four lead concentrations listed above that exceeded the residential comparison criterion, lead concentrations at the non-tidal wetland ranged between 12.5 to 103 mg/kg. The random pattern of lead concentrations throughout the non-tidal wetland does not indicate a point source, and lead was not a significant contaminant at the adjacent former southern tank farm. Lead concentrations at the adjacent southern tank farm are similar to and as random as those found in the non-tidal wetland. The four locations with lead concentrations above the residential and industrial comparison criterion are isolated, are at depths of 2.5 and 3.5 feet bgs, and are not associated with lead migration from the adjacent southern tank farm, and appear to be anomalies (Figure 13).

Molybdenum was previously identified as a COEC in the draft wetland investigation report for the SMHM. Figure 14 compares detected concentrations of molybdenum with a screening level derived for the SMHM. At the time of the draft non-tidal wetland investigation, an ambient dataset for molybdenum was not available in the original background technical memorandum for

Mare Island (Tetra Tech 2002b). After the draft version of this non-tidal wetland investigation report had been submitted, the Navy prepared a technical memorandum to first develop an ambient data set for molybdenum at Mare Island, and second, then evaluate molybdenum concentrations at the IR17 and Building 503 Area against ambient concentrations at Mare Island. The Navy submitted the molybdenum analysis to DTSC in a technical memorandum dated February 15, 2012 (ChaduxTt 2012a). The analysis demonstrated that the molybdenum concentrations in sediment at the non-tidal wetland are within the range of ambient molybdenum concentrations at Mare Island. The DTSC concurred with this conclusion in its comment letter dated June 5, 2012. Thus, molybdenum is not discussed further in this final report.

3.3.3.5 Pesticides

Pesticides were detected in sediment throughout the non-tidal wetland at concentrations below the residential and industrial comparison criteria (Table 6), with exception of one sample where DDD exceeded the residential comparison criterion at location B503SD006. Total DDTs were also identified as a COEC in the SLERA (see Section 4.2 and Appendix H for further discussion of ecological risk).

Ecological exposure to pesticides is evaluated by summing certain pesticides to develop concentrations for ecological comparison. Isomers of DDT and its metabolites, DDD and DDE, were summed to develop a total DDTs concentration. The maximum concentration for total DDTs in sediment at the non-tidal wetland is 2.2 mg/kg and was collected from boring location B503SD006 (Figure 15 and Table 6). The Navy conducted step-out soil sampling at three locations adjacent to B503SD006. Based on the step-out sample results for total DDTs, B503SD006 appears to be a single elevated result and not an indication of more widespread contamination, as adjacent samples had significantly lower concentrations of total DDTs, ranging from 0.078 to 0.476 mg/kg.

Total DDTs within the non-tidal wetland are considered to be representative of normal historical application of pesticides. Similar to PAHs discussed above, pesticides such as DDT are often found at low levels throughout the environment. Many pesticides, including DDT, are very persistent in the environment based on their physical properties, especially their tendency to sorb to soils and their lack of solubility in water. DDT and its metabolites are commonly found at low levels in soil from runoff or the migration of soil through erosion.

3.3.4 Groundwater

Chemicals detected in groundwater from two permanent and three temporary monitoring wells, and as grab groundwater samples from two sediment borings, are presented in Table 7. Data presented in the table represent groundwater samples collected in the non-tidal wetland area from 1998 to 2010. Figure 5 presents the locations of the five groundwater wells and two sediment borings. Groundwater is considered to be relatively immobile in the non-tidal wetland based on the lack of coarse-grained soil below the water table and the low hydraulic conductivity clays that are found throughout the non-tidal wetland. These clays limit the mobility of chemicals in groundwater throughout the non-tidal wetland.

Detected concentrations of metals in groundwater were compared with Mare Island ambient groundwater values before they were compared with the lower of the marine and freshwater NAWQC values (Water Board 2011) and the groundwater ESLs where groundwater is not a current or potential drinking water source (Water Board 2008). As discussed in Section 2.4.4, groundwater at the IR17 and Building 503 Area was considered non-potable in the RI report but may be suitable for freshwater replenishment (SulTech 2006a). Thus, NAWQCs and ESLs (Water Board 2008, 2011) are the most applicable water quality criteria for the IR17 and Building 503 Area. Water quality criteria are not available for some detected chemicals for comparison; however, all chemicals detected at the non-tidal wetland were further evaluated in the HHRA and SLERA for a determination of whether they contribute significantly to risk.

SVOCs, pesticides, and PCB congeners have not been detected in groundwater in the wetland area. Concentrations of some metals exceed ambient levels and water quality criteria and are presented below. Concentrations of VOCs, PAHs, and TPH were not detected at concentrations above industrial comparison criteria. Although VOCs in groundwater were detected below industrial comparison criteria, they are discussed below because they were the primary contaminants identified at the adjacent former southern tank farm area that had the largest potential to migrate to the non-tidal wetland.

3.3.4.1 Metals

The following metals were detected above both the Mare Island groundwater 95th percentile ambient values and water quality criteria in two or more samples. This report does not discuss groundwater concentrations of elements considered to be essential nutrients (calcium, magnesium, potassium, and sodium) or related to the TDS content of the non-tidal wetland groundwater (Table 7).

Analyte	Number of Detections Exceeding Mare Island Ambient Level / Number of Samples	Maximum Concentration	Location of Maximum Concentration	Water Quality Criterion [a]	Mare Island 95th Percentile Ambient Value
Aluminum	4 / 16	1,300	17W24	87	480
Antimony	3 / 16	33.7	17W24	30	5.6
Copper	7 / 16	1,460	17W24	3.1	33
Lead	4 / 16	47.7	17W24	2.5	10
Manganese	13 / 16	26,900	17W23	NA	5,400
Nickel	16 / 16	340	17W23	8.2	7.5
Zinc	9 / 16	1,130	17W24	81	260

Notes: Concentrations are presented in micrograms per liter.

a Lower value of the marine and freshwater NAWQC values (Water Board 2011) and the groundwater ESLs where groundwater is not a current or potential drinking water source (Water Board 2008)

NA Not applicable; a water quality criterion is not available for manganese

Exceedances were limited to two wells – 17W23 and 17W24. Both of these wells have high TDS (36,000 milligram per liter [mg/L] and 33,000 mg/L, respectively), which are indicative of a high mineral content in comparison to fresh water. The cyclical process of placing marine dredge spoils containing saltwater from Mare Island Strait and the subsequent evaporation of water, after the sediment settled in the non-tidal wetland, likely significantly increased the mineral content of groundwater in the area. The higher levels of essential nutrients, as well as aluminum, antimony, copper, lead, manganese, nickel, and zinc, may be a result of this repetitive process. In fact, these metals were not identified as risk drivers in overlying soil and sediment for human health or ecological receptors.

3.3.4.2 Volatile Organic Compounds

Seven VOCs were detected in groundwater within the non-tidal wetland area: 1,2,4-trimethylbenzene, 2-butanone, acetone, carbon disulfide, ethylbenzene, toluene, and xylenes. Detected concentrations of VOCs were below water quality criteria for five of the seven VOCs, but water quality criteria are not available for comparison for two (1,2,4-trimethylbenzene and carbon disulfide) of the seven VOCs (Table 7). Exposure to groundwater was evaluated in the HHRA for a construction worker and VOCs were not found to significantly contribute to risk. VOCs are discussed in this section because they were a primary contaminant (particularly ethylbenzene, toluene, and xylenes) in the adjacent former southern tank farm. In the past there was concern that the former southern tank farm may have impacted the non-tidal wetland. As presented in the RI report (SulTech 2006a), ethylbenzene had been detected in the former southern tank farm at concentrations up to 5,400 micrograms per liter (µg/L). However, ethylbenzene was detected in only two of 19 groundwater samples (well 17W24 and a grab groundwater sample from boring B503GB020) at a concentration below the water quality criterion of 43 µg/L. Xylenes were detected in the southern tank farm at concentrations up to 56,000 µg/L; however, in the non-tidal wetland, xylenes were only found in 2 of 11 samples at a maximum concentration of 0.3 µg/L (well 17W23 and temporary well IR17TW07) and below the water quality criterion of 100 µg/L. Toluene was detected in one of 19 groundwater samples from a grab groundwater sample (B503GB020) at a concentration of 0.4 µg/L, which is below the water quality criterion of 130 µg/L. The VOCs detected in the non-tidal wetland area will likely continue to naturally attenuate.

Figure 16 presents all volatile chemicals detected in groundwater since 1998 in the non-tidal wetland area and for the upland wells (17W13, 17W14, and 17W27) that are adjacent to the boundary of the wetland. Data for these three upland wells are provided in the figure for data presentation purposes only. Based on the low concentration of volatile chemicals detected in the non-tidal wetland wells, volatile chemicals in groundwater from the adjacent upland area have not significantly impacted the non-tidal wetland area. Furthermore, upland soils that were contaminated by coal tar distillates (BTEX, light and heavy distillates, cresols, and phenols) were removed from the southern tank farm during the 2010 NTCRA and thus are no longer a potential source of VOCs to be released to groundwater.

3.3.5 Soil Gas

Chemicals detected in soil gas samples collected within the non-tidal wetland area are presented in Table 8. Figures 5 and 17 present the locations of the 14 temporary soil gas wells. Soil gas samples were analyzed for VOCs. Ten locations were sampled in November 2010. Based on the results of the soil gas samples and regulatory agency comments (Appendix I) received on the draft version of this report, four step-out soil gas samples were collected in December 2011. A total of 10 volatile compounds (1,4-dioxane, 2,2,4-trimethylpentane, benzene, chloroform, cyclohexane, heptane, hexane, m,p-xylene, toluene, and trichloroethene [TCE]) were detected in soil gas in the non-tidal wetland area. For this nature and extent discussion, detected concentrations were compared with EPA (2010c) residential and industrial RSLs for ambient air with applied preliminary screening DTSC (2011) default attenuation factors of 0.001 for future residential structures and 0.0005 for future industrial buildings (see Table 2 of DTSC 2011). DTSC recommends that the default attenuation factors in Table 2 of DTSC 2011 be used along with the maximum subsurface concentrations for preliminary screening evaluations. VOCs detected in soil gas were not detected at concentrations above the comparison criteria (Table 8). Furthermore, the detected VOCs in soil gas were also not identified as risk drivers in the HHRA or SLERA.

The VOC 1,4-dioxane was detected in one of 14 samples collected in the non-tidal wetland area. The detected concentration from sample location B503SG007 was 130 $\mu g/m^3$. 1,4-Dioxane is a byproduct of pesticides and has a low soil sorption coefficient and a high volatilization factor, making it less persistent in the environment in soil and groundwater (EPA 1995). The single low-level detection of this compound does not indicate a point source of contamination in the non-tidal wetland area, but is most likely associated with normal historical application of pesticides at the site or along the fence line near Building 759, or along Azuar Drive. 1,4-Dixoane was not identified as a risk driver in soil gas in the HHRA or SLERA.

Detections of benzene in soil gas are most likely associated with the low-level detections of BTEX in soils, groundwater, and soil gas in the adjacent upland area. Benzene has not been detected in sediment or groundwater within the non-tidal wetland area. Since the source material (contaminated soil and groundwater) has been removed from the upland area, the benzene detected in the non-tidal wetland area will likely continue to naturally attenuate. Benzene was not identified as a risk driver in soil gas in the HHRA or SLERA.

Chloroform was not detected in sediment or groundwater in the non-tidal wetland area or in the adjacent upland area. The presence of chloroform in soil gas in the non-tidal wetland area is likely associated with plant volatiles emitted from buried peat layers and other high organic carbon content peats (Laturnus and others 2002), which are found in the former tidal marshland. The peat and organic sediments likely release chloroform when the water table drops and pore spaces drain during the dry season, which is when the soil gas samples were collected. The chloroform can then migrate upward to the surface.

TCE was detected in just one of the two Summa canisters collected as a duplicate pair at soil gas location B503SG012. TCE was also detected in the equipment blank used for quality assurance.

The only other chemical detected in the duplicate pair sample was hexane, which was detected at almost the same concentration in each Summa canister (4.3 and 4.8 µg/m^3). The detection of TCE in soil gas within the non-tidal wetland is suspect based on the detection of TCE in the equipment blank and because it was detected in only one of the two canisters.

The chemicals detected in soil gas were not identified as risk driving compounds in the HHRA or SLERA, which are described in the next section.

4.0 RISK ASSESSMENT

This section summarizes the HHRA and SLERA methodology and results. Appendices G and H present the full risk assessments of the HHRA and SLERA.

4.1 HUMAN HEALTH RISK ASSESSMENT

This section describes the methodology that was used to complete the HHRA for the non-tidal wetland area. The HHRA consisted of the following five overall components, described in the sections below.

- Data evaluation and identification of chemicals of potential concern (COPC)
- Exposure assessment
- Toxicity assessment
- Risk characterization
- Uncertainty evaluation

4.1.1 Data Evaluation and Identification of Chemicals of Potential Concern

The objective of the data evaluation was to develop a list of COPCs for evaluation in the HHRA. COPCs are chemicals carried through the quantitative exposure assessment and risk characterization portions of the HHRA. COPCs represent the chemicals assumed to account for most of the estimated health risks for a site. The selection of COPCs was based on chemicals detected in sediment, groundwater, and soil gas samples obtained from the non-tidal wetland area as part of this investigation and on sediment data from the RI (SulTech 2006a). The non-tidal wetland area was evaluated as a single exposure unit. Table G-1 of Appendix G presents a listing of all COPCs detected at least once in sediment (both 0-0.5 and 0-3 feet bgs), groundwater, and soil gas that were considered in the HHRA.

All laboratory data used in the HHRA was verified and validated. Chemicals with estimated laboratory results (that is, “J”-qualified data) were assumed to have been detected. Chemicals with concentrations reported as unusable (“R”-qualified) were eliminated from the HHRA data set.

The following three sets of risk estimates were prepared to satisfy DTSC and federal (Navy and EPA) requirements:

- Total risk
- Incremental risk
- Ambient risk

Total risk represents the risk associated with exposure to all detected chemicals except those present at concentrations consistent with ambient conditions (that is, site concentrations that are statistically shown to be similar to ambient metals concentrations in the fill material at Mare Island [Tetra Tech 2002b]). Thus, total risk is associated with exposure to all detected organic compounds, plus metals detected at concentrations that exceed ambient concentrations at Mare Island. Metals at site concentrations that are consistent with ambient concentrations are excluded from the total risk estimate. Appendix F details the statistical methods of the background comparisons that were conducted for chemicals in sediment. The results of the background comparisons that support the HHRA are included in Tables G1-2.5 and G1-2.6 of Appendix G.

Incremental risk is similar to total risk, except that chemicals with maximum detected concentrations in sediment below residential risk-based comparison criteria are also excluded from the risk estimate in addition to metals that are detected consistent with ambient conditions. Chemicals detected at maximum detected concentrations above residential comparison criteria for soil are more likely to contribute significantly to human health risks and hazards than are detected analytes at concentrations below soil comparison criteria. Based on the lack of appropriate screening values, data for groundwater and soil gas were not screened, and detected chemicals in groundwater and soil gas data were included in the HHRA.

Ambient risk represents the risk from exposure to metals with site concentrations consistent with ambient concentrations. Ambient risk represents the risk associated with ambient concentrations of metals that were excluded from the total and incremental risk estimates described above.

Calcium, magnesium, potassium, and sodium were excluded from all three sets of risk estimates (incremental, total, and ambient). These four chemical elements are considered essential human nutrients. In addition, data for specific TPH indicator chemicals (for example, benzene, toluene, and BAP) were used to assess potential human health risk from TPH contamination. TPH data were not used directly in the HHRA.

4.1.2 Exposure Assessment

The objective of the exposure assessment is to evaluate the type and magnitude of exposures to a human receptor from COPCs at a site. An exposure assessment is a multistage process. First, the receptors (or members of the population) or individuals at risk are identified. Then, the complete exposure pathways by which these receptors are likely to be exposed are identified. The final step is to quantify the chemical concentrations to which the receptors might be exposed and the intake of COPCs associated with each pathway of exposure. The following sections identify the potential receptors, exposure pathways, and method for estimating the chemical intake for the non-tidal wetland area.

4.1.2.1 Potential Receptors

The non-tidal wetland area encompasses approximately 1 acre and is not currently in use for any activities other than open space. The non-tidal wetland area is covered by vegetation consisting of sedges and pickleweed. The Mare Island Specific Plan (City of Vallejo 2008) designates reuse of the non-tidal wetland area as open space/recreational. The adjacent upland area of the IR17 and Building 503 Area is designated as a light industrial area.

Risks were quantified for three receptors for the non-tidal wetland area HHRA:

- Future recreational user
- Future construction worker
- Hypothetical future resident

Although residential development is not planned for the non-tidal wetland area, an unrestricted (residential) land use scenario generally represents the greatest potential for exposure to site chemicals and was evaluated to provide additional information to support risk management decisions for the site.

Exposure to surface sediment (0 to 0.5 foot bgs), which assumes minimal disturbance of the site during future land use, was evaluated for both the future recreational user and the hypothetical future resident. Exposure to combined surface sediment and subsurface sediment (considered 0 to 3 feet bgs in the HHRA) was evaluated for the future recreational user, future construction worker, and hypothetical future resident. Exposure to subsurface sediment assumes that future use of the site involves intrusive development and excavation of site sediment, thereby mixing sediment throughout the sediment column and making deeper sediment available at the surface for contact.

4.1.2.2 Exposure Pathways

An exposure pathway is the means by which a chemical moves through the environment from the source to a receptor. Exposure pathways are identified through an analysis of the distribution of the COPCs in the environment and the physical and chemical properties of the COPCs. All of the following are required for a pathway to be complete: a chemical source and mechanism for chemical release, an environmental transport medium, an exposure point, and an exposure route. These requirements are summarized in the HHRA CSM for the non-tidal wetland area (see Figure G-1 of Appendix G).

Potentially complete exposure pathways for these scenarios were identified based on chemicals detected in sediment, groundwater, and soil gas at the non-tidal wetland area and on the release and transport mechanisms for these chemicals. Sediment is assumed in the HHRA to be dry and not saturated, except for when the wetland is inundated by seasonal rainfall accumulation (see below for additional discussion). Exposure pathways identified as potentially complete for sediment, groundwater, and soil gas are discussed below. The HHRA estimated health risks for all exposure pathways identified as potentially complete.

As shown in the Figure G-1 of Appendix G, future recreational users, future construction workers, and future residents could be exposed to chemicals in sediment, groundwater, or soil gas through the following exposure pathways:

- Ingestion of contaminated sediment
- Dermal contact with contaminated sediment
- Inhalation of particulate and volatile chemicals released from sediment to outdoor air
- Inhalation of air vapors released from groundwater to outdoor air during trenching (future construction worker only)
- Inhalation of volatile chemicals released from subsurface sediment (as soil gas) and groundwater to indoor air (hypothetical future resident only)

No potentially complete groundwater exposure pathways were identified for the future recreational user. Direct exposure to groundwater (for example, ingestion) was not assumed for the residential scenario because the site hydrogeology and natural water chemistry evaluations in the RI indicated that groundwater is not suitable as a potential source of drinking water (SulTech 2006a). Dermal contact with groundwater in a construction trench was not considered a complete exposure pathway for a future construction worker. Current construction practices implement dewatering methods in areas where work will occur below the ground surface and proximate to the groundwater table. Thus, dermal contact with groundwater in a construction trench in the future was not considered a significant pathway and was excluded from the HHRA.

Surface water may be intermittently present within the non-tidal wetland area, predominantly from seasonal precipitation, but this area is dry for parts of the year (SulTech 2006a). A seasonal wetland is created during periods of the year characterized by high precipitation and lower evaporation-transpiration rates, such as in winter and spring months. As discussed in Section 3.3.7 of the RI (SulTech 2006a), a pathway for chemical transport from groundwater to surface water in the seasonal wetland is not complete. Since surface water is present only during periods of high precipitation and runoff, surface water is not expected to be a significant source of chemical exposure within the non-tidal wetland area. The predominant source of the surface water is precipitation and to a limited extent runoff from adjacent properties.

The most likely exposed population to surface water in the non-tidal wetland would be to a future recreational user. Since the wetland is filled with pickleweed and other thick vegetation and surface water is shallow and ephemeral, swimming is not expected, and the only exposure would be wading or walking through the wetland. The wetland does not have a sustained fish population that would draw a recreational user, and exposure via ingestion of fish tissue is not expected, because the wetland does not have any connection to the tidal areas of Mare Island. Therefore, the most likely exposure pathway would be dermal contact with the surface water.

BAP, lead, and total DDTs are risk drivers for exposure to sediment for human health (BAP and lead) and ecological receptors (total DDTs); however, none of these risk drivers is highly soluble in surface water so they would be not be expected to be present in high concentrations in the surface water. In addition, these chemical groups are not anticipated to move easily across the skin barrier (EPA 2004), so any exposure would result in a *de minimis* dose. Based on these factors, surface water would pose only a negligible or *de minimis* risk to a potential future recreational user or construction worker at the non-tidal wetland area.

4.1.2.3 Chemical Intake Estimates

The exposure point concentration (EPC) is the concentration of a COPC in an exposure medium (for example, surface sediment) that a receptor may be exposed to. EPCs for COPCs were estimated from measured or modeled concentrations. A 95 percent upper confidence limit (95UCL) was used as the EPC for each COPC for evaluation of exposure to chemicals in sediment, except when the 95UCL exceeded the maximum concentration or when the data set was not sufficiently large to calculate a 95UCL. In those cases, the maximum concentration was used as the EPC. The methods used to calculate EPCs for sediment are described in Appendix F.

The HHRA calculated EPCs in sediment based on data segregated into the following data sets:

- Surface Sediment Data (0 to 0.5 feet bgs): Soil data from this depth interval were applied to the future recreational user and future resident.
- Subsurface Sediment Data (0 to 3 feet bgs): Sediment data from the ground surface to the water table (approximately 3 feet bgs) were evaluated because shallow groundwater is present in the non-tidal wetland area. Sediment data from this depth interval were applied to the future recreational user, future construction worker, and future resident.

Maximum detected concentrations in groundwater and soil gas were used to estimate EPCs in trench and indoor air for evaluation of exposure to COPCs in groundwater from volatilization of groundwater into construction trench air or groundwater and soil gas from vapor intrusion to indoor air. Additional details regarding the methods used to calculate EPCs are provided in Section G6.0 of Appendix G.

4.1.3 Toxicity Assessment

The toxicity assessment identifies the reference doses, reference concentrations, slope factors, and inhalation unit risks used to evaluate cancer risks and adverse noncancer health effects.

The Navy (2003) recommends a "dual-tracking" approach for HHRAs to satisfy the HHRA requirements of both the California Environmental Protection Agency (Cal/EPA) and the federal EPA. That is, risk assessments are conducted following two parallel tracks: one that develops potential cancer risk estimates and noncancer hazard estimates using EPA's recommended hierarchy of toxicity values (the federal toxicity criteria), and one that develops these estimates giving preference to Cal/EPA toxicity values (the State of California toxicity criteria). The dual tracking approach was applied to the three sets of risk estimates described above in Section 4.1.1 as follows:

- Total risk – Risk estimates are developed using only the State of California toxicity hierarchy.
- Incremental risk – Two sets of risk estimates are developed – one using the federal toxicity value hierarchy and the second using the State of California toxicity value hierarchy.
- Ambient risk – Risk estimates are developed using only the federal toxicity value hierarchy.

The specific hierarchy of sources used to obtain federal and State of California toxicity criteria is described in Section G7.0 of Appendix G. Special considerations on route-to-route extrapolations, selection of surrogates, chromium, dioxin-like PCBs, nondioxin-like PCBs, and lead are also discussed in Section G7.0 of Appendix G.

4.1.4 Risk Characterization

The risk characterization involves combining EPCs, daily intakes, and toxicity criteria to calculate the potential for health risks associated with exposure to COPCs. Cancer risks and noncancer health hazards are characterized separately. The health risks for the non-tidal wetland area of the IR17 and Building 503 Area were estimated using a risk-based concentration (RBC) approach. This streamlined approach uses the ratio of EPCs to exposure scenario-specific RBCs to estimate health risks. The resulting risk estimates are numerically equivalent to the estimates obtained using the EPA (1989) "forward calculation methodology."

RBCs for sediment for each exposure scenario were calculated for carcinogenic COPCs based on a target cancer risk of 1E-06 and for noncarcinogenic COPCs based on a target noncancer hazard index (HI) of 1. Both cancer-based and noncancer-based RBCs were calculated for COPCs associated with both cancer and noncancer effects. The methodology used to calculate RBCs for the non-tidal wetland area is described in Section G8.0 of Appendix G. As discussed in Section 4.1.3, two sets of cancer risks were calculated, one based on the federal toxicity criteria hierarchy, and the other based on the State of California toxicity criteria hierarchy. Two sets of cancer-based RBCs were developed to calculate two sets of cancer risks, consistent with these two sets of toxicity criteria.

The RBCs were used to calculate cancer risks and noncancer hazards for each receptor and COPC at each exposure area. As detailed in Section 4.1.1, three types of risks were estimated: incremental, total, and ambient. Estimates are the same for total and incremental risks for evaluation of groundwater and vapor intrusion exposure because ambient or background concentrations were not applied to the small groundwater data set and are not associated with chemicals detected in soil gas. All chemicals detected in groundwater and soil gas collected in the most recent sampling events (November 2010 and December 2011) were included in groundwater and vapor intrusion risk estimates.

Cancer risks and noncancer health hazards were characterized separately. The specific methods used to calculate total, incremental, and ambient risks and hazards are detailed in Section G8.0 of Appendix G. Information to aid in interpretation of cancer risks and noncancer hazards estimated for the non-tidal wetland area is provided below. Risks from exposure to lead were evaluated separately; the method used to evaluate lead is also described below.

4.1.4.1 Interpretation of Cancer Risks

EPA guidance on exposure levels considered protective of human health is presented to aid in the interpretation of the results of the risk assessment. Though Mare Island is not on the National Priorities List (NPL), EPA defined general remedial action goals for sites on the NPL in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 CFR Section 300.430). The goals include a range for residual cancer risk, which is "an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}," or 1 in 10,000 (1E-04) to 1 in 1,000,000 (1E-06).

The goals set out in the NCP are applied once a decision to remediate a site has been made. A subsequent EPA directive provides additional guidance on the role of the HHRA in supporting risk management decisions and, in particular, evaluating whether a response action is necessary (EPA 1991). Specifically, the guidance states, "Where cumulative carcinogenic risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the noncancer hazard quotient (HQ) is less than 1, action generally is not warranted unless there are adverse environmental impacts." This HHRA refers to the carcinogenic risk range between 1E-06 and 1E-04 as the "risk management range." The lower end of the range, 1E-06, is referred to as the "point of departure." Risks that do not exceed the point of departure are considered negligible and do not require action.

4.1.4.2 Interpretation of Noncancer Hazards

An HI of less than 1 indicates that adverse noncancer health effects are not expected. If the total HI exceeds 1, further evaluation in the form of a segregation of the HI via a target organ analysis was done in the HHRA to assess whether the noncancer HIs are a concern (EPA 1989). HIs segregated by target organ that are greater than 1 may indicate a potential adverse effect.

4.1.4.3 Characterization of Risks from Exposure to Lead

Based on its unique toxicological properties, exposure to lead is evaluated using a biomarker (blood lead levels); blood lead modeling, which accounts for multiple sources of exposure to lead, is used to predict blood lead levels. DTSC's Office of Environmental Health Hazard Assessment (OEHHA) has set its CHHSL to an estimated blood level of 1 microgram per deciliter (µg/dL) (DTSC 2009a). The Navy has agreed not to increase the blood lead levels to more than background plus 1 µg/dL. Therefore, the residential screening value for lead will be the sum of the ambient concentration of lead at Mare Island (25.6 mg/kg) plus the residential soil CHHSL (80 mg/kg) (DTSC 2009a), to equal a modified OEHHA residential CHHSL of 105.6 mg/kg. Likewise, the sum of the ambient concentration of lead in soil plus the industrial soil CHHSL (320 mg/kg) (DTSC 2009a) would equal a modified OEHHA CHHSL for the industrial worker of 345.6 mg/kg.

The HHRA did not evaluate the potential for health effects from exposure to lead in groundwater. EPA and the State of California have established an action level for lead in groundwa μ
However, groundwater at the site is expected to be classified as non-potable and a drinking water action level is not appropriate for evaluating dermal exposure to groundwater during construction activities. Lead is not highly soluble in water and is not anticipated to move easily across the skin barrier, thus any exposure would result in a *de minimis* dose of lead.

4.1.5 Results of the Risk Assessment

This section presents the estimated cancer risks and noncancer HIs for the non-tidal wetland area at the IR17 and Building 503 Area. The discussion of risks results below is limited to results of the incremental risk evaluation (Attachment G1 of Appendix G). Incremental risks results based on both federal (EPA) and State of California (Cal/EPA) toxicity criteria are discussed. Table 9 presents a summary of the incremental risk results for human health that are discussed below, and also includes total and ambient risk results that are not discussed in detail below. Detailed calculations and summary tables for the total and ambient risk evaluations are presented in Attachments G2 and G3 of Appendix G. A COPC is identified as a COC when the COPC-specific risk exceeds 1E-06 or the COPC-specific HI exceeds 1. The nature and extent of contamination associated with chemicals identified as COCs is discussed above in Section 3.3.

4.1.5.1 Future Recreational User

Surface and subsurface sediment exposure for the future adult and child receptor is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from surface and subsurface sediment to outdoor air. Incremental risks from exposure to sediment, calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Minimal Disturbance Scenario (0 to 0.5 feet bgs)		Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard	Cancer Risk	Noncancer Hazard
Future Recreational User	Federal	5E-07	--	2E-06	0.4
	State of California	7E-07	--	4E-06	0.4

Note:
-- Not calculated; no chemicals having noncarcinogenic effects were detected in surface sediment.

<u>Minimal Disturbance Scenario</u>

For the minimal disturbance scenario (0 to 0.5 feet bgs), the estimated cancer risk from exposure to surface sediment is 5E-07 based on federal toxicity criteria and 7E-07 based on State of California toxicity criteria. Both estimates of cancer risk are below the risk management range of 1E-06 to 1E-04 for cancer effects. Thus, no cancer risk drivers were identified for the recreational user under the minimal disturbance scenario.

A noncancer hazard from recreational exposure to surface sediment was not calculated because none of the surface sediment COPCs is associated with noncarcinogenic health effects.

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cancer risk from exposure to subsurface sediment is 2E-06 based on federal toxicity criteria and 4E-06 based on State of California toxicity criteria. Both estimates of cancer risk are within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. Most of the risk is associated with incidental ingestion of and dermal contact with BAP (2E-06) in subsurface sediment. No cancer risk drivers were identified for the construction worker from exposure to groundwater.

The noncancer HI was 0.4, which is less than the threshold of 1 for noncarcinogens, based on both federal and State of California toxicity criteria hierarchies. Thus, no noncancer risk drivers were identified for the construction worker under the intrusive development scenario.

4.1.5.2 Future Construction Worker

Subsurface sediment exposure for the future construction worker is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from subsurface sediment to outdoor air. In addition, exposure for the future construction worker includes inhalation of volatile chemicals released to outdoor air in a trench. Incremental risks from exposure to subsurface sediment and groundwater, calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard
Future Construction Worker	Federal	8E-07	0.9
	State of California	9E-07	0.9

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cumulative cancer risk for exposure to subsurface sediment and groundwater is 8E-07 based on federal toxicity criteria and 9E-07 based on State of California toxicity criteria. Both estimates of cancer risk are below the risk management range of 1E-06 to 1E-04 for cancer effects, and no cancer risk drivers were identified for the construction worker under the intrusive development scenario.

The cumulative noncancer HI for exposure to subsurface sediment and groundwater based on both the federal and State of California toxicity criteria is 0.9, which is below the threshold of 1 for noncarcinogens. Thus, no noncancer risk drivers for sediment were identified for the construction worker under the intrusive development scenario.

4.1.5.3 Future Resident

Surface and subsurface sediment exposure for the future resident is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from surface and subsurface sediment to outdoor air. In addition, inhalation of volatile chemicals in subsurface sediment (as soil gas) and groundwater that migrate to indoor air (vapor intrusion) is evaluated for this scenario. Incremental risks from exposure to sediment and indoor air (from soil gas), calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Minimal Disturbance Scenario (0 to 0.5 feet bgs)		Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard	Cancer Risk	Noncancer Hazard
Assuming Migration of Volatiles in Soil Gas into Indoor Air					
Hypothetical Future Resident	Federal	2E-06	0.001	5E-06	0.8
	State of California	2E-06	0.0007	7E-06	0.8
Assuming Migration of Volatiles in Groundwater into Indoor Air					
Hypothetical Future Resident	Federal	8E-07	0.0004	4E-06	0.8
	State of California	1E-06	0.0004	6E-06	0.8

Minimal Disturbance Scenario

For the minimal disturbance scenario (0 to 0.5 feet bgs), the estimated cancer risk from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 2E-06 based on both federal and State of California toxicity criteria. The estimated cancer risk from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 8E-07 based on federal toxicity criteria and 1E-06 based on State of California toxicity criteria. All estimates of cancer risk are either below, equal to, or within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. No cancer risk drivers were identified for residential exposure under the minimal disturbance scenario.

The cumulative noncancer HI from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 0.001 based on federal toxicity criteria and 0.0007 based on State of California toxicity criteria. The estimated noncancer HI from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 0.0004 based on both federal and State of California toxicity criteria. All estimates of noncancer hazard are below the threshold of 1 for noncarcinogens. No noncancer risk drivers were identified for residential exposure under the minimal disturbance scenario.

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cumulative cancer risk from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 5E-06 based on federal toxicity criteria and 7E-06 based on State of California toxicity criteria. The estimated cancer risk from exposure to subsurface sediment and volatile chemicals in groundwater migrating to indoor air is 4E-06 based on federal toxicity criteria and 6E-06 based on State of California toxicity criteria. All cancer risk estimates are within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. Most of the cancer risk is associated with exposure to BAP in subsurface sediment. No cancer risk drivers were identified for the resident from exposure to indoor air from potential migration of volatiles in either soil gas or groundwater.

The cumulative noncancer HI from exposure to subsurface sediment and volatile chemicals in soil gas migrating to indoor air is 0.8, based on both federal and State of California toxicity criteria hierarchies. The estimated noncancer HI from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 0.8 based on both federal and State of California toxicity criteria hierarchies. Thus, no noncancer risk drivers were identified for the resident under the intrusive development scenario.

4.1.5.4 Lead

The table below compares the EPCs for lead in surface and subsurface sediment with the modified OEHHA residential and industrial CHHSL (105.6 and 345.6 mg/kg) (see Section 4.1.4.3).

Exposure Medium	Site EPC for Lead (mg/kg)	EPC Exceeds Screening Level?	
		Residential (105.5 mg/kg)	Industrial (345.6 mg/kg)
Surface Sediment	51	No	No
Subsurface Sediment	168	Yes	No

The EPC for lead in surface sediment is less than both the modified OEHHA residential and the modified industrial CHHSL (105.6 and 345.6 mg/kg). The EPC for lead in subsurface sediment exceeds the modified OEHHA residential CHHSL, but not the modified OEHHA industrial CHHSL. Thus, lead was identified as a risk driver in subsurface sediment for a hypothetical future resident.

4.1.6 Uncertainty Evaluation

Some uncertainties are inherent in the estimates of potential cancer risk and noncancer health hazards. The uncertainties fall into two categories: uncertainties associated with the general risk assessment methodologies, and uncertainties uniquely associated with this HHRA. The uncertainty evaluation presented in Section G10.0 of Appendix G includes a discussion of the following: data evaluation and selection of COPCs, exposure assessment, toxicity assessment, and risk characterization. Additional information about the HHRA uncertainty evaluation is presented in Section G10.0 of Appendix G.

4.2 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

A SLERA was previously conducted using site-specific data for the non-tidal wetland area in the southwestern corner of the IR17 and Building 503 Area in the onshore ERA (Tetra Tech 2002c). The results of the onshore SLERA indicate that the non-tidal wetland area at the IR17 and Building 503 Area does not pose unacceptable risk to ecological receptors. However, the SLERA for the non-tidal wetland area has been revised to:

- Include a broader list of representative receptors in the food chain model (FCM) when compared with the previous SLERA.
- Include soil gas data and risk estimates for inhalation exposure of subsurface vapors to burrowing animals that may be present at the site.
- Include additional data necessary to further characterize the nature and extent of contamination within the non-tidal wetland area.

4.2.1 Screening-Level Ecological Risk Assessment Methodology

This section describes the methods and assumptions that were used to complete the revised SLERA. The SLERA was conducted in accordance with Navy policy (Navy 1999, 2004a, 2004b) and EPA guidance (EPA 1997, 2001). Navy policy for conducting ERAs identifies a three-tiered approach that incorporates different levels of complexity (Navy 1999, 2004b). This approach consists of three tiers: (1) Tier 1 – SLERA, (2) Tier 2 – Baseline ERA (BERA), and (3) Tier 3 – evaluation of remedial alternatives.

The Tier 1 SLERA is analogous to Steps 1 and 2 of the EPA guidance (EPA 1997, 2001), and the Tier 2 BERA is analogous to Steps 3 to 7 of the EPA guidance. Within Tier 1, the primary objective of Step 1 is to evaluate whether a complete exposure pathway is present between chemicals of interest and selected ecological receptors. In Step 2, risks are estimated for the chemicals for which complete exposure pathways were identified in Step 1. Risks are estimated by comparing chemical concentrations directly with media-based threshold values, or by modeling chemical doses to representative receptors and comparing the dose estimates with threshold dose values. No unacceptable risks are expected below threshold values. Potential unacceptable risks may exist for chemicals that occur at concentrations or doses that exceed threshold values.

One of the following three outcomes of the Tier 1 SLERA is possible:

1. Ecological risks are acceptable, and no further ERA is necessary.

2. Potential unacceptable risks are indicated, additional ERA is warranted, and the ERA process proceeds to Tier 2.

3. Potential unacceptable risks are indicated, and site remediation is initiated.

If a site is identified in Tier 1 as posing potential unacceptable risks, a Tier 2 BERA is warranted. The Tier 2 BERA is much more site-specific and technically rigorous, and less conservative, than the Tier 1 SLERA. The Tier 2 BERA begins by refining the conservative exposure assumptions employed in the Tier 1 SLERA and recalculating the Tier 1 risk estimates. This refinement step is referred to as Step 3a (Navy 2004a, 2004b).

If the Step 3a refinement of the conservative exposure assumptions supports a determination of acceptable risk, no further action is warranted and the site exits the ERA process. If Step 3a does not support a determination of acceptable risk and continues to indicate an unacceptable risk, the BERA process, beginning with Step 3b, continues for that site.

Appendix H provides a complete description of the methodology that was used to conduct the Tier 1 SLERA and Step 3a risk refinement for the non-tidal wetland area at IR17.

4.2.2 Screening-Level Ecological Risk Assessment

A SLERA includes four primary phases: (1) problem formulation, (2) estimates of exposure, (3) evaluation of ecological effects, and (4) risk characterization. Conservative exposure parameters are identified from the literature during the exposure estimate phase for representative receptors that were established in the problem formulation phase. Chemical exposure levels that represent conservative thresholds for adverse ecological effects are identified from the literature during the ecological effects evaluation. Finally, the potential risks to selected assessment endpoints associated with the site are conservatively estimated during the risk characterization phase.

4.2.2.1 Problem Formulation (Step 1)

The problem formulation step includes development of a CSM to help describe potential exposure at the site. A site visit to identify whether complete exposure pathways and suitable habitat exist for representative receptors was conducted during the onshore ERA (Tetra Tech 2002c).

Selection of Chemicals of Potential Ecological Concern

Surface sediment samples collected between 0 and 2 feet bgs and surface and subsurface sediment samples collected between 0 and 3 feet bgs were analyzed to identify chemicals of potential ecological concern (COPEC). Burrowing receptors were evaluated using data for sediment from 0 to 3 feet bgs rather than the typical 0 to 6 feet bgs (DTSC 1998) because groundwater is encountered in shallow sediment. Plants, invertebrates, and other vertebrate receptors were evaluated using data for sediment collected from 0 to 2 feet bgs.

Conceptual Site Model

The CSM is a framework for relating ecological receptors to contaminated media. The CSM identifies exposure pathways to be evaluated in the SLERA and provides other key information such as chemical sources, release and transport mechanisms, and the relative importance of exposure pathways to specific receptor groups.

Evaluation of Exposure Pathways

Potentially complete exposure pathways to ecological receptors were evaluated based on the fate and transport processes associated with each COPEC. For an exposure pathway to be considered complete, a COPEC must be able to travel from the source to the receptor and must be taken up by the receptor through one or more exposure routes. Complete exposure pathways present the greatest potential risks of adverse effects to receptors of concern. Potential exposure pathways that may result in receptor contact in the non-tidal wetland area include exposure to air via inhalation of volatilized chemicals, sediment via direct contact and incidental ingestion, and food chain transfer via ingestion of contaminated prey.

Exposure to surface water was not evaluated because surface water is intermittent and seasonal within the non-tidal wetland and is attributed to precipitation. Exposure to groundwater was not evaluated because it is assumed that receptors would not burrow to groundwater and expose the burrow to open water. Therefore, there is no complete pathway for contaminant transport from groundwater to surface water or ecological receptors. Furthermore, the wetland is not hydrologically connected to tidal areas of Mare Island, and does not have a sustained fish or aquatic invertebrate population; thus, no complete exposure pathways for aquatic receptors were identified.

Assessment and Measurement Endpoints

Assessment endpoints were identified based on potentially complete exposure pathways. Six wetland vertebrate species were selected as representative of the feeding guilds associated with the non-tidal wetland area.

- The mallard (*Anas platyrhynchos*) as a surrogate for omnivorous birds
- The killdeer (*Charadrius vociferous*) as a surrogate for invertivorous birds
- The northern harrier (*Circus cyaneus*) as a surrogate for carnivorous birds
- The salt marsh harvest mouse (*Reithrodontomys raviventris*) as a surrogate for small herbivorous mammals
- The California vole (*Microtus californicus*) as a surrogate for herbivorous burrowing mammals

- The gray fox (*Urocyon cinereoargenteus*) as a surrogate for carnivorous mammals

Protection of plant, invertebrate, and animal populations was identified as the primary assessment endpoint, with the exception of the salt marsh harvest mouse, where protection of the individual is the assessment endpoint because of the mouse's endangered species status. Measurement endpoints used to evaluate risk to the assessment endpoints consisted primarily of direct comparisons of existing chemical concentrations with literature toxicity information for plants and invertebrates, and with TRVs for vertebrates in the FCM.

4.2.2.2 Exposure and Effects Assessment and Risk Characterization Summary (Step 2)

Existing sediment data from 0 to 2 feet bgs were used to evaluate potential ecological risks to plants, invertebrates, birds, and non-burrowing mammals in the SLERA. Sediment data from 0 to 3 feet bgs and soil gas data were used to evaluate potential risks to burrowing mammals. All COPECs were evaluated for effects on plants and non-tidal wetland macroinvertebrates. With the exception of VOCs, all COPECs were evaluated using an FCM for potential effects on birds and mammals. VOCs were considered COPECs only for plants, non-tidal wetland macroinvertebrates, and burrowing mammals. The inhalation pathway was modeled for detected VOCs in soil gas, which could pose an inhalation risk.

Maximum detected sediment concentrations were compared with Ecological Soil Screening Levels (Eco-SSL) (EPA 2010b) or Oak Ridge National Laboratory (ORNL) plant toxicity benchmarks (Efroymson and others 1997) if Eco-SSLs were not available, to evaluate risk posed to plants from exposure to COPECs. No sediment screening values were available for plants. Maximum detected sediment concentrations were compared with effects-range low sediment concentrations to evaluate risk posed to invertebrates from exposure to COPECs (Long and others 1995). Chemicals with a maximum concentration greater than the toxicological benchmarks were identified as COPECs requiring further evaluation in the SLERA Step 3a risk refinement; chemicals without toxicological benchmarks were also retained as COPECs.

An FCM was used to estimate doses using the maximum detected sediment concentration, and the estimated doses were then compared with established TRVs to calculate HQs to evaluate risk posed to vertebrates from exposure to COPECs. FCMs are used to integrate ecological and chemical information into the risk assessment and assess the exposure of higher-level receptors to chemicals in their diet. The estimated doses of chemicals to ecological receptors of interest are compared with high and low TRVs to estimate the potential adverse biological effects on the vertebrate receptor. Any chemical with a total daily dose greater than the low TRV was identified as a COPEC posing potential risk and so would require further evaluation in the BERA Step 3a risk refinement; any chemical with a total daily dose greater than the high TRV was identified as a COPEC posing potentially significant risk. Chemicals without TRVs were also retained as COPECs.

FCMs assess the exposure of higher-level receptors to chemicals of potential concern in media. Estimates of chemical concentrations in tissue were based on bioaccumulation factors (BAF) developed from collocated tissue and soil data collected in other areas of Mare Island, when available. Literature-derived BAFs were used when Mare Island BAFs were not available, as presented in Appendix H. Doses were calculated using average ingestion rates, minimum body weight, a conservative site use factor equal to 1.0, maximum site-specific concentrations of COPECs in sediment, and estimated concentrations of chemicals in tissue derived from tissue bioaccumulation data. These doses are compared with high and low TRVs to calculate HQs. An HQ greater than 1.0 indicates a chemical poses a potential risk and requires further evaluation in the BERA.

Risk from VOCs via the inhalation pathway was also evaluated for the California vole, the surrogate for burrowing mammals. Inhalation modelling was used to estimate the total air concentration in the burrow using the maximum detected soil gas concentrations, and the estimated burrow air concentrations were then compared with established TRVs to calculate HQs.

The SLERA risk characterization process integrates information from the exposure and effects assessments to evaluate relationships among chemicals and adverse effects on organisms. The conservative assumptions used in the SLERA may overestimate actual risk at the non-tidal wetlands area; therefore, the results of the risk characterization will be used to make recommendations about the need for further ecological investigation. If the results of the SLERA indicate that the site poses acceptable risk, no further ecological investigation is necessary.

Maximum concentrations of a number of COPECs in the non-tidal wetland area pose potential risk to plant, invertebrate, and vertebrate receptors based on the conservative assumptions of the SLERA. The following table presents chemicals with HQs greater than 1 that pose potential risk for specific receptors. These COPECs are further evaluated in the Step 3a risk refinement.

Assessment Endpoint	**COPECs with HQs > 1.0**
Plants	Arsenic, chromium, cobalt, copper, manganese, mercury, molybdenum, nickel, selenium, vanadium, and zinc
Invertebrates	Antimony, arsenic, chromium, copper, lead, mercury, nickel, zinc, total PCBs, and total DDTs
Birds	Arsenic, chromium, copper, lead, manganese, mercury, nickel, selenium, zinc, and total DDTs
Mammals (Ingestion)	Antimony, arsenic, barium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, vanadium, zinc, total HMW PAHs, and total DDTs
Burrowing Mammals (Inhalation)	None

Notes:

HMW High molecular weight

Chemicals without benchmarks or TRVs are also considered to pose potential risk for specific receptors and were further evaluated in the Step 3a risk refinement. These chemicals include:

Assessment Endpoint	COPECs without Screening Benchmarks or TRVs
Plants	Iron, chloromethane, trichlorofluoromethane, xylenes (total), 4-methylphenol, total HMW PAHs, total BHC, total chlordanes, total DDTs, and dioxin TEQ
Invertebrates	Barium, beryllium, cobalt, iron, manganese, molybdenum, selenium, thallium, vanadium, chloromethane, toluene, trichlorofluoromethane, xylenes (total), 4-methylphenol, total BHC, total chlordanes, and dioxin TEQ
Birds	Antimony, beryllium, iron, thallium, total HMW PAHs, total LMW PAHs, and 4-methylphenol
Mammals (Ingestion)	Iron and 4-methylphenol
Burrowing Mammals (Inhalation)	1,4-dioxane

Notes:

BHC Benzene hexachloride

LMW Low molecular weight

TEQ Toxicity equivalency quotient

4.2.3 Results of the Risk Refinement (Step 3a)

COPECs identified as posing potential risk in the Tier 1 SLERA, as well as those that do not have benchmarks or TRVs, were reevaluated in Step 3a. Step 3a reevaluates COPECs retained from Tier 1 to eliminate from further consideration those chemicals that were retained because very conservative exposure scenarios were used, and also to consider site-specific conditions, including background concentrations of metals (see Attachment H2 of Appendix H), and physiochemical conditions that affect the bioavailability of chemicals. The frequency and magnitude of chemical detections are also considered in Step 3a. Less conservative, but more realistic, assumptions are used in Step 3a (EPA 2001).

The results of the Step 3a risk refinement are used to assess whether there is a need for further evaluation of specific COEC in a BERA. The exit criteria for Step 3a, are as follows (Navy 2004b):

- If the reevaluation of the Tier 1 SLERA conservative assumptions (including consideration of background, detection frequency, and other factors) **supports** an acceptable risk determination, the site exits the ERA process.

- If the reevaluation of the Tier 1 SLERA conservative assumptions (including consideration of background, detection frequency, and other factors) **does not support** an acceptable risk determination, the site continues in the Tier 2 BERA process.

Based on the results of Step 3a risk refinement (Appendix H), the following chemicals were identified as final COECs that may require further evaluation.

Risk Summary of COECs for Ecological Receptors	
Plants	None
Non-tidal Wetland Macroinvertebrates	Total DDTs
Birds	None
Mammals	None
Burrowing Mammals (Inhalation)	None

The nature and extent of total DDTs is described in Section 3.3.

5.0 CONTAMINANT FATE AND TRANSPORT

This section provides an evaluation of the fate and transport for risk drivers identified in the non-tidal wetland area of the IR17 and Building 503 Area, including the evaluation approach, chemicals identified as risk drivers, potential migration pathways, and the fate and transport of risk drivers in the non-tidal wetland.

5.1 FATE AND TRANSPORT APPROACH

The approach for fate and transport included an evaluation of (1) physical features and past activities, (2) probable transport pathways for site chemicals, and (3) physical characteristics and chemical characteristics that may influence mobility and behavior of site-specific chemicals.

5.2 CHEMICALS IDENTIFIED AS RISK DRIVERS

Chemicals that were identified as risk drivers in the HHRA and SLERA, and that are included in the fate and transport evaluation, are listed below.

Sediment	Groundwater	Soil Gas
Benzo(a)pyrene [a] Total DDTs [b]	--	--

Notes:

-- No chemical risk drivers were identified for groundwater and soil gas in the non-tidal wetland area.

a Benzo(a)pyrene was identified as a risk driver for human health under both the federal and State of California toxicity hierarchies.

b Total DDTs was identified as a risk driver for ecological receptors only.

5.3 POTENTIAL MIGRATION PATHWAYS

Transport may be accomplished through physical processes for chemicals that are largely immobile in the environment. These transport processes include the wind blowing soil particles, soil erosion from the site by flowing water, volatilization to air, and physical removal (intentional or unintentional) through direct physical contact with the contaminated soil and a

Matthew Rodriquez
Secretary for
Environmental Protection

Department of Toxic Substances Control

Deborah O. Raphael, Director
700 Heinz Avenue
Berkeley, California 94710-2721

Edmund G. Brown Jr.
Governor

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
12	DTSC concurred	Table 1	Letter regarding the Non-Tidal Wetland Investigation, Installation Restoration Site 7 [IR17] and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, and dated September 12, 2012. From Barbara J. Cook, P.E., Assistant Deputy Director, Brownfields and Environmental Restoration Program. To Janet Lear, Navy Base Realignment and Closure Project Management Office West. December 5, 2012.

December 5, 2012

Janet Lear
Department of the Navy
BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Dear Ms. Lear:

Department of Toxic Substances Control (DTSC) and San Francisco Bay Regional Water Quality Control Board (Water Board) staff completed their review of the report titled: *Non-Tidal Wetlands Area Investigation, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California* prepared by Chadux Tt and dated September 12, 2012. The report has been revised to address our previous comments is approved.

If you have any questions, please contact Janet Naito of my staff at (510) 540-3833 or Janet.Naito@dtsc.ca.gov.

Sincerely,

Barbara J Cook

Barbara J. Cook, P.E., Assistant Deputy Director
Brownfields and Environmental Restoration Program

cc: Elizabeth Wells (via electronic mail to: EWells@waterboards.ca.gov)
San Francisco Bay Region Regional Water Quality Control Board

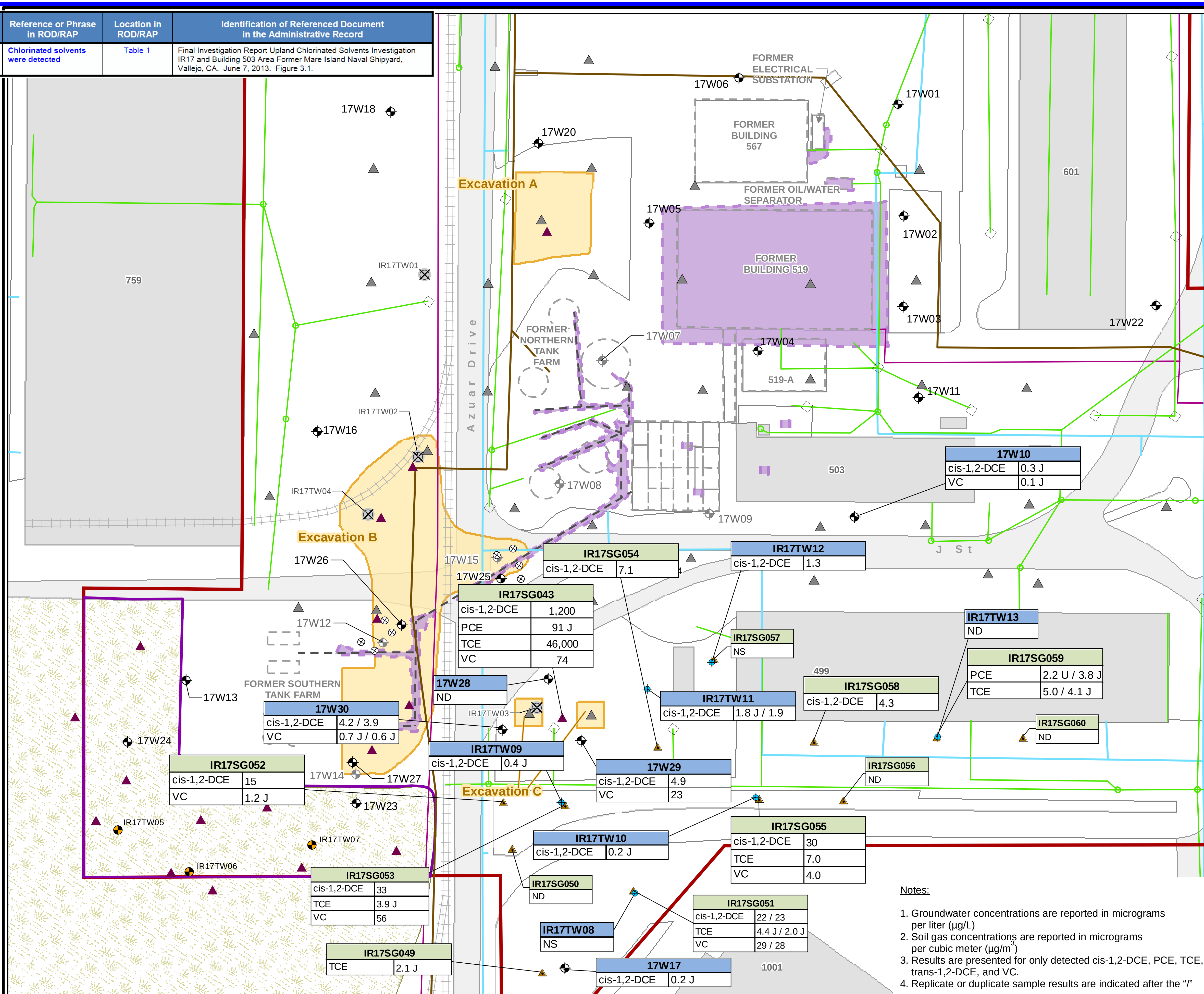
Carolyn D' Almeida (via electronic mail to: dAlmeida.carolyn@epamail.epa.gov)
U. S. Environmental Protection Agency

cc: Tami Nakahara (via electronic mail to: TNakahar@ospr.dfg.ca.gov)
California Department of Fish and Game
Office of Spill Prevention and Response (OSPR)

Reginald Paulding (via electronic mail to: reginald.paulding.ctr@navy.mil)
Heather Wochnick (via electronic mail to: Heather.wochnick@navv.mil)
Department of the Navy
BRAC Program Management Office West

Randa E. Chichakli (via electronic mail to: ChichakliRE@cdmsmith.com)
CDM Smith

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
13	Chlorinated solvents were detected	Table 1	Final Investigation Report Upland Chlorinated Solvents Investigation IR17 and Building 503 Area Former Mare Island Naval Shipyard, Vallejo, CA. June 7, 2013. Figure 3.1.



LEGEND:

- PIEZOMETER (DESTROYED)
- EXISTING MONITORING WELL
- FORMER MONITORING WELL
- FALL 2008 TEMPORARY WELL (DESTROYED)
- EXISTING TEMPORARY WELL
- ACTIVE SOIL GAS SAMPLE (INSTALLED FALL 2010)
- ACTIVE SOIL GAS SAMPLE (INSTALLED FALL 2008)
- ACTIVE SOIL GAS SAMPLE (INSTALLED AUGUST 2012)
- GRAB GROUNDWATER SAMPLE LOCATION (AUGUST 2012)
- UNDERGROUND TELEPHONE LINE
- NON-TIDAL WETLAND PROJECT BOUNDARY
- INSTALLATION RESTORATION SITE 17 AND BUILDING 503 AREA PROJECT BOUNDARY
- STORM WATER PIPELINE
- FRESH WATER PIPELINE
- FORMER PRODUCT DISTRIBUTION PIPELINE
- SALTWATER PIPELINE
- FORMER BUILDING/STRUCTURE
- EXISTING RAILROAD
- PREVIOUS INVESTIGATION EXCAVATION
- NON-TIME CRITICAL REMOVAL ACTION EXCAVATION
- BUILDING/STRUCTURE
- ROAD
- SITE FEATURE
- NON-TIDAL WETLAND

Groundwater Sample
Soil Gas

Acronyms:

J	Estimated concentration
U	Not detected above the stated limit
ND	Not detected
NS	Not sampled
cis-1,2-DCE	cis-1,2-Dichloroethene
trans-1,2-DCE	trans-1,2-Dichloroethene
PCE	Tetrachloroethene
TCE	Trichloroethene
VC	Vinyl Chloride

0 90 180 Feet

GRAPHIC SCALE

Notes:

1. Groundwater concentrations are reported in micrograms per liter (µg/L)
2. Soil gas concentrations are reported in micrograms per cubic meter (µg/m^3)
3. Results are presented for only detected cis-1,2-DCE, PCE, TCE, trans-1,2-DCE, and VC.
4. Replicate or duplicate sample results are indicated after the "/"

FORMER MARE ISLAND NAVAL SHIPYARD
DEPARTMENT OF THE NAVY,
BRAC PMO WEST SAN DIEGO, CALIFORNIA
CHLORINATED SOLVENTS INVESTIGATION REPORT

SAMPLE LOCATIONS AND CHLORINATED SOLVENTS DETECTIONS, AUGUST 2012

CKY Incorporated | ARCADIS | FIGURE 3.1

CITY: San Francisco DIV/GROUP: IM DB:ME LD: PIC: PM: TM: TR:
Project #:EM009777.0000.0002
Path: Q:\USNavy\MareIslandNavalShipyard\ProjectChlorinatedSolventsIR\mxd\Fig3-1_SampleLocationsAndChlorinatedSolventsDetections-August2012.mxd: 10/10/2012: 3:48:50 PM

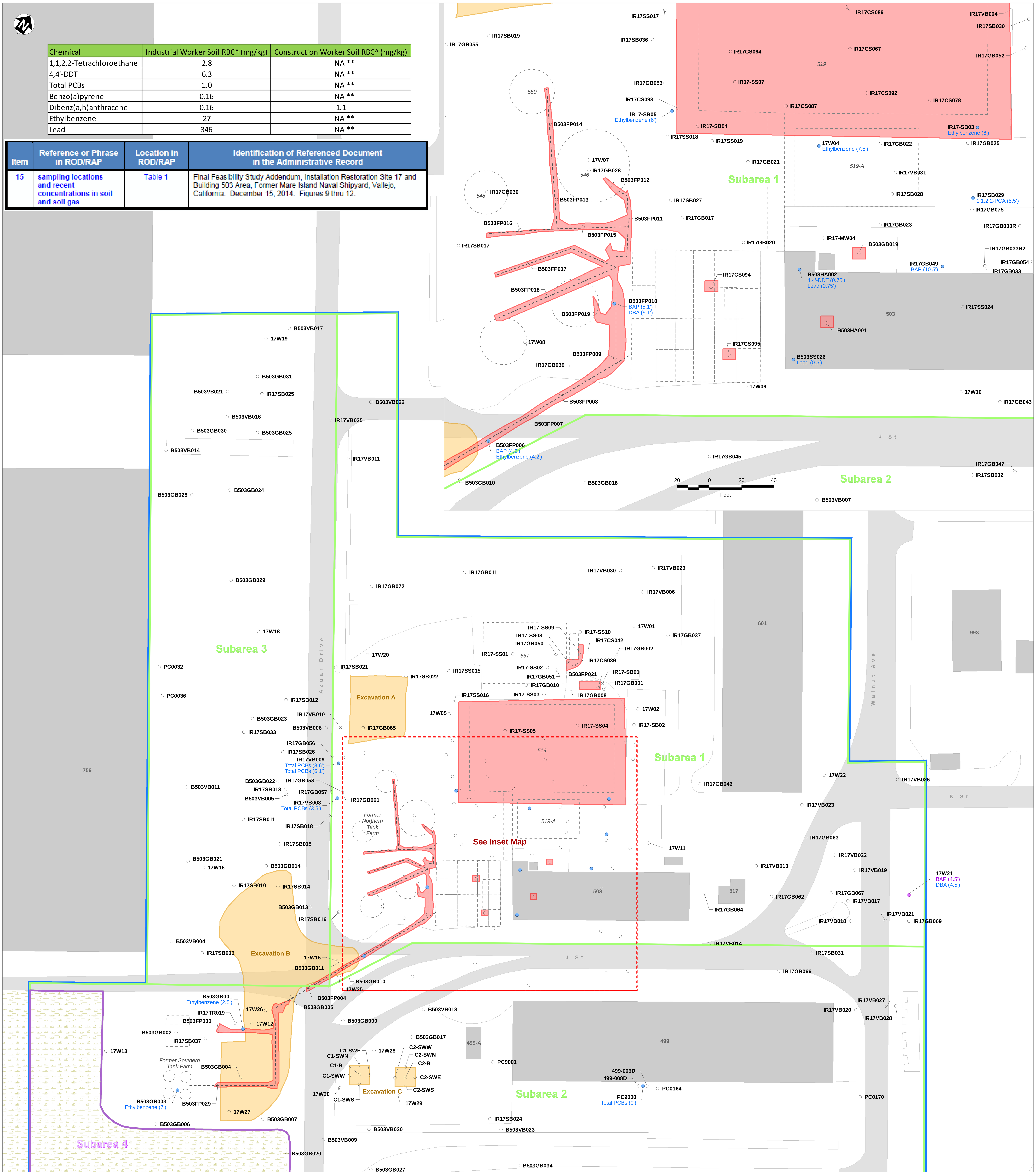
RESPONSES TO DTSC / WATER BOARD COMMENTS

NO.	COMMENT	RESPONSE
Specific 7a	Section 3.1.1.1, Paragraphs 6 and 7. a. Ethylbenzene and xylene cannot be removed as chemicals of concern unless there is more recent data to replace the data collected from 1990 to 1994. DTSC recommends carrying these chemicals through the FS addendum and remedy selection document. If, during the remedial design, additional soil and soil gas samples are collected from the areas where these chemicals were detected and the results are below the applicable remediation goals, the areas can be removed.	a. The Navy collected a replacement soil sample at location IR17GB033 on October 3, 2014, to demonstrate how site conditions have improved over the 20 years since the samples were originally collected in June 1994. The soil sample was collected from a depth between 7 and 8 feet below ground surface (bgs) and was analyzed only for benzene, toluene, ethylbenzene, and xylenes (BTEX); a duplicate soil sample was also collected from the same depth interval. Results of the October 2014 sample indicate a significant decrease in BTEX concentrations at IR17GB033 from natural attenuation. For example, xylenes was detected at 61,000 mg/kg in 1994, but when resampled, the concentrations were 53.3 mg/kg and 69.4 mg/kg for the original and duplicate samples. Ethylbenzene was detected at 7,900 mg/kg in 1994, but when resampled, the concentrations were 6.4 and 8.8 mg/kg for the original and duplicate samples. Based on the October 2014 data for IR17GB033 and updated HHRA, xylene is no longer a risk driver for the commercial/industrial worker or hypothetical future resident, and ethylbenzene is no longer a risk driver for the commercial/industrial worker. Ethylbenzene still remains a risk driver for the hypothetical future resident, however, the cancer risk is in the low end of the risk management range and is recommended for no further evaluation in the FS addendum.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
14	significant decrease in BTEX	Table 1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California, December 15, 2014. Table E-1, Response to Comments, Response to Department of Toxic Substance Control Specific Comment 7.a.

Chemical	Industrial Worker Soil RBC^ (mg/kg)	Construction Worker Soil RBC^ (mg/kg)
1,1,2,2-Tetrachloroethane	2.8	NA **
4,4'-DDT	6.3	NA **
Total PCBs	1.0	NA **
Benzo(a)pyrene	0.16	NA **
Dibenz(a,h)anthracene	0.16	1.1
Ethylbenzene	27	NA **
Lead	346	NA **

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
15	sampling locations and recent concentrations in soil and soil gas	Table 1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Figures 9 thru 12.



Soil Sampling Location (1990 through 2013)

Magnitude of Exceedance*

- > 1000x RBC
- > 100x RBC
- > 10x RBC
- > 1x RBC

Former Product Distribution Pipeline

Non-Time Critical Removal Action Excavation (2010)

Other Excavation (1999)

IR17 and Building 503 Area Boundary

Non-Tidal Wetland Boundary

Upland Subareas

Building/Structure

Road

Site Feature

Wetland

Removed Structure

Notes:

*	Sample locations are colored according to the highest magnitude of exceedance. Labels indicate those analytes which exceed their RBC and the bottom depth (ft bgs) of exceeding samples, with colors corresponding to the magnitude of the exceedance. No color assignment indicates no RBC exceedances. Exceeded criteria are for an industrial worker unless otherwise indicated.
**	Not applicable; this chemical was not identified as a soil risk driver for a construction worker.
^	Derivation of the RBCs is described in Table 4.

BAP	Benzo(a)pyrene
COC	Chemical of concern
DBA	Dibenz(a,h)anthracene
DDT	Dichlorodiphenyltrichloroethane
ft bgs	Feet below ground surface
HHRA	Human health risk assessmernt
IR	Installation Restoration
mg/kg	Milligrams per kilogram
NA	Not applicable
PCA	Tetrachloroethane
PCBs	Polychlorinated biphenyls
RBC	Risk-based concentration

Well or Boring Name — B503FP006
Chemical — BAP (4.2') Ethylbenzene (4.2')
Bottom depth of sample

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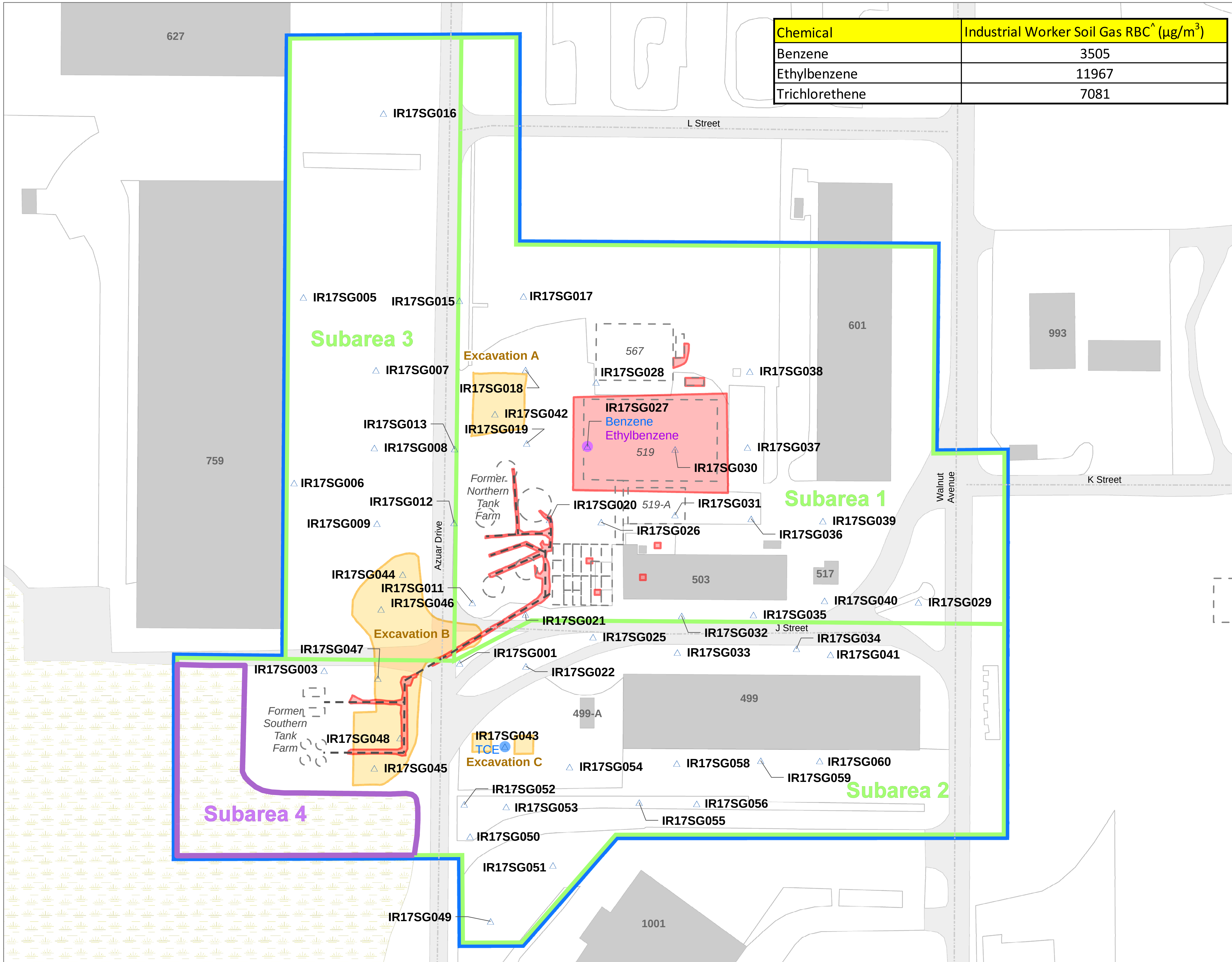
Former Mare Island Naval Shipyard, California
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 9
RISK DRIVERS IN SOIL ABOVE RISK-BASED CONCENTRATIONS FOR FUTURE COMMERCIAL/INDUSTRIAL AND CONSTRUCTION WORKERS

IR17 and Building 503 Feasibility Study Addendum



Chemical	Industrial Worker Soil Gas RBC^ (µg/m³)
Benzene	3505
Ethylbenzene	11967
Trichlorethene	7081

Soil Gas Sampling Location (2008 through 2012)

Magnitude of Exceedance*

- > 1000x RBC
- > 100x RBC
- > 10x RBC
- > 1x RBC

Former Product Distribution Pipeline

Non-Time Critical Removal Action Excavation (2010)

Other Excavation (1999)

IR17 and Building 503 Area

Non-Tidal Wetland Boundary

Upland Subareas

Removed Structure

Building/Structure

Road

Site Feature

Wetland

Notes:

* Sample locations are colored according to the highest magnitude of exceedance. Labels indicate those analytes which exceed their RBC, with colors corresponding to the magnitude of the exceedance. No color assignment indicates no RBC exceedances.

^ Derivation of the RBCs is described in Table 4.

IR Installation Restoration
RBC Risk-based concentration
TCE Trichloroethene
ug/m³ Micrograms per cubic meter

60 0 60 120

Feet

TriEco Tt A Joint Venture

Former Mare Island Naval Shipyard, California

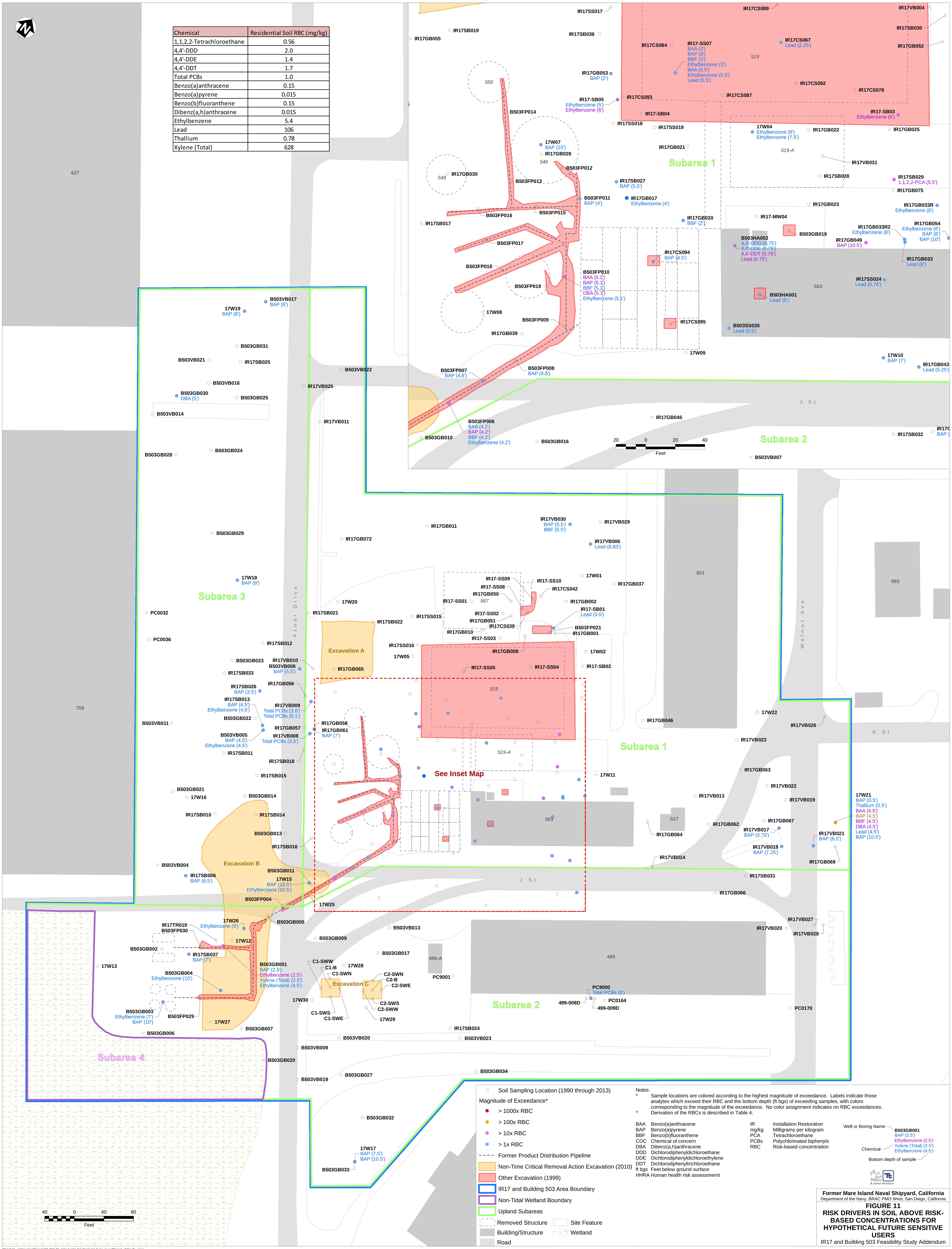
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 10

RISK DRIVERS IN SOIL GAS ABOVE RISK-BASED CONCENTRATIONS FOR FUTURE COMMERCIAL/INDUSTRIAL WORKERS

IR17 and Building 503 Feasibility Study Addendum

2014-12-04 \\DISKSTATION\TriEcoProjects\NAVFAC - AECRU V\BRAC 2\CTO -0016 -0039 Mare Island\MINS_GIS\103_IR17_FS_Addendum\10_SoilGas_Industrial_11x17_r2c.mxd TriEco-SD clynch



Chemical	Residential Soil RBC (mg/kg)
1,1,2,2-Tetrachloroethane	0.56
4,4'-DDD	2.0
4,4'-DDE	1.4
4,4'-DDT	1.7
Total PCBs	1.0
Benzo(a)anthracene	0.15
Benzo(a)pyrene	0.015
Benzo(b)fluoranthene	0.15
Dibenz(a,h)anthracene	0.015
Ethylbenzene	5.4
Lead	106
Thallium	0.78
Xylene (Total)	628

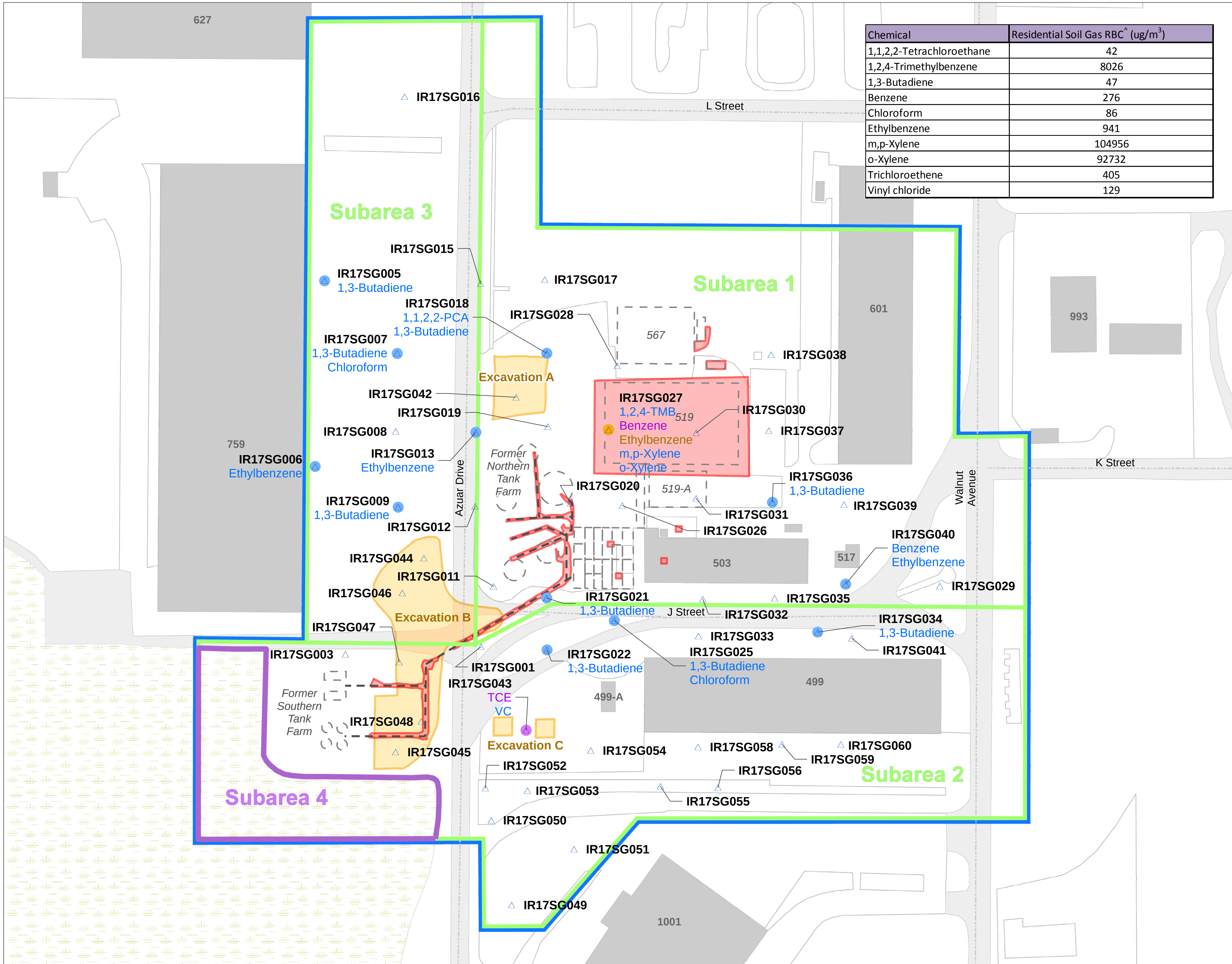
Former Mare Island Naval Shipyard, California

Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 11

RISK DRIVERS IN SOIL ABOVE RISK-BASED CONCENTRATIONS FOR HYPOTHETICAL FUTURE SENSITIVE USERS

IR17 and Building 503 Feasibility Study Addendum



Chemical	Residential Soil Gas RBC^ (ug/m^3)
1,1,2,2-Tetrachloroethane	42
1,2,4-Trimethylbenzene	8026
1,3-Butadiene	47
Benzene	276
Chloroform	86
Ethylbenzene	941
m,p-Xylene	104956
o-Xylene	92732
Trichloroethene	405
Vinyl chloride	129

Soil Gas Sampling Location (2008 through 2012)

Magnitude of Exceedance*

- > 1000x RBC
- > 100x RBC
- > 10x RBC
- > 1x RBC

Former Product Distribution Pipeline

Non-Time Critical Removal Action Excavation (2010)

Other Excavation (1999)

IR17 and Building 503 Area Boundary

Non-Tidal Wetland Boundary

Upland Subareas

Removed Structure

Building/Structure

Road

Site Feature

Wetland

Notes:

*	Sample locations are colored according to the highest magnitude of exceedance. Labels indicate those analytes which exceed their RBC, with colors corresponding to the magnitude of the exceedance. No color assignment indicates no RBC exceedances.
^	Derivation of the RBCs is described in Table 4.
IR	Installation Restoration
PCA	Tetrachloroethane
RBC	Risk-based concentration
TCE	Trichloroethene
TMB	Trimethylbenzene
ug/m^3	Micrograms per cubic meter
VC	Vinyl chloride

60 0 60 120

Feet

TriEco A Joint Venture

Former Mare Island Naval Shipyard, California

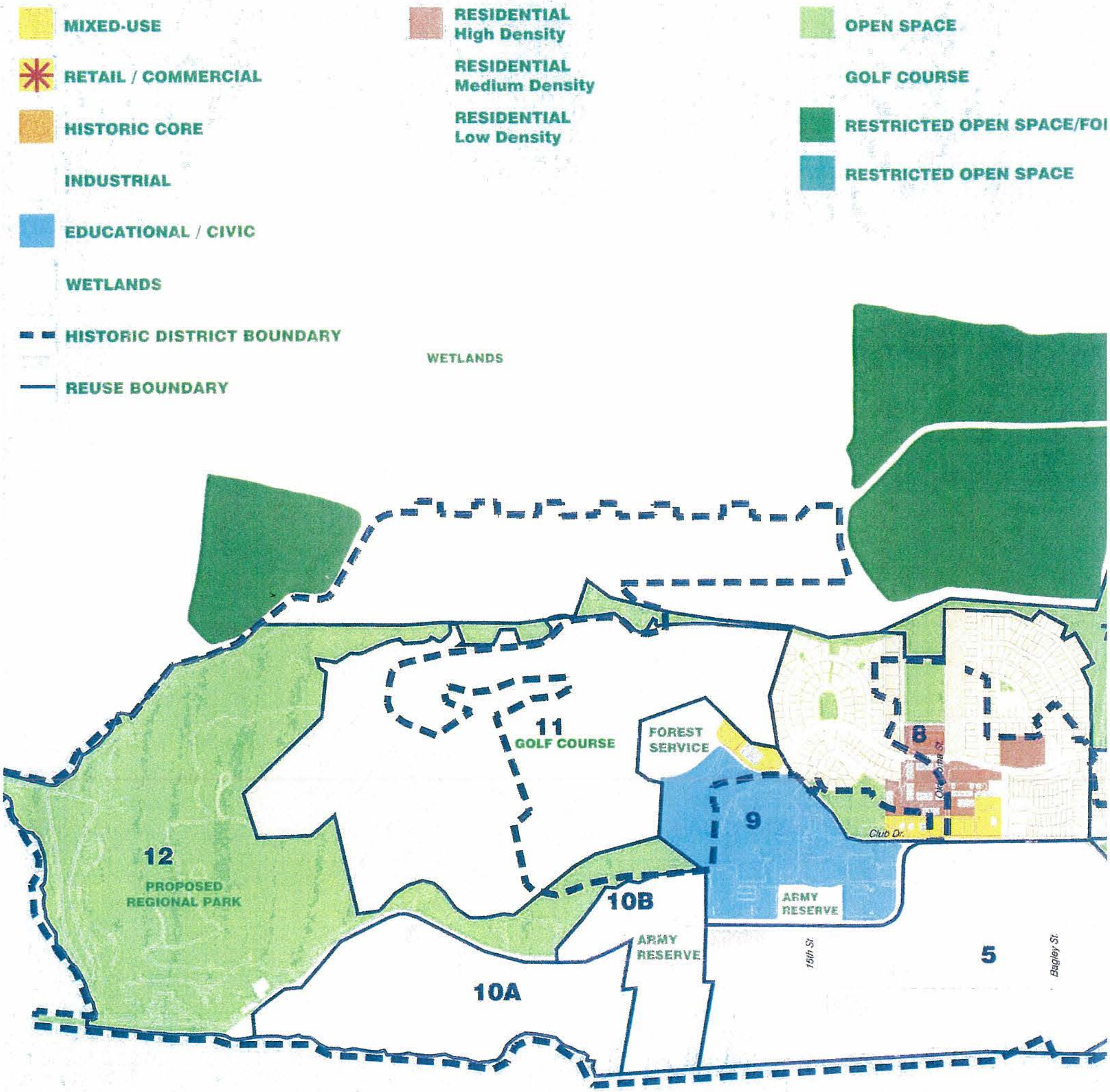
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 12

RISK DRIVERS IN SOIL GAS ABOVE RISK-BASED CONCENTRATIONS FOR HYPOTHETICAL FUTURE SENSITIVE USERS

IR17 and Building 503 Feasibility Study Addendum

2014-12-04 \\DISKSTATION\TriEcoProjects\NAVFAC - AECRU V\BRAC 2\CTO -0016 -0039 Mare Island\MINS_GIS\103_IR17_FS_Addendum\12_SoilGas_Residential_11x17_r2b.mxd TriEco-SD clynch



Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
16	Mare Island Specific Plan as amended	Section 2.4	Mare Island Specific Plan. Adopted March 1999; amended and restated December 2005; amended July 2007; and amended June 2008. City of Vallejo. 2008. Figure 3.1 and Sections 3.2.4, 3.3.1, 3.5.1, 3.5.2, and 3.5.18.

Note: Land uses are subject to change at any time without notice. Building masses shown for diagrammatic purposes only and do not constitute final buildout.

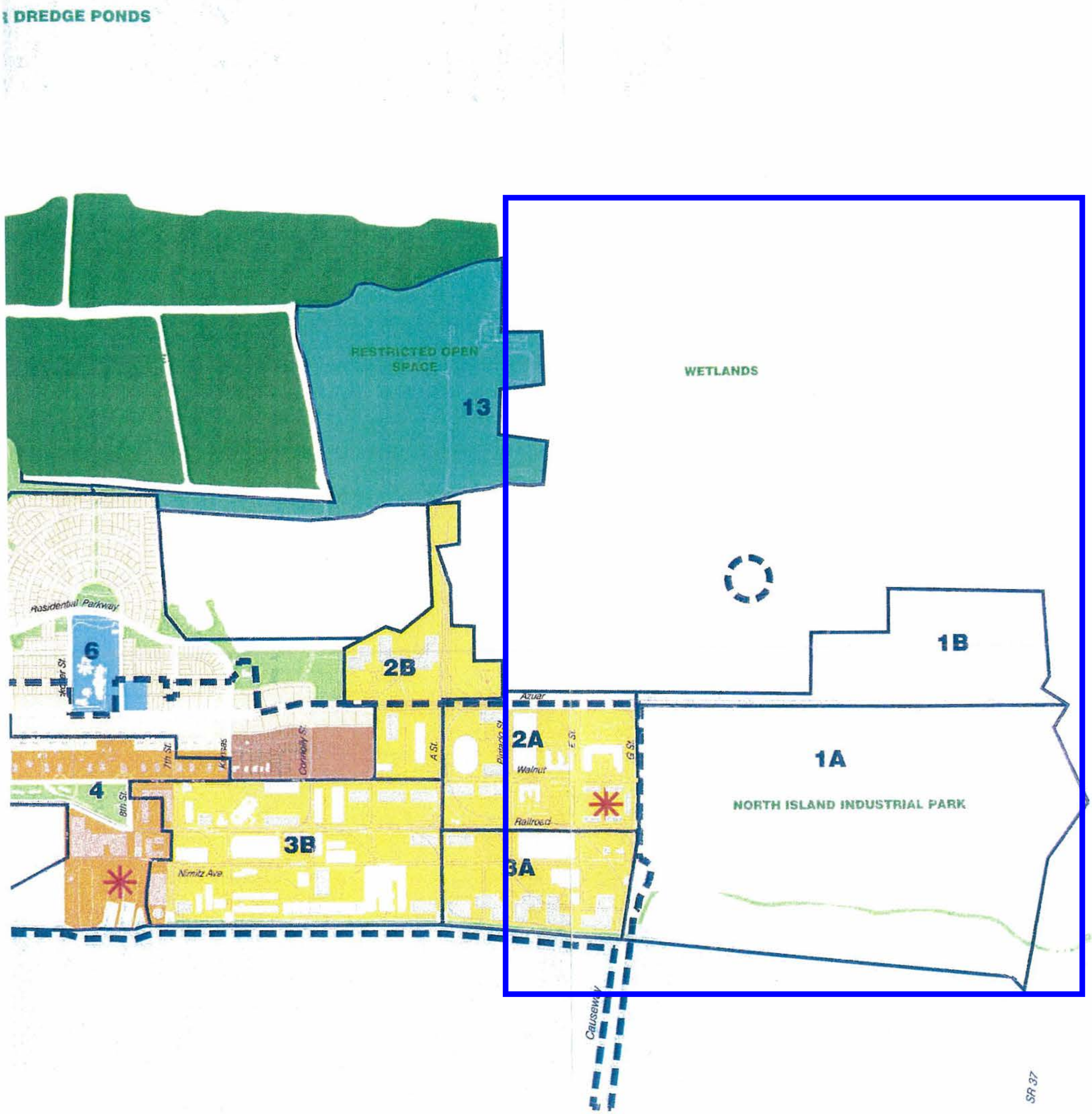


Figure 3.1

Land Use

Mare Island Specific Plan, Revised January 2008

3.2.1 Federal Transfer

As part of the base closure process, federal agencies were given the opportunity to request that portions of Mare Island be transferred for federal activities. The requests from four agencies were accepted by the Navy, and the resulting federal transfer properties were conveyed to the U.S. Army Reserve, the U.S. Forest Service, the U.S. Fish and Wildlife Service and the U.S. Coast Guard. Federal transfer properties are exempt from local land use authority and are not subject to the provisions of the Specific Plan.

3.2.2 Dredge Ponds

The inactive dredge ponds are required by the Three Party Dredge Pond Agreement to be designated for uses compatible with managed wetlands, open space or conservation. These uses may also include pond maintenance, interpretative, and scientific/educational facilities as well as access roadways and trails, as consistent with the use restrictions under the Agreement. The dredge pond areas comprise approximately one-third of the large, undeveloped western half of the Island. At one time, there were approximately ten ponds, all of which are presently inactive.

3.2.3 Conservation Easement

Certain undeveloped areas of Mare Island have been determined by the U.S. Fish and Wildlife Service to have significant habitat value. These areas are permanently protected from any level of development. The compatibility of future open space, managed wetlands and conservation uses for the inactive dredge ponds, as set forth in Section 3.2.2, above, with adjacent conservation easements must be considered in the designation of those uses. Such compatibility is to be ensured by the active participation of the State Lands Commission in future use approvals for the inactive dredge pond areas.

3.2.4 Open Space

This category encompasses open space uses that are both public and private, but that are lawfully used by the public. Open space includes uses, as approved appropriate by the Planning Manager, that are dedicated to preserving and supporting the permanent open space areas of Mare Island, including the inactive dredge ponds and surrounding areas. Urban uses are limited to those areas that are compatible with and complementary to the permanent open space or that are necessary to support, service and maintain these areas.

3.2.5 Developed Recreation

This category encompasses both public and privately operated recreational uses. These uses provide both active and passive recreation activities for residents, workers, and visitors of Mare Island, as well as for the greater Vallejo community. They include but are not limited to the following categories, as confirmed and approved by the City:

Table 3-1: Summary Development Program

Mixed-Use (Non-Residential): (Office/R&D, light industrial, retail, warehousing)	6,265,772 sf
Industrial: (Heavy industrial)	1,537,126 sf
Education/Civic:	1,254,698 sf*
Total Non-Residential:	9,057,596 sf
Total Residential:	1,400 units

*Includes federal agencies)

A summary description of the distribution of these major land use designations among the 13 Reuse Areas is provided as follows:

3.3.1 Mixed-Use Office/Research & Development

Reuse Area 1A (**North Island Industrial Park**) is a proposed employment area north of the Mare Island Causeway and east of Azuar Drive that is identified for a development program of 1.2 million square feet of light industrial, commercial, office R&D and warehouse uses.

3.3.1 Industrial

Reuse Area 1B (**Northwest Industrial Area**) is proposed for warehousing, light and heavy industrial.

Reuse Area 5 (**Waterfront Industrial Park**) and Reuse Area 10A (**South Island Business Park**), will provide locations for major heavy and light industrial development that utilizes the existing buildings and waterfront access while also allowing for new infill buildings of compatible size and function. Reuse Area 10B (**Army Reserve**), with its existing port facilities and warehouses, is a location for continued Army Reserve activities.

3.3.2 Mixed-Use Employment

South of Mare Island Causeway is the major mixed-use employment center of Mare Island, consisting of office, retail/service, R&D, and light industrial uses in existing and infill buildings sited along the existing street grid.

Reuse Area 2A (**Town Center**) incorporates a number of distinctive historic buildings along Walnut Avenue and additional new infill development along Walnut Avenue and Azuar Drive. A 50,000 square foot commercial center provides retail services at the intersection of Railroad Avenue and G Street.

Qualifying Notes for **Table 3-2**: Development Program by Reuse Area

- Building areas include proposed buildings and existing buildings to remain.
- Civic Use in Reuse Area 4 includes some historic buildings not under the control of the Master Developer.
- Civic use in Reuse Area 9 is part of Touro University development program total square footage.
- Building area totals do not include utility facilities.
- Roosevelt Terrace (29 acres) is privately developed and is no longer part of the Specific Plan Area.

3.5.1 Reuse Area 1A (North Island Industrial Park)

The North Island Industrial Park (Reuse Area 1A) contains a total of 155 acres situated in the northern portion of Mare Island. It has direct access to the State Route 37 interchange. State Route 37 and the North Gate form the northern boundary; G Street and the Causeway form the southern boundary. To the west are Reuse Area 1B and wetland areas, and to the east are wetlands and Mare Island Strait. A large pier extends from Reuse Area 1A into Mare Island Strait. This Reuse Area is not within the Historic District.

This Reuse Area will be developed primarily with light industrial, warehouse and office uses in a contemporary office park. A small commercial area to serve primarily office park users will be located at the entrance. The Waterfront Promenade will extend the length of the eastern edge of the area on the upland portion.

(A) Land Use

Given the direct freeway access and the relative absence of historic properties, Reuse Area 1A is intended for comprehensive development with new buildings as a warehouse/distribution district or office park.

- Approximately 29 acres in Reuse Area 1A are to be dedicated as a conservation easement.
- The proposed development program for Reuse Area 1A is 1,222,000 square feet of mixed-use (54,000 office/R&D; 348,000 retail; and 370,000 warehouse, and 450,000 square feet light industrial) and 6,000 square feet educational/civic.

3.5.2 Reuse Area 1B (Northwest Industrial Area)

Reuse Area 1B, a 37-acre industrial and warehousing site, will be part of the major industrial development at the northern end of Mare Island near the State Route 37 interchange. It is separated from Reuse Area 1A by Azuar Drive on the east and, on the south, west and north, is bordered by wetlands, and an inactive dredge disposal area.

(A) Land Use

Reuse Area 1B is identified for development with approximately 700,000 square feet of industrial uses including 516,563 square feet of mixed use (271,128 square feet of light industrial and 245,435 square feet of warehousing) and 183,437 square feet of heavy industrial. Initially this program and the associated parking, loading and internal circulation will be accommodated within the site's five existing buildings (Buildings 625, 627, 629, 751, and 759). None of these buildings are historic (the Reuse Area is not within the Historic District), and they may be replaced at a future date.

- Recycling/processing shall be limited to existing operations in the northwestern corner of Reuse Area 1B, with all outdoor areas fenced and landscaped and with all materials and equipment stored outdoors screened from view.
- The existing rail line and proposed spurs provide flexibility for railcar storage and train operations that support the designated heavy industrial/warehouse land uses.

3.5.3 Reuse Area 2A (Town Center)

Reuse Area 2A historically was a center of activity on the Island and will serve as Mare Island's Town Center, offering opportunities for a variety of recreation, retail, multi-family housing, and office/R&D type uses within a compact, pedestrian-oriented setting. It is intended to be the site of several important island destinations, including Rodman Center (Building 545) with its indoor recreational activities, a new retail center, and high density apartments.

The 48 acre Reuse Area 2A is located at the junction of major access roadways and is bounded by G Street on the north, Railroad Avenue on the east, A Street on the south, and Azuar Drive on the west. Development within Reuse Area 2A includes a combination of preservation, rehabilitation, and new infill construction.

(A) Land Use:

Reuse Area 2A is proposed for development with approximately 438,755 square feet of mixed use (including 288,730 square feet of office/R&D, 100,025 square feet of light industrial, and a 50,000 square foot retail commercial center); 131,245 square feet of educational/civic; and 100 high density residential units.

The Land Use Plan provides a concentration of land use in Reuse Area 2A that support creation of a Town Center while providing a smaller, separate concentration of industrial uses where they do not negatively impact the Town Center functions.

- Land use should reinforce the Town Center character while requiring minimal change to historic context and building fabric.

- The Naval Ammunition Depots located in Reuse Area 12 is part of a National Historic Landmark (NHL) District and includes some of the earliest structures on Mare Island, including a cemetery and archaeological features such as portions of a seawall and earth works from a Civil War era defense battery.

- Given that much of the area will remain in public ownership and is planned for public use, protection of the large number of historic resources may require restricting access to the NHL sub-area and limiting transport vehicles through the area.

3.5.17 Reuse Area 13 (Open Space/Recreation)

Reuse Area 13 is approximately 92 acres in size. It is bounded on almost all sides by wetlands and inactive dredge ponds. On the east side, it shares a short boundary with the West Business Park (Reuse Area 2B).

(A) Land Use:

Public access is prohibited for approximately 60 acres of Reuse Area 13 (RCRA). The remaining 32 acres is proposed for developed recreational uses as public open space.

3.5.18 Wetlands, Submerged Lands and Dredge Disposal Areas

Wetlands, submerged lands and inactive dredge ponds total approximately 3,787 acres, which are primarily the western half of Mare Island, but which also include water areas along the eastern and southern sides of Mare Island. Wetlands and submerged lands total approximately 2,865 acres and the inactive dredge ponds total approximately 922 acres. Approximately 162 acres were originally intended to be transferred to the U.S. Fish and Wildlife Service including Building 505. The land was to be used as an extension of the San Pablo Wildlife Refuge and as an interpretive center. However, in 2005, the U.S. Fish and Wildlife Service vacated Building 505 and a new sponsor of the proposed Wildlife Refuge and interpretive center has not been identified.

(A) Land Use:

- Wetlands: wetland areas; conservation easements; habitat maintenance and restoration; interpretive facilities, scientific/educational facilities; and trails

- Inactive Dredge Ponds: maintenance facilities; interpretative facilities; scientific/educational facilities; trails; open space, conservation and habitat management

- Eco-Recreation/Education: interpretative facilities, scientific/educational facilities, trails, staging areas, passive recreation and concessions

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
17	screening-level HHRA	Section 2.5.1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Pages G-1 through G-34 of Appendix G.

G1.0 INTRODUCTION AND OBJECTIVES

This appendix presents the methods for and the results of the human health risk assessment (HHRA) for the 1-acre, non-tidal wetland area located in the southwestern corner of the Installation Restoration Site 17 (IR17) and Building 503 Area at the former Mare Island Naval Shipyard (Mare Island) in Vallejo, California (see Figure 3 of the main report). This appendix is provided as part of the non-tidal wetland investigation report being prepared to supplement the Remedial Investigation (RI) for Investigation Area (IA) A1 within which the IR17 and Building 503 Area is located (SulTech 2006). The HHRA incorporates guidance issued by the Department of Navy, the U.S. Environmental Protection Agency (EPA), and the California Environmental Protection Agency's (Cal/EPA) Department of Toxic Substances Control (DTSC).

Sections 2.0 and 3.0 of the non-tidal wetland investigation report include background information on the history of the IR17 and Building 503 Area; summarize historical operations at Mare Island; describe the physical characteristics of the area, and the nature and results of environmental investigations for the non-tidal wetland area. This information was used to conduct this HHRA but is not repeated in detail in this appendix.

HHRAs are prepared to evaluate potential health risks under current and future land use conditions. The specific objectives of this HHRA are as follows:

- Estimate the magnitude of potential human health risks associated with current site conditions and potential future land use scenarios.
- Identify the environmental media and chemicals that pose the primary health concerns.
- Provide a foundation for assessing the need for response actions.

The remainder of this appendix, organized as follows, presents the methods for and results of each of these steps:

- Section G2.0 – Risk Assessment Guidelines (Overview of the HHRA methodology)
- Section G3.0 – Conceptual site model
- Section G4.0 – Data used in the risk evaluation
- Section G5.0 – Identification of chemicals of potential concern (COPC)
- Section G6.0 – Exposure assessment
- Section G7.0 – Toxicity assessment
- Section G8.0 – Risk characterization
- Section G9.0 – Results of the HHRA
- Section G10.0 – Uncertainty analysis.

References used to prepare this appendix are listed in Section G11.0. Figures and tables are presented after the references. Five attachments (G1 through G5) accompany this appendix. Attachment G1 contains the analytical data summaries, exposure point concentration (EPC) summaries, detailed incremental risk calculations, and summaries of risk results for the non-tidal wetland area. Attachment G2 contains detailed risk estimates for all chemicals detected above ambient conditions. Attachment G3 contains detailed risk estimates for chemicals that were detected at less than ambient concentrations. Attachments G4 and G5 describe the methods used to estimate concentrations of chemicals in outdoor and indoor air, respectively.

G2.0 RISK ASSESSMENT GUIDELINES

The methods used to conduct the HHRA are based on the risk assessment framework developed by EPA. The framework is set forth in *Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A)* (EPA 1989) and "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities" (DTSC 1992). The EPA HHRA framework consists of the following six basic steps:

1. **Conceptual Site Model (CSM):** This step involves identifying potential exposure pathways to the COPCs and identifying human populations that might be exposed to these under current or future site conditions.

2. **Data Evaluation and Selection of COPCs:** This step consists of evaluating the analytical data for usability in the HHRA, grouping analytical data by medium and selecting COPCs in media.

3. **Exposure Assessment:** This step quantifies exposure to the COPCs identified for potentially complete exposure pathways. EPCs are estimated from measured or modeled concentrations, and pathway-specific intakes (doses) are estimated using hypothetical human receptors for evaluation in the subsequent risk calculations.

4. **Toxicity Assessment:** This step consists of compiling toxicity values that characterize potential adverse health effects from exposure to COPCs.

5. **Risk Characterization:** This step combines the results of the previous steps to quantitatively characterize potential risks to human health associated with exposure to COPCs at the area evaluated. Both potential cancer risks and noncancer hazard indices (HI), a measure of the potential for adverse health effects other than cancer, are evaluated.

6. **Uncertainty Analysis:** This step analyzes the major uncertainties associated with the risks and hazards calculated.

G3.0 CONCEPTUAL SITE MODEL

The CSM summarizes information on sources of chemicals at the non-tidal wetland area, affected environmental media, chemical release and transport mechanisms that may occur at the site, potentially exposed receptors, and potential exposure pathways for each receptor. Figure G-1 presents the CSM for the non-tidal wetland area. The components of the CSM are discussed below.

G3.1 SOURCES OF SITE CHEMICALS

Historical uses of the IR17 and Building 503 Area are summarized in Section 2.0 of the main report. Chemicals detected within the non-tidal wetland area of the IR17 and Building 503 Area include metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), pesticides, polychlorinated biphenyls (PCB), and total petroleum hydrocarbons (TPH).

G3.2 AFFECTED ENVIRONMENTAL MEDIA

Historical uses of the IR17 and Building 503 Area have resulted in chemical releases to upland soil and groundwater. This HHRA considers sediment and groundwater within the non-tidal wetland area as potential sources of exposure to chemicals. Specific information on the nature and extent of chemical releases in the non-tidal wetland area are summarized in Section 3.3 of the main report.

G3.3 CHEMICAL RELEASE AND TRANSPORT MECHANISMS

Chemical release and transport mechanisms for the chemicals detected at the non-tidal wetland area are shown on Figure G-1. Sediment is assumed in the HHRA to be dry. Based on these transport mechanisms, nonvolatile chemicals detected in sediment may migrate to ambient (outdoor) air, and volatile chemicals detected in sediment and groundwater may migrate to outdoor and indoor air. Outdoor air and indoor air are therefore considered additional sources of exposure for chemicals at the non-tidal wetland area.

G3.4 POTENTIALLY EXPOSED HUMAN RECEPTORS

The non-tidal wetland area of the IR17 and Building 503 Area is not currently used; therefore, no current receptors were identified for evaluation in the HHRA.

According to the Mare Island Specific Plan (City of Vallejo 2008), reuse of the wetland area may include wetlands, conservation easements, habitat maintenance and restoration, interpretive facilities, scientific and educational facilities, and trails. The reasonably anticipated future land use for the non-tidal wetland area would remain as open space/recreational.

Potential future receptors may include a future recreational user who may visit the non-tidal wetland area and a future construction worker who may be present at the site to conduct maintenance on or to install utilities. Commercial/industrial reuse of the non-tidal wetland area is not a planned use and is not evaluated in this HHRA. Though residential use is also not a planned use for the non-tidal wetland area, an evaluation of an unrestricted use scenario (such as residential) was conducted to determine whether the property can be released by the Navy without restriction. Thus, the Navy evaluated the effects to a future hypothetical residential receptor.

G3.5 POTENTIALLY COMPLETE EXPOSURE PATHWAYS

According to guidance from EPA (1989), a complete exposure pathway consists of four elements:

- A source and mechanism of chemical release
- A retention or transport medium (or media, in cases involving transfer of chemicals)
- A point of potential human contact with the contaminated medium (referred to as the exposure point)
- An exposure route (such as ingestion) at the contact point

If any of these elements is missing (except in a case where the source itself is the point of exposure), the exposure pathway is considered incomplete. For example, if human contact with the source or transport medium does not occur, the exposure pathway is incomplete and is not quantitatively evaluated for risk. Similarly, if human contact with an exposure medium is not possible, the exposure pathway is considered incomplete and is not evaluated.

The CSM for the non-tidal wetland area summarizes the information on sources of COPCs, affected environmental media, COPC release and transport mechanisms that may occur at the non-tidal wetland area, potentially exposed receptors, and potential exposure pathways for each receptor (see Figure G-1). Potentially complete exposure pathways are designated by a "C" in the CSM. Incomplete exposure pathways are designated by an "I." Quantitative risk evaluation (that is, calculation of numerical cancer and noncancer risk estimates) was conducted for exposure pathways identified in the CSM as potentially complete. This information is also summarized in Table G1-1.1 of Attachment G1.

Many of the exposure pathways for the future exposure scenarios (recreational user, construction worker, and resident) are based on assumed future exposures; these pathways are considered potentially complete and are evaluated to provide a conservative estimate of risk.

G3.5.1 Sediment

Three potentially complete exposure pathways for surface sediment and subsurface sediment were identified for each receptor selected for evaluation in the HHRA:

- Incidental ingestion of sediment
- Dermal contact with sediment
- Inhalation of chemicals released to outdoor air from wind erosion and volatilization

Sediment is assumed in the HHRA to be dry. Exposure to surface sediment (0 to 0.5 feet below ground surface [bgs]), which assumes current site conditions or minimal disturbance of the site during future land use, was evaluated for the future recreational user and future resident. Exposure to combined surface and subsurface sediment (0 to 3 feet bgs) was evaluated for the future recreational user, future construction worker, and future resident. Exposure to combined surface and subsurface sediment assumes that future use of the non-tidal wetland area involves intrusive development and excavation, thereby mixing sediment throughout the sediment column and making deeper sediment available at the surface for contact.

G3.5.2 Groundwater

One potentially complete exposure pathway for groundwater was identified for the receptors selected for evaluation in the HHRA:

- Inhalation of volatile chemicals released from groundwater in a construction trench to outdoor air.

Indirect exposure to chemicals in groundwater may result during construction activities that involve trenching (see Section G6.1.3). Volatilization of chemicals in groundwater to indoor air is also possible; vapor intrusion from groundwater was evaluated in parallel with soil gas data that were used to evaluate exposure to indoor air (Section G3.5.3).

Dermal contact with groundwater in a construction trench was not considered a complete exposure pathway for a future construction worker. Current construction practices implement dewatering methods in areas where work will occur below the ground surface and proximate to the groundwater table. Thus, dermal contact with groundwater in a construction trench in the future was not considered a significant pathway and was excluded from the HHRA.

Historical use of groundwater at Mare Island has been limited by poor water quality and wells that seasonally ran dry. Currently, groundwater is not used for any purpose at Mare Island. The Navy evaluated hydrogeology and natural water chemistry in the RI (SulTech 2006) and determined that groundwater is not suitable as a potential source of drinking water for risk assessment purposes. However, the Navy is currently preparing a separate technical memorandum to formally seek regulatory agency concurrence on this issue.

G3.5.3 Indoor Air

Exposure to volatile chemicals in sediment and groundwater from vapor intrusion into indoor air was evaluated for the future hypothetical residential receptor. Soil gas data were obtained at the non-tidal wetland area and used to evaluate exposure to indoor air (see Section G6.1.4). A parallel evaluation of the vapor intrusion from groundwater into indoor air was also conducted.

Health risks from subsurface vapor intrusion into indoor air are not expected in the future because the planned reuse is as open space/recreational. Further, all current buildings adjacent to the non-tidal wetland area were built on pilings to counteract the instability of the underlying fill material in the area. Assumedly, any future structures would be built on pilings as well (that is, in the future, buildings likely would not be built with foundations in full direct contact with sediment).

G4.0 DATA USED IN THE RISK EVALUATION

Analytical data for sediment, groundwater, and soil gas are available for the non-tidal wetland area (see Sections 2.0 and 3.0 of the main report). This section discusses the process used to evaluate, reduce, and group the analytical data for quantitative evaluation in the HHRA.

Field screening data (for example, passive soil gas and waste characterization data) and analytical data from groundwater samples collected using Hydropunch sampling methods were excluded from the HHRA because these data do not provide appropriate measurements for quantifying exposure, do not represent an environmental medium for human exposure, or do not meet data quality criteria for risk assessment.

Outdoor and indoor air samples were not collected as part of the characterization of the non-tidal wetland area. However, volatile chemicals in sediment and groundwater can be released to indoor air as a result of subsurface vapor intrusion and to outdoor air during construction or trenching activities. Chemicals in dry sediment can be released to outdoor air as a result of volatilization or wind suspension or to indoor air as a result of subsurface vapor intrusion of volatile chemicals in sediment and groundwater. Transfer of COPCs to outdoor air was modeled on the basis of concentrations in sediment and groundwater (see Sections G6.1.2 and G6.1.3). Soil gas data were collected within the wetland area to evaluate vapor intrusion, and a parallel evaluation for vapor intrusion was also conducted using groundwater data. Transfer of volatile chemicals from the subsurface into indoor air was modeled on the basis of concentrations of volatile chemicals in soil gas and groundwater (see Section G6.1.4).

G4.1 DATA EVALUATION

All validated sediment, groundwater, and soil gas analytical data obtained during investigations for the non-tidal wetland area were initially considered for evaluation in the HHRA. Data associated with these investigations are further described in Sections 2.0 through 5.0 of the main report.

As part of the data evaluation process, all of the analytical data underwent cursory validation, and 10 percent of the data underwent full validation to verify these data met EPA data quality criteria for use in risk assessment (EPA 1992). The laboratory analytical data were evaluated by an independent validation contractor using EPA Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review (EPA 2008, 2010b) and the associated analytical methods.

The cursory review evaluated key quality assurance and quality control information such as holding times, calibration requirements, and spiking accuracy. The full validation evaluated additional quality assurance and quality control criteria, and used the raw data to check calculations and chemical identifications. The overall objective was to verify that the analytical data met EPA guidelines for adequacy based on precision, accuracy, representativeness, comparability, and completeness parameters. At each stage of the validation, qualifiers were assigned to the results according to EPA guidelines (EPA 2008, 2010b) and associated analytical methods.

All validated data without qualifiers and all validated data qualified as estimated (J) and not detected (U) were used in the HHRA for chemicals detected in at least one sample. Chemicals not detected in any samples were excluded from evaluation in the HHRA. Validated data qualified as rejected (R) were excluded from the HHRA.

The validated data for sediment, groundwater, and soil gas for the non-tidal wetland area are presented in Appendix E of the RI report. The full laboratory and data validation reports are presented in Appendix J. Sampling locations associated with the data are shown on Figure 5 of the main report.

G4.2 DATA REDUCTION

In addition to the quality evaluation, the following data reduction processes were implemented for the HHRA.

- For some organic chemicals, more than one method was used to analyze samples (for example, naphthalene). For these cases, the result associated with the maximum detected concentration for a detected chemical or the highest minimum reporting limit for a nondetected chemical was used in the HHRA. This methodology ensures the HHRA remains conservative by using the maximum detected concentrations, while incorporating the increased precision of lower reporting limits for nondetected chemicals.

- For xylene, analytical results for some samples were reported for specific isomers (that is, m-, o-, and p-xylene) rather than for xylene (total). In these cases, the results for the individual xylene isomers were summed to calculate xylene (total), and the calculated result for xylene (total) was used in the HHRA. Isomer-specific xylene results for sediment were summed for evaluation as xylene (total) in the HHRA. However, isomer-specific xylene results were used in the HHRA dataset for soil gas because only one isomer pair (m,p-xylene) was reported and there were no additional isomers reported to sum with m,p-xylene.

- For groundwater, only data obtained in November 2010 from the two existing monitoring wells (17W23 and 17W24) and three temporary wells (IR17TW05, IR17TW06, and IR17TW07) were included in the HHRA. Samples were previously collected in 2002 and 2003 after the two permanent wells (17W23 and 17W24) had been installed. However, those data are over 7 years old and do not represent current site conditions. Thus, the maximum detected concentrations from groundwater samples collected in 2010 were used to evaluate exposure to groundwater in this HHRA.

- Duplicate samples were collected for some samples of groundwater and soil gas at the non-tidal wetland area to assess laboratory precision. For groundwater, the result for the original sample was retained, and the result for the duplicate sample was excluded from the HHRA dataset. For soil gas, the highest detected concentration for each detected chemical in the normal and duplicate sample was used as the concentration for that location. There were no duplicate results for sediment samples in the database for the non-tidal wetland area for consideration in this HHRA.

- One historical sediment sample (B503BG020) was collected in 1998 within the non-tidal wetland and labeled in the database as a soil sample. For this HHRA, any sediment or soil sample collected within the non-tidal wetland area boundary was considered to be sediment.

G4.3 DATA GROUPING

Data for sediment, groundwater, and soil gas were grouped onto a single exposure unit. Additional details on the grouping of data for sediment, soil gas, and groundwater are provided below. Analytical data summaries for each exposure medium are presented in the Tables G1-2.1 through G1-2.4 in Attachment G1. Figure 5 of the main report shows the locations of the sediment, groundwater, and soil gas samples.

G4.3.1 Sediment

Sediment data were grouped into two depth intervals: surface sediment, represented by data obtained from 0 to 0.5 feet bgs, and subsurface sediment, represented by data obtained from 0 to 3 feet bgs. These two data sets were used to evaluate sediment exposures in the HHRA as follows:

- Future recreational and hypothetical future residential scenarios: Sediment exposure for these scenarios was based on the two data sets of (1) all surface sediment (samples collected from 0 to 0.5 feet bgs) and (2) subsurface sediment (samples collected from 0 to 3 feet bgs). Sediment exposures for each scenario were evaluated separately for each data set.

- Future construction worker scenario: Sediment exposure was assumed limited to subsurface sediment (samples collected from 0 to 3 feet bgs) because construction workers are anticipated to be involved with intrusive excavation activities.

G4.3.2 Groundwater

Groundwater data were grouped into one source area for evaluation of potential exposure to the future construction worker during trenching activities.

G4.3.3 Soil Gas

Soil gas data were collected throughout the non-tidal wetland area and were grouped into one source area for evaluation of indoor air exposure to a hypothetical future resident.

G5.0 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

COPCs are chemicals carried through the quantitative exposure assessment and risk characterization. COPCs for sediment, groundwater, and soil gas were identified separately for each data grouping. Table G-1 lists the chemicals of potential concern that were detected at least once in sediment, groundwater, and soil gas. All chemicals detected in at least one sample, except essential human nutrients and TPH, were initially identified as COPCs. Chemicals considered essential human nutrients are calcium, magnesium, potassium, and sodium. TPH data were not evaluated in the HHRA because these data are not chemical-specific and are considered inadequate and insufficient for risk evaluation (DTSC 1993). Rather, the data for specific TPH indicator chemicals (for example, benzene, toluene, ethylbenzene, xylene [total], and individual PAHs) were used to assess health risks from TPH contamination.

The identified COPCs were used to estimate "total risk" for the non-tidal wetland area─that is, the risk associated with exposure to all detected organic compounds, plus any metals that were detected at concentrations above ambient concentrations at Mare Island. "Incremental risk" and "ambient risk" also were estimated. Incremental risk is similar to total risk, except that chemicals with maximum detected concentrations in sediment below residential risk-based screening concentrations are also excluded from the risk estimate. Risk-based screening concentrations were determined by selecting the more conservative value between the EPA's residential regional screening level (RSL) (EPA 2010a), or "Cal-modified" 2004 EPA Region 9 residential preliminary remediation goal (PRG) or DTSC's Office of Environmental Health Hazard Assessment (OEHHA) California human health screening level (CHHSL) for residential soil (DTSC 2009a). "Ambient risk" then represents the risk from exposure to metals that are consistent with ambient concentrations and that were excluded from the total and incremental risk evaluations. Further details on the methodology used to calculate total, incremental, and ambient risks are provided in Section G8.0. Tables G1-2.5 and G1-2.6 of Attachment G1 provide the results of the statistical comparisons between site and ambient concentrations for surface sediment (0 to 0.5 feet bgs) and subsurface sediment (0 to 3 feet bgs).

G6.0 EXPOSURE ASSESSMENT

An exposure assessment identifies potential human receptors that could be exposed to site-related chemicals, as well as the routes, magnitude, frequency, and duration of the potential exposures. Reasonable maximum exposure health risks were estimated in this HHRA. The potential exposure scenarios and pathways for the non-tidal wetland area are presented in Section G3.0, Conceptual Site Model. The remainder of this section describes the process used to estimate EPCs for COPCs for each exposure scenario and pathway.

G6.1 EXPOSURE POINT CONCENTRATIONS

The EPC is the concentration of a COPC in an exposure medium (for example, surface sediment) to which a receptor may be exposed. The methods used to calculate EPCs for sediment and groundwater are described in Appendix F. The EPCs calculated for each sediment and groundwater COPC for each data grouping are summarized in Tables G1-3.1 through G1-3.3 of Attachment G1. The EPC for each COPC is represented by the 95 percent upper confidence limit of the arithmetic mean (95UCL). For some COPCs, the calculated 95UCL exceeded the maximum detected concentration, or the number of detected samples precluded calculation of a 95UCL (less than six detected samples); for these cases, the maximum detected concentration was used as the EPC.

As discussed in Section G3.0, COPCs in sediment may be transferred to outdoor and indoor air from wind erosion or volatilization. Samples of outdoor or indoor air were not collected at the non-tidal wetland area. Because a risk-based concentration (RBC) approach was used for this HHRA, transport models were incorporated in the development of RBCs to account for transfer mechanisms from sediment and groundwater in the absence of direct measurements of chemical concentrations in air. The RBCs were then used to calculate risk to a receptor. These transport models are discussed below. Tables G1-3.4 through G1-3.6 of Attachment G1 present the EPCs for soil gas, groundwater (as a vapor concentration), and trench air. Section G8.0 discusses the methods used calculate RBCs for the non-tidal wetland area.

Inorganic chemicals detected at the non-tidal wetland area that exceeded Mare Island ambient concentrations, based on either a shift in the median or an indication of hot spots, were considered to represent potential site releases and were evaluated in the HHRA. See Appendix F of the main report for discussion on the background analysis. Those chemicals that did not exceed ambient concentrations were dropped from further consideration. Inorganic chemicals with no available ambient concentrations were retained by default. All detected organic chemicals were considered to represent potential site releases and were considered in the HHRA. Tables G1-2.5 and G1-2.6 of Attachment G1 present the results of the ambient analysis for sediment.

G6.1.1 Outdoor Air – Particulate Chemicals Released from Sediment

Particulate emission factors (PEF) that estimate particulate concentrations of COPCs in outdoor air based on COPC concentrations in sediment were used to develop RBCs for sediment. For all scenarios except the construction worker scenario, the HHRA used a default PEF of 1.36×10^9 cubic meters per kilogram (m^3/kg) provided in EPA (2010a). For the construction worker scenario, the HHRA used a construction activity-specific PEF of 1.0×10^6 m^3/kg (DTSC 2011a).

G6.1.2 Outdoor Air – Volatile Chemicals Released from Sediment

Chemical-specific volatilization factors (VF) that estimate concentrations of volatile COPCs in outdoor air based on concentrations of volatile COPC in sediment were used to develop RBCs for sediment. VFs were taken from EPA (2010a) and are summarized in Table G-2.

G6.1.3 Outdoor Air – Volatile Chemicals Released from Groundwater to Construction Trench Air

Possible future construction at the site may involve construction of trenches and, therefore, construction workers at the site may be exposed to airborne vapors in a trench. A model was developed to simulate migration of chemicals in groundwater through the soil into a trench to estimate the vapor concentrations in the trench. The model consists of two parts: (1) calculation of volatile emission rates from groundwater into a trench, using the VLEACH model (Ravi and Johnson 1996), and (2) calculation of vapor concentrations in the trench air using the calculated emission rates and a simple air dispersion (box) model. The derived trench air concentrations were used to derive the chemical-specific VFs that are used in the equations shown in Table G-5 to calculate groundwater RBCs for construction worker exposure. The trench air concentrations derived from the model and the predicted site-specific VFs are summarized in Table G1-3.6 of Attachment G1. The models used to estimate volatilization into a construction trench and the derived site-specific VFs are described in Attachment G4 to this appendix.

G6.1.4 Indoor Air – Subsurface Vapor Intrusion

Soil gas data were obtained for the non-tidal wetland area to evaluate health risks from subsurface vapor intrusion of volatile chemicals in sediment and groundwater to indoor air. The maximum detected concentration in soil gas was used as the soil gas EPC. Maximum concentrations, rather than 95UCLs, were used as EPCs for soil gas because potential indoor air exposures from vapor intrusion are more likely to be building-specific, rather than exposure-area wide. In addition, for evaluation of potential future exposures, use of maximum detected concentrations is recommended (DTSC 2011b). In addition, an evaluation of vapor intrusion was conducted using the maximum detected concentrations in groundwater to provide a parallel evaluation with the soil gas results.

Health risks from vapor intrusion exposure were estimated using site-specific RBCs for soil gas and groundwater. This approach involved first calculating RBCs for indoor air, then using modeling to estimate the attenuation of chemical concentrations between soil gas and indoor air and between groundwater and indoor air, and then applying the estimated attenuation to the indoor air RBCs to derive soil gas and groundwater RBCs. Attachment G5 details the methodology used to develop soil gas and groundwater RBCs.

G6.2 Exposure Assumptions and Daily Intake

Daily intake is the amount of a COPC that may be taken into an individual's body, averaged over the period that the individual is exposed. Estimates of daily intake of COPCs are based on the EPCs and exposure-scenario-specific assumptions and intake parameters. Because an RBC approach was used for this HHRA, estimates of daily intake are incorporated in the derivation of COPC-specific RBCs.

EPA-derived exposure algorithms were used to estimate the chemical intakes for each route of exposure (that is, oral, dermal, and inhalation). The generic equations for calculating chemical intake are provided below (EPA 1989, 2009a):

$$I\,(oral\ or\ dermal) = \frac{C \times CR \times EF \times ED}{BW \times AT} \quad \text{(G-1)}$$

$$I\,(inhalation) = \frac{C \times ET \times EF \times ED}{AT} \quad \text{(G-2)}$$

where

I	=	Intake: the amount of chemical at the exchange boundary from oral or dermal exposure (milligrams per kilogram per day [mg/kg-day] for oral and dermal exposure; milligrams per cubic meter [mg/m^3] for inhalation exposure)
C	=	Chemical concentration for the exposure medium: the EPC (for example, milligrams per kilogram [mg/kg] for sediment)
CR	=	Contact rate: the amount of contaminated medium contacted orally or dermally per unit of time or event; may be the ingestion rate or dermal contact rate (for example, milligrams per day [mg/day] for the ingestion rate of sediment). The contact rate is not applicable to inhalation exposures.
ET	=	Exposure time: number of hours the exposure occurs (hours per day [hr/day]); the exposure time is applicable only to inhalation exposures.
EF	=	Exposure frequency: how often the exposure occurs (days per year)
ED	=	Exposure duration: the number of years a receptor comes in contact with the contaminated medium (years)
BW	=	Body weight: the average body weight of the receptor over the exposure period (kilograms); applicable only to oral and dermal exposures
AT	=	Averaging time: the period over which exposure is averaged (days for oral and dermal exposures; hours for inhalation exposures). For carcinogens, the averaging time is 25,550 days (oral and dermal exposures) and 613,200 hours (inhalation exposures) on the basis of a lifetime exposure of 70 years, which represents the average life expectancy. For noncarcinogens, the averaging time is equal to the exposure duration (ED) expressed in days (ED × 365 days/year) for oral and dermal exposures and in hours (ED × 365 days/year × 24 hr/day) for inhalation exposures.

Pathway-specific variations of the generic equations above are used to calculate exposure-scenario-specific daily intakes of COPCs. Exposure assumptions for the parameters used to calculate daily intake were established in the work plan (ChaduxTt 2010). These assumptions are listed in Tables G1-4.1 through G1-4.3 of Attachment G1.

For evaluation of the dermal exposure route for sediment, chemical-specific dermal absorption factors (ABS) are used to estimate the fraction of COPCs that cross the skin barrier. ABS values used for this evaluation were taken from EPA (2010a). ABS values are summarized in Table G-2.

G7.0 TOXICITY ASSESSMENT

The toxicity assessment identifies the reference doses (RfD), reference concentrations (RfC), slope factors (SF), and inhalation unit risks (IUR) used to evaluate adverse noncancer health effects and cancer risks. Risks were calculated based on two sets of toxicity criteria: one set using federal (EPA) toxicity criteria, and the other set using State of California (Cal/EPA) toxicity criteria. The hierarchy of sources used to obtain federal and State of California toxicity criteria are described below. Special considerations on route-to-route extrapolations, selection of surrogates, chromium, dioxin-like PCBs, nondioxin-like PCBs, and lead are discussed in Sections G7.1 through G7.6.

The first set of risk estimates was calculated using the federal EPA toxicity criteria hierarchy. Sources used to obtain toxicity criteria for the EPA hierarchy are listed below, and follow EPA (2003).

1. EPA's Integrated Risk Information System (IRIS). IRIS is an online database that contains EPA-approved RfDs, RfC, SFs, and IURs (EPA 2011). The toxicity criteria provided in IRIS have undergone review and are recognized as agency-wide consensus information.
2. EPA's Provisional Peer-Reviewed Toxicity Values (PPRTV) Database. EPA's PPRTVs are EPA-approved RfDs, RfCs, SFs, and IURs that have undergone review and are recognized as consensus information. The PPRTVs are obtained from EPA (2010a).
3. Other toxicity values, in the following order of preference. The order of preference is consistent with the order used by EPA (2010a) for developing RSLs:
   a. For carcinogens, Cal/EPA's OEHHA on-line database (OEHHA 2011).

      For noncancer effects from inhalation route exposures, OEHHA chronic reference exposure levels (REL) (OEHHA 2008).
   b. Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (ATSDR 2009).
   c. EPA's Health Effects Assessment Summary Tables (HEAST) (EPA 1997).

The second set of risk estimates were calculated using a similar toxicity criteria hierarchy, except that State of California SF and IUR toxicity criteria provided in the OEHHA database (OEHHA 2011), when available, were used preferentially over EPA criteria for estimating cancer risks.

These toxicity criteria hierarchies result in different cancer risk and noncancer hazard estimates because of the difference between federal and State of California hierarchies of sources used to identify cancer SFs and IURs. Therefore, two sets of cancer risks and noncancer hazards were calculated.

The federal and State of California toxicity criteria used for the risk evaluation are presented in Tables G1-5.1 through G1-6.4 of Attachment G1.

G7.1 ROUTE-TO-ROUTE EXTRAPOLATION

Toxicity criteria are not available for the dermal exposure route; therefore, route-to-route extrapolations of oral toxicity criteria were used to evaluate dermal exposures for all COPCs. The oral absorption efficiency was assumed to be 100 percent for all COPCs; that is, oral toxicity criteria were not adjusted for absorption efficiency to evaluate dermal exposures (ChaduxTt 2010).

Toxicity criteria are also not available for the inhalation exposure route for some COPCs. EPA (2009a) generally does not support simple route-to-route extrapolations (that is, use of oral toxicity criteria to evaluate inhalation exposures) because risks and hazards may be misrepresented when data from one route are substituted for another without any consideration of the pharmacokinetic differences between the routes. Therefore, route extrapolation was not used to evaluate inhalation exposures for COPCs lacking inhalation toxicity criteria. The uncertainty analysis of this HHRA provides a qualitative evaluation of this exposure route and addresses the implications of not quantitatively assessing risks from inhalation exposure for COPCs lacking inhalation toxicity criteria (see Section G10.4).

G7.2 CHEMICAL SURROGATES

The following chemical surrogates were used to avoid data gaps in the HHRA because of a lack of toxicity criteria for some COPCs. Chemical surrogates were selected based on structural similarity, chemical activity, and mechanisms of toxicity.

COPC Lacking Toxicity Information	Chemical Surrogate Used in HHRA
1-Methylphenanthrene Phenanthrene	Anthracene
2,2,4-Trimethylpentane Heptane	n-Hexane
2,3,5-Trimethylnaphthalene	2-Methylnaphthalene
2,4'-Dichlorodiphenyldichloroethane (DDD)	4,4'-DDD
2,4'-Dichlorodiphenyldichloroethene (DDE)	4,4'-DDE
2,4'-Dichlorodiphenyltrichloroethane (DDT)	4,4'-DDT
Acenaphthylene	Acenaphthene
alpha-Chlordane gamma-Chlordane trans-Nonachlor	Chlordane
Benzo(e)pyrene Benzo(g,h,i)perylene Perylene	Pyrene
Total PCBs	Aroclor-1260

G7.3 CHROMIUM

Valence-state analytical data are not available for chromium in sediment at the non-tidal wetland area of the IR17 and Building 503 Area. For purposes of assessing toxicity from exposure to chromium, all chromium results were assumed to consist of a one-to-six ratio of hexavalent-to-trivalent chromium, and adjustment to the IUR for chromium was made following the approach recommended in EPA (2009b). Section G10.3 discusses the uncertainties associated with this approach for estimating health risks from chromium.

G7.4 DIOXIN-LIKE POLYCHLORINATED BIPHENYLS

Analytical results for dioxin-like PCB congeners were used to calculate sample-specific toxicity equivalency quotient (TEQ) concentrations. The TEQ concentrations were calculated by multiplying detected and nondetected concentrations of individual PCB congeners by their respective toxicity equivalency factors (TEF), based on toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), and summing the TEF-adjusted concentrations. Nondetected congeners were excluded from the calculation. The sum of the TEF-adjusted dioxin-like PCB congeners is represented as “Dioxin TEQ.” TEFs were based on Van den Berg and others (2006), and the dioxin-like PCB TEF values are shown below. The EPC for Dioxin TEQ was derived using the calculated sample-specific Dioxin TEQ concentrations. The toxicity criterion for 2,3,7,8-TCDD, the specific dioxin congener on which the TEFs for dioxin-like PCBs are based, was used to evaluate cancer risks associated with exposure to Dioxin TEQ in sediment. Noncancer toxicity criteria are not available for Dioxin TEQ.

Compound	TEF (Van den Berg and others 2006)
PCB-77	0.0001
PCB-81	0.0003
PCB-105	0.00003
PCB-114	0.00003
PCB-118	0.00003
PCB-123	0.00003
PCB-126	0.1
PCB-156	0.00003
PCB-157	0.00003
PCB-167	0.00003
PCB-169	0.03
PCB-189	0.00003

G7.5 NONDIOXIN-LIKE POLYCHLORINATED BIPHENYLS

For nondioxin-like PCB congeners, calculation of the EPC involved summing detected and nondetected concentrations for nondioxin-like PCB congeners at each sample location. Similar to the approach used for dioxin-like PCB congeners, nondetected congeners were excluded from the calculation. The sum of nondioxin-like PCB congeners is represented as “Total PCBs.” The EPC for Total PCBs was derived using the calculated sample-specific Total PCBs concentrations. The toxicity criteria for high risk and persistent PCBs and Aroclor-1260 were used to evaluate cancer risks and noncancer hazards, respectively, associated with exposure to Total PCBs.

G7.6 LEAD

Although toxicity criteria (oral and inhalation slope factors) are available for lead from OEHHA (2011), risks from exposure to lead were characterized using blood lead modeling-based screening concentrations, rather than exposure route-specific toxicity criteria for lead. Health effects from exposure to lead, particularly in children, may occur at such low blood lead levels that use of threshold-based toxicity criteria to evaluate potential risks from exposure to lead is not preferred. Rather, exposure to lead is evaluated by using a biomarker (blood lead levels); blood lead modeling, which accounts for multiple sources of exposure to lead, is used to predict blood lead levels. OEHHA has established a goal of an estimated blood level of 1 microgram per deciliter (µg/dL) for its CHHSLs for residential and industrial exposures. The Navy has established a modified CHHSL for Mare Island so the soils do not increase the blood lead levels more than 1 µg/dL above background for the residential or industrial receptors. Therefore, the residential screening value for lead will be the sum of the ambient concentration of lead at Mare Island (25.6 mg/kg) plus the residential soil CHHSL (80 mg/kg) (DTSC 2009a), to equal a modified OEHHA residential CHHSL of 105.6 mg/kg. Likewise, for the industrial worker, the sum of the ambient concentration of lead in soil plus the industrial soil CHHSL (320 mg/kg) (DTSC 2009a) would equal a modified OEHHA industrial CHHSL of 345.6 mg/kg. Risks from exposure to lead are characterized in Section G8.3.

G8.0 RISK CHARACTERIZATION

The risk characterization involves/ combining EPCs, daily intakes, and toxicity criteria to calculate the potential for health risks associated with exposure to COPCs. Cancer risks and noncancer health hazards are characterized separately. Based on the HHRA methodology, health risks for the non-tidal wetland are estimated using a RBC approach. This streamlined approach uses the ratio of EPCs to exposure scenario-specific RBCs to estimate health risks. The resulting risk estimates are numerically equivalent to the estimates obtained using the EPA (1989) “forward calculation methodology.”

For each exposure scenario, RBCs were calculated for carcinogenic COPCs based on a target cancer risk of 1E-06, and for noncarcinogenic COPCs based on a target noncancer HI of 1. For COPCs associated with both cancer and noncancer effects, both cancer-based and noncancer-based RBCs were calculated. The RBC equations are shown in Tables G-3 through G-6. The RBC equations incorporate the scenario- and pathway-specific exposure assumptions identified in Tables G1-4.1 through G1-4.3 of Attachment G1 and chemical-specific toxicity criteria in Tables G1-5.1 through G1-6.4 of Attachment G1. As discussed in Section G7.0, two sets of cancer risks were calculated: one following the federal toxicity criteria hierarchy, and the other following the State of California toxicity criteria hierarchy.

Tables G-7 through G-12 present the pathway-specific and combined, multi-pathway RBCs for the non-tidal wetland area based on federal toxicity criteria. Tables G-13 through G-18 present the pathway-specific and combined, multi-pathway RBCs based on State of California toxicity criteria.

For exposure scenarios for which both an adult and child receptor are evaluated (that is, recreational and residential), the estimated cancer risk is based on the sum of the risk estimated for the adult receptor plus the estimated risk for the child receptor. Hence, for the recreational and residential receptor, the RBCs for carcinogenic effects are based on combined child and adult exposures. However, for noncancer hazard estimates, the noncancer HI is based on the HI estimated for the child. Intake by children of sediment and air per unit body mass is higher; thus, noncancer HIs for a child are always higher than noncancer HIs for an adult. Therefore, recreational and residential RBCs for noncarcinogenic effects are based on the child.

The RBCs were used to calculate cancer risks and noncancer hazards for each receptor and COPC within the non-tidal wetland area. Three types of risks were estimated: total, incremental, and ambient. To satisfy the HHRA requirements of both CalEPA and EPA, the Navy (2003) recommends a "dual-tracking" approach for HHRAs. That is, risk assessments are conducted following two parallel tracks: one that develops potential cancer risk estimates and noncancer hazard estimates using EPA's recommended hierarchy of toxicity values, and one that develops these estimates giving preference to DTSC toxicity values. Risks were calculated in the HHRA as follows:

- Total risk:
  - Based on all detected chemicals and excludes those metals for which site concentrations do not exceed ambient concentrations for Mare Island. All detected organic chemicals and metals for which site concentrations exceed ambient concentrations are included in the estimates of site risk.
  - Risk estimates are developed using only the State of California toxicity hierarchy.
- Incremental risk:
  - Similar to total risk as described above, except that chemicals with maximum detected concentrations in sediment below residential risk-based screening concentrations are also excluded from the risk estimate. All chemicals detected in groundwater and soil gas were included in the incremental risk evaluation for indoor air, and no screening was conducted.
  - Two sets of risk estimates are developed – one using the federal toxicity value hierarchy and the second using the State of California toxicity value hierarchy.
- Ambient risk:
  - Represents risks from exposure to metals with site concentrations consistent with ambient concentrations that were excluded from the total and incremental risk estimates.
  - Risk estimates are developed using only the federal toxicity value hierarchy.

The following sections describe how the RBCs for the non-tidal wetland area were used to calculate health risks.

G8.1 CHARACTERIZATION OF CANCER RISKS

The cancer risk estimate associated with exposure to a carcinogenic COPC is calculated as follows:

$$Cancer\ risk = (EPC/RBC_c) \times 10^{-6}$$

where:

EPC	=	Exposure point concentration in mg/kg for sediment, micrograms per liter (µg/L) for groundwater, micrograms per cubic meter (µg/m^3) for soil gas
RBC_c	=	Risk-based concentration for carcinogens in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas

Individuals may be exposed to more than one COPC at the non-tidal wetland area. The cancer risks for individual COPCs are summed by exposure pathway to calculate the cumulative cancer risk for the exposure pathway, using the following equation. Pathway cancer risks are then summed to calculate a cumulative, multi-pathway cancer risk.

$$Cumulative\ risk = 10^{-6} \times \{EPC_1/RBC_{c1} + EPC_2/RBC_{c2} + \ldots EPC_n/RBC_{cn}\}$$

where:

Cumulative risk	=	Cumulative cancer risk from exposure to all carcinogenic COPCs (unitless)
EPC	=	Exposure point concentration in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas
RBC_c	=	Risk-based concentration for carcinogens in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas

EPA guidance on exposure levels considered protective of human health is presented to help interpret results of the risk assessment. In the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA defined general remedial action goals for sites on the National Priorities List (Title 40 of the *Code of Federal Regulations,* Section 300.430). The goals include a range for residual cancer risk, which is "an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}," or 1 in 10,000 (1E-04) to 1 in 1,000,000 (1E-06).

The goals set out in the NCP are applied once a decision to remediate a site has been made. A subsequent EPA directive provides additional guidance on the role of the HHRA in supporting risk management decisions and, in particular, evaluating whether a response action is necessary (EPA 1991). Specifically, the guidance states, “Where cumulative carcinogenic risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the noncancer hazard quotient (HQ) is less than 1, action generally is not warranted unless there are adverse environmental impacts.” This HHRA guidance refers to the cancer risk range between 1E-06 and 1E-04 as the “risk management range.” The lower end of the range, 1E-06, is referred to as the “point of departure.” Risks that do not exceed the point of departure are considered negligible, and do not require action.

G8.2 CHARACTERIZATION OF NONCANCER HAZARDS

The potential for receptors to develop adverse health effects from inhalation exposure to COPCs not classified as carcinogens and from carcinogens known to cause adverse health effects other than cancer is calculated as follows:

$$\textit{Hazard quotient (HQ)} = EPC/RBC_{nc}$$

where:

EPC	=	Exposure point concentration in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas
RBC_{nc}	=	Risk-based concentration in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas

The HQs for individual COPCs are summed by exposure pathway to evaluate the cumulative potential for noncancer effects from exposure to multiple COPCs, yielding a HI as shown below. Pathway HIs are then summed to calculate a cumulative, multi-pathway HI.

$$\textit{Hazard Index (HI)} = EPC_1/RBC_{nc1} + EPC_2/RBC_{nc2} + \ldots + EPC_n/RBC_{ncn}$$

where:

HI	=	Cumulative noncancer hazard index from exposure to all noncarcinogenic COPCs (unitless)
EPC	=	Exposure point concentration in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas
RBC_{nc}	=	Risk-based concentration in mg/kg for sediment, µg/L for groundwater, µg/m^3 for soil gas

A HI of less than 1 indicates that adverse noncancer health effects are not expected. If the total HI exceeds 1, further evaluation in the form of a segregation of the HI via a target organ analysis may be performed to assess whether the noncancer HIs are a concern (EPA 1989). Target organ HIs greater than 1 may indicate a potential adverse effect. Segregated HIs were calculated for an individual exposure medium (for example sediment), and for combined exposure media (for example sediment and soil gas), if the total HI exceeded the threshold of 1.

G8.3 CHARACTERIZATION OF RISKS FROM EXPOSURE TO LEAD

As discussed in Section G7.6, lead was identified as a COPC in surface sediment, subsurface sediment, and groundwater. The HHRA evaluated the potential for health effects from exposure to lead in sediment by comparing EPCs with the summed concentration of the ambient concentration of lead at Mare Island (25.6 mg/kg) and the OEHHA CHHSLs (DTSC 2009a) for residential (80 mg/kg) and industrial (320 mg/kg) exposure scenarios.

The HHRA did not evaluate the potential for health effects from exposure to lead in groundwater. The EPA and State of California have established an action level for lead in groundwater of 15 µg/L based on residential use of groundwater as a drinking water source. However, groundwater at the site is expected to be classified as non-potable and a drinking water action level is not appropriate for evaluating dermal exposure to groundwater during construction activities. Lead is not highly soluble in water and is not anticipated to move easily across the skin barrier, thus any exposure would result in a *de minimis* dose of lead. Furthermore, current practices typically entail dewatering techniques during excavations to keep the area clear of standing water.

G9.0 RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT

This section presents the estimated cancer risks and noncancer HIs for the non-tidal wetland area at the IR17 and Building 503 Area. As detailed in Section G8.0, for sediment, groundwater, and soil gas exposure, the HHRA estimated total, incremental, and ambient risks using either federal EPA toxicity criteria hierarchy (referred to hereafter as federal criteria) or the Cal/EPA toxicity criteria hierarchy (referred to hereafter as State of California criteria).

The discussion below is limited to the results of the incremental risk evaluations (Attachment G1). Incremental risk results based on both federal and State of California toxicity criteria are discussed. For this HHRA, a COPC is termed a “chemical risk driver,” or chemical of concern (COC), when the COPC-specific incremental risk exceeds 1E-06 or the COPC-specific incremental HI exceeds 1. COPCs identified as chemical risk drivers are shown in boldface in the discussion of risk results.

Risks were estimated for the following exposure scenarios:

- Future recreational user (exposure from direct contact with surface sediment and subsurface sediment)
- Future construction worker (exposure from direct contact with surface and subsurface sediment and inhalation of groundwater vapors during trenching)
- Future resident (exposure from direct contact with surface sediment, direct contact with subsurface sediment, and subsurface vapor intrusion to indoor air)

Detailed calculations for incremental, total, and ambient risks and HIs are presented in Attachments G1 through G3. EPA (1989) guidance for HHRAs indicates that risk and HI results should be rounded to one significant figure. To aid in review of calculations, the risk calculations provided in Attachments G1 through G3 for each pathway of exposure are presented with two significant figures. The summed, multi-pathway risk estimates for each chemical and the summed, multi-chemical risks for the non-tidal wetland area are rounded to one significant figure.

Incremental risk estimates for the non-tidal wetland area are summarized by exposure pathway in Table G-19 and by exposure medium in Table G-20. Detailed incremental risk calculations are provided Tables G1-7.1 through G1-7.10 in Attachment G1.

As discussed in Section G8.3, the potential for health effects from exposure to lead in sediment was evaluated by comparing EPCs with health-based screening concentrations for lead. Results of the lead evaluation are discussed in Section G9.4.

An additional evaluation of risks and hazards associated with ambient concentrations of metals in sediment at Mare Island is included in the HHRA. Calculations of ambient risks and hazards are provided in Attachment G3. Results of the ambient risk evaluation are further discussed in Section G10.1.

G9.1 FUTURE RECREATIONAL USER

Surface and subsurface sediment exposure for the future adult and child recreator is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from surface and subsurface sediment to outdoor air. Incremental risks from exposure to sediment, calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Minimal Disturbance Scenario (0 to 0.5 feet bgs)		Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard	Cancer Risk	Noncancer Hazard
Future Recreational User	Federal	5E-07	--	2E-06	0.4
	State of California	7E-07	--	4E-06	0.4

Note:

-- Not calculated; no chemicals having noncarcinogenic effects were detected in surface sediment.

Minimal Disturbance Scenario

For the minimal disturbance scenario (0 to 0.5 feet bgs), the estimated cancer risk from exposure to surface sediment is 5E-07 based on federal toxicity criteria and 7E-07 based on State of California toxicity criteria. Both estimates of cancer risk are below the risk management range of 1E-06 to 1E-04 for cancer effects. Thus, no cancer risk drivers were identified for the recreational user under the minimal disturbance scenario.

A noncancer hazard from recreational exposure to surface sediment was not calculated because none of the surface sediment COPCs is associated with noncarcinogenic health effects.

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cancer risk from exposure to subsurface sediment is 2E-06 based on federal toxicity criteria and 4E-06 based on State of California toxicity criteria. Both estimates of cancer risk are within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. Most of the risk is associated with incidental ingestion of and dermal contact with **benzo(a)pyrene** (2E-06) in subsurface sediment. No cancer risk drivers were identified for the construction worker from exposure to groundwater.

The noncancer HI was 0.4, which is less than the threshold of 1 for noncarcinogens, based on both federal and State of California toxicity criteria hierarchies. Thus, no noncancer risk drivers were identified for the construction worker under the intrusive development scenario.

G9.2 FUTURE CONSTRUCTION WORKER

Subsurface sediment exposure for the future construction worker is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from subsurface sediment to outdoor air. In addition, exposure for the future construction worker includes inhalation of volatile chemicals released to outdoor air in a trench. Incremental risks from exposure to subsurface sediment and groundwater, calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard
Future Construction Worker	Federal	8E-07	0.9
	State of California	9E-07	0.9

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cumulative cancer risk for exposure to subsurface sediment and groundwater is 8E-07 based on federal toxicity criteria and 9E-07 based on State of California toxicity criteria. Both estimates of cancer risk are below the risk management range of 1E-06 to 1E-04 for cancer effects, and no cancer risk drivers were identified for the construction worker under the intrusive development scenario.

The cumulative noncancer HI for exposure to subsurface sediment and groundwater based on both the federal and State of California toxicity criteria is 0.9, which is below the threshold of 1 for noncarcinogens. Thus, no noncancer risk drivers for sediment were identified for the construction worker under the intrusive development scenario.

G9.3 FUTURE RESIDENT

Surface and subsurface sediment exposure for the future adult and child resident is based on incidental ingestion of and dermal contact with chemicals in surface and subsurface sediment, and inhalation of volatile and particulate chemicals released from surface and subsurface sediment to outdoor air. In addition, inhalation of volatile chemicals in subsurface sediment (as soil gas) and groundwater that migrate to indoor air (vapor intrusion) is evaluated for this scenario. Incremental risks from exposure to sediment and indoor air (from soil gas), calculated using federal and State of California toxicity criteria, are presented in the table and text below.

Scenario	Toxicity Criteria Hierarchy	Minimal Disturbance Scenario (0 to 0.5 feet bgs)		Intrusive Development Scenario (0 to 3 feet bgs)	
		Cancer Risk	Noncancer Hazard	Cancer Risk	Noncancer Hazard
Assuming Migration of Volatile Chemicals in Soil Gas into Indoor Air					
Hypothetical Future Resident	Federal	2E-06	0.001	5E-06	0.8
	State of California	2E-06	0.0007	7E-06	0.8
Assuming Migration of Volatile Chemicals in Groundwater into Indoor Air					
Hypothetical Future Resident	Federal	8E-07	0.0004	4E-06	0.8
	State of California	1E-06	0.0004	6E-06	0.8

Minimal Disturbance Scenario

For the minimal disturbance scenario (0 to 0.5 feet bgs), the estimated cancer risk from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 2E-06 based on both federal and State of California toxicity criteria. The estimated cancer risk from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 8E-07 based on federal toxicity criteria and 1E-06 based on State of California toxicity criteria. All estimates of cancer risk are either below, equal to, or within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. No cancer risk drivers were identified for residential exposure under the minimal disturbance scenario.

The cumulative noncancer HI from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 0.001 based on federal toxicity criteria and 0.0007 based on State of California toxicity criteria. The estimated noncancer HI from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 0.0004 based on both federal and State of California toxicity criteria. All estimates of noncancer hazard are below the threshold of 1 for noncarcinogens. No noncancer risk drivers were identified for residential exposure under the minimal disturbance scenario.

Intrusive Development Scenario

For the intrusive development scenario (0 to 3 feet bgs), the cumulative cancer risk from exposure to surface sediment and volatile chemicals in soil gas migrating to indoor air is 5E-06 based on federal toxicity criteria and 7E-06 based on State of California toxicity criteria. The estimated cancer risk from exposure to subsurface sediment and volatile chemicals in groundwater migrating to indoor air is 4E-06 based on federal toxicity criteria and 6E-06 based on State of California toxicity criteria. All cancer risk estimates are within the lower end of the risk management range of 1E-06 to 1E-04 for cancer effects. Most of the cancer risk is associated with exposure to BAP in subsurface sediment. No cancer risk drivers were identified for the resident from exposure to indoor air from potential migration of volatiles in either soil gas or groundwater.

The cumulative noncancer HI from exposure to subsurface sediment and volatile chemicals in soil gas migrating to indoor air is 0.8, based on both federal and State of California toxicity criteria hierarchies. The estimated noncancer HI from exposure to surface sediment and volatile chemicals in groundwater migrating to indoor air is 0.8 based on both federal and State of California toxicity criteria hierarchies. Thus, no noncancer risk drivers were identified for the resident under the intrusive development scenario.

G9.4 LEAD

The table below compares the EPCs for lead in surface and subsurface sediment with the modified OEHHA residential and industrial CHHSLs (105.6 and 345.6 mg/kg) (see also Table G-21).

Exposure Medium	Site EPC for Lead (mg/kg)	EPC Exceeds Screening Level?	
		Residential (105.5 mg/kg)	Industrial (345.6 mg/kg)
Surface Sediment	51	No	No
Subsurface Sediment	168	**Yes**	No

Notes:

EPA U.S. Environmental Protection Agency
EPC Exposure point concentration
mg/kg Milligram per kilogram

The EPC for lead in surface sediment is less than the both modified OEHHA residential and industrial CHHSLs (105.6 and 345.6 mg/kg). The EPC for lead in subsurface sediment exceeds the modified OEHHA residential CHHSL, but not the modified OEHHA industrial CHHSL. Thus, lead was identified as a risk driver in subsurface sediment for a hypothetical future resident.

Lead was not identified as a concern for the future recreational user. The future use of the non-tidal wetland area is anticipated to remain as open space/recreational. All detections of lead in the surface soil (0 to 0.5 feet bgs) were below the modified OEHHA residential CHHSL. The highest detections of lead in sediment were found at 2.5 and 3.5 feet bgs, deeper than the depth that would reasonably be encountered during a site visit. The anticipated ingestion rate for the future adult and child recreational user at the non-tidal wetland area is assumed to be only 50 percent of the ingestion rate assumed for the adult and child residential user. Furthermore, the recreator is only assumed to be on site for only 1/12 the amount of time (2 hours per day) that a resident is expected to be on site (24 hours per day). Thus, the potential exposure to lead in sediment by a future recreational user is expected to be more than 50 percent lower than the exposure that would be assumed for the residential user.

G10.0 UNCERTAINTY ANALYSIS

Varying degrees of uncertainty at each stage of the HHRA arise from assumptions made in the risk assessment and from the limitations of the data used to calculate risks. Uncertainty and variability are also inherent in the exposure assessment, toxicity values, and risk characterization. Table G-22 lists the general uncertainties associated with HHRAs.

The effect of uncertainties is overestimation or underestimation of the actual cancer risk or HI. In general, the risk assessment process is based on use of conservative (health-protective) assumptions that, when combined, are intended to overestimate the actual risk. However, a small possibility exists that risks were underestimated.

The remainder of this discussion focuses on the following site-specific uncertainties associated with this HHRA:

- The influence of metals in sediment at ambient levels on health risk estimates
- Use of soil gas sampling results for characterizing risks from subsurface vapor intrusion to indoor air
- Use of the latest groundwater monitoring event at monitoring wells for estimates of groundwater risk
- Use of a total chromium approach that assumes a one-to-six ratio of hexavalent-to-trivalent chromium to estimate risks from chromium exposure
- Lack of risk estimates for inhalation exposure for COPCs lacking inhalation toxicity criteria
- Elevated detection limits for sediment, groundwater, and soil gas samples
- Estimating risks for individual carcinogenic PAHs rather than using a benzo(a)pyrene-equivalent (BAP EQ) approach
- Lack of toxicity criteria for thallium.
- Changes in TCE toxicity criteria

G10.1 RISKS FROM EXPOSURE TO METALS IN SEDIMENT AT AMBIENT LEVELS

The HHRA included an assessment of ambient risk (Attachment G3) to evaluate the contribution of site concentrations consistent with ambient concentrations. Ambient risk represents the risk associated with ambient concentrations of metals excluded from the total and incremental risk estimates. Appendix F of the wetland investigation report provides a summary of the statistical methods that were used to conduct the background comparisons. Tables G1-2.5 and G1-2.6 of Attachment G1 present the results of the statistical comparison to background for sediment and identifies those metals found to exceed ambient concentrations. As discussed in Section G9.0, the results of the incremental risk evaluation are used to characterize risks and identify COCs for the non-tidal wetland area.

Attachment G3 presents risk estimates based on exposure to ambient levels of metals in sediment at the non-tidal wetland area. The methods used to estimate ambient risks are the same as those used to estimate incremental and total risks. Risks were estimated for the recreational construction worker and residential scenarios using the same sediment exposure pathways as those included in the estimate of incremental risks. Similarly, EPCs for ambient levels of metals at Mare Island were calculated using the same methods used to calculate EPCs for site COPCs—that is, 95UCL concentrations were used to represent ambient levels of metals. Analytical data for ambient metals were based on Tetra Tech EM Inc. (2002) and ChaduxTt (2012).

Tables G3-2.1 and G3-2.2 of Attachment G3 summarize the risks associated with ambient metals by exposure pathway and exposure medium. For exposure to ambient levels of metals in sediment under the minimal disturbance scenario, cancer risks were 2E-05 for the recreational user and 3E-05 for the resident. Under the intrusive development scenario, cancer risks were 2E-05 for recreational user, 5E-06 for the construction worker, and 4E-05 for the residential scenario. All risk estimates were based on federal criteria. For all scenarios, cancer risks from exposure to ambient levels of metals in sediment exceed the threshold for cancer risks of 1E-06, but are within the EPA risk management range of 1E-06 to 1E-04. For the recreational user and residential scenarios, exposure to ambient levels of arsenic in sediment contributes nearly all of the cancer risk estimates for ambient metals. For the construction worker, exposure to arsenic and chromium in sediment contributes nearly all of the cancer risk estimate for ambient metals.

Noncancer HIs for exposure to ambient levels of metals in sediment under the minimal disturbance and intrusive development scenarios for the recreational user are 0.8 and 0.9, respectively. Under the intrusive development scenario, the noncancer HI is 6 for the construction worker. Under the minimal disturbance and intrusive development scenarios for the resident, the noncancer HIs are both 2.

The highest segregated HI by target organ for the construction worker scenario is 6, which exceeds the threshold of 1. Most of the segregated HI estimates for the construction worker are associated with ambient levels of manganese in sediment. For the residential scenario, the highest segregated HIs by target organ are 0.7 for surface sediment and 0.8 for subsurface sediment; both of these segregated HI estimates are less than the threshold of 1 and are associated with exposure to ambient levels of arsenic in sediment.

This evaluation shows that the cancer risks and HIs associated with exposure to metals present at ambient levels, particularly ambient levels of arsenic in sediment, are relatively significant. That is, ambient levels of metals at Mare Island are associated with cancer risks above the carcinogenic threshold of 1E-06 for all scenarios.

G10.2 GROUNDWATER DATA USED FOR RISK ESTIMATES

Risk estimates for exposure to groundwater, evaluated for the construction worker scenario, were based on groundwater analytical results from the latest sampling event from two monitoring wells and three new temporary groundwater wells. Additional monitoring well data were collected on six different occasions between 2002 and 2003. However, these data are over 7 years old and not representative of current conditions. Section 3.3 of the main report discusses the nature and extent of groundwater and considers data from 1998 through 2010 in the comparison, including grab groundwater data collected from sediment borings. For the purposes of this HHRA, risk estimates for construction worker exposure to groundwater at the non-tidal wetland are based on the recent monitoring results and likely reflect current conditions.

G10.3 RISK ESTIMATES FOR CHROMIUM

As discussed in Section G7.3, valence-state analytical data are not available for chromium in sediment samples collected in the non-tidal wetland area. Soil samples collected from areas in the upland were analyzed for both trivalent and hexavalent chromium; hexavalent chromium was not detected in the upland and is therefore not expected to be present in the non-tidal wetland. However, for purposes of assessing toxicity from exposure to chromium in the non-tidal wetland, chromium results were assumed to consist of a one-to-six ratio of hexavalent-to-trivalent chromium, and the IUR developed for total chromium in EPA (2009b) was used to estimate health risks from inhalation exposure to chromium. Hexavalent chromium is considered carcinogenic, especially for the inhalation route of exposure, while trivalent chromium is associated only with noncarcinogenic effects. The IUR developed in EPA (2009b) for total chromium is similarly calculated based on a one-to-six ratio of hexavalent-to-trivalent chromium. Although valence-state data for chromium are not available, previous historical activities at the non-tidal wetland and greater IR17 and Building 503 Area, described in Sections 2.0 and 3.0 of the main report, do not indicate activities associated with hexavalent chromium releases.

Concentrations of chromium at the non-tidal wetland area were not found to be statistically greater than ambient concentrations; thus chromium was evaluated only in the ambient risk evaluation (Attachment G3). Using the above approach for use of total chromium, chromium was identified as a COC in sediment for the construction worker scenario. Chromium was not identified as a COC for surface or subsurface sediment for the future recreational user or residential scenarios. Although a residential scenario generally represents the greatest potential for exposure to site chemicals, inhalation exposure to particulate chemicals in sediment is highest for the construction worker for this HHRA because of the PEF used to estimate particulate concentrations in ambient air. Specifically, a PEF of 1.0×10^6 m^3/kg (DTSC 2011a) was used to estimate airborne particulate concentrations for the construction worker scenario, while a PEF of 1.36×10^9 m^3/kg (EPA 2010a) was used for all other scenarios evaluated in the HHRA.

The PEF for the construction worker scenario is approximately 1,000 times higher than the PEF used to evaluate recreational and residential exposures (the reciprocal of the PEF value is used to calculate risks). Although increased particulate emissions are expected during construction activities, the HHRA assumes that the increased emissions occur continually without cessation through the entire duration of construction-related activities. Specifically, inhalation risk estimates for the construction worker assume higher levels of particulate emissions for 8 hours per day, 250 days per year, for an entire year (ChaduxTt 2010). The assumptions used to estimate particulate exposures for the construction worker are conservative, and when coupled with the assumption that one-seventh of the chromium in sediment throughout the non-tidal wetland is hexavalent chromium, are likely to result in overestimates of inhalation health risks for chromium for the construction worker scenario.

G10.4 LACK OF INHALATION TOXICITY CRITERIA FOR SOME COPCS

As discussed in Section G7.1, toxicity criteria are not available for the inhalation exposure route for some COPCs. EPA RAGS Part F generally does not support simple route-to-route extrapolations (that is, use of oral toxicity criteria to evaluate inhalation exposures) because risks and hazards may be misrepresented when data from one route are substituted for another without any consideration of the pharmacokinetic differences between the routes (EPA 2009a). Therefore, route extrapolation was not used to evaluate inhalation exposures for COPCs lacking inhalation toxicity criteria.

This approach may result in an underestimate of health risks for the inhalation route of exposure; however, the level of uncertainty is likely low. Of the 68 chemicals identified as COPCs at the non-tidal wetland, 40 of the COPCs lack inhalation noncancer toxicity criteria and 37 COPCs lack inhalation cancer toxicity criteria. Of these chemicals, 10 chemicals (25 percent) lacking noncancer toxicity values and 18 chemicals (49 percent) lacking cancer values are VOCs. The remaining chemicals are metals, pesticides, SVOCs, and PAHs. For metals, pesticides, SVOCs, and PAHs, inhalation risks are based on estimates of outdoor inhalation exposure from particulate emissions from dry sediment. However, the contribution of the particulate inhalation route of exposure to health risks is negligible compared with the oral and dermal routes of exposure (see Tables G1-7.1 through G1-7.10 in Attachment G1 for exposure-route-specific risk estimates). For volatile chemicals, inhalation risks are based on estimates of outdoor inhalation exposure from volatile emissions from sediment and indoor inhalation exposure from vapor intrusion (using soil gas data).

Although volatile COPCs were detected in samples of sediment, detections were minimal and none of these chemicals was detected in soil gas samples, indicating that the vapor-phase concentrations of these sediment chemicals are minimal to negligible. Likewise, inhalation exposure to these chemicals is likely to be minimal to negligible.

G10.5 ELEVATED DETECTION LIMITS FOR NONDETECTED CHEMICALS

Analytical detection limits were elevated for nondetected compounds in some samples of sediment, groundwater, and soil gas. Specifically, for some chemicals not detected in samples of sediment, groundwater, and soil gas, sample-specific detection limits exceeded RBCs established for the non-tidal wetland area HHRA. Nondetected results with elevated detection limits may cause an underestimate of health risks. Risks may be underestimated if a chemical is consistently or frequently not detected and detection limits are consistently greater than RBCs, because the chemical may actually be present at concentrations associated with health risk.

For this evaluation, the following criteria were selected to assess whether nondetected results with elevated detection limits could result in an underestimate of health risks: (1) nondetected results comprise more than 50 percent of the samples for a given COPC, and (2) of the nondetected samples, 50 percent or greater of nondetected results exceed RBCs for the non-tidal wetland. The following sections provide an evaluation of chemicals with elevated detection limits that meet these criteria.

In general, sample results for which detection limits were elevated are unlikely to result in underestimation of health risks because a large number of samples were collected at the non-tidal wetland, which reduces the uncertainty associated with characterization of chemical concentrations at the non-tidal wetland.

G10.5.1 Sediment

Table G-23 shows the number of chemical-specific results for sediment samples with detection limits greater than the respective residential sediment RBCs. The occurrence of elevated detection limits in sediment samples in the non-tidal wetland area is minimal, and the criteria discussed above in Section G10.5 were not met for any chemicals.

G10.5.2 Groundwater

Table G-24 shows the number of chemical-specific results for groundwater samples with detection limits greater than the respective RBCs for groundwater. RBCs for groundwater are based on the construction worker scenario, which is the only scenario for which groundwater exposure pathways were identified as potentially complete for the non-tidal wetland area. The occurrence of elevated detection limits in groundwater samples in the non-tidal wetland area is minimal, and the criteria discussed above in Section G10.5 were not met for any chemicals.

G10.5.3 Soil Gas

Table G-25 shows the number of chemical-specific results for soil gas samples with detection limits greater than respective residential RBCs for soil gas.

1,2-Dibromomethane is the only chemical in soil gas for which nondetected sample results for soil gas meet the criteria discussed in Section G10.5. Elevated detection limits for nondetected results of 1,2-dibromomethane occurred for all 10 samples collected at the non-tidal wetland. 1,2-Dibromomethane was not detected in any of the soil gas samples, and the percentage of nondetected results is 100 percent. The average detection limit for 1,2-dibromomethane was 8.66 µg/m^3, which is above the soil gas RBC calculated for the future resident of 5.8 µg/m^3. Groundwater data available in 2002 and 2003 for the two monitoring wells at the non-tidal wetland area did not have detectable levels of 1,2-dibromomethane; recent groundwater results did not report the results for this chemical. Risks from indoor air exposure to 1,2-dibromomethane in soil gas may be underestimated, though the magnitude of the underestimation is expected to be low.

G10.6 RISK ESTIMATES FOR CARCINOGENIC PAHS AND BAP EQ SCREENING LEVEL

Based on the HHRA methodology for the non-tidal wetland area (ChaduxTt 2010), the HHRA cancer risks were estimated on a PAH-specific basis in the HHRA for seven carcinogenic PAHs—benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. However, each of these PAHs can also be evaluated using a BAP EQ approach because toxicity criteria for each of these carcinogenic PAHs are based on relative potency to benzo(a)pyrene. A BAP EQ screening criterion of 0.62 mg/kg was used as the screening criterion in this HHRA because the value has been used at other Mare Island and other Naval sites in the San Francisco Bay area. No further action is typically necessary for the seven carcinogenic PAHs where BAP EQ concentrations do not exceed 0.62 mg/kg.

To evaluate the non-tidal wetland HHRA results for individual carcinogenic PAHs with respect to the BAP EQ screening level, BAP EQ concentrations were calculated for each sediment sample location with analytical results for the carcinogenic PAHs of interest. In addition, to assess whether detection limits for nondetected results of the PAHs may result in an underestimation of risks, BAP EQ concentrations were calculated for all sediment samples, including those samples for which no carcinogenic PAHs were detected. One-half the detection limit was used to estimate the BAP concentration for carcinogenic PAHs that were not detected.

Table G-26 shows the calculated BAP EQ concentrations for each sediment sampling location. BAP EQ concentrations were calculated using two methods: one based on EPA (2010a) relative potency factors (RPF) for PAHs, and the other based on DTSC (2009b) RPFs. The RPFs are shown below:

	Relative Potency Factor	
PAH	**EPA (2010a)**	**DTSC (2009b)**
Benz(a)anthracene	0.1	0.1
Benzo(a)pyrene *(index compound)*	1	1
Benzo(b)fluoranthene	0.1	0.1
Benzo(k)fluoranthene	0.01	0.1
Chrysene	0.001	0.01
Dibenz(a,h)anthracene	1	0.34
Indeno(1,2,3-cd)pyrene	0.1	0.1

As shown in Table G-26, 40 samples of sediment were analyzed for carcinogenic PAHs. Of these, just one sample (2.5 percent of total samples) has a BAP EQ concentration that exceeds the BAP EQ screening level of 0.62 mg/kg when EPA and DTSC RPFs and one-half of the detection limit for nondetected results are used to calculate BAP EQ concentrations. Carcinogenic PAHs were detected in 38 out of 40 samples. The site-wide average BAP EQ concentration is 0.14 mg/kg based on EPA RPFs and 0.13 mg/kg based on DTSC RPFs, neither of which exceeds the screening level of 0.62 mg/kg. Based on the site-wide average and the low number of discrete samples that exceed the screening level, carcinogenic PAHs likely are present in the non-tidal wetland area at ambient levels.

G10.7 LACK OF TOXICITY CRITERIA FOR THALLIUM

EPA withdrew toxicity criteria for thallium, a metal, from IRIS in September 2009. Therefore, RBCs could not be developed to evaluate potential health risks from exposure to thallium at the non-tidal wetland area. Thallium is in sediment, though the concentrations are comparable to ambient, and thallium was evaluated only in the ambient risk evaluation (Attachment G3). The highest EPC calculated for thallium in sediment is 0.21 mg/kg for surface sediment. Prior to withdrawing toxicity criteria for thallium from IRIS, EPA (2009b) developed a risk-based RSL for residential exposure to thallium (as soluble salts) in sediment of 5.1 mg/kg. The maximum EPC for thallium at the non-tidal wetland area does not exceed the previous EPA RSL for thallium. Although the thallium RSL is no longer considered valid because it is based on withdrawn toxicity criteria, it does indicate that concentrations of thallium in sediment at the non-tidal wetland would not have been considered of concern prior to the changes in IRIS for thallium.

G10.8 CHANGES IN TRICHLOROETHENE TOXICITY CRITERIA

Evaluation of potential mutagenic and non-mutagenic modes of action for cancer risk, and noncancer hazards, for TCE in accordance with the recent September 28, 2011, IRIS toxicological review (EPA 2011), was excluded from the HHRA. The new review for TCE shows higher toxicity by all three toxicity mechanisms (mutagenic cancer, non-mutagenic cancer, and noncancer hazard). Therefore, the exclusion of the new IRIS review toxicity values is expected to underestimate risk for TCE in comparison to using the OEHHA toxicity criteria for TCE. The increase in cancer risk by oral and dermal exposure is approximately a factor of 10 or less. The increase in cancer risk by inhalation exposure is approximately a factor of three or less. The increase in noncancer hazard by inhalation is expected to be approximately a factor of 300. These factors are used in the analysis of the likely impact of the uncertainty from the revised toxicity factors below.

TCE was detected only in soil gas at the non-tidal wetland area. The estimated cancer risk for the inhalation pathway (vapor intrusion into indoor air) was 3.1E-08 for the hypothetical future resident. An increase by a factor of three would leave TCE below the point of departure of 1E-06 for cancer risk (using the upper limit of three for the expected increase in risk discussed above) with an estimated cancer risk of 8.7E-08. The estimated noncancer hazard for the inhalation pathway was 0.00006 for the hypothetical future resident. Therefore, the increase would still leave TCE below the threshold hazard index of 1 (using the upper limit of 300 for the expected increase in hazard discussed above) with an estimated noncancer hazard of 0.018.

Thus, no additional concerns would be identified for TCE in soil gas at the non-tidal wetland area based on the changes in toxicity criteria for TCE.

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Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
18	Results of the screening-level HHRA	Section 2.5.1	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Section 6.1.2 and Tables G-20 and G-21.

seven VOCs, but water quality criteria are not available for comparison for the other two VOCs (1,2,4-trimethylbenzene and carbon disulfide). VOCs detected in groundwater (except toluene and total xylenes) were not detected in soil gas within the non-tidal wetland area and were also not identified as COCs in the HHRA.

- Based on the low concentrations of VOCs detected in the non-tidal wetland, VOCs in groundwater from the upland area have not significantly contaminated the non-tidal wetland area, do not pose an unacceptable risk to human health, and will likely continue to naturally attenuate.

Soil Gas Investigation

Fourteen soil gas samples were collected in November 2010 and December 2011 and analyzed for VOCs only. Ten chemicals were detected in soil gas: 1,4-dioxane, 2,2,4-trimethylpentane, benzene, chloroform, cyclohexane, heptane, hexane, m,p-xylene, toluene, and TCE. All detected chemicals in soil gas were detected below comparison criteria and were not identified as risk drivers in the HHRA and SLERA.

Benzene and chloroform were not identified in sediment or groundwater at the non-tidal wetland. Only benzene was detected in groundwater in the adjacent upland area. Chloroform can be produced by marine plants and is most likely associated with off-gassing from peatlands and high organic content sediment, such as those found in the former tidal marshland. The peat and organic sediments likely release chloroform when the water table drops and pore spaces drain during the dry season, which is when the soil gas samples were collected.

The presence of benzene in soil gas is likely associated with historical releases of BTEX in soil in the vicinity of the adjacent southern tank farm and migration in soil gas to the non-tidal wetland. 1,4-Dioxane, a pesticide byproduct, is likely associated with normal historical application of pesticides or pesticides in historical runoff from adjacent upland areas.

Soils contaminated with residual free-phase product (coal tar distillates) at the southern tank farm were removed during the 2010 NTCRA, eliminating the likely source of VOC contamination to soil, soil gas, and groundwater in the area. Since the source has been removed from the upland area, the concentrations of benzene will likely continue to naturally attenuate.

6.1.2 Risk Assessment Results

Human Health Risk Assessment

Results of the HHRA indicate that no action is required at the site for exposure to sediment, groundwater, or soil gas (Table 9). Excess cancer risk estimates for the non-tidal wetland area for the minimal disturbance scenario (0 to 0.5 feet bgs) for the future recreational user is 5E-07, which is less than the carcinogenic threshold of 1E-06. The excess cancer risk estimate for a future resident for the minimal disturbance scenario was 2E-06 assuming vapor intrusion of soil gas into indoor air and 8E-07 assuming vapor intrusion from groundwater into indoor air. Both of these risk estimates for the resident are near the lower end of or below the risk management range of 1E-06 to 1E-04 for carcinogens. For the intrusive development scenario (0 to 3 feet bgs), excess cancer risk estimates were less than the carcinogenic threshold of 1E-06 for the future construction worker (8E-07) and near the lower end of the risk management range for the future recreational user (2E-06). The excess cancer risk estimate for a future resident for the intrusive development scenario was 5E-06 assuming vapor intrusion of soil gas into indoor air and 4E-06 assuming vapor intrusion from groundwater into indoor air. Both of these risk estimates for the resident are within the lower end of the risk management range. Noncancer HIs were less than the noncancer threshold of 1 for all three receptors for both the minimal disturbance and intrusive development scenarios; no target organ segregated HIs exceeded the noncancer threshold of 1.

The excess cancer risk estimates exceeding 1E-06 are associated with concentrations of BAP in subsurface sediment for the future recreational user and future resident. However, an evaluation of BAP EQ concentrations resulted in a site-wide average that was less than the ambient screening level for PAHs that is used at other Bay Area sites. PAHs in Mare Island soil and sediment are ubiquitous and most likely represent ambient conditions as a result of general depositional processes that are not related to site activities or may have been present in the dredge fill material placed during site development between 1911 and the early 1940s. Lead was also detected at levels above the residential screening criterion but was less than the industrial screening criterion; thus, lead was identified as a risk driver only for the hypothetical future resident. However, lead is not recommended to be carried forward as a concern because the four locations with lead concentrations above the residential comparison criterion and two locations above the industrial comparison criterion are isolated, are at depths of 2.5 and 3.5 feet bgs, are not associated with lead migration from the adjacent southern tank farm, and appear to be anomalies. No further action is recommended to address risk to human health (Table 9).

Screening Level Ecological Risk Assessment

Potential risks to ecological receptors in the non-tidal wetland area were also evaluated based on data for sediment and soil gas. Sediment concentrations were compared with plant and invertebrate toxicity benchmarks and used in FCMs to estimate daily doses to birds and mammals. An inhalation model was used to evaluate risk to burrowing mammals from volatile chemicals in soil gas. Results of the SLERA indicated that total DDTs poses a potential unacceptable risk to invertebrates (Table 9).

Although total DDTs was identified as a risk driver for ecological receptors, concentrations of total DDTs represent normal historical application of pesticides, as no point sources were identified. Ecological risk posed by chemicals within the non-tidal wetland area is similar to the risk posed by chemicals present at ambient conditions and, therefore, no further evaluation or action is proposed to address risk to ecological receptors (Table 9).

TABLE G-20: SUMMARY OF INCREMENTAL HUMAN HEALTH RISKS BY EXPOSURE MEDIUM

Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Receptor	Exposure Medium (a)		Incremental Cancer Risk		Noncancer Hazard Index (b)	
			Federal	**State of California**	**Federal**	**State of California**
Future Recreational User	Surface Sediment	Risk Results	5E-07	7E-07	0	0
		COCs (c)	--	--	--	--
	Subsurface Sediment	Risk Results	**2E-06**	**4E-06**	0.4	0.4
		COCs (c)	Benzo(a)pyrene	Benzo(a)pyrene	--	--
Future Construction Worker	Subsurface Sediment	Risk Results	8E-07	9E-07	0.9	0.9
		COCs (c)	--	--	--	--
	Groundwater	Risk Results	4E-15	4E-15	0.0000008	0.0000008
		COCs (c)	--	--	--	--
	Receptor Total: Subsurface Sediment and Groundwater		8E-07	9E-07	0.9	0.9
Future Resident	Surface Sediment	Risk Results	8E-07	1E-06	0	0
		COCs (c)	--	--	--	--
	Subsurface Sediment	Risk Results	**4E-06**	**6E-06**	0.8	0.8
		COCs (c)	Benzo(a)pyrene	Benzo(a)pyrene	--	--
	Indoor Air (Soil Gas VI)	Risk Results	1E-06	1E-06	0.001	0.0007
		COCs (c)	--	--	--	--
	Indoor Air (GW VI)	Risk Results	5E-09	5E-09	0.0004	0.0004
		COCs (c)	**--**	**--**	--	--
	Receptor Total: Surface Sediment and SG Indoor Air		**2E-06**	**2E-06**	0.001	0.0007
	Receptor Total: Subsurface Sediment and SG Indoor Air		**5E-06**	**7E-06**	0.8	0.8
	Receptor Total: Surface Sediment and GW Indoor Air		8E-07	1E-06	0.0004	0.0004
	Receptor Total: Subsurface Sediment and GW Indoor Air		**4E-06**	**6E-06**	0.8	0.8

TABLE G-20: SUMMARY OF INCREMENTAL HUMAN HEALTH RISKS BY EXPOSURE MEDIUM

Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Notes:	Values that are in **bold** exceed the cancer risk threshold of 1E-06 or noncancer threshold of 1.
(a)	Surface sediment is 0 to 0.5 feet bgs. Subsurface sediment is 0 to 3 feet bgs.
(b)	The value in parenthesis is the highest noncancer HI, segregated by target organ. Segregated HIs were calculated for incremental risk and are shown when the total HI exceeds 1.
(c)	Chemicals are identified as COCs if the chemical-specific cancer risk exceeds 1E-06 or the chemical-specific noncancer hazard exceeds 1. COCs are based on incremental risk results for both EPA and State of California toxicity criteria, unless otherwise noted.
--	None; no chemicals were identified as COCs
bgs	Below ground surface
COC	Chemical of concern
EPA	U.S. Environmental Protection Agency
GW	Groundwater
HI	Hazard index
SG	Soil gas
VI	Vapor Intrusion

TABLE G-21: SUMMARY OF RISK EVALUATION FOR LEAD

Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Exposure Medium [a]	Site EPC for Lead	Background Concentration [b]	Lead Screening Level [c]		Site EPC Exceeds Ambient Concentrations?	Site EPC Exceeds the Lead Screening Level?	
			Residential	Industrial		Residential	Industrial
Surface Sediment	51	59	105.6	345.6	No	No	No
Subsurface Sediment	168	59	105.6	345.6	Yes	**Yes**	No

Notes: Units are in milligrams per kilogram (mg/kg) for sediment.

a Surface sediment is 0 to 0.5 feet bgs; subsurface sediment is 0 to 3 feet bgs.

b Background value shown is the 95th percentile value (Tetra Tech 2002).

c The screening levels for residential and industrial exposure to lead in soil are the OEHHA (2009) CHHSLs of 80 and 320 mg/kg, respectively, added to the 95 percent upper confidence level of the arithmetic mean (25.6 mg/kg) for lead in ambient fill at Mare Island.

-- Not applicable; not evaluated

bgs Below ground surface

CHHSL California Human Health Screening Level

DTSC Department of Toxic Substances Control

EPC Exposure point concentration

OEHHA California Environmental Protection Agency Office of Environmental Health Hazard Assessment

Source:

OEHHA. 2009. "Revised California Human Health Screening Levels for Lead." Integrated Risk Assessment Branch, OEHHA, Cal/EPA. September.

Tetra Tech. 2002. “Final Compilation of Technical Memoranda on Ambient Analyses of Metals in Soils and Groundwater, Mare Island, Vallejo, California.” April 19.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
19	updated baseline HHRA	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Pages A-1 through A-57, Figure A-1 and Tables A-1 through A-13 of Appendix A.

A1.0 INTRODUCTION

This appendix presents the methods and the results of an updated baseline human health risk assessment (HHRA) conducted as part of the feasibility study (FS) addendum for Subareas 1 through 3 in the upland portion of the Installation Restoration Site 17 (IR17) and Building 503 Area at Mare Island Naval Shipyard (Mare Island) in Vallejo, California. The original HHRA was conducted as part of the remedial investigation (RI) report (SulTech 2006); however, additional investigations have been conducted and there have been updates to risk assessment guidance since the RI report was finalized. Thus, this updated HHRA is being prepared in conjunction with the FS addendum. Subarea 1 includes the former paint manufacturing area and northern tank farm. Subarea 2 consists of the former southern tank farm and the chlorinated solvent area. Subarea 3 includes the parking lot for Building 759 (a building adjacent to and outside the project boundary). Subarea 4, the adjacent non-tidal wetland area along the southern boundary of the site, is not included within this updated HHRA as it was recently evaluated in the Non-Tidal Wetland Investigation Report (ChaduxTt 2012). Figure 3 of the main FS addendum shows the location of each subarea evaluated in the HHRA.

The HHRA was prepared in accordance with guidance issued by the Department of the Navy (Navy) (Navy 2001, 2003), U.S. Environmental Protection Agency (EPA) (EPA 1989, 2009a), and California Department of Toxic Substances Control (DTSC) (DTSC 1992; 2011a; 2012). Section 2.1 of the main FS addendum text provides background information on the history of the shipyard and other operations conducted at Mare Island, the physical characteristics of the island, and the nature and results of large-scale environmental investigations. This information was used to conduct this HHRA.

A1.1 OBJECTIVES

An HHRA is prepared to evaluate potential health risks associated with a site under future land use conditions. The specific objectives of this HHRA for the IR17 and Building 503 Area are as follows:

- Estimate the magnitude of potential human health risks associated with hypothetical future site use at each subarea.
- Identify the environmental media and contaminants that pose the primary risk to human health.
- Provide the basis to support risk management decisions about the need for further action at IR17 and Building 503 Area.

A1.2 SCOPE

The IR17 and Building 503 Area is planned for transfer to the City of Vallejo after site cleanup is complete. The site is partly located in the North Island Industrial Park (property north and east of Azuar Drive) and the Northwest Industrial Area (property west of and including Azuar Drive), as defined in the “Mare Island Specific Plan” (City of Vallejo 2008). According to the Mare

Island Specific Plan (City of Vallejo 2008), reuse of the North Island Industrial Park is as a proposed employment area with light industrial, commercial, office research and development, and warehouse uses. The Northwest Industrial Area is proposed for warehousing and light and heavy industrial. The reasonably anticipated future land use for the IR17 and Building 503 Area is light and heavy industrial.

Based on the proposed future land reuses, the purpose of this HHRA is to evaluate the effects of chemicals in soil and groundwater for a future commercial/industrial worker and a construction worker (also considered protective of a utility/maintenance worker). Residential exposures (or other sensitive uses such as hospitals, schools for persons under 21 years of age, and day care facilities) are not expected under future site conditions. However, a residential exposure scenario was evaluated for Subareas 1 through 3 for comparative purposes and to evaluate potential future unrestricted land use because no formal deed notice or other administrative control is yet in place to prohibit future residential land use.

A2.0 SITE DESCRIPTION AND BACKGROUND

The IR17 and Building 503 Area is located on Mare Island, which is located in Solano County, California. Mare Island proper is bordered by Highway 37 to the north, Carquinez Strait to the south, and San Pablo Bay to the west. The Napa River (Mare Island Strait) separates Mare Island from the mainland and the City of Vallejo to the east. Mare Island operated as a Navy facility for 142 years until officially closing on April 1, 1996.

Originally, land occupied by the IR17 and Building 503 Area was part of a tidal marshlands area near the shoreline of Mare Island Strait, northwest of the Mare Island upland area. Between 1911 and 1938, land occupied by the IR17 and Building 503 Area was created with dredge fill material (primarily clay and silt) (PRC Environmental Management, Inc. 1995; SulTech 2006). The land remained vacant until the former paint manufacturing facility was constructed at the site between 1938 and 1944 (SulTech 2006). Additionally, coarser-grained fill was imported to the site before it was developed, resulting in the site's current ground surface elevation of 7 to 9 feet above mean sea level (msl). A portion of the IR17 and Building 503 Area is paved, and various buildings, scattered vegetation, and exposed soil cover the remainder of the site. Historically, paints and varnishes were manufactured at the former paint manufacturing facility from the 1940s to the mid-1950s in support of ship construction and maintenance. Additional details on historical site operations are provided in Section 2.1 of the FS addendum report.

A3.0 RISK ASSESSMENT GUIDELINES

The methods used to conduct the HHRA are based on the risk assessment framework developed by EPA and DTSC. The framework is documented in *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part A)* (EPA 1989) and "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities" (DTSC 1992). The EPA and DTSC framework consists of the following six basic steps:

1. **Conceptual Site Model (CSM):** This step involves evaluating potential exposure pathways in which human populations might be exposed to chemicals of potential concern (COPC) under current or future site conditions.

2. **Data Evaluation and Selection of COPCs:** This step consists of evaluating the analytical data for usability in the HHRA, grouping analytical data by site and by medium, and selecting COPCs in site media.

3. **Exposure Assessment:** This step quantifies exposure to the identified COPCs for exposure pathways that are potentially complete. Exposure point concentrations (EPC) are estimated from measured or modeled concentrations, and pathway-specific intakes (doses) are estimated using hypothetical human receptors for evaluation in the subsequent risk calculations.

4. **Toxicity Assessment:** This step consists of compiling toxicity values that characterize potential adverse health effects from exposure to COPCs.

5. **Risk Characterization:** This step combines the results of the previous steps to quantitatively characterize potential risks to human health associated with exposure to COPCs at the area evaluated. Both potential cancer risks and noncancer hazard indices (HI), a measure of the potential for adverse health effects other than cancer, are evaluated.

6. **Uncertainty Analysis:** This step analyzes the major uncertainties associated with the risks calculated.

The remainder of this appendix presents the methods for and results of each of these steps of the HHRA. The data, assumptions, and calculations associated with each of these steps are provided in this HHRA in RAGS Part D tabular format (EPA 2001).

A3.1 NAVY'S RISK ASSESSMENT GUIDANCE

This section summarizes the Navy's three-tiered risk assessment guidance (Section A3.1.1), the requirement to conduct dual tracking (Section A3.1.2), and the Navy's approach to estimating risks and hazards from chemicals found at concentrations within background or ambient levels (Section A3.1.3).

A3.1.1 Three-Tiered Risk Assessment Guidance

This HHRA is consistent with the Navy policy for conducting HHRAs related to the Environmental Restoration Program (Navy 2001). This policy involves a three-tiered approach to conducting HHRAs:

- **Tier 1 – Screening Assessment.** This step involves a screening risk assessment to identify COPCs by comparing the maximum detected concentration of each chemical in each medium to an appropriate "risk-based criterion." This comparison is known as Tier 1A. Based on this screening, sites may be eliminated from further evaluation if concentrations of all detected chemicals are less than the risk-based criteria. In addition, sites with chemicals detected above risk-based criteria may be retained in a Tier 1B evaluation. Tier 1B further evaluates the chemicals by refining the conservative assumptions for the risk-based criteria and calculating a risk estimate. Chemicals with detected concentrations exceeding risk-based criteria from the Tier 1B evaluation are retained as COPCs and evaluated in Tier 2.

- **Tier 2 – Baseline HHRA.** This step is more rigorous than Tier 1 and involves the quantification of adverse health effects on hypothetical human receptors. This tier is typically conducted at the RI phase and is site-specific. The result of the Tier 2 baseline HHRA is a characterization of site risks to determine whether those risks are acceptable or unacceptable.

- **Tier 3 – Evaluation of Remedial Alternatives.** This step involves evaluation of remedial alternatives which may be conducted during the feasibility study. The decision to evaluate remedial alternatives in Tier 3 usually is based on a determination of unacceptable risks at the end of the Tier 2 step.

Tiers 1A and 2 of the Navy policy are applied in this HHRA appendix. Specifically, the HHRA incorporates the Tier 1A assessment into the COPC selection step, which is presented in Section A5.0. Chemicals retained as COPCs are then evaluated quantitatively in the remaining components of the HHRA (exposure assessment, toxicity assessment, and risk characterization), which together are equivalent to the Navy Tier 2 assessment. The main FS addendum text presents Tier 3 of the Navy policy.

A3.1.2 Dual-Tracking HHRA

DTSC provides carcinogenic toxicity values when conducting risk assessments in California. DTSC's toxicity values were developed by, and are available from, the DTSC's Office of Environmental Health Hazard Assessment (OEHHA). However, federal guidance indicates that EPA's Superfund guidance (including the December 5, 2003, guidance on selecting toxicity factors developed by the Office of Solid Waste and Emergency Response [OSWER] [EPA 2003]) should be followed when conducting risk assessments at federal facilities. Therefore, to satisfy the requirements of both DTSC and EPA, Navy risk assessment guidance (Navy 2003) uses a "dual-tracking" approach to conduct risk assessments. That is, risk assessments are conducted following two parallel tracks: one that develops potential cancer risk estimates and noncancer hazard estimates using EPA's recommended hierarchy of toxicity values, and one that develops these estimates giving preference to DTSC carcinogenic toxicity values. For the DTSC track, the EPA-recommended hierarchy is followed for COPCs without DTSC toxicity values to avoid data gaps.

This HHRA was conducted following the dual-tracking approach (Navy 2003). Section A9.0 of this appendix summarizes potential cancer risk and noncancer hazard estimates derived by following this approach.

A3.1.3 Incremental, Total, and Ambient Risk and Hazard Estimates

EPA and DTSC risk assessment guidance requires evaluation of potential cancer risks and noncancer hazards that may result from exposure to all COPCs identified for a particular site. However, DTSC guidance on the COPC selection process differs from the Navy approach (Navy 2001), which is based on EPA RAGS Part A (EPA 1989) and EPA RAGS Part D (EPA 2001). RAGS Part D recommends use of a risk-based screening concentration (such as a risk-based regional screening level [RSL]) against which to compare maxima from each subarea to help select COPCs. This also is recommended in the Navy's tiered risk assessment guidance (Navy 2001). Both state and federal approaches (DTSC 1992; Navy 2004) recommend screening metals against ambient concentrations in order to select COPCs. However, DTSC (1992) recommends that no toxicity-based or RSL screen be used to select COPCs for risk evaluation. To satisfy state (DTSC) and federal (Navy and EPA) requirements, the following three sets of risk estimates were prepared:

1. Incremental risk.
2. Total risk.
3. Ambient risk.

For this HHRA, total risk represents the risks from potential exposure to all detected analytes present above ambient concentrations. That is, total risk includes risks associated with all detected organic compounds, plus inorganic compounds occurring naturally in the environment, but detected at levels that exceed natural background levels at Mare Island.

Incremental risk represents risks from potential exposures to the subset of chemicals detected at concentrations above ambient concentrations, with maximum detected concentrations above conservative residential risk-based screening concentrations (that is, above EPA's RSLs [EPA 2012]). Analytes detected across the IR17 and Building 503 Area with maximum concentrations above residential RSLs are more likely to contribute significantly to human health risks and hazards than detected analytes at concentrations below RSLs.

The ambient risk estimate represents the risk from exposure to metals at concentrations found within the background fill concentration range (statistically shown to be attributed to fill upon which the area had been constructed) at Mare Island. That is, ambient risk represents risks associated with ambient concentrations of metals that were excluded from the total and incremental risk estimates.

The three risk estimates, or risk scenarios, primarily differ in the chemicals selected for evaluation. In addition, the toxicity assessment differs for some risk scenarios after application of the Navy (2003) dual-tracking approach discussed in Section A3.1.2. The distinctions in COPC selection methodology and dual-tracking practices for each risk scenario are as follows:

- **Incremental risk.** Under this risk scenario, a chemical in soil is selected as a COPC if site concentrations are greater than ambient concentrations in Mare Island fill using two-population statistical tests, and the maximum concentration exceeds the more conservative value of the residential soil RSL (EPA 2012), “Cal-modified” 2004 EPA Region 9 residential soil preliminary remediation goal (PRG) or DTSC’s OEHHA residential soil California Human Health Screening Level (CHHSL) (DTSC 2012). All detected organic chemicals in groundwater and soil gas are retained as COPCs. Two sets of risk estimates are developed–one using the EPA toxicity value hierarchy and the second using the DTSC toxicity value hierarchy (Navy 2003). Results of the incremental risk evaluation are provided in Attachment A1 and are discussed throughout the main text of this appendix.

- **Total risk.** Under this risk scenario, all chemicals detected in soil are carried through the risk evaluation except for chemicals found at concentrations statistically indistinguishable from their ambient fill concentrations. All detected organic chemicals in groundwater and soil gas are retained as COPCs. Risk estimates are developed using only DTSC toxicity values. Results of the total risk evaluation are provided in Attachment A2.

- **Ambient risk.** Under this risk scenario, chemicals in soil found within ambient concentrations, and that were excluded from the incremental and total risk evaluations described above, are carried through the ambient risk evaluation. Risk estimates are developed using only federal toxicity values. Results of the ambient risk evaluation are provided in Attachment A3.

A4.0 CONCEPTUAL SITE MODEL

The FS addendum report contains background information on the exposure setting and land use at the IR17 and Building 503 Area, including site history, geology, hydrogeology, and climate. Section 2.1.1 of the FS addendum describes the CSM used to frame future human health exposure possibilities. Although this information was used to prepare this HHRA, it is not repeated in this appendix.

A4.1 CURRENT AND FUTURE LAND USE

Most of the site is not currently in use, with exception of the parking lot for Building 759 that is used as employee parking for Earthquake Protection Systems, Inc. The proposed reuse of the IR17 and Building 503 Area is as an employment area with light and heavy industrial, commercial, office research and development, and warehouse uses (City of Vallejo 2008). For the purposes of this report, the proposed reuse for the IR17 and Building 503 Area is defined as industrial reuse. Potential human receptors include construction workers who could be present during development of the site, and commercial/industrial workers who could be present at the site in the future. Because current exposures are limited and potentially less conservative than future long-term exposures, the focus of the HHRA is on potential future uses of the site rather than current exposures.

A4.2 IDENTIFYING RECEPTORS AND EXPOSURE PATHWAYS

Receptors and exposure pathways at the IR17 and Building 503 Area are identified (consistent with the CSM discussed in Section 2.1.1 of the main FS addendum text) on the basis of several factors, including site configuration, land use, and activity patterns. The following sections discuss the receptors identified and the exposure pathways evaluated in this risk assessment.

A4.2.1 Receptors

Presently, the IR17 and Building 503 Area is not used and is open to the public. The proposed future use for the IR17 and Building 503 Area is predominantly for commercial and light industrial development. Given this future reuse, the most likely future receptors would be commercial/industrial workers and construction workers.

Residential exposures are not expected under future site conditions. However, a residential exposure scenario was evaluated for Subareas 1 through 3 for comparative purposes and to evaluate potential future unrestricted land use because no formal deed notice or other administrative control is yet in place to prohibit future residential land use.

A4.2.2 Exposure Pathways

CSMs depicting the exposure pathways identified for the IR17 and Building 503 Area are presented on Figure A-1. Several routes of exposure quantitatively evaluated in this HHRA are identical, and include incidental ingestion of soil, dermal contact with soil, and inhalation of particulates and vapors from soil. Exposure pathways evaluated for the commercial/industrial worker and resident are identical to those identified for the construction worker, but also include inhalation of chemical vapors from subsurface soil and groundwater (as soil gas) while indoors (for example, in an office or warehouse or residential home). The exposure routes for the construction worker also include inhalation of vapors from groundwater in a construction trench. The following exposure pathways are quantified in this HHRA:

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemical vapors in ambient (outdoor) air from soil
- Inhalation of chemicals adsorbed to windblown soils
- Inhalation of chemical vapors in indoor air from soil and groundwater (as soil gas) (commercial/industrial worker and hypothetical resident only)

- Inhalation of chemical vapors in a construction trench from groundwater (construction worker only)

No groundwater ingestion is evaluated for future receptors based on the lack of potability of shallow saline groundwater at the IR17 and Building 503 Area as discussed in Section 2.2.6 of the main FS addendum text. The only complete groundwater-related exposure would be for volatile chemicals migrating upward through overlying vadose zone soils. Based on expected land use (that is, the potential for working in a building or warehouse), in addition to the previously listed pathways, potential exposure to chemicals migrating from soil gas into indoor air is evaluated for the commercial/industrial worker and future residents. Potential exposure from migration of volatile groundwater contaminants into a construction trench is also evaluated for the construction worker via inhalation. Dermal contact with groundwater in a construction trench was not considered a complete exposure pathway for a future construction worker. Groundwater was not encountered in the NTCRA excavations and current construction practices implement dewatering methods in areas where work will occur below the ground surface and proximate to the groundwater table. These methods include dewatering and partially backfilling excavations at the end of each work day to avoid potential intrusion of groundwater. Thus, dermal contact with groundwater in a construction trench in the future was not considered a complete pathway and was excluded from the HHRA.

No surface water bodies occur in the upland area of the IR17 and Building 503 Area; thus surface water was not considered a complete exposure pathway to future receptors and was not evaluated in this HHRA.

To initiate the RAGS Part D standardized reporting process (EPA 2001), a modified version of the "Selection of Exposure Pathways" standard Table 1 was completed for the subareas evaluated in the HHRA. This table mirrors the graphical CSM (Figure A-1) and is provided in Table A1-1.1 of Attachment A1.

A5.0 DATA EVALUATION AND IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

This section discusses the process used to evaluate, reduce, and group the analytical data for the IR17 and Building 503 Area subareas, and describes the methods used to identify COPCs for quantitative evaluation in the HHRA.

A5.1 DATA EVALUATION

This section provides a summary of the methods used to evaluate and validate the data used to conduct the HHRA for the IR17 and Building 503 Area.

As part of the data evaluation process, all analytical data were reviewed to verify that the data met EPA data quality criteria for use in a risk assessment (EPA 1992). Samples collected during the RI and subsequent investigations were validated in accordance with EPA data validation guidelines (EPA 2008, 2010). To summarize the data validation process, all analytical data were subject to a cursory review, and 10 percent of the data were fully validated. The cursory review evaluated key quality assurance and quality control (QA/QC) information such as holding times, calibration requirements, and spiking accuracy. The full validation evaluated additional QA/QC criteria and used the raw data to check calculations and analyte identifications. The overall objective of data validation was to verify that the analytical data met EPA guidelines for adequacy based on precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters. At each stage of the validation, qualifiers were assigned to the results according to EPA guidelines (EPA 2008, 2010) and associated analytical methods.

The results of the data validation process are documented in a quality control summary report (QCSR) presented in the RI report. The QCSR includes a discussion of PARCC parameters, an evaluation of how well data met PARCC parameter goals established in the quality assurance project plan, and a summary of how meeting these PARCC goals helps achieve data quality objectives for the RI and other investigations. All data without qualifiers and all data qualified as estimated (J) were used in the HHRA. Data qualified as nondetect (U) or nondetect estimated concentration (UJ) were incorporated into the HHRA by using a proxy concentration as described in Attachment A4. Consistent with EPA guidance, data qualified as rejected (R) are considered unusable for risk assessment purposes (EPA 1989, 1992); no data qualified as rejected were used in the HHRA for the IR17 and Building 503 Area.

A5.2 DATA GROUPING

The validated analytical data were then grouped by sample medium (soil, groundwater, and soil gas) according to the subareas identified for evaluation in the exposure assessment. The soil analytical data for each subarea were further divided into the following two subsets, corresponding to the following depth intervals:

1. Surface soils, represented by soil samples collected from 0 to 0.5 foot below ground surface (bgs) for Subareas 1 and 2, and soil samples collected from 0 to 2 feet bgs for Subarea 3. The DTSC requested the surface soil interval be determined as 0 to 0.5 foot bgs for all three subareas; however, Subarea 3 had fewer samples in that depth range than Subareas 1 and 2 and the Navy proposed to evaluate Subarea 3 as 0 to 2 feet bgs. Samples were generally included in the surface soil groups for Subareas 1 and 2 if they had either a top depth less than 0.5 feet, or a top and bottom depth both equal to 0.5 feet. However, two samples with a top depth of 0.25 feet and a bottom depth of 2 feet were not included in the surface soil group for Subarea 1, and one sample with a depth of 0.25 feet and a bottom depth of 2.5 feet was not included in the surface soil group for Subarea 2. Samples were included in the surface soil group for Subarea 3 if they had either a top depth less than or equal to 2 feet or at top and bottom depth equal to 2 feet. This data set was used to evaluate potential exposures associated with the future developed and undeveloped configurations.

2. Subsurface soils, represented by soil samples collected from 0 to 10 feet bgs. Samples were included in the subsurface soil group if they had a top of sample depth less than 10 feet. This data set was used to evaluate potential exposures associated with a future redevelopment scenario. This scenario accounted for the possibility of future regrading or excavation activities, which would redistribute subsurface soils to the surface.

In addition, a sample representative of fill was included in the HHRA data set for Subarea 3. Samples were collected from this fill material prior to its use at IR17 during the 2010 non-time critical removal action. A total of 19 soil samples were collected from the fill, and these samples were analyzed for compounds including metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, and polycyclic aromatic hydrocarbons (PAH). In order to represent the contribution of this fill material to risk at Subarea 3, EPCs were developed for this fill material from the 19 sample results, following the procedures described in Attachment A4. The EPCs were included in the HHRA data set as a single sample to represent the fill, and the sample was assumed to be in the 0-0.5 foot bgs depth range so that it appears in both the surface and subsurface soil data sets. The calculated EPCs for this fill sample are presented in Table A1-3.7 of Attachment A1.

Groundwater samples were grouped based on available data for Subareas 1 through 3. Soil gas data are also available for Subareas 1 through 3. Soil, groundwater, and soil gas sampling locations are shown on Figure 3 of the FS addendum report.

Tables A1-2.1 through A1-2.12 of Attachment A1 list all analytes detected in one or more soil samples for each of the subareas for the 0- to 0.5-foot (Subareas 1 and 2), 0- to 2-foot (Subarea 3), and 0- to 10-foot (all three subareas) soil depth intervals, as well as groundwater and soil gas. The tables include the following information about each detected chemical: minimum and maximum concentrations, location of maximum concentration, detection frequency, range of quantitation limits, residential screening level for soil, and identification of COPC. It should be noted that xylene results are provided as xylene (total) for some soil samples. For soil samples with results reported as m,p-xylenes and o-xylene isomers, the results were added to provide the xylene (total) concentration. If both m,p-xylenes and o-xylene were not detected in a sample, the soil sample was reported as nondetected for xylene (total) at the higher of the reported detection limits.

Tables A1-3.1 through A1-3.12 provide the data for soil, groundwater, and soil gas at the IR17 and Building 503 Area, including the following information for each chemical:

- An indication of whether the concentrations across the site are normally, lognormally, gamma, or nonparametrically distributed
- Frequency of detection (number of detections compared with number of samples collected)
- The minimum and maximum reported detection limits (values below detection limits are referred to in the table as censored data)
- The minimum and maximum detected concentrations
- Number of high censored results
- The arithmetic mean and the 95th, 97.5th, or 99th percentile upper confidence limit on the arithmetic mean (referred to henceforth as the 95UCL for simplicity)

Analytes for which all results were reported as nondetect (U-qualified) are not listed in the tables. Soil sampling locations are shown on Figures 9 and 11 of the main FS addendum. Air samples were not collected as part of the site characterization of the IR17 and Building 503 Area. As discussed in Section A6.1.3, however, outdoor air concentrations of volatile and particulate chemicals were modeled based on soil concentrations. Outdoor air concentrations within a construction trench were modeled from groundwater, as detailed in Attachment A5. Indoor air concentrations of volatile chemicals were modeled for soil gas and groundwater, as detailed in Attachment A6.

A5.3 IDENTIFYING CHEMICALS OF POTENTIAL CONCERN

COPCs are chemicals carried through the quantitative exposure assessment and risk characterization portions of the HHRA. COPCs represent the chemicals assumed to account for most of the estimated health risks for a site. Data for soil, groundwater, and soil gas for Subareas 1 through 3 were used to identify COPCs. COPCs were identified separately for soil, groundwater, and soil gas for each subarea.

Detected chemicals selected for evaluation in this HHRA are COPCs. The following sections describe the COPC selection process for soil (Section A5.3.1), groundwater (Section A5.3.2), and soil gas (Section A5.3.3). COPCs for soil, groundwater, and soil gas for all evaluated subareas are summarized in Tables A1-2.1 through A1-2.18 of Attachment A1. COPCs for each subarea are listed in Table A-1.

A5.3.1 Soil

COPCs represent those site-related chemicals assumed to account for the majority of any estimated health effects at a site. Consistent with guidance provided by EPA (1989, 2001) and the Navy (2000, 2001), the following criteria were used to identify COPCs in soil for all three subareas at the IR17 and Building 503 Area:

- If an inorganic chemical is considered an essential human nutrient (that is, calcium, magnesium, potassium, or sodium), it was excluded as a COPC.

- If the maximum detected concentration of a chemical in soil or sediment exceeded the more conservative value of the residential soil RSL (EPA 2012), "Cal-modified" 2004 EPA Region 9 residential soil PRG or DTSC's OEHHA residential soil CHHSL (DTSC 2012), it was retained as a COPC in the incremental risk evaluation. No risk-based screening was conducted as part of the total risk evaluation. Residential soil RSLs, PRGs, and CHHSLs account for chemical exposures associated with incidental ingestion, dermal contact, and outdoor inhalation of soil particulates and vapors.

- If the concentration of an inorganic chemical was determined statistically below its ambient level documented at Mare Island (Tetra Tech EM Inc. [Tetra Tech] 2002), it was excluded as a COPC in soil from the incremental and total risk evaluations. However, these excluded inorganic chemicals were considered in the ambient risk evaluation.

A more detailed discussion of the RSLs and the methods used to conduct the ambient analysis are provided in the following text.

A5.3.1.1 Risk-Based Concentrations

RSLs are risk-based concentrations that correspond to a cancer risk of 10^{-6} or a hazard quotient (HQ) of 1, based on standardized equations that combine standard exposure assumptions and EPA toxicity values. Exposure pathways incorporated into the RSLs for soil are incidental ingestion, dermal contact, and inhalation of airborne particles and VOC released from soil to ambient (outdoor) air. RSLs are currently available for a resident and a commercial/industrial worker (EPA 2012). Select past EPA PRGs were modified to be consistent with DTSC guidance, and were known as “Cal-modified” PRGs (DTSC 2012). The main difference in EPA and DTSC methodology is EPA’s lack of route-to-route extrapolation of toxicity values, which results in RSLs at higher concentrations than the comparable PRG and/or EPA’s exclusion of RSLs for some compounds previously listed in the EPA RSL tables. The Navy has accepted the use of Cal-modified values, when available, for screening purposes only (Navy 2009). The residential RSL is more conservative (that is, lower) than the commercial/industrial RSL because residential exposure is expected to be greater (more prolonged) than the shorter exposure times of occupational receptors. The risk estimates developed using risk-based concentrations represent the risk for all exposure pathways evaluated within the RSL framework.

A5.3.1.2 Ambient Analysis

Site soil concentrations were compared with the IR17 and Building 503 Area ambient concentrations of inorganic chemicals following Navy guidance (Navy 1998, 1999, 2000). The null hypothesis (H_o) (site concentrations are less than or equal to ambient concentrations) was tested in two ways, depending on the percentage of nondetects for each chemical, as follows:

- For data sets where nondetected concentrations composed less than 40 percent of the data, the Wilcoxon Rank Sum (WRS) test was used to compare the site data set with the ambient data set. For example, the WRS test was performed when an element was detected in more than 60 percent of the samples.
  - If the WRS test showed a shift in the median, indicating that site concentrations exceeded ambient concentrations, the chemical was retained for screening with the RSLs.
  - If the WRS test did not show a shift in the median (that is, site concentrations were *not* elevated with respect to ambient concentrations), the quantile test was performed to test for differences from ambient levels. If the quantile test resulted in rejecting H_o, the chemical was identified as “exceeding ambient” and retained for toxicological screening. If the quantile test failed to detect hot spots, the chemical was dropped from further consideration.

- For data sets in which nondetected concentrations composed more than 40 percent of the data, both the test of proportions (implemented using the Fisher exact test) and the quantile test were performed. If either test rejected H_o, the chemical was retained. If neither test rejected H_o, the chemical was dropped from further consideration.

For a data set including six or fewer data points, no statistical analysis was conducted to determine a 95UCL, and the maximum detected concentration was used as the EPC in the HHRA.

Inorganic chemicals that exceeded the IR17 and Building 503 Area ambient concentrations, based on either a shift in the median or an indication of hot spots, were considered to represent potential site releases and were evaluated in the HHRA. Those chemicals that did not exceed ambient concentrations were dropped from further consideration in the incremental (Attachment A1) and total (Attachment A2) risk evaluations, but were presented in the ambient risk evaluation (Attachment A3). Inorganic chemicals for which no ambient concentrations were available were treated as though they exceeded ambient and were retained by default. All detected organic chemicals were considered to represent potential site releases and were considered in the HHRA. Tables A1-2.13 through A1-2.18 of Attachment A1 present the results of the ambient analysis for soil.

A5.3.2 Groundwater

As discussed in Section 2.2.6 of the main FS addendum text, groundwater at the IR17 and Building 503 Area is not potable due to high salinity. As a result, no direct (ingestion or dermal) exposure pathways are complete. However, VOCs in groundwater can volatilize and migrate upwards into enclosures (for example, buildings) and into construction trenches. Therefore, inhalation of VOCs that volatilize from groundwater to outdoor and indoor air represents an indirect exposure pathway. Indoor air exposures are considered more significant than outdoor air exposures because vapors become more concentrated indoors. Dermal contact with groundwater within a construction trench is not anticipated for the construction worker because dewatering practices would be implemented as a result of the shallow groundwater conditions at the site. Dewatering would reduce the potential for groundwater pooling at the base of the trench and, thus, direct exposure to groundwater in a trench is not a complete pathway.

All detected organic chemicals in groundwater were included in the HHRA. The COPCs in groundwater for each subarea are presented in Tables A1-2.7 through A1-2.9 in Attachment A1.

A5.3.3 Soil Gas

Soil gas samples were collected in vadose zone soil from throughout Subareas 1 through 3 (Figure 3 of the main FS addendum). All soil gas samples were considered in the HHRA. The COPCs in soil gas for Subareas 1 through 3 are presented in Tables A1-2.10 through A1-2.12 in Attachment A1.

A6.0 EXPOSURE ASSESSMENT

An exposure assessment identifies potential human receptors that could be exposed to site-related chemicals, as well as the routes, magnitude, frequency, and duration of the potential exposures. The principal objective of this evaluation is to identify reasonable maximum exposures (RME). As defined by EPA (1989), the RME is the maximum exposure reasonably expected at a site. The potential human receptors and complete exposure pathways for the identified receptors were presented in Section A4.0, Conceptual Site Model. The remainder of this section describes the process used to estimate EPCs and quantify chemical intake for pathway-specific exposures for each receptor.

A6.1 EXPOSURE POINTS AND EXPOSURE POINT CONCENTRATIONS

Potential exposure points are identified based on anticipated future population activity patterns and the relationship of those activities to the presence of contaminated media. A location is identified as an exposure point if a human might ingest or have dermal contact with contaminated soil or inhale contaminated air in the future. The spatial distribution of COPC concentrations (for example, VOCs) at the IR17 and Building 503 Area was evaluated to identify possible areas of localized contamination.

A6.1.1 Soil

EPCs were calculated following EPA guidance (EPA 2002a, 2009b) for a surface soil (0 to 0.5 foot bgs for Subareas 1 and 2, and 0 to 2 feet bgs for Subarea 3) data set and a combined surface/subsurface soils (0 to 10 feet bgs) data set. The underlying assumption in the assessment of the combined surface/subsurface soils data set is that subsurface soil may be brought to the surface during redevelopment activities (for example, removal of current structures, excavation of soil for construction of new facilities, and regrading).

As noted in Section A1.2, the IR17 and Building 503 Area is proposed for commercial/industrial reuse (City of Vallejo 2008). If the site remains undeveloped or undergoes minimal disturbance, future site conditions will mirror current site conditions (that is, the soil will not be excavated and redistributed across the site). Under this future condition (minimal disturbance scenario), a commercial/industrial worker or a hypothetical resident may be present at the IR17 and Building 503 Area and may be exposed to chemicals in the soil from 0 to 0.5 foot (Subareas 1 and 2) or 0 to 2 feet bgs (Subarea 3). However, if the IR17 and Building 503 Area is developed (that is, intrusive development scenario), construction workers could be exposed during redevelopment. In addition, commercial/industrial workers and hypothetical residents would become potentially exposed future receptors. Exposure for the future redeveloped case thus includes exposure to any COPCs detected between 0 and 10 feet bgs. Future site conditions were evaluated as described in the following paragraphs.

For this HHRA, both the 0- to 0.5-foot (0 to 2-feet at Subarea 3) and the 0- to 10-feet bgs depth intervals were evaluated for the commercial/industrial worker and residential receptors. Only the 0- to 10-feet bgs depth interval was evaluated for the construction worker, who is assumed exposed to soil only during such intrusive activities as excavation, with mixing of all soil depths as the most reasonable exposure.

Detailed summary statistics for all detected analytes in soil are presented in Tables A1-2.1 through A1-2.6 in Attachment A1. EPCs in soil and the basis for their calculations are presented in Tables A1-3.1 through A1-3.6. Each table identifies the type of statistical distribution that was associated with each EPC, following EPA (2002a, 2009b) guidance. 95UCL concentrations were calculated using distribution-dependent formulae, following Gilbert (1987) and EPA (2002a, 2009b), as described in detail in Attachment A4. In cases where the 95UCL exceeded the maximum detected concentration, the maximum detected concentration was used as the soil EPC.

A6.1.2 Groundwater

Detailed summary statistics for all detected analytes in groundwater are presented in Tables A1-2.7 through A1-2. 9 in Attachment A1. The maximum detected concentrations of chemicals in groundwater are presented in Tables A1-3.8 through A1-3.10 in Attachment A1.

A6.1.3 Outdoor Air – Particulate and Volatile Chemicals Released from Soil

Chemicals can be transferred to outdoor air by three mechanisms: (1) wind erosion and release of airborne particulates from soil, (2) volatilization from soil, and (3) volatilization from groundwater (Section A6.1.4). In the absence of direct measurements of chemical concentrations in air, models were used to estimate EPCs in outdoor air as a result of these soil transfer mechanisms.

EPCs of volatile compounds released from soil to outdoor air and chemicals in airborne particulates were estimated using the soil EPCs as the source term along with an EPA methodology on the derivation of RSLs (EPA 2012). To derive these outdoor air EPCs, the soil EPC was multiplied by the reciprocal of a chemical-specific volatilization factor (VF), which is a chemical-specific value that relates chemical concentrations in soil to airborne concentrations that may be inhaled. The chemical-specific volatilization factors used for the IR17 and Building 503 Area are presented in Table A-2.

To derive EPCs for airborne particulates, EPA uses a model that calculates a particulate emission factor (PEF) relative to the contaminant concentration in soil and the concentration of respirable particulates in the air due to fugitive dust (erosion from wind) emissions from contaminated soils. The PEF is a non-chemical-specific value that relates chemical concentrations in soil to airborne concentrations that may be inhaled. The PEF model is based on a study by Cowherd and others (1985) involving a rapid assessment procedure applicable to a typical hazardous site where surface contamination provides a relatively continuous and constant potential for emission over an extended period.

EPCs for nonvolatile COPCs released from surface and subsurface soil to outdoor air as particulates were estimated using soil EPCs as the source term and the methodology provided by EPA in its memorandum describing the derivation of RSLs (EPA 2012). To derive the EPCs for particulates released to outdoor air, the soil EPC was multiplied by the reciprocal of the

PEF. The EPA (2012) default PEF of 1.36E+09 cubic meters per kilogram (m^3/kg) was used to evaluate particulate inhalation exposures for all receptors except the future construction worker, who was evaluated using a PEF of 1.00E+6 m^3/kg (DTSC 2011b). The default PEF is based on the assumption that vegetation covers 50 percent of the site. This assumption may overestimate COPC concentrations in outdoor air for the IR17 and Building 503 Area where the percentage of vegetative cover or pavement exceeds 50 percent at the site and thus accordingly reduces the potential for particulate emissions from soil.

A6.1.4 Outdoor Air – Volatile Chemicals Released from Groundwater to Construction Trench Air

Possible future construction at the site may involve construction of trenches and, therefore, construction workers at the site may be exposed to airborne vapors in a trench. A model was developed to simulate migration of chemicals in groundwater through the soil into a trench to estimate the vapor concentrations in the trench. The IR17 and Building 503 Area HHRA adopted the EPA (2012) definition of volatility (Henry's law constant greater than 1E-05 atmosphere-cubic meter per mole and molecular weight less than 200 grams per mole). Only detected contaminants that met those two criteria were considered VOCs and available for intake via an inhalation pathway.

Models were used to estimate EPCs in construction trench air that may be inhaled by construction workers from volatile COPCs in groundwater. A model was developed to simulate migration of chemicals in groundwater through the soil into a trench to estimate the vapor concentrations in the trench. The model consists of two parts: (1) calculation of volatile emission rates from groundwater into a trench, using the VLEACH model (Ravi and Johnson 1996), and (2) calculation of vapor concentrations in the trench air using the calculated emission rates and a simple air dispersion (box) model. A full description of the model used to estimate volatilization into a construction trench is provided in Attachment A5. Trench air concentrations derived from the model (EPCs) for VOCs migrating from groundwater in Subareas 1 through 3 are summarized in Tables A1-3.11 through A1-3.13 of Attachment A1.

A6.1.5 Indoor Air – Subsurface Vapor Intrusion

Samples collected from the water-bearing zone closest to the land surface were considered appropriate for evaluation of vapor intrusion. Most monitoring wells at Mare Island are all in the same (assumed to be connected) water-bearing zone, and the layer of groundwater from which organic vapors emanate is within about 6 to 7 feet of the land surface, depending on seasonal conditions. Available groundwater data from monitoring wells within Subareas 1 through 3 were used in the HHRA.

As indicated in Section 2.2.6 of the main FS addendum text, groundwater at the IR17 and Building 503 Area is considered nonpotable. As a result, no direct (ingestion or dermal) exposure pathways are complete for the commercial/industrial worker and resident. However, VOCs in groundwater and subsurface soil (as soil gas) can migrate upwards into enclosed spaces (for example, buildings).

The maximum detected concentrations in soil gas (Tables A1-3.14 through A1-3.16) and groundwater (Tables A1-3.8 through A1-3.10) were used to estimate indoor air concentrations for Subareas 1 through 3 and were assumed to represent future site conditions. Methods used to estimate indoor air vapor concentrations are consistent with DTSC guidance and protocols (DTSC 2011a) and presented in Attachment A6. Indoor air concentrations derived from the model (EPCs) for VOCs migrating into indoor air from soil gas and groundwater in Subareas 1 through 3 are summarized in Tables A1-3.17 through A1-3.22 of Attachment A1.

A6.2 CHEMICAL INTAKE ESTIMATES

Estimates of exposure are based on the EPCs (as described in Section A6.1) and scenario-specific assumptions and intake parameters. Consistent with EPA (1995) guidance, exposure estimates (intakes)—expressed in terms of milligrams of chemical per kilogram body weight per day (mg/kg-day)—were calculated for a RME scenario for each receptor and exposure pathway. The RME represents the highest exposure reasonably expected and is calculated using the EPC and the RME exposure parameters.

EPA-derived exposure algorithms were used to estimate the chemical intakes for each route of exposure (that is, oral, dermal, and inhalation). The generic equations for calculating chemical intake are provided below (EPA 1989, 2009a):

$$I\ (oral\ or\ dermal) = \frac{C \times CR \times EF \times ED}{BW \times AT} \qquad \text{(A-1)}$$

$$I\ (inhalation) = \frac{C \times ET \times EF \times ED}{AT} \qquad \text{(A-2)}$$

where

I	=	Intake: the amount of chemical at the exchange boundary (from oral or dermal exposure, in mg/kg-day; from inhalation exposure, in milligrams per cubic meter [mg/m^3])
C	=	Chemical concentration for the exposure medium: the EPC (for example, milligrams per kilogram [mg/kg] for soil)
CR	=	Contact rate: the amount of contaminated medium contacted orally or dermally per unit of time or event; may be the ingestion rate or dermal contact rate (for example, milligrams per day [mg/day] for the ingestion rate of soil). The contact rate is not applicable for inhalation exposures.
ET	=	Exposure time: number of hours during which the exposure occurs (hours per day); the exposure time is applicable only for inhalation exposures.
EF	=	Exposure frequency: how often the exposure occurs (days per year)
ED	=	Exposure duration: the number of years during which a receptor comes in contact with the contaminated medium (years)
BW	=	Body weight: the average body weight of the receptor over the exposure period (kilograms); only applicable for oral and dermal exposures

AT = Averaging time: the period over which exposure is averaged (days for oral and dermal exposures; hours for inhalation exposures). For carcinogens, the averaging time is 25,550 days (oral and dermal exposures) and 613,200 hours (inhalation exposures) on the basis of a lifetime exposure of 70 years, which represents the average life expectancy. For noncarcinogens, the averaging time is equal to the exposure duration expressed in days (ED × 365 days per year) for oral and dermal exposures, and in hours (ED × 365 days per year × 24 hours per day) for inhalation exposures.

Pathway-specific variations of the generic equation above were used to calculate intakes of COPCs. The exposure parameters common to all equations are discussed in Section A6.2.1, and pathway-specific equations and exposure parameters are discussed in Section A6.2.2.

A6.2.1 General Exposure Assumptions

The exposure parameter values used in the intake equations are based on a series of reported and assumed factors related to potential land use patterns at the IR17 and Building 503 Area. Exposure parameters also account for a number of physiological factors, such as daily breathing rate and surface area of exposed skin. Exposure parameters common to all intake equations are the exposure time, exposure frequency, exposure duration, body weight, and averaging time. Each of these parameters is discussed in detail in the following text and are presented in Tables A1-4.1 and A1-4.2 of Attachment A1.

A6.2.1.1 Exposure Time, Frequency, and Duration

The three parameters (exposure time, exposure frequency, and exposure duration) together define the total extent of exposure of a receptor. The exposure time is the number of hours per day (or hours per event) when a receptor is present at a specific exposure point; it is used only to describe the inhalation pathway. An exposure time of 8 hours per day was assumed for the commercial/industrial worker and the construction worker for evaluation of exposures to COPCs in soils released to outdoor air from wind erosion or volatilization (EPA 1991a; DTSC 1992). The exposure times for the child and adult resident were assumed to be 24 hours per day. It was assumed the construction worker would spend 8 hours per day in a construction trench.

The exposure frequency is the number of days per year (or events per year) when exposure occurs. An exposure frequency of 250 days per year was assumed for commercial/industrial and construction workers, corresponding to the number of workdays in a year. An exposure frequency of 350 days per year was assumed for both the child and adult resident (EPA 1991a; DTSC 1992) based on the assumption of year-round exposure. It was assumed the construction worker would spend a limited time in a construction trench, and an exposure frequency of 60 days per year was used.

The exposure duration is the total number of years when exposure occurs. The exposure duration was 25 years for the commercial/industrial worker; 1 year for the construction worker

(EPA 2002b; DTSC 2000); and 30 years for the resident, which is equivalent to 24 years for the adult and 6 years for the child (EPA 1991a; DTSC 1992).

A6.2.1.2 Body Weight

Consistent with EPA and DTSC guidance (EPA 1991a; DTSC 1992), a default body weight of 70 kilograms was used for all adult receptors, and 15 kilograms was used for the child receptor.

A6.2.1.3 Averaging Time

The averaging time for addressing adverse noncancer health effects is equal to the exposure duration (in years) times 365 days per year, as recommended by EPA (1989). The averaging time for cancer risk estimation is the number of days in a 70-year lifetime or 25,550 days, as recommended by EPA (1989). For the inhalation route, the averaging time is converted from days to hours.

A6.2.2 Pathway-Specific Exposure Factors

This section summarizes the exposure factors unique to each of the exposure pathways quantified in this HHRA, and these factors are summarized in RAGS Part D standard "Values Used for Daily Intake" tables (Tables A1-4.1 and A1-4.2 of Attachment A1).

A6.2.2.1 Exposure Parameters and Equation for Inhalation of Volatile Emissions and Particulates Released from Soil

Individuals may be exposed to COPCs in air by inhaling chemicals in vapor phase or sorbed to particulates. Exposure time, exposure frequency, and exposure duration are used to estimate chemical intake from the inhalation exposure route. The assumptions for these parameters are discussed above in Section A6.2.1. Chemical-specific VFs and site- and scenario-specific PEFs, described in Sections A6.1, were used to estimate EPCs in outdoor air. The protocols followed for this pathway are described in Attachment A6.

A6.2.2.2 Exposure Parameters and Equation for Incidental Ingestion of Soil

Individuals may be exposed to COPCs in soil by inadvertently ingesting contaminated soil. The intake (applied dose) is estimated as the amount of chemical at the exchange boundary (gastrointestinal tract). The exposure parameters specific to the ingestion of soil pathway are the soil ingestion rate and the fraction of the ingested soil assumed contaminated.

Default soil ingestion rates were used for the workers: 100 mg/day for the future commercial/industrial worker and 330 mg/day for the construction worker (EPA 1991a, 2002b). Estimated soil ingestion rates were 200 mg/day for the child and 100 mg/day for the adult residents. Different ingestion rates were necessitated, given children's mouthing habits, which are assumed to result in greater incidental soil intakes during the preschool years (EPA 1991a, 2012). All factors are presented in Table A1-4.1 of Attachment A1.

The term "fraction ingested" is used to account for the fraction of soil contacted that is assumed contaminated. All soil contacted is conservatively assumed contaminated for this HHRA (that is, the fraction ingested was set equal to 1).

A6.2.2.3 Exposure Parameters and Equation for Dermal Contact with Soil

Individuals may be exposed to COPCs in soil by direct contact with the skin. The intake for the dermal pathway is estimated as an absorbed dose, which is the amount of chemical that crosses the skin, enters the body, and passes into the bloodstream. (The absorbed dose contrasts with an applied dose, which is used to estimate intake for all other exposure routes.) The exposure parameters specific to the assessment of the dermal pathway are the skin surface area (the amount of skin in contact with soil), the amount of soil adhering to the skin (adherence factor), and the chemical-specific dermal absorption factor (ABS) (that is, the fraction of chemical in contact with the skin that actually crosses the skin barrier). ABS factors are taken from EPA (2012) and are summarized in Table A-2.

Receptor-specific values for the dermal adherence factor were provided by DTSC (2000): 0.2 milligram per square centimeter (mg/cm^2) for the commercial/industrial worker, 0.8 mg/cm^2 for the construction worker, 0.2 mg/cm^2 for the child resident, and 0.07 mg/cm^2 for adult residents. Table A1-4.1 of Attachment A1 summarizes dermal parameter values for soil.

The following default values for body surface area were used: 5,700 square centimeters (cm^2) for commercial/industrial and construction workers (DTSC 2000), 2,900 cm^2 for child residents, and 5,700 cm^2 for adult residents (DTSC 2000; EPA 2004).

A7.0 TOXICITY ASSESSMENT

The toxicity assessment identifies the reference doses (RfD), reference concentrations (RfC), slope factors (SF), and inhalation unit risks (IUR) used to evaluate adverse noncancer health effects and cancer risks. Based on the methodology for the HHRA, two sets of risks were calculated: one set using federal (EPA) toxicity criteria, and the other set using the DTSC toxicity criteria. The hierarchy of sources used to obtain EPA and State of California toxicity criteria are described below. The RfDs and SFs are discussed in Sections A7.1 and A7.2. Special considerations on route-to-route extrapolations, selection of chemical surrogates, chromium, and lead, are discussed in Sections A7.3 through A7.6.

The first set of risk estimates were calculated using the federal toxicity criteria hierarchy. Sources used to obtain federal toxicity criteria are listed below, and follow the hierarchy outlined in EPA (2003).

1. EPA's Integrated Risk Information System (IRIS). IRIS is an online database that contains EPA-approved RfDs, RfC, SFs, and IURs (EPA 2013). The toxicity criteria provided in IRIS have undergone review and are recognized as agency-wide consensus information.
2. EPA's Provisional Peer-Reviewed Toxicity Values (PPRTV) Database. EPA's PPRTVs are EPA-approved RfDs, RfCs, SFs, and IURs that have undergone review and are recognized as consensus information. The PPRTVs are obtained from EPA (2012).
3. Other EPA toxicity values, including, but not limited to:
    a. EPA's Health Effects Assessment Summary Tables (HEAST). HEAST values are obtained from EPA (2012).
    b. EPA's National Center for Environmental Assessment (NCEA) papers (chemical-specific references). NCEA values are obtained from EPA (2012).
    c. California Environmental Protection Agency's (Cal/EPA) OEHHA on-line database, which contains approved toxicity criteria (OEHHA 2013). These toxicity criteria have undergone review and are recognized toxicity values for evaluations in California.
4. For noncancer effects from inhalation route exposures, OEHHA chronic reference exposure levels (REL) (OEHHA 2012).

The second set of risk estimates were calculated using a similar toxicity criteria hierarchy, except that State of California toxicity criteria, when available, were used preferentially over federal criteria for assessing cancer effects. State criteria were also used preferentially over federal criteria for assessing noncancer effects if state criteria were based directly on inhalation studies. Sources used to obtain toxicity criteria for the state toxicity criteria hierarchy are listed below, in descending order.

1. Carcinogenic toxicity criteria: OEHHA online database (OEHHA 2013). If an OEHHA toxicity criterion for cancer effects is not available, the toxicity criterion is the same as the value used for the federal toxicity criteria hierarchy.

    Noncarcinogenic toxicity criteria (inhalation exposure only):

    a. The EPA (2013) IRIS RfC is used if the EPA IRIS RfC was based on an inhalation study (and not extrapolated from an oral study).
    b. The OEHHA chronic REL (OEHHA 2012) is used if the EPA IRIS inhalation RfC was extrapolated from an oral study, or if an IRIS RfC is unavailable. If an OEHHA chronic REL is not available, the toxicity criterion used to evaluate noncancer inhalation exposure is the same as the value used for the federal toxicity criteria hierarchy.
2. EPA's PPRTVs (as cited in EPA 2012).

3. Other EPA and non-EPA sources of toxicity criteria, including, but not limited to:
    a. EPA's HEAST (as cited in EPA 2012).
    b. EPA's NCEA chemical-specific studies (as cited in EPA 2012).

The federal and State of California toxicity criteria used for this HHRA are presented in standard RAGS Part D format "Toxicity Data" tables in Attachment A1 (see Tables A1-5.1 through A1-6.4), and are discussed in the following sections. Toxicity profiles for COPCs are not included in this HHRA.

A7.1 REFERENCE DOSES AND REFERENCE CONCENTRATIONS

The potential for adverse noncancer health effects to result from exposure to chemicals was characterized by comparing an exposure estimate (intake) with an RfD for oral and dermal exposures and with an RfC for inhalation exposures. EPA (1989) defines an RfD as an estimate (with uncertainty that spans perhaps an order of magnitude or more) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to occur without an appreciable risk of harmful effects. The RfDs are expressed as mg/kg-day and are specific to the chemical, exposure route (for example, ingestion or inhalation), and exposure duration (chronic or subchronic). Consistent with EPA (1989) and DTSC (1992) guidance, oral RfDs were used to assess dermal exposure in the absence of route-specific dermal RfDs, as detailed in Section A7.3. RfCs are concentrations in air expressed in units of mg/m^3, and are used to assess inhalation exposures (EPA 2012).

Chronic RfDs and RfCs are developed for evaluating exposures that occur over periods of more than 7 years, and subchronic RfDs and RfCs are for exposures of less than 7 years. Although the potential exposures considered in this risk assessment are for periods of from 1 to 30 years, chronic RfDs and RfCs were used to evaluate both chronic and subchronic exposures. Few subchronic RfDs and RfCs were available, and the use of only one set of criteria based on chronic exposures simplifies the analysis. Using chronic RfDs and RfCs results in conservative estimates of potential hazards and does not affect the interpretation or conclusions of the assessment.

Developments of RfDs and RfCs are based on review of relevant human and animal studies for each chemical, and selection of the study (or studies) pertinent to deriving the specific RfD or RfC. RfDs and RfCs are often derived from a measured or estimated no observed adverse effect level (NOAEL). The NOAEL corresponds to the dose, in mg/kg-day, that can be administered without inducing observable adverse effects. If a NOAEL cannot be established, the lowest observed adverse effect level (LOAEL) is used. The LOAEL corresponds to the lowest daily dose administered that induces an observable adverse effect. The toxic effect characterized by the LOAEL is referred to as the "critical effect."

Most NOAELs are based on data from experimental studies in animals. Both the experimental parameters and the extrapolation of animal data to humans are potential sources of uncertainty; therefore, the NOAEL or LOAEL is divided by an uncertainty factor in deriving an RfD to ensure that the RfD will be protective of human health. The uncertainty factors usually occur in multiples of 10, and each factor represents a specific area of uncertainty inherent in the extrapolation from available data. Uncertainty factors account for the following:

- Extrapolation of data from animals to humans (interspecies extrapolation)
- Variation in human sensitivity to the toxic effects of a chemical (intraspecies differences)
- Derivation of a chronic RfD based on a subchronic rather than a chronic study
- Derivation of an RfD based on a LOAEL rather than a NOAEL

Modifying factors between 0 and 10 may also be applied to accommodate other factors or additional uncertainty associated with the data. The modifying factor is 1 for most chemicals. RfDs and RfCs are summarized in Tables A1-5.1 through A1-5.4 of Attachment A1 for the COPCs identified for this HHRA.

A7.2 SLOPE FACTORS AND INHALATION UNIT RISKS

The toxicity information considered in the assessment of potential cancer risks includes a weight-of-evidence classification, a SF for evaluation of oral exposures, and an IUR for evaluation of inhalation exposures. The weight-of-evidence classification qualitatively describes the likelihood that a chemical is a human carcinogen and is based on an evaluation of the available data from human and animal studies. Since publication of its 1996 cancer guidelines, "Proposed Guidelines for Carcinogen Risk Assessment" (EPA 1996), EPA has evaluated chemicals using a weight-of-evidence narrative and one of the following descriptors for classifying potential carcinogenicity to humans: "known/likely," "cannot be determined," and "not likely." EPA had evaluated chemicals before publication of its 1996 guidelines in accordance with the 1996 guidelines (EPA 1996). These chemicals had been classified using an alphanumeric system that assigned the chemical to one of five groups: Group A, a known human carcinogen; Groups B1 and B2, a probable human carcinogen; and Group C, a possible human carcinogen. Chemicals that could not be classified as human carcinogens because of lack of data were categorized in Group D, and chemicals showing no evidence of carcinogenicity in humans were categorized in Group E.

SFs and IURs are upper-bound estimates, approximating 95UCL on the increased cancer risk from lifetime exposure to a chemical (EPA 1989). The SFs and IURs used to estimate cancer risks were obtained from the sources identified in Section A7.2.

Similar to RfDs and RfCs, SFs and IURs are specific to the chemical and route of exposure. SFs are used to assess oral exposures, and IURs are used to assess inhalation exposures.

As with RfDs, oral SFs were used to estimate cancer risks for exposures via the dermal route if a dermal SF was not available, as detailed in Section A7.3. The SFs and IURs used in this assessment are presented in Tables A1-6.1 through A1-6.4 of Attachment A1.

A7.3 ROUTE-TO-ROUTE EXTRAPOLATION

Toxicity values are not available for the dermal exposure route; therefore, route-to-route extrapolations of oral toxicity values were used to evaluate dermal exposures for inorganic and organic COPCs. The oral absorption efficiency was assumed as 100 percent for all COPCs; that is, oral toxicity values were not adjusted for absorption efficiency to evaluate dermal exposures (see Tables A1-5.1 through A1-6.4 of Attachment A1).

A7.4 CHEMICAL SURROGATES

Because of a lack of toxicity values for some COPCs, the following chemical surrogates were used to avoid data gaps in the HHRA.

COPC Lacking Toxicity Information	Chemical Surrogate Used in HHRA
1-Methylphenanthrene, Phenanthrene	Anthracene
2,3,5-Trimethylnaphthalene, 2,6-Dimethylnaphthalene	2-Methylnaphthalene
2-Amino-4,6-dinitrotoluene	2,4-Dinitrotoluene
4-Ethyltoluene	Toluene
Acenaphthylene	Acenaphthene
alpha- and gamma-Chlordane	Chlordane
Aroclor-1260	Aroclor-1254
Benzo(g,h,i)perylene	Pyrene
Chromium	Chromium, trivalent
Endosulfan I	Endosulfan
Endrin aldehyde, Endrin ketone	Endrin
Ethanol	Methanol
Heptane	n-Hexane
Mercury	Mercury, inorganic salts
Nickel	Nickel, soluble salts
Tetrahydrofuran	1,2-Epoxybutane
Thallium	Thallium, soluble salts
Vanadium	Vanadium and compounds

A7.5 CHROMIUM

Chromium was identified as a COPC in surface soil and subsurface soil at the IR17 and Building 503 Area. Analytical data for soil at the IR17 and Building 503 Area, as reported in the FS addendum, show detections of hexavalent chromium. Of the detections of hexavalent chromium, the maximum detected concentration (0.1 mg/kg) does not exceed the EPA RSL of 0.29 mg/kg for hexavalent chromium (EPA 2012). While not all samples underwent chromium speciation, it is assumed that based on the low concentrations and low detection frequency of hexavalent chromium at the IR17 and Building 503 Area, the non-speciated samples are more than likely trivalent chromium. Therefore, toxicity criteria for trivalent chromium were used to evaluate chromium in soil at the IR17 and Building 503 Area when speciation is not apparent.

A7.6 LEAD

Although toxicity criteria (oral and inhalation slope factors) are available for lead from OEHHA (2013), risks from exposure to lead were characterized using blood lead modeling-based screening concentrations, rather than exposure route-specific toxicity criteria for lead. Health effects from exposure to lead, particularly in children, may occur at such low blood lead levels that use of threshold-based toxicity criteria to evaluate potential risks from exposure to lead is not preferred. Rather, exposure to lead is evaluated by using a biomarker (blood lead levels); blood lead modeling, which accounts for multiple sources of exposure to lead, is used to predict blood lead levels. OEHHA has established a goal of an estimated blood level of 1 microgram per deciliter (µg/dL) for its CHHSLs for residential and industrial exposures. The Navy has established a modified CHHSL for Mare Island so the soils do not increase the blood lead levels more than 1 µg/dL above background for the residential or industrial receptors. Therefore, the residential screening value for lead will be the sum of the ambient concentration of lead at Mare Island (25.6 mg/kg) plus the residential soil CHHSL (80 mg/kg) (DTSC 2009), to equal a modified OEHHA residential CHHSL of 105.6 mg/kg. Likewise, for the industrial worker, the sum of the ambient concentration of lead in soil plus the industrial soil CHHSL (320 mg/kg) (DTSC 2009) would equal a modified OEHHA industrial CHHSL of 345.6 mg/kg. Risks from exposure to lead are characterized in Section A8.3.

A7.7 MUTAGENS

EPA guidance regarding evaluation of risk from early-life exposure to carcinogens recommends a different approach to estimating chemical intake for carcinogenic chemicals with a mutagenic mode of action (MOA) (EPA 2005). Chemicals with a mutagenic MOA may cause irreversible damage to deoxyribonucleic acid (DNA), and would exhibit a greater effect on DNA in early-life versus later-life exposure. EPA (2005) provides guidelines for evaluating cancer risks for mutagens; these guidelines are applicable to exposure scenarios such as residential, for which potential receptors include children that may be exposed to mutagens in early life. Seven PAHs detected at IR17 and Building 503 Area are associated with a mutagenic MOA: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. In addition, hexavalent chromium, methylene chloride, trichloroethene (TCE) and vinyl chloride are also considered mutagenic. Separate cancer risk equations are presented for mutagens, though TCE and vinyl chloride have unique equations and were used in the HHRA for the incremental risk evaluation using federal toxicity criteria (Attachment A1). However, for the incremental (Attachment A1) and total risk evaluations (Attachment A2) using the State of California toxicity criteria, the standard mutagen equations were used for all mutagenic chemicals, including TCE and vinyl chloride. The State of California toxicity criteria for TCE has not been split into mutagenic and non-mutagenic criteria like the EPA has done; thus the standard mutagenic equation was used. Furthermore, based on the DTSC's Office of Human and Ecological Risk HHRA Note 3 (DTSC 2014), the DTSC did not apply the unique mutagenic equation with age-dependent adjustment factors for vinyl chloride because vinyl chloride is currently under review. The mutagenic equations are presented in Table A1-4.1 in Attachment A1.

A8.0 RISK CHARACTERIZATION

The final step in the HHRA is the characterization of the potential risks associated with exposure to detected chemicals. Cancer risks and noncancer health hazards are characterized separately. The general methodology for estimating cancer risks and HIs is presented in Sections A8.1 and A8.2. The results of risk characterization of lead are presented in Section A8.3. As discussed in Section A7.0, two independent sets of risks were calculated for each subarea: the first set is based on federal toxicity criteria, and the second set is based on State of California toxicity criteria. The methodology described below for calculating cancer risks and noncancer HIs applies to both sets of risk calculations.

A8.1 CHARACTERIZATION OF CANCER RISKS

Risks associated with exposure to chemicals classified as carcinogens are estimated as the incremental probability that an individual will develop cancer over a lifetime as a direct result of an exposure (EPA 1989, 2009a). The estimated risk is expressed as a unitless probability.

Three steps are used in estimating cancer risks for chemicals classified as carcinogens. First, the chemical intake is multiplied by the chemical-specific SF (oral and dermal exposure) or the chemical-specific IUR (inhalation exposure) to derive a cancer risk estimate for a single chemical and pathway. The calculation is based on the following relationship:

$$\textit{Chemical-Specific Cancer Risk (oral or dermal)} = \textit{Intake (mg/kg-day)} \times \textit{SF (mg/kg-day)}^{-1} \quad \text{(A-3)}$$

$$\textit{Chemical-Specific Cancer Risk (inhalation)} = \textit{Intake (mg/m}^3\textit{)} \times 10^3 \textit{ (micrograms per milligram [µg/mg]} \times \textit{IUR (micrograms per cubic meter [µg/m}^3\textit{])}^{-1} \quad \text{(A-4)}$$

Second, the individual chemical cancer risks are assumed additive to estimate the cancer risk associated with exposure to multiple carcinogens for a single exposure pathway, as follows:

$$\textit{Pathway-Specific Cancer Risk} = \Sigma \textit{ Chemical-Specific Cancer Risk} \quad \text{(A-5)}$$

Third, pathway-specific risks are summed to estimate the overall cancer risk for each receptor. Cancer risks estimated for the future commercial/industrial worker, future construction worker, and future resident are presented in Section A9.0. The estimated cancer risk for the future resident is based on the sum of the risks estimated for the child and adult resident.

EPA guidance on exposure levels considered protective of human health is presented to help interpret results of the risk assessment. In the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA defined general remedial action goals for sites on the National Priorities List (Title 40 of the *Code of Federal Regulations* Section 300.430). The goals include a range for residual cancer risk, which is "an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}," or 1 in 10,000 to 1 in 1,000,000. The goals set out in the NCP are applied following a decision to remediate a site. A subsequent EPA directive provides additional guidance on the role of the HHRA in supporting risk management decisions, and in particular, evaluating whether a response action is necessary (EPA 1991b). Specifically, the guidance states, "Where cumulative carcinogenic risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the noncancer HQ is less than 1, action generally is not warranted unless there are adverse environmental impacts." EPA Region 9 has stated, however, that action may be taken to address risks between 10^{-4} and 10^{-6}. In addition, Cal/EPA has stated that it considers 10^{-6} as the point of departure for risk management decisions. For this reason, the range between 10^{-4} and 10^{-6} is referred to as the "risk management range" in this HHRA.

A8.2 CHARACTERIZATION OF NONCANCER HAZARDS

The potential for exposure that may result in adverse health effects other than cancer is evaluated by comparing the intake with a RfD (oral and dermal exposure) and with a RfC (inhalation exposure) for chemicals not classified as carcinogens and for carcinogens known to cause adverse health effects other than cancer. When calculated for a single chemical, the comparison yields a ratio termed the HQ:

$$HQ\ (oral\ or\ dermal) = \frac{Intake\ (mg/kg\text{-}day)}{RfD\ (mg/kg\text{-}day)} \tag{A-6}$$

$$HQ\ (inhalation) = \frac{Intake\ (mg/m^3)}{RfC\ (mg/m^3)} \tag{A-7}$$

The HQs for all chemicals are summed to evaluate the potential for adverse health effects other than cancer from concurrent exposure to multiple chemicals, yielding a HI as follows:

$$HI = \Sigma\ HQ \tag{A-8}$$

Pathway-specific HIs are then summed to estimate a total HI for each receptor. A HI of less than 1 indicates that adverse noncancer health effects are not expected. If the total HI exceeds 1, further evaluation in the form of a segregation of the HI via a target organ analysis is performed to assess whether the noncancer HIs are a concern (EPA 1989). Target organ HIs greater than 1 may indicate a potential adverse effect.

Estimated HIs for the future commercial/industrial worker, construction worker, and resident are presented in Section A9.0. The total noncancer HI for the future resident is based on the total HI estimated for the child resident because the intake for children of soil, groundwater, and air per unit body mass is higher; thus, noncancer HIs for a child resident are always higher than noncancer HIs for an adult resident.

A8.3 HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO LEAD

As discussed in Section A7.6, lead was identified as a COPC in surface soil and sediment, subsurface soil, and groundwater. The HHRA evaluated the potential for health effects from exposure to lead in soil by comparing EPCs with the summed concentration of the ambient concentration of lead at Mare Island (25.6 mg/kg) and the OEHHA CHHSLs (DTSC 2009) for residential (80 mg/kg) and industrial (320 mg/kg) exposure scenarios. For quick reference, the modified OEHHA CHHSL and the IR17 and Building 503 Area EPCs (by subarea) for lead are presented in the following table.

	Modified OEHHA CHHSL		EPC for Lead	
Subarea	Residential	Industrial	Surface Soil	Subsurface Soil
1	105.6	345.6	**2,190**	**216**
2	105.6	345.6	50	26
3	105.6	345.6	11	21

Notes: All values shown are in milligrams per kilogram.
Bold font indicates value is above the modified OEHHA residential CHHSL.
Shading and **bold** font indicates value is above both the modified OEHHA industrial and residential CHHSLs.

CHHSL California Human Health Screening Level
EPC Exposure point concentration
OEHHA Office of Environmental Health Hazard Assessment

As discussed in Section 2.2.6 of the main FS addendum, the groundwater at the IR17 and Building 503 Area is considered not suitable for municipal or domestic water supply. Thus, maximum contaminant levels for drinking water are not considered relevant for comparison criteria because groundwater in the IR17 and Building 503 Area is considered to be nonpotable.

A9.0 RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT

This section summarizes the results of the HHRA conducted for the IR17 and Building 503 Area. The HHRA included statistical analysis of soil data sets, selection of COPCs, exposure assessment, and risk characterization. Based on expected uses of the IR17 and Building 503 Area, commercial/industrial and construction workers and hypothetical residents were evaluated for Subareas 1 through 3. Although residences are not expected within these subareas, potential effects also were quantified for both child and adult resident receptors. This section summarizes the incremental results for cancer risks and noncancer adverse health effects to commercial/industrial workers, construction workers, and hypothetical residents within Subareas 1 through 3.

Two sets of risks estimates were calculated for the incremental and total risk evaluations—one set using federal toxicity criteria, and the other set using the State of California toxicity criteria preferentially over federal toxicity criteria. An ambient risk evaluation was conducted using only the federal toxicity criteria hierarchy. In accordance with EPA guidance, risk and hazard estimates in the HHRA should be presented to only one significant figure (EPA 1989). However, tables in Attachments A1, A2, and A3 show chemical-specific risk results to two significant figures for each subarea to aid review of the risk calculations. Likewise, risks are discussed in this section using two significant figures, so the discussion can be easily matched with the calculations presented in Attachments A1, A2, and A3. However, the summed, multi-pathway risks based on all exposure media are presented to one significant figure (EPA 1989).

As discussed in Section A8.1, the estimated cancer risk for the future residential scenarios is based on the sum of the risks estimated for adult and child residents. The total noncancer HI for the future resident is based on the total HI estimated for the child receptor (Section A8.2).

The discussion of risks results below is limited to results of the incremental risk evaluation. Incremental risks results based on both federal and State of California toxicity criteria are discussed. For this HHRA, a COPC is termed a "chemical risk driver" when the COPC-specific incremental risk exceeds 10^{-6} or the COPC-specific incremental HI exceeds 1. COPCs identified as chemical risk drivers are shown in boldface in the discussion of risk results.

A9.1 SUBAREA 1

Incremental cancer risks and noncancer HIs for Subarea 1 are summarized for each exposure scenario in the following text. Detailed calculations for the risks and HIs are presented in the format required by RAGS Part D (see Attachment A1, Tables A1-7.1.1 through A1-9.2.9). A detailed summary of incremental risks for Subarea 1 using federal and State of California toxicity criteria is provided in Tables A-3 and A-4. The incremental chemical risk drivers for Subarea 1 are summarized in Table A-5. The inorganic chemicals included in the ambient risk evaluation (Attachment A3) were excluded from the incremental and total risk evaluations as they were determined to be statistically similar to ambient.

Receptors for Subarea 1 were evaluated for exposure to surface soil (future commercial/industrial worker and future resident), subsurface soil (future commercial/industrial worker, future construction worker, and future resident), groundwater (future construction worker), and soil gas (future commercial/industrial worker and future resident).

Subarea 1 – Minimal Disturbance (0 to 0.5 feet bgs interval)				
	Cancer Risk		**Hazard Index**	
	Incremental		**Incremental**	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	2E-05	4E-05	1 (<1)	1 (<1)
Hypothetical Resident	3E-04	4E-04	12 (6)	15 (8)
Subarea 1 – Intrusive Development (0 to 10 feet bgs interval)				
	Cancer Risk		**Hazard Index**	
	Incremental		**Incremental**	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	4E-05	6E-05	0.9 (<1)	1 (<1)
Construction Worker	4E-06	4E-06	2 (<1)	2 (<1)
Hypothetical Resident	4E-04	6E-04	9 (7)	12 (9)

Note:
The highest target organ segregated hazard index is shown in parentheses. A value of "<1" means less than 1.
bgs Below ground surface

Incremental risks from exposure to surface and subsurface soil and groundwater, calculated using federal and State of California toxicity criteria, are discussed below.

A9.1.1 Future Commercial/Industrial Worker

Minimal Disturbance – Surface Soil (0 to 0.5 feet bgs)

Surface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to surface soil is 5.4E-06. Most of this risk is associated with incidental ingestion of and dermal contact with **4,4'-dichlorodiphenyltrichloroethane (DDT)** (4.0E-06). The noncancer HI from exposure to surface soil is 0.39, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to surface soil is 5.3E-06. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria.

The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 2.5E-05. Most of this risk is associated with incidental ingestion and inhalation of **1,1,2,2-tetrachloroethane (PCA)** (7.6E-06), and incidental ingestion of and dermal contact with **Aroclor-1248** (3.8E-06), **benzo(a)pyrene** (1.8E-06), and **dibenzo(a,h)anthracene** (7.0E-06). The noncancer HI from exposure to subsurface soil is 0.22, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 2.2E-05. Most of this risk is associated with incidental ingestion of and dermal contact and inhalation of **1,1,2,2-PCA** (8.1E-06), and incidental ingestion and dermal contact with **Aroclor-1248** (3.8E-06), and **dibenzo(a,h)anthracene** (3.9E-06). The noncancer HI from exposure to subsurface soil using State of California toxicity criteria is 0.24, which is less than the threshold of 1 for noncarcinogens.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 1.8E-05. Most of this risk is associated with inhalation of **benzene** (5.1E-06) and **ethylbenzene** (1.3E-05) in indoor air. The noncancer HI for exposure to vapor intrusion from soil gas is 0.70, which is less than the threshold HI of 1 for noncarcinogens.

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 3.4E-05. Most of this risk is associated with inhalation of **1,3-butadiene** (1.9E-06), **benzene** (1.9E-05) and **ethylbenzene** (1.3E-05) in indoor air. The noncancer HI for exposure to vapor intrusion from soil gas is 0.97, which is less than the threshold HI of 1 for noncarcinogens.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and exposure to vapor intrusion from soil gas is 2E-05. The cumulative cancer risk from commercial/industrial worker exposure to subsurface soil from direct contact and soil gas from vapor intrusion is 4E-05.

The cumulative noncancer HI for the commercial/industrial worker exposure to surface soil and soil gas is 1, which is equal to the noncancer threshold of 1. The target organ segregated HI is less than 1. The cumulative noncancer HI from exposure to subsurface soil and soil gas is 0.9, which is less than the noncancer threshold of 1.

State of California Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and vapor intrusion from soil gas is 4E-05. The cumulative cancer risk from commercial/industrial worker exposure to subsurface soil from direct contact and soil gas from vapor intrusion is 6E-05.

The cumulative noncancer HI for commercial/industrial worker exposure to surface soil and soil gas is 1, and the target organ segregated HI is less than 1. The cumulative noncancer HI for commercial/industrial worker exposure to subsurface soil and soil gas is 1, and the target organ segregated HI is less than 1. These results are less than or equal to the noncancer threshold of 1.

A9.1.2 Future Construction Worker

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future construction worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 3.4E-06. However, no chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil. The noncancer HI from exposure to subsurface soil is 1.2, which is greater than the threshold of 1 for noncarcinogens. However, the highest target organ segregated HI is 0.81 based on respiratory effects, which is below the noncancer threshold.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 3.0E-06. However, no chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil. The noncancer HI from exposure to subsurface soil is 1.3, which is greater than the threshold of 1 for noncarcinogens. However, the highest target organ segregated HI is 0.74 based on respiratory effects, which is below the noncancer threshold.

Groundwater – Construction Trench

Exposure to groundwater for the future construction worker is limited to inhalation of volatile chemicals in groundwater in a construction trench.

Federal Toxicity Criteria

The cancer risk from exposure to groundwater is 4.4E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to groundwater is 0.57, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to groundwater is 7.7E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to groundwater is 0.60, which is less than the threshold of 1 for noncarcinogens.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from construction worker exposure to subsurface soil from direct contact and inhalation of volatile chemicals in groundwater in a construction trench is 4E-06. However, no chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil. The cumulative noncancer

HI for construction worker exposure to subsurface soil and groundwater is 2, which is greater than the threshold HI of 1 for noncarcinogens. However, the highest target organ segregated HI is 0.8 based on respiratory effects, which is below the noncancer threshold.

State of California Toxicity Criteria

The cumulative cancer risk from construction worker exposure to subsurface soil from direct contact and inhalation of volatile chemicals in groundwater in a construction trench using State of California toxicity criteria is 4E-06. However, no chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil. The cumulative noncancer HI for construction worker exposure to subsurface soil and groundwater is 2, which is greater than the threshold HI of 1 for noncarcinogens. However, the highest target organ segregated HI is 0.9 based on respiratory effects, which is below the noncancer threshold.

A9.1.3 Future Adult/Child Resident

Minimal Disturbance – Surface Soil (0 to 0.5 feet bgs)

Surface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The estimated cancer risk for the future residential exposure scenario is based on the sum of the risks estimated for child and adult residents. The cancer risk from exposure to surface soil is 1.9E-05. Most of the risk is associated with the incidental ingestion of and dermal contact with **4,4-dichlorodiphenyldichloroethane** (**DDD)** (1.7E-06), **4,4-dichlorodiphenyldichloroethylene** (**DDE)** (1.7E-06), **4,4-DDT** (1.5E-05), and **benzo(a)pyrene** (1.3E-06) in surface soil.

The noncancer HI for the future residential scenario is based on the HI (4.9) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The target organ segregated HI is 3.2 based on blood effects. The majority of the noncancer risk (3.2) is from ingestion of **thallium** in surface soil.

State of California Toxicity Criteria

The cancer risk and noncancer HI from exposure to surface soil do not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The estimated cancer risk for the future residential exposure scenario is based on the sum of the risks estimated for child and adult residents. The cancer risk from exposure to subsurface soil is 1.6E-04. Most of the risk is associated with incidental ingestion and inhalation of **1,1,2,2-PCA** (3.7E-05), and incidental ingestion and dermal contact with **4,4-DDT** (3.6E-06), **Aroclor-1242** (1.5E-06), **Aroclor-1248** (9.5E-06), **Aroclor-1254** (2.4E-06), **benzo(a)anthracene** (3.4E-06), **benzo(a)pyrene** (2.0E-05), **benzo(b)fluoranthene** (2.0E-06), **dibenz(a,h)anthracene** (7.5E-05), and inhalation of **ethylbenzene** (3.2E-06) in subsurface soil.

The noncancer HI for the future residential scenario is based on the total HI (1.7) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (0.74) is less than the threshold of 1 and was related to endocrine effects. Thus, there are no noncancer risk drivers using federal toxicity criteria.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 1.3E-04. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria, with the exception of **indeno(1,2,3-cd)pyrene** added as an additional risk driver.

The noncancer HI for the future residential scenario is based on the total HI (1.8) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (0.74) is less than the threshold of 1 and was related to endocrine effects. Thus, there are no noncancer risk drivers using State of California toxicity criteria.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 2.3E-04. Most of this risk is associated with inhalation of **1,1,2,2-PCA** (1.1E-06), **1,3-butadiene** (4.3E-06), **benzene** (6.5E-05), and **ethylbenzene** (1.6E-04) in indoor air.

The noncancer HI for exposure to vapor intrusion from soil gas is 7.4, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (6.4) was greater than the threshold of 1 and was related to nervous system effects. Most of this risk is associated with inhalation of **1,2,4-trimethylbenzene** (1.5), **m,p-xylene** (3.2), and **o-xylene** (1.6).

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 4.3E-04. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria, with the exception of **vinyl chloride** added as an additional cancer risk driver.

The noncancer HI for exposure to vapor intrusion from soil gas is 10, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (8.4) was greater than the threshold of 1 and was related to nervous system effects. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria, with the exception of **1,3,5-trimethylbenzene** added as an additional noncancer risk driver.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from residential exposure to surface soil from direct contact and vapor intrusion from soil gas is 3E-04. The cumulative cancer risk from residential exposure to subsurface soil from direct contact and vapor intrusion from soil gas to indoor air is 4E-04.

The cumulative noncancer HI for residential exposure to surface soil and soil gas is 12. The cumulative noncancer HI for residential exposure to subsurface soil and soil gas is 9. Both of these results are greater than or equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI for surface soil and soil gas is 6, and highest target organ segregated HI for subsurface soil and soil gas is 7; both estimates are greater than the threshold of 1.

State of California Toxicity Criteria

The cumulative cancer risk from residential exposure to surface soil from direct contact and vapor intrusion from soil gas is 4E-04. The cumulative cancer risk from residential exposure to subsurface soil from direct contact and vapor intrusion from soil gas to indoor air is 5E-04.

The cumulative noncancer HI for residential exposure to surface soil and soil gas is 15. The cumulative noncancer HI for residential exposure to subsurface soil and soil gas is 12. Both of these results are greater than or equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI for surface soil and soil gas is 8, and highest target organ segregated HI for subsurface soil and soil gas is 9; both estimates are greater than the threshold of 1.

A9.1.4 Lead Evaluation

Lead was identified as a COPC in surface and subsurface soil at Subarea 1. The EPC for incremental lead is 2,190 mg/kg in surface soil and is 216 mg/kg in subsurface soil (Attachment A1, Tables A1-3.1 and A1-3.2). Both of the EPCs for lead in surface and subsurface soil at Subarea 1 are above the modified OEHHA residential CHHSL (105.6 mg/kg). The EPC for lead at Subarea 1 is above the modified OEHHA industrial CHHSL (345.6 mg/kg) in surface soil, but below the OEHHA industrial CHHSL in subsurface soil. Thus, **lead** was identified as a risk driver at Subarea 1 in surface soil for both the commercial/industrial worker and hypothetical future resident, and in subsurface soil for the hypothetical future resident. A summary of the risk evaluation for lead is presented in Table A-6.

A9.2 SUBAREA 2

Incremental cancer risks and noncancer HIs for Subarea 2 are summarized for each exposure scenario in the following text. Detailed calculations for the risks and HIs are presented in the format required by RAGS Part D (see Attachment A1, Tables A1-7.3.1 through A1-9.4.9). A detailed summary of incremental risks for Subarea 2 using federal and State of California toxicity criteria is provided in Tables A-7 and A-8. The incremental chemical risk drivers for Subarea 2 are summarized in Table A-9. The inorganic chemicals included in the ambient risk evaluation (Attachment A3) were excluded from the incremental and total risk evaluations as they were determined to be statistically similar to ambient.

Receptors for Subarea 2 were evaluated for exposure to surface soil (future commercial/industrial worker and future resident) subsurface soil (future commercial/industrial worker, future construction worker, and future resident), groundwater (future construction worker), and soil gas (future commercial/industrial worker and future resident).

Subarea 2 – Minimal Disturbance (0 to 0.5 feet bgs interval)				
	Cancer Risk		Hazard Index	
	Incremental		Incremental	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	9E-06	1E-05	2 (2)	0.3 (<1)
Hypothetical Resident	1E-04	2E-04	24 (24)	3 (2)
Subarea 2 – Intrusive Development (0 to 10 feet bgs interval)				
	Cancer Risk		**Hazard Index**	
	Incremental		**Incremental**	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	1E-05	1E-05	3 (2)	1 (<1)
Construction Worker	1E-06	2E-06	1 (<1)	1 (<1)
Hypothetical Resident	2E-04	2E-04	27 (24)	6 (3)

Note:
The highest target organ segregated hazard index is shown in parentheses. A value of "<1" means less than 1.
bgs Below ground surface

Incremental risks from exposure to surface and subsurface soil and groundwater, calculated using federal and State of California toxicity criteria, are discussed below.

A9.2.1 Future Commercial/Industrial Worker

Minimal Disturbance – Surface Soil (0 to 0.5 feet bgs)

Surface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to surface soil is 2.0E-06. Most of this risk is associated with incidental ingestion of and dermal contact with **Aroclor-1260** (1.4E-06). The noncancer HI from exposure to surface soil is 0.047, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk and noncancer HI from exposure to surface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 6.0E-06. Most of this risk is associated with incidental ingestion of and dermal contact with **Aroclor-1260** (1.4E-06) and **ethylbenzene** (3.3E-06). The noncancer HI from exposure to subsurface soil is 0.58, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 5.9E-06. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria. The noncancer HI from exposure to subsurface soil is 0.70, which is less than the threshold of 1 for noncarcinogens.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 7.4E-06. Most of this risk is associated with inhalation of **TCE** (6.5E-06) in indoor air. The noncancer HI for exposure to vapor intrusion from soil gas is 2.3, which is greater than the threshold HI of 1 for noncarcinogens. The target organ segregated HI is 2.2 based on developmental and immunological system effects. Most of this noncancer risk is associated with inhalation of **TCE** (2.2) in indoor air.

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 8.8E-06. Most of this risk is associated with inhalation of **1,3-butadiene** (2.8E-06), **TCE** (3.2E-06) and **vinyl chloride** (2.6E-06) in indoor air. The noncancer HI for exposure to vapor intrusion from soil gas is 0.26, which is less than the threshold HI of 1 for noncarcinogens.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and exposure to vapor intrusion from soil gas is 9E-06. The cumulative cancer risk from commercial/industrial worker exposure to subsurface soil from direct contact and soil gas from vapor intrusion is 1E-05.

The cumulative noncancer HI for the commercial/industrial worker exposure to surface soil and soil gas is 2, which is greater than the noncancer threshold of 1. The target organ segregated HI is 2. The cumulative noncancer HI from exposure to subsurface soil and soil gas is 3 and the target organ segregated HI is 2; both results are greater than the noncancer threshold.

State of California Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and vapor intrusion from soil gas is 1E-05. The cumulative cancer risk from commercial/industrial worker exposure to subsurface soil from direct contact and soil gas from vapor intrusion is 1E-05.

The cumulative noncancer HI for the commercial/industrial worker exposure to surface soil and soil gas is 0.3, which is less than the noncancer threshold of 1. The cumulative noncancer HI from exposure to subsurface soil and soil gas is 1, however the highest target organ segregated HI is less than 1.

A9.2.2 Future Construction Worker

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future construction worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 9.1E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil is 1.3, which is greater than the threshold of 1 for noncarcinogens; however, the highest target organ segregated HI is less than 1. Thus, no risk drivers were identified for construction worker exposure to subsurface soil.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 8.9E-07, which is less than the point of departure 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil is 1.4, which is greater than the threshold of 1 for noncarcinogens; however, the highest target organ segregated HI is less than 1. Thus, no risk drivers were identified for construction worker exposure to subsurface soil.

Groundwater – Construction Trench

Exposure to groundwater for the future construction worker is limited to inhalation of volatile chemicals in groundwater in a construction trench.

Federal Toxicity Criteria

The cancer risk from exposure to groundwater is 5.5E-08, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to groundwater is 0.023, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to groundwater is 6.5E-07, which is less than the point of departure for carcinogens. The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from construction worker exposure to subsurface soil from direct contact and inhalation of volatile chemicals in groundwater in a construction trench is 1.0E-06, which is equal to the point of departure for carcinogens. No chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil and groundwater. The cumulative noncancer HI for construction worker exposure to subsurface soil and groundwater is 1, which is equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI is less than 1; thus no noncancer risk drivers were identified for construction worker exposure to subsurface soil and groundwater.

State of California Toxicity Criteria

The cumulative cancer risk from construction worker exposure to subsurface soil from direct contact and inhalation of volatile chemicals in groundwater in a construction trench is 2E-06. No chemical-specific cancer risk estimates exceeded 10^{-6}; thus, no cancer risk drivers were identified for construction worker exposure to subsurface soil and groundwater.

The cumulative noncancer HI from exposure to subsurface soil and groundwater does not differ between the federal and State of California toxicity criteria risk evaluations.

A9.2.3 Future Adult/Child Resident

Minimal Disturbance – Surface Soil (0 to 0.5 feet bgs)

Surface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The estimated cancer risk for the future residential exposure scenario is based on the sum of the risks estimated for child and adult residents. The cancer risk from exposure to surface soil is 5.1E-06. Most of the risk is associated with the incidental ingestion of and dermal contact with **Aroclor-1254** (1.7E-06) and **Aroclor-1260** (3.4E-06) in surface soil.

The noncancer HI for the future residential scenario is based on the HI (0.33) estimated for the child resident, which is less than the threshold HI of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk and noncancer HI from exposure to surface soil do not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The estimated cancer risk for the future residential exposure scenario is based on the sum of the risks estimated for child and adult residents. The cancer risk from exposure to subsurface soil is 2.7E-05. Most of the risk is associated with incidental ingestion of, dermal contact with, and inhalation of **Aroclor-1254** (1.7E-06), **Aroclor-1260** (3.4E-06), **benzo(a)pyrene** (2.7E-06), and **ethylbenzene** (1.8E-05) in subsurface soil.

The noncancer HI for the future residential scenario is based on the total HI (3.0) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (2.0) was greater than the threshold of 1 and was related to nervous system effects. The majority of the noncancer risk (1.4) is from inhalation of **xylene (total)** in outdoor air.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 2.5E-05. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria.

The noncancer HI for the future residential scenario is based on the total HI (3.5) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (2.5) was greater than the threshold of 1 and was related to nervous system effects. The noncancer risk driver does not differ between the federal and State of California toxicity criteria risk evaluations.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 1.3E-04. Most of this risk is associated with inhalation of **1,3-butadiene** (6.2E-06), **chloroform** (1.5E-05), **TCE** (1.1E-04), and **vinyl chloride** (6.5E-06) in indoor air.

The noncancer HI for exposure to vapor intrusion from soil gas is 24, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (24) was greater than the threshold of 1 and was related to developmental and immunological system effects. Most of this risk is associated with inhalation of **TCE** (24).

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 1.7E-04. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria.

The noncancer HI for exposure to vapor intrusion from soil gas is 2.7, which is greater than the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (2.4) was greater than the threshold of 1 and was related to reproductive system effects. Most of this risk is associated with inhalation of **1,3-butadiene** (2.4).

Summary

Federal Toxicity Criteria

The cumulative cancer risks from residential exposure to surface soil from direct contact and vapor intrusion from soil gas is 1E-04, and the risks from subsurface soil from direct contact and vapor intrusion from soil gas is 2E-04.

The cumulative noncancer HI for residential exposure to surface soil and soil gas is 24. The cumulative noncancer HI for residential exposure to subsurface soil and soil gas is 27. Both of these results are greater than or equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI for surface soil and soil gas, and subsurface soil and soil gas, are 24; both estimates are greater than the threshold of 1.

State of California Toxicity Criteria

The cumulative cancer risks from residential exposure to surface soil from direct contact and vapor intrusion from soil gas, and from subsurface soil from direct contact and vapor intrusion from soil gas, are both 2E-04.

The cumulative noncancer HI for residential exposure to surface soil and soil gas is 3. The cumulative noncancer HI for residential exposure to subsurface soil and soil gas is 6. Both of these results are greater than or equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI for surface soil and soil gas is 2, and highest target organ segregated HI for subsurface soil and soil gas is 3; both estimates are greater than the threshold of 1.

A9.2.4 Lead Evaluation

Lead was identified as a COPC in surface and subsurface soil at Subarea 2. The EPC for incremental lead is 50 mg/kg in surface soil and is 26 mg/kg in subsurface soil (Attachment A1, Tables A1-3.3 and A1-3.4). Both of the EPCs for lead in surface and subsurface soil at Subarea 2 are below the modified OEHHA residential and industrial CHHSLs (105.6 and 345.6 mg/kg). Thus, lead was not identified as a risk driver for any receptor at Subarea 2. A summary of the risk evaluation for lead is presented in Table A-6.

A9.3 SUBAREA 3

Incremental cancer risks and noncancer HIs for Subarea 3 are summarized for each exposure scenario in the following text. Detailed calculations for the risks and HIs are presented in the format required by RAGS Part D (see Attachment A1, Tables A1-7.5.1 through A1-9.6.9). A detailed summary of incremental risks for Subarea 3 using federal and State of California toxicity criteria is provided in Tables A-10 and A-11. The incremental chemical risk drivers for Subarea 3 are summarized in Table A-12. The inorganic chemicals included in the ambient risk evaluation (Attachment A3) were excluded from the incremental and total risk evaluations as they were determined to be statistically similar to ambient.

Receptors for Subarea 3 were evaluated for exposure to surface soil (future commercial/industrial worker and future resident) subsurface soil (future commercial/worker, future construction worker, and future resident), groundwater (future construction worker), and soil gas (future commercial/worker and future resident).

Subarea 3 – Minimal Disturbance (0 to 2 feet bgs interval)				
	Cancer Risk		Hazard Index	
	Incremental		Incremental	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	8E-07	2E-06	0.3 (<1)	0.4 (<1)
Hypothetical Resident	1E-05	2E-05	4 (3)	4 (3)

Subarea 3 – Intrusive Development (0 to 10 feet bgs interval)				
	Cancer Risk		Hazard Index	
	Incremental		Incremental	
Scenario	*Federal*	*State*	*Federal*	*State*
Commercial/Industrial Worker	2E-06	2E-06	0.3 (<1)	0.4 (<1)
Construction Worker	3E-07	3E-07	0.9 (<1)	0.9 (<1)
Hypothetical Resident	2E-05	3E-05	4 (3)	4 (3)

Note:
The highest target organ segregated hazard index is shown in parentheses. A value of “<1” means less than 1.
bgs Below ground surface

Incremental risks from exposure to surface and subsurface soil, groundwater, and soil gas, calculated using federal and State of California toxicity criteria, are discussed below.

A9.3.1 Future Commercial/Industrial Worker

Minimal Disturbance – Surface Soil (0 to 2 feet bgs)

Surface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to surface soil could not be calculated because all COPCs in surface soil were not associated with carcinogenic effects. The noncancer HI from exposure to surface soil is 0.25, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to surface soil could not be calculated because all COPCs in surface soil were not associated with carcinogenic effects. The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future commercial/industrial worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 8.3E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil is 0.25, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 6.2E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 8.0E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil is 0.022, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 1.7E-06. Most of this risk is associated with inhalation of **1,3-butadiene** (1.2E-06) in indoor air. The noncancer HI from exposure to subsurface soil is 0.11, which is less than the threshold of 1 for noncarcinogens.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and exposure to vapor intrusion from soil gas is 8E-07, which is less than the point of departure of 10^{-6} for carcinogens. The cumulative cancer risk from commercial/industrial worker exposure to subsurface soil from direct contact and soil gas from vapor intrusion is 2E-06.

The cumulative noncancer HI for the commercial/industrial worker exposure to surface soil and soil gas, and subsurface soil and soil gas, is 0.3, which is less than the noncancer threshold of 1.

State of California Toxicity Criteria

The cumulative cancer risk from commercial/industrial worker exposure to surface soil from direct contact and vapor intrusion from soil gas, and subsurface soil from direct contact and vapor intrusion from soil gas, is 2E-06.

The cumulative noncancer HI for the commercial/industrial worker exposure to surface soil and soil gas, and subsurface soil and soil gas, is 0.4, which is less than the noncancer threshold of 1.

A9.3.2 Future Construction Worker

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future construction worker is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to subsurface soil is 8.1E-08, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil is 0.84, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 5.0E-08, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Groundwater – Construction Trench

Exposure to groundwater for the future construction worker is limited to inhalation of volatile chemicals in groundwater in a construction trench.

Federal Toxicity Criteria

The cancer risk from exposure to groundwater is 1.8E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to groundwater is 0.064, which is less than the threshold of 1 for noncarcinogens.

State of California Toxicity Criteria

The cancer risk from exposure to groundwater is 2.2E-07, which is less than the point of departure of 10^{-6} for carcinogens. The noncancer HI from exposure to groundwater is 0.070, which is less than the threshold of 1 for noncarcinogens.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from construction worker exposure to subsurface soil from direct contact and inhalation of volatile chemicals in groundwater in a construction trench is 3E-07, which is less than the point of departure of 10^{-6} for carcinogens. The cumulative noncancer HI for construction worker exposure to subsurface soil and groundwater is 0.9, which is less than the threshold HI of 1 for noncarcinogens.

State of California Toxicity Criteria

The cumulative cancer risk for construction worker exposure to subsurface soil and groundwater does not differ between the federal and State of California toxicity criteria risk evaluations. The cumulative noncancer HI for construction worker exposure to subsurface soil and groundwater is 1, which is equal to the threshold HI of 1 for noncarcinogens.

A9.3.3 Future Adult/Child Resident

Minimal Disturbance – Surface Soil (0 to 0.5 feet bgs)

Surface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from surface soil to outdoor air.

Federal Toxicity Criteria

The cancer risk from exposure to surface soil could not be calculated because all COPCs in surface soil were not associated with carcinogenic effects. The noncancer HI for the future residential scenario is based on the HI (3.3) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The target organ segregated HI is 3.3 based on blood effects. The majority of the noncancer risk (3.3) is from ingestion of **thallium** in surface soil.

State of California Toxicity Criteria

The cancer risk and noncancer HI from exposure to surface soil do not differ between the federal and State of California toxicity criteria risk evaluations.

Intrusive Development – Subsurface Soil (0 to 10 feet bgs)

Subsurface soil exposure for the future resident is based on incidental ingestion, dermal contact, and inhalation of particulate chemicals released from subsurface soil to outdoor air.

Federal Toxicity Criteria

The estimated cancer risk for the future residential exposure scenario is based on the sum of the risks estimated for child and adult residents. The cancer risk from exposure to subsurface soil is 6.5E-06. Most of the risk is associated with ingestion and dermal contact with **benzo(a)pyrene** (2.3E-06) and **dibenz(a,h)anthracene** (2.0E-06) in soil, and inhalation of **ethylbenzene** (2.0E-06) in outdoor air.

The noncancer HI for the future residential scenario is based on the HI (3.3) estimated for the child resident, which is greater than the threshold HI of 1 for noncarcinogens. The target organ segregated HI is 3.3 based on blood effects. The majority of the noncancer risk (3.3) is from ingestion of **thallium** in subsurface soil.

State of California Toxicity Criteria

The cancer risk from exposure to subsurface soil is 4.2E-06. Risk drivers identified using State of California toxicity criteria do not differ from the risk drivers identified using federal toxicity criteria.

The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

Soil Gas – Vapor Intrusion

Exposure to soil gas for the future resident is limited to vapor intrusion from subsurface soil vapors.

Federal Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 1.0E-05. Most of this risk is associated with inhalation of **1,3-butadiene** (2.6E-06), **chloroform** (1.4E-06), and **ethylbenzene** (5.8E-06) in indoor air. The noncancer HI for exposure to vapor intrusion from soil gas is 0.23, which is less than the threshold HI of 1 for noncarcinogens.

State of California Toxicity Criteria

The total cancer risk from exposure to vapor intrusion from soil gas is 2.2E-05. Most of this risk is associated with inhalation of **1,3-butadiene** (1.5E-05) and **ethylbenzene** (5.8E-06) in indoor air.

The noncancer HI for exposure to vapor intrusion from soil gas is 1.1, which is about equal to the threshold HI of 1 for noncarcinogens. The highest target organ segregated HI (1.0) is equal to the threshold of 1. Thus, no noncancer risk drivers were identified for the future resident for soil gas.

Summary

Federal Toxicity Criteria

The cumulative cancer risk from residential exposure to surface soil from direct contact and vapor intrusion from soil gas is 1E-05. The cumulative cancer risk from residential exposure to subsurface soil from direct contact and vapor intrusion from soil gas to indoor air is 2E-05.

The cumulative noncancer HI for residential exposure to surface soil and soil gas, and subsurface soil and soil gas, is 4. The highest target organ segregated HI for surface soil and soil gas, and subsurface soil and soil gas, is 3; both estimates are greater than the threshold of 1.

State of California Toxicity Criteria

The cumulative cancer risk from residential exposure to surface soil from direct contact and vapor intrusion from soil gas is 2E-05, and from subsurface soil from direct contact and vapor intrusion from soil gas is 3E-05.

The noncancer HI from exposure to subsurface soil does not differ between the federal and State of California toxicity criteria risk evaluations.

A9.3.4 Lead Evaluation

Lead was identified as a COPC in surface and subsurface soil and groundwater at Subarea 3. The EPC for incremental lead is 11 mg/kg in surface soil and is 21 mg/kg in subsurface soil (Attachment A1, Tables A1-3.5 and A1-3.6). Both of the EPCs for lead in surface and subsurface soil at Subarea 3 are below the modified OEHHA residential and industrial CHHSLs (105.6 and 345.6 mg/kg). Thus, lead was not identified as a risk driver for any receptor at Subarea 3. A summary of the risk evaluation for lead is presented in Table A-6.

A10.0 UNCERTAINTY EVALUATION

Some uncertainties are inherent in the estimates of potential cancer risk and noncancer health hazard presented in this document. The uncertainties fall into two categories: uncertainties associated with the general risk assessment methodologies and uncertainties uniquely associated with this HHRA. The following subsections present information related to these uncertainties.

A10.1 DATA EVALUATION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

To identify COPCs for the HHRA, the adequacy of site characterization data was reviewed, and a structured selection process was employed. The uncertainties associated with these two components of COPC selection are discussed in the following sections.

A10.1.1 Site Characterization Data

The risk assessment is based on analytical data presented in the RI report and subsequent investigations. The total number of samples collected during these investigations was quite large; however, not all samples were analyzed for the full suite of compounds. If records of area history did not suggest that chemicals of a particular class were likely to have been used or released at a site, the number of samples analyzed for that class of compounds was limited.

A10.1.2 Methods Used to Identify Chemicals of Potential Concern

The primary uncertainty associated with the COPC selection process is the possibility that a chemical may be inappropriately identified as a COPC for evaluation in the risk assessment (that is, a detected chemical may be inappropriately excluded or included as a COPC). For the HHRA, chemicals were excluded as COPCs using the following criteria:

- Metals detected at concentrations below respective ambient limits (for both incremental and total risk evaluations)
- Essential nutrients detected at concentrations typical of respective U.S. background levels (for both incremental and total risk evaluations)
- Chemicals in soils with maximum detected concentrations below their respective residential RSLs for soil (for incremental risk evaluation only)

The first two criteria are not likely to result in the inadvertent exclusion of chemicals as COPCs; however, use of RSLs as COPC selection criteria may adversely affect results of the HHRA. As indicated previously in Section A5.3 (Identifying Chemicals of Potential Concern), cancer-based RSLs are estimated based on respective cancer risks of 1E-06, and the noncancer-based RSLs are based on respective HIs of 1. It is possible that chemicals detected just below the cancer or noncancer RSL were excluded as COPCs. The selection of COPCs was based on the maximum detected concentration in any subarea, and therefore, the likelihood of exclusion of a risk driver is negligible. However, new toxicological information could become available that changes the values of RSLs used in this HHRA, and therefore in turn could change the number of chemicals selected as COPCs.

A10.2 EXPOSURE ASSESSMENT

Uncertainties were identified in association with four areas of the exposure assessment process: (1) selection of exposure scenarios, (2) selection of exposure pathways, (3) estimation of EPCs, and (4) selection of exposure variables used to estimate chemical intake. Uncertainties in each of these areas are discussed below in Sections A10.2.1 through A10.2.4.

A10.2.1 Exposure Scenarios

Exposure scenarios were identified based on observed and assumed land use and activity that may occur there. To the degree that actual land use and activity patterns are not those assumed, uncertainties are introduced. For example, future land use is anticipated to be commercial/industrial reuse (City of Vallejo 2008). Exposure estimates developed under the future redeveloped land use scenarios (commercial/industrial) may conservatively overestimate risks in the event the land is not used for industrial purposes and instead is used for recreational uses, as an example.

A10.2.2 Selecting Exposure Pathways

The exposure pathways quantified in this risk assessment were identified based on the area conceptual model, relevant site characterization data, and contaminant fate and transport considerations. To the extent that these factors may not accurately predict the migration of contaminants within and from the area, uncertainty is introduced into the exposure assessment.

A10.2.3 Estimating Exposure Point Concentrations

In general, the uncertainties associated with site characterization and the estimation of a representative EPC increase with smaller data sets. Estimation of EPCs is affected by sampling strategy, treatment of nondetectable concentrations and high detection limits, assumptions regarding contaminant degradation over time, and accuracy of modeled estimates of chemical concentrations in air. The site had few potential chemical sources, so the number of samples analyzed for particular classes of compounds (VOCs, SVOCs, and pesticides) was relatively small. For small data sets, the 95UCL (used as the EPC) often exceeds the maximum detected concentration at a site because the standard deviation associated with small data sets is high. Consequently, the maximum detected concentration (or the concentration of a single detected value) was often used as the RME concentration for calculating intakes to the receptors. The number of COPCs for which this was the case is shown in Tables A1-3.1 through A1-3.10 of Attachment A1. Where the maximum concentration was used as the EPC, risks are most likely overestimated.

The sample collection strategy was designed as a purposive investigation, whereby samples were collected in areas of suspected or known contamination. The primary objective of this sampling effort was to define the nature and extent of contamination. The EPCs based on these nonrandom soil samples are likely to overestimate the concentrations at the exposure point, as well as the actual dose to the receptor.

As described in Attachment A4, a statistical proxy value was substituted for all laboratory analytical results reported as not detected. Future COPC concentrations (and by association, the EPCs) were assumed to remain the same as those that were measured during site characterization activities. This assumption ignores the effects of various fate and transport mechanisms that will alter the composition and distribution of chemicals present in the various media. In general, the assumption of steady-state conditions results in overestimated COPC concentrations and exposure doses because contaminant concentrations generally tend to decrease over time as a result of fate and transport processes.

In the absence of direct measurements, mathematical models were applied to estimate contaminant concentrations in air. While models cannot predict true EPCs at different times and locations or in different media, they provide a conservative estimate of the EPC under certain assumed conditions. To model concentrations of volatile compounds in outdoor air, a VF was applied to data for concentrations of the same compounds in soil. The model did not account for attenuation of emissions by paved surfaces or building foundations that may be present under future land use at the site. Similarly, for the indoor air assessment, because future building characteristics cannot be definitively known, conservative DTSC and EPA defaults were used (Attachment A6).

A10.2.4 Selecting Exposure Variables

The exposure variables used to estimate chemical intake are standard upperbound estimates. In reality, however, activity patterns and physiological responses of individuals may vary considerably. It is possible that the exposure variables used in this evaluation do not represent actual future exposure conditions.

A10.3 TOXICITY ASSESSMENT

The primary uncertainties associated with the toxicity assessment relate to derivation of toxicity values for COPCs. Standard RfDs and SFs developed by DTSC and EPA were used to estimate potential cancer and noncancer health effects from exposure to COPCs at the site. These values are derived by applying conservative (health-protective) assumptions and are intended to protect the most sensitive potentially exposed individuals.

To derive the toxicity values, EPA makes several assumptions that tend to overestimate the actual hazard or risk to human health. Because data from human studies are generally unavailable, the RfDs are typically derived from animal studies. Uncertainty factors and modifying factors are then applied to the data from animal studies to ensure that the RfDs are adequately protective of human health. For many compounds, this approach results in an overestimated potential for noncancer adverse health effects.

Derivation of SFs used to estimate cancer risk is also typically based on data from animal studies. These data are taken from studies in which high doses of a test chemical were administered to laboratory animals, and the reported response is extrapolated to the much lower doses to which humans are likely to be subjected. Very little experimental data are available on the nature of the dose-response relationship at low doses (for example, a threshold may exist or the dose-response curve may pass through the origin). Because of this uncertainty, EPA has selected a conservative model to estimate the low-dose relationship, and EPA uses an upperbound estimate (typically a 95 percent upper confidence limit of the slope factor predicted by the extrapolation model) as the SF. With this SF, an upperbound estimate of potential cancer risks is obtained.

A second uncertainty associated with toxicity values is the unavailability of RfDs or SFs for all COPCs at a site. The cancer risks and noncancer health hazards can be assessed only for those COPCs for which the relevant toxicity values are available. For organic COPCs for which a SF or an RfD was available for only one route of exposure, route-to-route extrapolations were made. These extrapolations introduce some uncertainty into the risk and hazard estimates. Further, the use of oral toxicity values to assess the dermal pathway introduces additional uncertainty into the results; risks may be overestimated or underestimated using this approach. Risks may be underestimated for exposure to metals for which an RfD is unavailable for one or more exposure routes. Using this extrapolation approach, however, a SF was available to assess the oral, dermal, and inhalation risks for most of the carcinogenic COPCs. Similarly, an RfD was available to assess the noncancer health hazards for most COPCs.

Benzene, toluene, ethylbenzene, and total xylenes (BTEX) and PAH were used as surrogates for the assessment of potential risks and hazards associated with total petroleum hydrocarbons (TPH). The assessment of TPH thus depended on the adequacy of the BTEX and PAH analytical data. Most samples were analyzed for BTEX, and the analytical results are believed to adequately represent the health risks associated with potential exposure to TPH as gasoline. Greater uncertainty is associated with use of the PAH data because the number of analyses was limited. The magnitude of the uncertainties in the TPH assessment was assumed a function of the spatial distribution of TPH as diesel and motor oil contamination, presumed similar to the distribution of the samples analyzed for PAHs. However, a preliminary evaluation of the PAH and TPH data has suggested that the compounds of these two types may not be well correlated at Mare Island (in other words, the TPH may not contain PAHs). Because of the localized effects of TPH at the IR17 and Building 503 Area, this approach does not appear to underestimate human health risks.

A10.4 RISK CHARACTERIZATION

Standard EPA methodologies were used for the risk characterization step. Using these methods, the risks from exposure to multiple carcinogens were added to estimate the total cancer risk associated with exposures at a site. The underlying assumption of this approach is that the risks from carcinogens to different target organs are additive. This assumption contributes to the uncertainty in the risk assessment and may result in underestimated or overestimated risks, depending on whether interactions among site COPCs are synergistic or antagonistic. Because information on most of these interactions is unavailable, most possible interactions were not evaluated in this HHRA. The target organ-specific analyses were conducted if additive effects contributed to HIs greater than unity.

Risks characterized for the ambient risk scenario were estimated to distinguish between potential health risks posed by metals at concentrations shown to be statistically indistinguishable from ambient fill concentrations and the potential health risks posed by metals present as a result of site-related activities (Attachment A3). The results of this evaluation demonstrate the following:

- Metals at concentrations statistically indistinguishable from their concentrations in ambient fill at Mare Island, which may be either anthropogenic (Bay sediment dredge) or naturally occurring background, contribute to estimated potential cancer risks within the EPA risk management range of 10^{-6} to 10^{-4}.

- For metals at concentrations statistically indistinguishable from their concentrations in ambient fill at Mare Island, estimated ambient noncancer HIs are below 1 for commercial/industrial worker exposure in Subareas 1 through 3. Estimated ambient noncancer HIs are above 1 for construction worker and residential exposure in Subareas 1 through 3. The highest target organ segregated HIs for the resident in surface soil are below the threshold of 1 in Subareas 1 through 3. The highest target organ segregated HIs are above 1 for the construction worker (in all subareas), and for the resident in subsurface soil at all subareas.

Significant ambient concentrations of arsenic in both native and nonnative fill materials have occurred at Mare Island, with the elevated concentrations attributed to natural geologic processes instead of placement of fill (Tetra Tech 2002). The same study confirmed that ambient concentrations of arsenic in California consistently exceed the EPA's cancer-based RSL for residential soil by at least an order of magnitude, and that high background arsenic concentrations characterize much of the natural environment (Tetra Tech 2002).

A potential source of uncertainty in the evaluation of health risk associated with metals in soil is the assumption that metals in soil are readily absorbed by human receptors. In reality, metals in soil are not readily desorbed from soil after being taken into the body (or bioavailable). This contrasts with the circumstances under which metals undergo toxicity tests involving different initial forms of metals under assessment, as well as dissolution of the metals in water or an easily digestible carrier. Metals detected in soil such as that sampled at the IR17 and Building 503 Area are usually bound to soil macromolecules in forms not easily dissolved or digestible by human enzymatic systems. This HHRA assumed 100 percent of the metals detected in soil are bioavailable to human receptors. This assumption may be responsible, in part, for the elevated risk and hazard estimates of the ambient risk scenario. The uncertainty in this case is assumed to overestimate potential risks due to metals.

A10.5 UNCERTAINTY SUMMARY

The overall magnitude of each uncertainty discussed previously is summarized in Table A-13.

This HHRA was developed based upon a series of assumptions, almost all conservative, that are expected to overestimate risks. Even considering a few uncertainties contributing to a small underestimate of risk, the compounded conservatism in the HHRA process is believed to negate assumptions that may contribute to underestimation of risk.

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PRIMARY SOURCE	PRIMARY RELEASE MECHANISM	SECONDARY SOURCE	SECONDARY RELEASE MECHANISM	TERTIARY SOURCE	TERTIARY RELEASE MECHANISM	QUATERNARY SOURCE	EXPOSURE ROUTE	POTENTIAL RECEPTORS: Future Commercial/ Industrial Worker	POTENTIAL RECEPTORS: Future Construction Worker	POTENTIAL RECEPTORS: Future Hypothetical Resident
Paint and solvent manufacturing facility; storage tanks with solvents and paint components	Leaks from tanks, oil/water separator, and pipelines and spills during manufacturing and drum filling.	Surface Soil (0-0.5 feet bgs for Subareas 1 and 2; 0-2 feet bgs for Subarea 3)					Ingestion	C	C (a)	C
							Dermal Contact	C	C (a)	C
			Wind Suspension	Outdoor Air (Particulates)			Inhalation	C	C (a)	C
			Volatilization	Outdoor Air (VOCs)			Inhalation	C	C (a)	C
		Subsurface Soil (0-10 feet bgs)					Ingestion	C	C	C
							Dermal Contact	C	C	C
			Wind Suspension	Outdoor Air (Particulates)			Inhalation	C	C	C
			Volatilization	Outdoor Air (VOCs)			Inhalation	C	C	C
				Indoor Air (VOCs)			Inhalation	C (b)	I	C (b)
			Infiltration and Percolation	Groundwater			Ingestion	I	I	I
							Dermal Contact	I	I (c)	I
					Volatilization (Construction)	Construction Trench Air (VOCs)	Inhalation	I	C	I
					Volatilization (Domestic Use)	Indoor Air (VOCs)	Inhalation	I	I	I
					Volatilization (Vapor Intrusion)	Indoor Air (VOCs)	Inhalation	C (b)	I	C (b)

LEGEND

bgs	Below ground surface
C	Potentially complete exposure pathway
I	Incomplete or negligible exposure pathway
VOC	Volatile organic compound

(a) Surface soil is included in the evaluation of subsurface soil exposure pathways. For the construction worker, surface soil will not be evaluated as a separate depth interval from subsurface soil.

(b) Exposure to vapor intrusion of volatile chemicals from subsurface soil into indoor air will be evaluated using collected soil gas data.

(c) Dermal contact with groundwater was not considered to be a complete exposure pathway. Current construction practices implement dewatering methods in areas where work will occur below the ground surface and proximate to the groundwater table. Thus, dermal contact with groundwater in a construction trench in the future was not considered to be a significant pathway and was excluded from the HHRA.

Mare Island Naval Shipyard, Vallejo, California
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE A-1

HUMAN HEALTH CONCEPTUAL SITE MODEL FOR SUBAREAS 1 THROUGH 3

IR17 and Building 503 Area

TABLE A-1: CHEMICALS OF POTENTIAL CONCERN

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Medium	Chemicals of Potential Concern					
	Subarea 1		Subarea 2		Subarea 3	
Surface	**4,4'-DDD**	Dieldrin	4,4'-DDD	Chrysene	2-Butanone	delta-BHC
Soil	**4,4'-DDE**	Endosulfan sulfate	4,4'-DDE	Cobalt	2-Methylnaphthalene	Endosulfan I
(0-0.5 feet bgs for	**4,4'-DDT**	Endrin aldehyde	4,4'-DDT	Copper *	4,4'-DDD	Endrin aldehyde
Subareas 1 and 2)	alpha-Chlordane	Fluoranthene	Aluminum *	Endrin aldehyde	4,4'-DDT	Ethylbenzene
	Aluminum *	gamma-Chlordane	Antimony *	Fluoranthene	4-Isopropyltoluene	Fluoranthene
	Antimony	Heptachlor epoxide	**Aroclor-1254**	Iron *	4-Methyl-2-pentanone	gamma-BHC (Lindane)
(0-2 feet bgs for	Aroclor-1260	Iron *	**Aroclor-1260**	Lead *	4-Methylphenol	gamma-Chlordane
Subarea 3)	Arsenic *	**Lead**	Arsenic *	Manganese *	Acetone	Iron *
	Barium	Manganese *	Barium	Nickel *	Aldrin	Lead *
	Benzo(a)pyrene	Mercury *	Benzo(a)anthracene	Pyrene	Aluminum *	Manganese
	Benzo(b)fluoranthene	Molybdenum *	Benzo(b)fluoranthene	Vanadium *	Antimony *	Mercury *
	Benzo(k)fluoranthene	Nickel *	Beryllium *	Zinc *	Aroclor-1254	Methylene chloride
	Beryllium *	Phenanthrene	Chromium *		Aroclor-1260	Molybdenum
	beta-BHC	Phenol			Arsenic *	Naphthalene
	Cadmium *	Pyrene			Barium	Nickel *
	Chromium	Selenium			Beryllium	Phenanthrene
	Chrysene	**Thallium**			beta-BHC	Phenol
	Cobalt	Vanadium *			bis(2-Ethylhexyl)phthalate	Pyrene
	Copper	Zinc			Cadmium *	Selenium
					Carbon disulfide	Tetrachloroethene
					Chromium *	**Thallium**
					Chrysene	Vanadium *
					Cobalt	Xylene (total)
					Copper *	Zinc *

TABLE A-1: CHEMICALS OF POTENTIAL CONCERN

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Medium	Chemicals of Potential Concern					
	Subarea 1		Subarea 2		Subarea 3	
Subsurface	**1,1,2,2-Tetrachloroethane**	Copper *	1,2,4-Trichlorobenzene	delta-BHC	1,2,4-Trimethylbenzene	Cobalt
Soil	**1,2,4-Trimethylbenzene**	**Copper ***	**1,2,4-Trimethylbenzene**	Dibenz(a,h)anthracene	1,3,5-Trimethylbenzene	Copper *
(0-10 feet bgs)	**1,3,5-Trimethylbenzene**	Dibenz(a,h)anthracene	1,2-Dichloroethene (total)	Dibenzofuran	1-Methylnaphthalene	delta-BHC
	1-Methylnaphthalene	Dibenzofuran	**1,3,5-Trimethylbenzene**	Dieldrin	2,4-Dimethylphenol	**Dibenz(a,h)anthracene**
	2,4-Dimethylphenol	Dieldrin	1-Methylnaphthalene	Endosulfan I	2-Butanone	Dibenzofuran
	2-Butanone	Diethylphthalate	2,4-Dimethylphenol	Endosulfan sulfate	2-Methylnaphthalene	Endosulfan I
	2-Methylnaphthalene	Endosulfan II	2-Butanone	Endrin	4,4'-DDD	Endrin aldehyde
	2-Methylphenol	Endosulfan sulfate	2-Methylnaphthalene	Endrin aldehyde	4,4'-DDT	**Ethylbenzene**
	4,4'-DDD	Endrin	4,4'-DDD	Endrin ketone	4-Isopropyltoluene	Fluoranthene
	4,4'-DDE	**Endrin aldehyde**	4,4'-DDE	**Ethylbenzene**	4-Methyl-2-pentanone	Fluorene
	4,4'-DDT	Ethylbenzene	4,4'-DDT	Fluoranthene	4-Methylphenol	gamma-BHC (Lindane)
	4-Bromophenyl-phenylether	**Cobalt**	4-Isopropyltoluene	Fluorene	Acenaphthene	gamma-Chlordane
	4-Isopropyltoluene	Fluorene	4-Methyl-2-pentanone	Heptachlor	Acenaphthylene	Indeno(1,2,3-cd)pyrene
	4-Methylphenol	Freon 12	Acenaphthene	Heptachlor epoxide	Acetone	Iron *
	Acenaphthene	gamma-Chlordane	Acenaphthylene	Indeno(1,2,3-cd)pyrene	Aldrin	Isopropylbenzene
	Acenaphthylene	Heptachlor epoxide	Acetone	Iron *	Aluminum *	Lead *
	Acetone	**Hexavalent Chromium**	alpha-BHC	Isopropylbenzene	Anthracene	m,p-Xylene
	alpha-Chlordane	Indeno(1,2,3-cd)pyrene	alpha-Chlordane	Lead *	Antimony *	Manganese *
	Aluminum *	Iron *	Aluminum *	m,p-Xylene	Aroclor-1254	Mercury *
	Anthracene	**Isopropylbenzene**	Anthracene	Manganese *	Aroclor-1260	Methylene chloride
	Antimony	Lead	Antimony *	Mercury *	Arsenic *	Molybdenum
	Aroclor-1242	Manganese *	**Aroclor-1254**	Methoxychlor	Barium	Naphthalene
	Aroclor-1248	Mercury *	**Aroclor-1260**	Molybdenum *	Benzene	Nickel *
	Aroclor-1254	Methoxychlor	Arsenic *	Naphthalene	Benzo(a)anthracene	o-Xylene
	Aroclor-1260	Molybdenum	Barium	n-Butylbenzene	**Benzo(a)pyrene**	Phenanthrene
	Arsenic *	**Naphthalene**	Benzene	Nickel *	Benzo(b)fluoranthene	Phenol
	Barium	n-Butylbenzene	**Benzo(a)anthracene**	n-Propylbenzene	Benzo(g,h,i)perylene	Pyrene
	Benzene	Nickel *	**Benzo(a)pyrene**	o-Xylene	Benzo(k)fluoranthene	Selenium
	Benzo(a)anthracene	n-Propylbenzene	Benzo(b)fluoranthene	Phenanthrene	Beryllium *	Tetrachloroethene
	Benzo(a)pyrene	Phenanthrene	Benzo(g,h,i)perylene	Phenol	beta-BHC	**Thallium**
	Benzo(b)fluoranthene	Phenol	Benzo(k)fluoranthene	Pyrene	bis(2-Ethylhexyl)phthalate	Toluene
	Benzo(g,h,i)perylene	Pyrene	Beryllium *	sec-Butylbenzene	Cadmium *	Vanadium *
	Benzo(k)fluoranthene	sec-Butylbenzene	beta-BHC	Selenium	Carbon disulfide	Xylene (total)
	Benzoic Acid	Selenium	bis(2-Ethylhexyl)phthalate	Styrene	Chromium *	Zinc *
	Beryllium	Silver	Cadmium *	Thallium *	Chrysene	
	beta-BHC	tert-Butylbenzene	Carbon disulfide	Toluene		
	bis(2-Ethylhexyl)phthalate	Thallium *	Chromium *	Trichloroethene		
	Cadmium *	Toluene	Chrysene	Vanadium *		
	Carbazole	Trichloroethene	cis-1,2-Dichloroethene	**Xylene (total)**		
	Carbon disulfide	Vanadium *	**Cobalt**	Zinc *		
	Chloromethane	**Xylene (total)**	Copper *			
	Chromium *	Zinc *				
	Chrysene					

TABLE A-1: CHEMICALS OF POTENTIAL CONCERN

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Medium	Chemicals of Potential Concern					
	Subarea 1		Subarea 2		Subarea 3	
Groundwater [a]	1,2,4-Trimethylbenzene	Fluorene	1,2,4-Trimethylbenzene	Isopropylbenzene	1,2,4-Trimethylbenzene	Fluorene
	1,3,5-Trimethylbenzene	Isopropylbenzene	1,2-Dichloroethane	m,p-Xylene	1,3,5-Trimethylbenzene	Isopropylbenzene
	1,3-Dichlorobenzene	m,p-Xylene	1,3,5-Trimethylbenzene	Methane	2-Methylnaphthalene	m,p-Xylene
	1-Methylnaphthalene	Methane	Benzene	o-Xylene	Acetone	Naphthalene
	2-Butanone	Naphthalene	Benzo(g,h,i)perylene	Toluene	Benzene	o-Xylene
	2-Methylnaphthalene	n-Propylbenzene	Carbon Disulfide	trans-1,2-Dichloroethene	Carbon disulfide	Toluene
	4-Isopropyltoluene	o-Xylene	Chlorobenzene	Trichloroethene	Ethylbenzene	
	Acenaphthene	Phenanthrene	cis-1,2-Dichloroethene	Vinyl chloride		
	Acenaphthylene	Propionitrile	Ethylbenzene	Xylene (total)		
	Acetone	Pyrene				
	Acrolein	Styrene				
	Benzene	tert-Butylbenzene				
	Carbon disulfide	Tetrahydrofuran				
	Chloroform	Toluene				
	cis-1,2-Dichloroethene	Trichlorofluoromethane				
	Ethane	Vinyl chloride				
	Ethylbenzene	Xylene (total)				

Exposure Medium	Chemicals of Potential Concern					
	Subarea 1		Subarea 2		Subarea 3	
Soil Gas [a]	1,1,2,2-Tetrachloroethane	Cyclohexane	1,1-Dichloroethane	Chloroform	1,1-Dichloroethane	Ethylbenzene
	1,1-Dichloroethane	Ethanol	1,1-Dichloroethene	cis-1,2-Dichloroethene	1,2,4-Trimethylbenzene	Freon 113
	1,2,4-Trimethylbenzene	Ethylbenzene	1,2,4-Trichlorobenzene	Cyclohexane	1,3,5-Trimethylbenzene	Freon 114
	1,3,5-Trimethylbenzene	Freon 114	1,2,4-Trimethylbenzene	Ethanol	1,3-Butadiene	Freon 12
	1,3-Butadiene	Freon 12	1,2-Dichlorobenzene	Ethylbenzene	2,2,4-Trimethylpentane	Heptane
	2,2,4-Trimethylpentane	Heptane	1,2-Dichloroethane	Freon 113	2-Butanone	Hexane
	2-Butanone	Hexane	1,2-Dichloropropane	Freon 12	2-Hexanone	Isopropylbenzene
	4-Ethyltoluene	Isopropylbenzene	1,3,5-Trimethylbenzene	Heptane	4-Ethyltoluene	m,p-Xylene
	4-Methyl-2-pentanone	m,p-Xylene	1,3-Butadiene	Hexane	Acetone	Methyl tertiary butylether
	Acetone	n-Propylbenzene	1,4-Dichlorobenzene	Isopropylbenzene	Benzene	n-Propylbenzene
	Benzene	o-Xylene	2,2,4-Trimethylpentane	m,p-Xylene	Carbon disulfide	o-Xylene
	Carbon disulfide	Tetrachloroethene	2-Butanone	n-Propylbenzene	Chloroethane	Styrene
	Chloroethane	Tetrahydrofuran	4-Ethyltoluene	o-Xylene	Chloroform	Tetrachloroethene
	Chloroform	Toluene	4-Methyl-2-pentanone	Styrene	Chloromethane	Toluene
	Chloromethane	Trichloroethene	Acetone	Tetrachloroethene	cis-1,2-Dichloroethene	Trichloroethene
	cis-1,2-Dichloroethene	Vinyl chloride	Benzene	Toluene	Cyclohexane	Trichlorofluoromethane
			Bromomethane	trans-1,2-Dichloroethene	Ethanol	
			Carbon disulfide	Trichloroethene		
			Chlorobenzene	Trichlorofluoromethane		
			Chloroethane	Vinyl chloride		

TABLE A-1: CHEMICALS OF POTENTIAL CONCERN

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Notes:

Asterisk denotes an inorganic chemical was found to be statistically similar to ambient conditions. The inorganic chemical was excluded from the incremental (Attachment A1) and total (Attachment A2) risk evaluations, but was evaluated in the ambient risk evaluation (Attachment A3).

Boldface font indicates the subset of the detected chemcials in soil that were retained for evaluation in the incremental risk evaluation after comparison to residential screening levels.

a Chemicals detected in groundwater and soil gas were included in both the incremental (Attachment A1) and total (Attachment A2) risk evaluations.

bgs	Below ground surface
BHC	Hexachlorocyclohexane
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane

TABLE A-2: CHEMICAL-SPECIFIC DERMAL ABSORPTION AND VOLITALIZATION FACTORS

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area,
Former Mare Island Naval Shipyard, Vallejo, California

Chemical of Potential Concern	Dermal Aborption Factor [a] (unitless)	Volatilization Factor [a] (m^3/kg)
1,1,2,2-Tetrachloroethane	NA	1.6E+04
1,2,4-Trichlorobenzene	NA	3.2E+04
1,2,4-Trimethylbenzene	NA	8.5E+03
1,2-Dichloroethene (total)	NA	2.7E+03
1,3,5-Trimethylbenzene	NA	7.1E+03
1-Methylnaphthalene	1.3E-01	6.3E+04
2,4-Dimethylphenol	1.0E-01	NV
2-Butanone	NA	1.3E+04
2-Methylnaphthalene	1.3E-01	6.2E+04
2-Methylphenol	1.0E-01	NV
4,4'-DDD	1.0E-01	NV
4,4'-DDE	1.0E-01	NV
4,4'-DDT	3.0E-02	NV
4-Bromophenyl-phenylether	NA	9.0E+03
4-Isopropyltoluene [b]	NA	6.7E+03
4-Methyl-2-pentanone	NA	1.1E+04
4-Methylphenol	1.0E-01	NV
Acenaphthene	1.3E-01	1.5E+05
Acenaphthylene [c]	1.3E-01	1.5E+05
Acetone	NA	1.5E+04
Aldrin	1.0E-01	NV
alpha-BHC	1.0E-01	NV
alpha-Chlordane	4.0E-02	NV
Aluminum	NA	NV
Anthracene	1.3E-01	5.6E+05
Antimony	NA	NV
Aroclor-1242	1.4E-01	NV
Aroclor-1248	1.4E-01	NV
Aroclor-1254	1.4E-01	NV
Aroclor-1260	1.4E-01	NV
Arsenic	3.0E-02	NV
Barium	NA	NV
Benzene	NA	3.8E+03
Benzo(a)anthracene	1.3E-01	NV
Benzo(a)pyrene	1.3E-01	NV
Benzo(b)fluoranthene	1.3E-01	NV
Benzo(g,h,i)perylene [d]	1.3E-01	NV
Benzo(k)fluoranthene	1.3E-01	NV
Benzoic Acid	1.0E-01	NV
Beryllium	NA	NV
beta-BHC	1.0E-01	NV
bis(2-Ethylhexyl)phthalate	1.0E-01	NV
Cadmium	1.0E-03	NV
Carbazole	1.3E-01	NV
Carbon disulfide	NA	1.3E+03
Chloromethane	NA	1.3E+03
Chromium [e]	NA	NV

TABLE A-2: CHEMICAL-SPECIFIC DERMAL ABSORPTION AND VOLITALIZATION FACTORS
Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area,
Former Mare Island Naval Shipyard, Vallejo, California

Chemical of Potential Concern	Dermal Aborption Factor [a] (unitless)	Volatilization Factor [a] (m^3/kg)
Chrysene	1.3E-01	NV
cis-1,2-Dichloroethene	NA	2.7E+03
Cobalt	NA	NV
Copper	NA	NV
delta-BHC [f]	1.0E-01	NV
Dibenz(a,h)anthracene	1.3E-01	NV
Dibenzofuran [g]	NA	3.0E+05
Dieldrin	1.0E-01	NV
Diethylphthalate	1.0E-01	NV
Endosulfan I [h]	1.0E-01	NV
Endosulfan II [h]	1.0E-01	NV
Endosulfan sulfate	1.0E-01	NV
Endrin	1.0E-01	NV
Endrin aldehyde [i]	1.0E-01	NV
Endrin ketone [i]	1.0E-01	NV
Ethylbenzene	NA	6.1E+03
Fluoranthene	1.3E-01	NV
Fluorene	1.3E-01	3.0E+05
Freon 12	NA	9.0E+02
gamma-BHC (Lindane)	4.0E-02	NV
gamma-Chlordane	4.0E-02	NV
Heptachlor	1.0E-01	NV
Heptachlor epoxide	1.0E-01	NV
Hexavalent Chromium	NA	NV
Indeno(1,2,3-cd)pyrene	1.3E-01	NV
Iron	NA	NV
Isopropylbenzene	NA	6.7E+03
Lead	NA	NV
m,p-Xylene	NA	6.0E+03
Manganese	NA	NV
Mercury	NA	2.1E+04
Methoxychlor	1.0E-01	NV
Methylene chloride	NA	2.4E+03
Molybdenum	NA	NV
Naphthalene	1.3E-01	5.0E+04
n-Butylbenzene	NA	7.2E+03
Nickel	NA	NV
n-Propylbenzene	1.0E-01	7.5E+03
o-Xylene	NA	7.0E+03
Phenanthrene [j]	1.3E-01	5.6E+05
Phenol	1.0E-01	NV
Pyrene	1.3E-01	2.6E+06
sec-Butylbenzene	NA	7.2E+03
Selenium	NA	NV
Silver	NA	NV
Styrene	NA	1.0E+04
tert-Butylbenzene	NA	7.2E+03

TABLE A-2: CHEMICAL-SPECIFIC DERMAL ABSORPTION AND VOLITALIZATION FACTORS

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area,
Former Mare Island Naval Shipyard, Vallejo, California

Chemical of Potential Concern	Dermal Aborption Factor [a] (unitless)	Volatilization Factor [a] (m^3/kg)
Tetrachloroethene	NA	2.5E+03
Thallium	NA	NV
Toluene	NA	4.6E+03
Trichloroethene	NA	2.4E+03
Vanadium	NA	NV
Xylene (total)	NA	6.3E+03
Zinc	NA	NV

Notes:

a Values taken from EPA (2012).
b The VF for isopropylbenzene was used as a surrogate.
c The VF for acenaphthene was used as a surrogate.
d The ABS for pyrene was used as a surrogate.
e The ABS for chromium III was used as a surrogate.
f The ABS for alpha-BHC was used as a surrogate.
g The VF for fluorene was used as a surrogate.
h The ABS for endosulfan was used as a surrogate.
i The ABS for endrin was used as a surrogate.
j The VF for anthracene was used as a surrogate.

BHC Hexachlorocyclohexane
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethylene
DDT Dichlorodiphenyltrichloroethane
EPA U.S. Environmental Protection Agency
NA Not available; chemical does not have a dermal absorption factor.
NV Not applicable; chemical is not considered volatile.
m^3/kg Cubic meters per kilogram

Source:

EPA. 2012. “Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites.” November. Available on-line at: <http://www.epa.gov/region9/superfund/prg/index.html>

TABLE A-3: INCREMENTAL RISK SUMMARY, FEDERAL TOXICITY CRITERIA, SUBAREA 1

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Pathway	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	3.6E-06	8.4E-06	1.1E-06	1.7E-05	9.3E-05
Dermal Contact with Soil	1.7E-06	9.6E-06	1.5E-06	2.5E-06	3.4E-05
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	1.3E-08	6.8E-06	7.9E-07	6.7E-08	3.4E-05
SOIL TOTAL	**5.4E-06**	**2.5E-05**	**3.4E-06**	**1.9E-05**	**1.6E-04**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	1.8E-05	1.8E-05	--	2.3E-04	2.3E-04
SOIL GAS TOTAL	**1.8E-05**	**1.8E-05**	**--**	**2.3E-04**	**2.3E-04**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	4.4E-07	--	--
GROUNDWATER TOTAL	**--**	**--**	**4.4E-07**	**--**	**--**
Multipathway Total	**2E-05**	**4E-05**	**4E-06**	**3E-04**	**4E-04**

Exposure Pathway	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.37	0.096	0.32	4.9	1.3
Dermal Contact with Soil	0.017	0.045	0.18	0.056	0.15
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	0.00068	0.075	0.73	0.0029	0.31
SOIL TOTAL	**0.39 (<1)**	**0.22 (<1)**	**1.2 (<1)**	**4.9 (3.2)**	**1.7 (<1)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	0.70	0.70	--	7.4	7.4
SOIL GAS TOTAL	**0.70 (<1)**	**0.70 (<1)**	**--**	**7.4 (6.4)**	**7.4 (6.4)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.57	--	--
GROUNDWATER TOTAL	**--**	**--**	**0.57 (<1)**	**--**	**--**
Multipathway Total	**1 (<1)**	**0.9 (<1)**	**2 (<1)**	**12 (6)**	**9 (7)**

Notes:

Values shown in parentheses () represent the highest target organ segregated hazard index.

a Based on combined adult and child exposure

b Based on child exposure

-- Not applicable; exposure pathway is not complete for this receptor.

bgs Below ground surface

TABLE A-4: INCREMENTAL RISK SUMMARY, STATE OF CALIFORNIA TOXICITY CRITERIA, SUBAREA 1
Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Pathway	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	3.6E-06	7.6E-06	1.0E-06	1.6E-05	7.0E-05
Dermal Contact with Soil	1.7E-06	7.5E-06	1.2E-06	2.3E-06	2.3E-05
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	1.3E-08	6.8E-06	7.9E-07	6.7E-08	3.4E-05
SOIL TOTAL	**5.3E-06**	**2.2E-05**	**3.0E-06**	**1.9E-05**	**1.3E-04**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	3.4E-05	3.4E-05	--	4.3E-04	4.3E-04
SOIL GAS TOTAL	**3.4E-05**	**3.4E-05**	**--**	**4.3E-04**	**4.3E-04**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	7.7E-07	--	--
GROUNDWATER TOTAL	**--**	**--**	**7.7E-07**	**--**	**--**
Multipathway Total	**4E-05**	**6E-05**	**4E-06**	**4E-04**	**6E-04**

Exposure Pathway	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.37	0.096	0.32	4.9	1.2
Dermal Contact with Soil	0.017	0.045	0.18	0.056	0.15
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	0.00068	0.10	0.76	0.0029	0.43
SOIL TOTAL	**0.39 (<1)**	**0.24 (<1)**	**1.3 (<1)**	**4.9 (3.2)**	**1.8 (<1)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	0.97	0.97	--	10	10
SOIL GAS TOTAL	**0.97 (<1)**	**0.97 (<1)**	**--**	**10 (8.4)**	**10 (8.4)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.60	--	--
GROUNDWATER TOTAL	**--**	**-**	**0.60 (<1)**	**--**	**--**
Multipathway Total	**1 (<1)**	**1 (<1)**	**2 (<1)**	**15 (8)**	**12 (9)**

Notes:
Values shown in parentheses () represent the highest target organ segregated hazard index.
a Based on combined adult and child exposure
b Based on child exposure
c No risk is calculated because all COPCs either do not have a dermal absorption factor, or do not have oral/dermal toxicity values.
-- Not applicable; exposure pathway is not complete for this receptor.
bgs Below ground surface

TABLE A-5: SUMMARY OF INCREMENTAL RISK DRIVERS FOR SUBAREA 1

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Medium	Exposure Medium	Exposure Pathway	Future Commercial/Industrial Worker	Future Construction Worker	Future Resident (Adult and Child)
Soil	Surface Soil (0 to 2 feet bgs)	Direct Contact [a]	4,4'-DDT Lead		4,4'-DDD 4,4'-DDE 4,4'-DDT Benzo(a)pyrene [c] Lead Thallium
	Subsurface Soil (0 to 10 feet bgs)	Direct Contact [a]	1,1,2,2-Tetrachloroethane Aroclor-1248 Benzo(a)pyrene [c] Dibenz(a,h)anthracene	Dibenz(a,h)anthracene [c]	1,1,2,2-Tetrachloroethane 4,4'-DDT Aroclor-1242 Aroclor-1248 Aroclor-1254 Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluroanthene Benzo(k)fluroanthene [d] Dibenz(a,h)anthracene Ethylbenzene Indeno(1,2,3-cd)pyrene [d] Lead
Soil Vapor	Indoor Air	Vapor Intrusion to Indoor Air	1,3-Butadiene [d] Benzene Ethylbenzene		1,1,2,2-Tetrachloroethane 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene [d] 1,3-Butadiene Benzene Ethylbenzene m,p-Xylene o-Xylene Vinyl chloride [d]
Groundwater	Groundwater	Inhalation in Trench Air [b]		--	

Notes: Risk drivers are those chemicals for which the chemical-specific cancer risk for a given exposure medium (for example, surface soil) exceeds 1E-06 or the chemical-specific noncancer hazard index exceeds 1. Risk drivers shown are based on results for incremental risk.
Risk drivers shown are based on HHRA results for both federal and State of California toxicity criteria, unless otherwise noted.

a Soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulate chemicals released from soil to outdoor air.

b Groundwater exposure pathway evaluated for direct contact is the inhalation of volatile chemicals released from groundwater in a construction trench.

c Chemical is a risk driver based on Federal toxicity criteria only.

d Chemical is a risk driver based on State of California toxicity criteria only.

(Grey shading) Exposure pathway not evaluated for this receptor (see Section A4.2).

-- No risk drivers were identified for this exposure pathway for this receptor.

bgs Below ground surface

HHRA Human health risk assessment

TABLE A-6: SUMMARY OF RISK EVALUATION FOR LEAD

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area,
Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Medium [a]	Units	Lead Concentration		Lead Screening Level [b]		EPC Exceeds the Lead Screening Level?	
			Maximum	EPC	Residential	Commercial/ Industrial	Residential	Commercial/ Industrial
1	Surface Soil	mg/kg	2,190	2,190	105.6	345.6	**Yes**	**Yes**
	Subsurface Soil	mg/kg	2,190	216	105.6	345.6	**Yes**	No
2	Surface Soil	mg/kg	50.1	50.1	105.6	345.6	No	No
	Subsurface Soil	mg/kg	57.3	26.1	105.6	345.6	No	No
3	Surface Soil	mg/kg	10.9	10.9	105.6	345.6	No	No
	Subsurface Soil	mg/kg	37.7	20.9	105.6	345.6	No	No

Notes:

a Surface soil is 0 to 0.5 foot bgs for Subareas 1 and 2 and is 0 to 2 feet for Subarea 3. Subsurface soil is 0 to 10 feet bgs for all three subareas.

b The screening levels for residential and commercial/industrial exposure to lead in soil are the OEHHA (2009) CHHSLs of 80 and 320 mg/kg added to the 95 percent upper confidence level of the arithmetic mean (25.6 mg/kg) for lead in ambient fill at Mare Island to create Mare Island-specific lead screening levels of 105.6 and 345.6 mg/kg.

bgs Below ground surface
CHHSL California Human Health Screening Level
EPC Exposure point concentration
mg/kg Milligram per kilogram
OEHHA California Environmental Protection Agency Office of Environmental Health Hazard Assessment

Sources:

OEHHA. 2009. "Revised California Human Health Screening Levels for Lead." Integrated Risk Assessment Branch, OEHHA, Cal/EPA. September.

TABLE A-7: INCREMENTAL RISK SUMMARY, FEDERAL TOXICITY CRITERIA, SUBAREA 2

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Pathway	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	7.8E-07	1.3E-06	1.7E-07	3.5E-06	7.5E-06
Dermal Contact with Soil	1.2E-06	1.4E-06	2.3E-07	1.6E-06	2.5E-06
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	3.8E-11	3.3E-06	5.1E-07	1.9E-10	1.7E-05
SOIL TOTAL	**2.0E-06**	**6.0E-06**	**9.1E-07**	**5.1E-06**	**2.7E-05**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	7.4E-06	7.4E-06	--	1.3E-04	1.3E-04
SOIL GAS TOTAL	**7.4E-06**	**7.4E-06**	**--**	**1.3E-04**	**1.3E-04**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	5.5E-08	--	--
GROUNDWATER TOTAL	**--**	**--**	**5.5E-08**	**--**	**--**
Multipathway Total	**9E-06**	**1E-05**	**1E-06**	**1E-04**	**2E-04**

Exposure Pathway	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.018	0.066	0.22	0.24	0.89
Dermal Contact with Soil	0.029	0.029	0.12	0.096	0.096
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [c]	0.48	0.98	-- [c]	2.0
SOIL TOTAL	**0.047 (<1)**	**0.58 (<1)**	**1.3 (<1)**	**0.33 (<1)**	**3.0 (2.0)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	2.3	2.3	--	24	24
SOIL GAS TOTAL	**2.3 (2.2)**	**2.3 (2.2)**	**--**	**24 (24)**	**24 (24)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.023	--	--
GROUNDWATER TOTAL	**--**	**--**	**0.023 (<1)**	**--**	**--**
Multipathway Total	**2 (2)**	**3 (2)**	**1 (<1)**	**24 (24)**	**27 (24)**

Notes:

Values shown in parentheses () represent the highest target organ segregated hazard index.

a Based on combined adult and child exposure

b Based on child exposure

c No risk is calculated because all COPCs do not have inhalation toxicity values.

-- Not applicable; exposure pathway is not complete for this receptor.

bgs Below ground surface

TABLE A-8: INCREMENTAL RISK SUMMARY, STATE OF CALIFORNIA TOXICITY CRITERIA, SUBAREA 2

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Pathway	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	7.8E-07	1.2E-06	1.6E-07	3.5E-06	6.6E-06
Dermal Contact with Soil	1.2E-06	1.4E-06	2.2E-07	1.6E-06	2.1E-06
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	3.8E-11	3.3E-06	5.1E-07	1.9E-10	1.7E-05
SOIL TOTAL	**2.0E-06**	**5.9E-06**	**8.9E-07**	**5.1E-06**	**2.5E-05**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	8.8E-06	8.8E-06	--	1.7E-04	1.7E-04
SOIL GAS TOTAL	**8.8E-06**	**8.8E-06**	**--**	**1.7E-04**	**1.7E-04**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	6.5E-07	--	--
GROUNDWATER TOTAL	**--**	**--**	**6.5E-07**	**--**	**--**
Multipathway Total	**1E-05**	**1E-05**	**2E-06**	**2E-04**	**2E-04**

Exposure Pathway	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 0.5 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.018	0.066	0.22	0.24	0.87
Dermal Contact with Soil	0.029	0.029	0.12	0.096	0.096
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [c]	0.60	1.1	-- [c]	2.5
SOIL TOTAL	**0.047 (<1)**	**0.70 (<1)**	**1.4 (<1)**	**0.33 (<1)**	**3.5 (2.5)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	0.26	0.26	--	2.7	2.7
SOIL GAS TOTAL	**0.26 (<1)**	**0.26 (<1)**	**--**	**2.7 (2.4)**	**2.7 (2.4)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.023	--	--
GROUNDWATER TOTAL	**--**	**-**	**0.023**	**--**	**--**
Multipathway Total	**0.3 (<1)**	**1 (<1)**	**1 (<1)**	**3 (2)**	**6 (3)**

Notes:

Values shown in parentheses () represent the highest target organ segregated hazard index.

a Based on combined adult and child exposure

b Based on child exposure

c No risk is calculated because all COPCs either do not have a dermal absorption factor, or do not have oral/dermal toxicity values.

-- Not applicable; exposure pathway is not complete for this receptor.

bgs Below ground surface

TABLE A-9: SUMMARY OF INCREMENTAL RISK DRIVERS FOR SUBAREA 2
Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Medium	Exposure Medium	Exposure Pathway	Future Commercial/Industrial Worker	Future Construction Worker	Future Resident (Adult and Child)
Soil	Surface Soil (0 to 2 feet bgs)	Direct Contact [a]	Aroclor-1260		Aroclor-1254 Aroclor-1260
	Subsurface Soil (0 to 10 feet bgs)	Direct Contact [a]	Aroclor-1260 Ethylbenzene	--	Aroclor-1254 Aroclor-1260 Benzo(a)pyrene Ethylbenzene Xylene (total)
Soil Vapor	Indoor Air	Vapor Intrusion to Indoor Air	1,3-Butadiene [c] Trichloroethene Vinyl Chloride [c]		1,3-Butadiene Chloroform [d] Trichloroethene Vinyl Chloride
Groundwater	Groundwater	Inhalation in Trench Air [b]		--	

Notes: Risk drivers are those chemicals for which the chemical-specific cancer risk for a given exposure medium (for example, surface soil) exceeds 1E-06 or the chemical-specific noncancer hazard index exceeds 1. Risk drivers shown are based on results for incremental risk. Risk drivers shown are based on HHRA results for both federal and State of California toxicity criteria, unless otherwise noted.

a Soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulate chemicals released from soil to outdoor air.

b Groundwater exposure pathway evaluated for direct contact is the inhalation of volatile chemicals released from groundwater in a construction trench.

c Chemical is a risk driver based on State of California toxicity criteria only.

d Chemical is a risk driver based on Federal toxicity criteria only.

(shaded) Exposure pathway not evaluated for this receptor (see Section A4.2).

-- No risk drivers were identified for this exposure pathway for this receptor.

bgs Below ground surface

HHRA Human health risk assessment

TABLE A-10: INCREMENTAL RISK SUMMARY, FEDERAL TOXICITY CRITERIA, SUBAREA 3

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Exposure Pathway	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
	(0 to 2 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 2 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	-- [c]	2.1E-07	2.7E-08	-- [c]	3.3E-06
Dermal Contact with Soil	-- [c]	2.4E-07	3.8E-08	-- [c]	1.2E-06
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [c]	3.9E-07	1.6E-08	-- [c]	2.0E-06
SOIL TOTAL	**--**	**8.3E-07**	**8.1E-08**	**--**	**6.5E-06**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	8.0E-07	8.0E-07	--	1.0E-05	1.0E-05
SOIL GAS TOTAL	**8.0E-07**	**8.0E-07**	**--**	**1.0E-05**	**1.0E-05**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	1.8E-07	--	--
GROUNDWATER TOTAL	**--**	**--**	**1.8E-07**	**--**	**--**
Multipathway Total	**8E-07**	**2E-06**	**3E-07**	**1E-05**	**2E-05**

Exposure Pathway	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
	(0 to 2 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 2 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.25	0.25	0.84	3.3	3.3
Dermal Contact with Soil	-- [d]	-- [d]	-- [d]	-- [d]	-- [d]
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [e]	0.00044	0.00044	-- [e]	0.0018
SOIL TOTAL	**0.25 (<1)**	**0.25 (<1)**	**0.84 (<1)**	**3.3 (3.3)**	**3.3 (3.3)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	0.022	0.022	--	0.23	0.23
SOIL GAS TOTAL	**0.022 (<1)**	**0.022 (<1)**	**--**	**0.23 (<1)**	**0.23 (<1)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.064	--	--
GROUNDWATER TOTAL	**--**	**--**	**0.064 (<1)**	**--**	**--**
Multipathway Total	**0.3 (<1)**	**0.3 (<1)**	**0.9 (<1)**	**4 (3)**	**4 (3)**

Notes:

Values shown in parentheses () represent the highest target organ segregated hazard index.

a Based on combined adult and child exposure

b Based on child exposure

c No risk is calculated because all COPCs in surface soil are not carcinogenic.

d No risk is calculated because all COPCs either do not have a dermal absorption factor, or do not have oral/dermal toxicity values.

e No risk is calculated because all COPCs do not have inhalation toxicity values.

-- Not applicable; exposure pathway is not complete for this receptor.

bgs Below ground surface

TABLE A-11: INCREMENTAL RISK SUMMARY, STATE OF CALIFORNIA TOXICITY CRITERIA, SUBAREA 3

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

	CANCER RISK				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [a]	
Exposure Pathway	(0 to 2 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 2 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	-- [c]	1.2E-07	1.6E-08	-- [c]	1.7E-06
Dermal Contact with Soil	-- [c]	1.1E-07	1.8E-08	-- [c]	5.8E-07
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [c]	3.9E-07	1.6E-08	-- [c]	2.0E-06
SOIL TOTAL	**--**	**6.2E-07**	**5.0E-08**	**--**	**4.2E-06**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	1.7E-06	1.7E-06	--	2.2E-05	2.2E-05
SOIL GAS TOTAL	**1.7E-06**	**1.7E-06**	**--**	**2.2E-05**	**2.2E-05**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	2.2E-07	--	--
GROUNDWATER TOTAL	**--**	**--**	**2.2E-07**	**--**	**--**
Multipathway Total	**2E-06**	**2E-06**	**3E-07**	**2E-05**	**3E-05**

	NONCANCER HAZARD				
	Future Commercial/ Industrial Worker		Future Construction Worker	Future Resident [b]	
Exposure Pathway	(0 to 2 feet bgs)	(0 to 10 feet bgs)	(0 to 10 feet bgs)	(0 to 2 feet bgs)	(0 to 10 feet bgs)
Soil Exposure Pathways					
Soil Ingestion	0.25	0.25	0.84	3.3	3.3
Dermal Contact with Soil	-- [d]	-- [d]	-- [d]	-- [d]	-- [d]
Inhalation of Volatiles and Particulates Released from Soil to Outdoor Air	-- [e]	0.00044	0.00044	-- [e]	0.0018
SOIL TOTAL	**0.25 (<1)**	**0.25 (<1)**	**0.84 (<1)**	**3.3 (3.3)**	**3.3 (3.3)**
Soil Gas Exposure Pathways					
Inhalation of Volatiles Released from Soil Gas to Indoor Air (Vapor Intrusion)	0.11	0.11	--	1.1	1.1
SOIL GAS TOTAL	**0.11 (<1)**	**0.11 (<1)**	**--**	**1.1 (1.0)**	**1.1 (1.0)**
Groundwater Exposure Pathways					
Inhalation of Volatiles Released from Groundwater to Trench Air	--	--	0.070	--	--
GROUNDWATER TOTAL	**--**	**--**	**0.070 (<1)**	**--**	**--**
Multipathway Total	**0.4 (<1)**	**0.4 (<1)**	**0.9 (<1)**	**4 (3)**	**4 (3)**

Notes:

Values shown in parentheses () represent the highest target organ segregated hazard index.

a Based on combined adult and child exposure

b Based on child exposure

c No risk is calculated because all COPCs in surface soil are not carcinogenic.

d No risk is calculated because all COPCs either do not have a dermal absorption factor, or do not have oral/dermal toxicity values.

e No risk is calculated because all COPCs do not have inhalation toxicity values.

-- Not applicable; exposure pathway is not complete for this receptor.

bgs Below ground surface

TABLE A-12: SUMMARY OF INCREMENTAL RISK DRIVERS FOR SUBAREA 3

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Medium	Exposure Medium	Exposure Pathway	Future Commercial/Industrial Worker	Future Construction Worker	Future Resident (Adult and Child)
Soil	Surface Soil (0 to 2 feet bgs)	Direct Contact [a]	--		Thallium
	Subsurface Soil (0 to 10 feet bgs)	Direct Contact [a]	--	--	Benzo(a)pyrene [d] Dibenz(a,h)anthracene Ethylbenzene Thallium
Soil Vapor	Indoor Air	Vapor Intrusion to Indoor Air	1,3-Butadiene [c]		1,3-Butadiene Chloroform [d] Ethylbenzene
Groundwater	Groundwater	Inhalation in Trench Air [b]		--	

Notes: Risk drivers are those chemicals for which the chemical-specific cancer risk for a given exposure medium (for example, surface soil) exceeds 1E-06 or the chemical-specific noncancer hazard index exceeds 1. Risk drivers shown are based on results for incremental risk. Risk drivers shown are based on HHRA results for both federal and State of California toxicity criteria, unless otherwise noted.

a Soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulate chemicals released from soil to outdoor air.

b Groundwater exposure pathway evaluated for direct contact is the inhalation of volatile chemicals released from groundwater in a construction trench.

c Chemical is a risk driver based on State of California toxicity criteria only.

d Chemical is a risk driver based on Federal toxicity criteria only.

(grey box) Exposure pathway not evaluated for this receptor (see Section A4.2).

-- No risk drivers were identified for this exposure pathway for this receptor.

bgs Below ground surface

HHRA Human health risk assessment

TABLE A-13: SUMMARY OF UNCERTAINTIES

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Uncertainty[a]	Effect on Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Data Evaluation		
Site history may limit the number of chemicals that are analyzed in samples.	May underestimate risk because if area history did not suggest that chemicals of a particular class were likely to have been used or released at a site, the number of samples analyzed for that class of compounds was limited.	Low Underestimate
Sufficient samples may not have been taken to characterize the media evaluated.	May underestimate or overestimate risk because calculated risks for an exposure area may be based on very few samples, which may or may not be representative of the area at large.	Moderate Under- or Overestimate
Selection of Chemicals of Potential Concern		
Chemicals detected just below the cancer or noncancer RSL were excluded as COPCs in the incremental risk evaluation.	The selection of COPCs was based on the maximum detected concentration, and therefore, the likelihood of exclusion of a risk driver is negligible. However, this may underestimate incremental risks because new toxicological information could become available that changes the values of RSLs used in this HHRA, and therefore in turn could change the number of chemicals selected as COPCs.	Low Underestimate
Exposure Assessment		
Future land use may be open space reuse.	Exposure estimates developed under the future redeveloped land use scenarios (commercial/industrial) may conservatively overestimate risks.	Moderate to High Overestimate
Sizes of exposure areas are fixed instead of variable.	May underestimate or overestimate risk because exposure may not be confined to the sizes of the areas selected for evaluation. EPCs for COPCs in adjacent exposure areas may be higher or lower.	Moderate Under- or Overestimate
Exposure assumptions are based on high estimates of daily, long-term exposure for residential, industrial, and recreational receptors.	Thirty years of exposure is assumed for recreational receptors and 30 years for residential receptors. These durations may overestimate exposure to these receptors because average intake or exposure could be less than is assumed in the risk evaluation. The assumption that recreational users will visit the same exposure location for 30 years is a very conservative estimate. Likewise, the assumption that residents will reside in the same dwelling for most of their lifetime is a very conservative estimate.	Moderate to High Overestimate
The exposure pathways quantified in this risk assessment were identified based on the area conceptual model, relevant site characterization data, and contaminant fate and transport considerations.	May underestimate or overestimate risk because these factors may not accurately predict the migration of contaminants within and from the area	Low Under- or Overestimate
The standard assumptions regarding body weight, period exposed, life expectancy, population characteristics, and lifestyle may not be representative of any actual exposure situation.	May overestimate risk associated with exposure to contaminants at the site because other environmental conditions may affect potential receptors, and health-related concerns may not necessarily be attributed to residual contaminants at the site.	Moderate Overestimate

TABLE A-13: SUMMARY OF UNCERTAINTIES

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Uncertainty[a]	Effect on Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Exposure Assessment (Continued)		
The amount of media intake is assumed to be constant and representative of the exposed population.	May underestimate or overestimate risk to potential receptors because individual intake could be less or more than the amount assumed in the risk evaluation. Furthermore, it is assumed that a receptor may take in the same amount of media over the entire exposure duration, which is unlikely to happen in actuality.	Moderate Under- or Overestimate
EPC often based on the maximum detected concentration.	May overestimate risk because the maximum detected concentration (or the concentration of a single detected value) was often used as the RME concentration for calculating intakes to the receptors.	Moderate Overestimate
Samples were collected in areas of suspected or known contamination to be purposefully investigative.	May overestimate risks because the sample collection strategy was designed as a purposive investigation. The primary objective of this sampling effort was to define the nature and extent of contamination. The EPCs based on these nonrandom soil samples are likely to overestimate the concentrations at the exposure point, as well as the actual dose to the receptor.	Moderate Overestimate
EPCs are assumed to exist uniformly across the exposure area for the entire duration of exposure.	May overestimate risks because this assumption does not account for reductions to COPC concentrations that may results from biodegradation, chemical oxidation, hydrolysis, or other chemical removal processes.	Moderate Overestimate
Maximum detected groundwater and soil gas concentrations were used to estimate indoor air concentrations from vapor intrusion.	May overestimate risks because use of maximum concentrations does not account for seasonal fluctuations or degradation processes.	Moderate Overestimate
Use of soil gas data that has evidence of limited atmospheric breakthrough during sampling.	May underestimate the concentration of the volatile chemicals detected in soil gas from intrusion of atmospheric (ambient) air. Though breakthrough was indicated in the laboratory results, breakthrough was calculated to be limited.	Low Underestimate
Toxicity Assessment		
Statistical methods used to extrapolate from high to low doses rely on experimental animal data.	In animal studies, high doses of a test chemical are administered to laboratory animals, and the reported response is extrapolated to the much lower doses that are likely for human exposure. Very little experimental data are available on the nature of the dose-response relationship at low doses. Because of this uncertainty, EPA has selected a conservative model to estimate the low-dose relationship, and EPA uses an upper-bound estimate (typically a 95 percent upper confidence limit of the slope factor [SF] predicted by the extrapolation model) as the SF. An upper-bound estimate of potential cancer risks is obtained with this SF.	Moderate to High Overestimate
Toxicity values for surrogate chemicals were used to calculate risks when toxicity values were unavailable for a given COPC.	Surrogate chemicals can introduce uncertainty because of the underlying assumption that the target chemical affects the same target organ or exerts the same method of carcinogenesis at the same effective dose as the surrogate chemical.	Moderate Under- or Overestimate

TABLE A-13: SUMMARY OF UNCERTAINTIES
Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Uncertainty[a]	Effect on Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Toxicity Assessment (Continued)		
Use of toxicity criteria that has since been withdrawn or replaced by newer toxicity criteria and studies	May over or underestimate risks for chemicals whose toxicity profiles have been updated or re-reviewed by the EPA or the State of California, resulting in the withdrawal or revision of a toxicity value	Moderate Over- or Underestimate
Benzene, toluene, ethylbenzene, and total xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH) were used as surrogates for the assessment of potential risks and hazards associated with TPH.	Most samples were analyzed for BTEX though the number of samples analyzed for PAHs was limited. A preliminary evaluation of the PAH and TPH data has suggested that the compounds of these two types may not be well correlated at Mare Island (in other words, the TPH may not contain PAHs). Because of the localized effects of TPH at the IR17 and Building 503 Area, this approach does not appear to underestimate human health risks.	Low Underestimate
Risk Characterization		
Risks from carcinogens with different target organs are assumed to be additive.	This assumption contributes to the uncertainty in the risk assessment and may result in underestimated or overestimated risks, depending on whether the interactions among the COPCs are synergistic or antagonistic.	Moderate Under- or Overestimate
Uncertainty in the risk estimates may be magnified through the multiplicative combination of many upper-bound, conservative assumptions for EPCs, chemical intake, and toxicity criteria.	May overestimate risks because upper-bound, conservative assumptions are compounded in the HHRA.	High Overestimate

Notes:

a Uncertainties associated with the HHRA are discussed in Section A10.0.

COPC Chemical of potential concern
EPA U.S. Environmental Protection Agency
EPC Exposure point concentration
HHRA Human health risk assessment
RME Reasonable maximum exposure
SF Slope factor
TCE Trichloroethene
TPH Total petroleum hydrocarbons

TABLE 2: SUMMARY OF HUMAN HEALTH RISK

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Exposure Scenario	Exposure Medium	Incremental Risk Results - Federal Toxicity Criteria Hierarchy [a]			Incremental Risk Results - State of California Toxicity Criteria Hierarchy [a]		
			Cancer Risk	Noncancer Hazard [b]	Risk Drivers [c]	Cancer Risk	Noncancer Hazard [b]	Risk Drivers [c]
1	Future Commercial/ Industrial Worker	Surface Soil (0 to 0.5 ft bgs)	5E-06	0.4	4,4'-DDT, Lead	5E-06	0.4	4,4'-DDT, Lead
		Subsurface Soil (0 to 10 ft bgs)	2E-05	0.2	1,1,2,2-PCA, Aroclor-1248, Benzo(a)pyrene, Dibenz(a,h)anthracene	2E-05	0.2	1,1,2,2-PCA, Aroclor-1248, Dibenz(a,h)anthracene
		Soil Gas	2E-05	0.7	Benzene, Ethylbenzene	3E-05	1 (<1)	1,3-Butadiene, Benzene, Ethylbenzene
		Total (Surface Soil, Soil Gas)	2E-05	1 (<1)		4E-05	1 (<1)	
		Total (Subsurface Soil, Soil Gas)	4E-05	0.9		6E-05	1 (<1)	
	Future Construction Worker	Subsurface Soil (0 to 10 ft bgs)	3E-06	1 (<1)	Dibenz(a,h)anthracene	3E-06	1 (<1)	*None*
		Groundwater	4E-07	0.6	*None*	8E-07	0.6	*None*
		Total (Subsurface Soil,	4E-06	2 (<1)		4E-06	2 (<1)	
	Hypothetical Future Resident	Surface Soil (0 to 0.5 ft bgs)	2E-05	5 (3)	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Benzo(a)pyrene, Lead, Thallium	2E-05	5 (3)	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Lead, Thallium
		Subsurface Soil (0 to 10 ft bgs)	2E-04	2 (<1)	1,1,2,2-PCA, 4,4'-DDT, Aroclor-1242, Aroclor-1248, Aroclor-1254, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Ethylbenzene, Lead	1E-04	2 (<1)	1,1,2,2-PCA, 4,4'-DDT, Aroclor-1242, Aroclor-1248, Aroclor-1254, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Ethylbenzene, Indeno(1,2,3-cd)pyrene, Lead
		Soil Gas	2E-04	7 (6)	1,1,2,2-PCA, 1,2,4-Trimethylbenzene, 1,3-Butadiene, Benzene, Ethylbenzene, m,p-Xylene, o-Xylene	4E-04	10 (8)	1,1,2,2-PCA, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, 1,3-Butadiene, Benzene, Ethylbenzene, m,p-Xylene, o-Xylene, Vinyl Chloride
		Total (Surface Soil, Soil Gas)	3E-04	12 (6)		4E-04	15 (8)	
		Total (Subsurface Soil, Soil Gas)	4E-04	9 (7)		6E-04	12 (9)	
2	Future Commercial/ Industrial Worker	Surface Soil (0 to 0.5 ft bgs)	2E-06	0.05	Aroclor-1260	2E-06	0.05	Aroclor-1260
		Subsurface Soil (0 to 10 ft bgs)	6E-06	0.6	Aroclor-1260, Ethylbenzene	6E-06	0.7	Aroclor-1260, Ethylbenzene
		Soil Gas	7E-06	2 (2)	Trichloroethene	9E-06	0.3	1,3-Butadiene, Trichloroethene, Vinyl Chloride
		Total (Surface Soil, Soil Gas)	9E-06	2 (2)		1E-05	0.3	
		Total (Subsurface Soil, Soil Gas)	1E-05	3 (2)		1E-05	1 (<1)	
	Future Construction Worker	Subsurface Soil (0 to 10 ft bgs)	9E-07	1 (<1)	*None*	9E-07	1 (<1)	*None*
		Groundwater	5E-08	0.02	*None*	6E-07	0.02	*None*
		Total (Subsurface Soil,	1E-06	1 (<1)		2E-06	1 (<1)	
	Hypothetical Future Resident	Surface Soil (0 to 0.5 ft bgs)	5E-06	0.3	Aroclor-1254, Aroclor-1260	5E-06	0.3	Aroclor-1254, Aroclor-1260
		Subsurface Soil (0 to 10 ft bgs)	3E-05	3 (2)	Aroclor-1254, Aroclor-1260, Benzo(a)pyrene, Ethylbenzene, Xylene (total)	3E-05	4 (3)	Aroclor-1254, Aroclor-1260, Benzo(a)pyrene, Ethylbenzene, Xylene (total)
		Soil Gas	1E-04	24 (24)	1,3-Butadiene, Chloroform, Trichloroethene, Vinyl Chloride	2E-04	3 (2)	1,3-Butadiene, Trichloroethene, Vinyl Chloride
		Total (Surface Soil, Soil Gas)	1E-04	24 (24)		2E-04	3 (2)	
		Total (Subsurface Soil, Soil Gas)	2E-04	27 (24)		2E-04	6 (3)	

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
20	estimated HHRA cancer risks and noncancer hazards	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Table 2.

TABLE 2: SUMMARY OF HUMAN HEALTH RISK

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Exposure Scenario	Exposure Medium	Incremental Risk Results - Federal Toxicity Criteria Hierarchy [a]			Incremental Risk Results - State of California Toxicity Criteria Hierarchy [a]		
			Cancer Risk	Noncancer Hazard [b]	Risk Drivers [c]	Cancer Risk	Noncancer Hazard [b]	Risk Drivers [c]
3	Future Commercial/ Industrial Worker	Surface Soil (0 to 2 ft bgs)	--	0.3	*None*	--	0.3	*None*
		Subsurface Soil (0 to 10 ft bgs)	8E-07	0.3	*None*	6E-07	0.3	*None*
		Soil Gas	8E-07	0.02	*None*	2E-06	0.1	1,3-Butadiene
		Total (Surface Soil, Soil Gas)	8E-07	0.3		2E-06	0.4	
		Total (Subsurface Soil, Soil Gas)	2E-06	0.3		2E-06	0.4	
	Future Construction Worker	Subsurface Soil (0 to 10 ft bgs)	8E-08	0.8	*None*	5E-08	0.8	*None*
		Groundwater	2E-07	0.06	*None*	2E-07	0.07	*None*
		Total (Subsurface Soil,	3E-07	0.9		3E-07	0.9	
	Hypothetical Future Resident	Surface Soil (0 to 2 ft bgs)	--	3 (3)	Thallium	--	3 (3)	Thallium
		Subsurface Soil (0 to 10 ft bgs)	6E-06	3 (3)	Benzo(a)pyrene, Dibenz(a,h)anthracene, Ethylbenzene, Thallium	4E-06	3 (3)	Dibenz(a,h)anthracene, Ethylbenzene, Thallium
		Soil Gas	1E-05	0.2	1,3-Butadiene, Chloroform, Ethylbenzene	2E-05	1 (1)	1,3-Butadiene, Ethylbenzene
		Total (Surface Soil, Soil Gas)	1E-05	4 (3)		2E-05	4 (3)	
		Total (Subsurface Soil, Soil Gas)	2E-05	4 (3)		3E-05	4 (3)	

Notes:

a Results shown for Subareas 1 through 3 are presented to one significant figure and are based on the incremental risk evaluation (see Attachment A1 of Appendix A).

b Results in parentheses ( ) are target organ segregated hazard index results and are presented when the cumulative noncancer hazard exceeds 1 for a given medium.

c Risk drivers are those chemicals for which the chemical-specific cancer risk for a given exposure medium (for example, surface soil) exceeds 10^{-6} or the chemical-specific noncancer hazard index exceeds 1. Risk drivers are based on incremental risk.

-- Not applicable
ft bgs Feet below ground surface
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethene
DDT Dichlorodiphenyltrichloroethane
PCA Tetrachloroethane

TABLE 3: CANCER RISKS AND NONCANCER HAZARDS FOR HUMAN HEALTH RISK DRIVERS

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Receptor	Medium	Total Cancer Risk	Total HI	Maximum Segregated HI	Chemical Risk Driver [a]	Chemical-Specific Cancer Risk	Percentage of Total Cancer Risk	Chemical-Specific HI	Percentage of Total HI
1	Future Commercial/ Industrial Worker	Surface Soil (0-0.5 ft bgs)	5E-06	0.4	--	4,4'-DDT	4.0E-06	74%	0.066	17%
						Lead	--	--	--	--
		Subsurface Soil (0-10 ft bgs)	2E-05	0.2	--	1,1,2,2-Tetrachloroethane	7.6E-06	31%	0.0010	0%
						Aroclor-1248	3.8E-06	15%	--	--
						Benzo(a)pyrene	1.8E-06	7%	--	--
						Dibenz(a,h)anthracene	7.0E-06	28%	--	--
		Soil Gas	2E-05	0.7	--	Benzene	5.1E-06	28%	0.061	9%
						Ethylbenzene	1.3E-05	69%	0.014	2%
	Future Construction Worker	Subsurface Soil (0-10 ft bgs)	3E-06	1	<1	Dibenz(a,h)anthracene	1.0E-06	30%	--	--
		Groundwater	4E-07	0.6	--	*No chemical risk drivers were identified for this scenario*				
	Future Hypothetical Resident	Surface Soil (0-0.5 ft bgs)	2E-05	5	3	4,4'-DDD	1.7E-06	9%	--	--
						4,4'-DDE	1.7E-06	9%	--	--
						4,4'-DDT	1.5E-05	75%	0.69	14%
						Benzo(a)pyrene	1.3E-06	7%	--	--
						Lead	--	--	--	--
						Thallium	--	--	3.2	65%
		Subsurface Soil (0-10 ft bgs)	2E-04	2	<1	1,1,2,2-Tetrachloroethane	3.7E-05	23%	0.013	0.8%
						4,4'-DDT	3.6E-06	2%	0.17	10%
						Aroclor-1242	1.5E-06	0.9%	--	--
						Aroclor-1248	9.5E-06	6%	--	--
						Aroclor-1254	2.4E-06	1%	0.47	27%
						Benzo(a)anthracene	3.4E-06	2%	--	--
						Benzo(a)pyrene	2.0E-05	12%	--	--
						Benzo(b)fluoranthene	2.0E-06	1%	--	--
						Dibenz(a,h)anthracene	7.5E-05	47%	--	--
						Ethylbenzene	2.9E-06	2%	0.0027	0.16%
						Lead	--	--	--	--
		Soil Gas	2E-04	7	6	1,1,2,2-Tetrachloroethane	1.1E-06	0.5%	--	--
						1,2,4-Trimethylbenzene	--	--	1.5	20%
						1,3-Butadiene	4.3E-06	2%	0.17	2%
						Benzene	6.5E-05	28%	0.65	9%
						Ethylbenzene	1.6E-04	69%	0.15	2%
						m,p-Xylene	--	--	3.2	44%
						o-Xylene	--	--	1.6	22%

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
21	chemicals of concern	Section 2.5.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Table 3.

TABLE 3: CANCER RISKS AND NONCANCER HAZARDS FOR HUMAN HEALTH RISK DRIVERS

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Receptor	Medium	Total Cancer Risk	Total HI	Maximum Segregated HI	Chemical Risk Driver [a]	Chemical-Specific Cancer Risk	Percentage of Total Cancer Risk	Chemical-Specific HI	Percentage of Total HI
2	Future Commercial/ Industrial Worker	Surface Soil (0-0.5 ft bgs)	2E-06	0.05	--	Aroclor-1260	1.4E-06	67%	--	--
		Subsurface Soil (0-10 ft bgs)	6E-06	0.6	--	Aroclor-1260	1.4E-06	23%	--	--
						Ethylbenzene	3.7E-06	61%	0.0046	0.8%
		Soil Gas	7E-06	2	2	Trichloroethene	6.5E-06	88%	2.2	98%
	Future Construction Worker	Subsurface Soil (0-10 ft bgs)	9E-07	1	<1	*No chemical risk drivers were identified for this scenario*				
		Groundwater	5E-08	0.02	--	*No chemical risk drivers were identified for this scenario*				
	Future Hypothetical Resident	Surface Soil (0-0.5 ft bgs)	5E-06	0.3	--	Aroclor-1254	1.7E-06	33%	0.33	100%
						Aroclor-1260	3.4E-06	67%	--	--
		Subsurface Soil (0-10 ft bgs)	3E-05	3	2	Aroclor-1254	1.7E-06	6%	0.33	11%
						Aroclor-1260	3.4E-06	13%	--	--
						Benzo(a)pyrene	2.7E-06	10%	--	--
						Ethylbenzene	1.8E-05	68%	0.028	0.9%
						Xylene (Total)	--	--	1.4	48%
		Soil Gas	1E-04	24	24	1,3-Butadiene	6.2E-06	5%	0.24	1.0%
						Chloroform	1.5E-06	1%	0.0016	0.007%
						Trichloroethene	1.1E-04	87%	24	98%
						Vinyl Chloride	6.5E-06	5%	0.010	0.04%
3	Future Commercial/ Industrial Worker	Surface Soil (0-2 ft bgs)	--	0.3	--	*No chemical risk drivers were identified for this scenario*				
		Subsurface Soil (0-10 ft bgs)	8E-07	0.3	--	*No chemical risk drivers were identified for this scenario*				
		Soil Gas	8E-07	0.02	--	*No chemical risk drivers were identified for this scenario*				
	Future Construction Worker	Subsurface Soil (0-10 ft bgs)	8E-08	0.8	--	*No chemical risk drivers were identified for this scenario*				
		Groundwater	2E-07	0.06	--	*No chemical risk drivers were identified for this scenario*				
	Future Hypothetical Resident	Surface Soil (0-2 ft bgs)	--	3	3	Thallium	--	--	3.3	100%
		Subsurface Soil (0-10 ft bgs)	6E-06	3	3	Benzo(a)pyrene	2.3E-06	35%	--	--
						Dibenz(a,h)anthracene	2.0E-06	32%	--	--
						Ethylbenzene	2.2E-06	33%	0.0033	0.1%
						Thallium	--	--	3.3	99.9%
		Soil Gas	1E-05	0.2	--	1,3-Butadiene	2.6E-06	25.4%	0.10	43.6%
						Chloroform	1.4E-06	13.8%	0.0014	0.6%
						Ethylbenzene	5.8E-06	57.5%	0.0055	2.4%

TABLE 3: CANCER RISKS AND NONCANCER HAZARDS FOR HUMAN HEALTH RISK DRIVERS

Feasibility Study Addendum for the Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California

Subarea	Receptor	Medium	Total Cancer Risk	Total HI	Maximum Segregated HI	Chemical Risk Driver [a]	Chemical-Specific Cancer Risk	Percentage of Total Cancer Risk	Chemical-Specific HI	Percentage of Total HI

Notes:

a	Chemicals risk drivers are chemicals for which the chemical-specific cancer risk exceeded 10^{-6} or the noncancer risk exceeded 1.
Risks shown in the table are from the incremental risk evaluation (Attachment A1 of Appendix A) and are based on the federal toxicity criteria hierarchy.

b	Exposure pathways evaluated in the HHRA for soil are incidental ingestion, dermal contact, and inhalation of volatile and particulate chemicals released from soil to outdoor air.
Groundwater exposure pathways addressed by construction trench exposure are inhalation of volatile chemicals. For soil gas, inhalation is the sole exposure pathway evaluated for subsurface vapor intrusion of soil gas to indoor air.

Gray shading indicates chemical is not recommended for further evaluation based on discussion presented in Sections 3.1.1, 3.1.2, and 3.1.3.

--	Not available or not applicable
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
ft bgs	Feet below ground surface
HI	Hazard index
RAO	Remedial action objective

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
22	screening-level ecological risk assessment	Section 2.5.2	Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California. ChaduxTt. September 12, 2012. Page ES-6.

characterized. Organic chemicals remaining in sediment, groundwater, and soil gas at the site are expected to continue to naturally attenuate as the upland sources were removed during the 2010 NTCRA.

Chemical concentrations in sediment, groundwater, and soil gas at the site do not pose an unacceptable risk to human health. The HHRA identified BAP as a risk driver in sediment; however, BAP is ubiquitous and the average concentration within the non-tidal wetland is less than the ambient screening level for the Bay Area. Consequently, excess cancer risks associated with BAP are considered representative of non-point atmospheric deposition at Mare Island, among other factors. Total DDTs was identified as a risk driver for ecological receptors. However, concentrations of these chemicals most likely represent normal historical application of pesticides and no point sources were identified. The mobility of BAP, lead, and total DDTs is most likely dependent on the rates of wind and water erosion of sediments, and these erosion rates are expected to be low due to the densely vegetated surface in the non-tidal wetland area. Therefore, no further evaluation or action is warranted to address risk to human health or ecological receptors.

Based on results and conclusions of the non-tidal wetland area investigation, the nature and extent of chemicals at the site have been adequately characterized and these chemicals do not pose a significant risk to human health or the environment. Furthermore, sediment, groundwater, and soil gas data do not suggest the non-tidal wetland area has been contaminated by historical activities in the upland area. Therefore, a feasibility study to evaluate remedial alternatives is not warranted for the non-tidal wetland area at the IR17 and Building 503 Area, and no further action is recommended.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
23	developed numerical remediation goals (RG)	Section 2.8	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Section 4.3.

4.2.2 Location-Specific

Location-specific ARARs are identified based on attributes of and resources present at the site (for example, cultural or historic resources). Based on the location of the IR17 and Building 503 Area, the substantive provisions of the following requirements are potential location-specific ARARs:

- Floodplain Management (Exec. Order No. 11988, codified at 40 CFR § 6.302(b) and 40 CFR Part 6, Appendix A, § 6(a)(1), (a)(3), and (a)(5)).
- Requirements to design, construct, operate, and maintain a facility to prevent washout at Cal. Code Regs. tit. 22, § 66264.18(b).

Neither of these potential location-specific ARARs was used to develop RAOs, numerical or remediation goals.

4.2.3 Potential Action-Specific

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken. These requirements are triggered by the particular remedial activities selected. Action-specific ARARs indicate how each alternative must be conducted. No potential action-specific ARARs were used to develop RAOs, or numerical remediation goals.

The alternatives being evaluated are described in Section 5.0 and the potential federal and state action-specific ARARs associated with these alternatives are described in Appendix B.

4.3 REMEDIATION GOALS

This section presents the process used to develop remediation goals for the RAOs at the IR17 and Building 503 Area. Remediation goals were developed based on the media, chemicals, exposure pathways, and receptors identified in the RAOs and are used to guide the development of remedial alternatives. Table 5 presents the remediation goals.

4.3.1 Impacted Media, Chemicals of Concern, Pathways, and Receptors

RAOs were identified for chemicals in soil and soil gas at Subarea 1 and soil gas at Subarea 2. The chemicals, affected media (soil, soil gas, and groundwater), exposure pathways, and receptors are shown on Table 2.

Receptors identified in the RAOs for exposure to chemicals in soil and soil gas at Subarea 1 and soil gas at Subarea 2 are future commercial/industrial workers and hypothetical sensitive users. Exposure pathways to soil include incidental ingestion of soil, dermal contact with soil, inhalation of airborne soil particles as dust, and inhalation of VOCs released directly from soil to outdoor air. In addition, the following inhalation exposure pathways include VOCs released from soil gas to indoor air (vapor intrusion) and VOCs released from groundwater to soil gas (vapor intrusion).

No RAOs were developed for specific contaminants in groundwater because there is no complete pathway for drinking water. However, a general RAO was developed for groundwater at Subareas 1, 2, and 3 to ensure no complete pathway exists. Because no specific contaminant was identified, remediation goals were not developed for groundwater.

4.3.2 Risk-Based Concentrations

The first step in developing remediation goals involves the calculation of RBCs for each COC identified in the RAOs. Exposure scenario-specific human health RBCs were calculated based on a target cancer risk level of 10^{-6} and a target noncancer HI of 1. The exposure scenarios and pathways addressed by the human health RBCs are summarized in Table 5. The RBCs were calculated using the same exposure assumptions and toxicity criteria used to assess potential cancer risks and noncancer hazards for the COCs in the HHRA (Section 3.1 and Appendix A). The human health RBCs for soil and soil gas COCs are listed in Table 5.

4.3.3 Chemical-Specific ARARs

The second step in developing remediation goals involves the identification of chemical-specific ARARs for the exposure pathways for the COCs identified in the RAOs. If a chemical-specific ARAR that presents a cleanup standard is identified for a particular chemical, the remediation goal would be equal to that standard. The TSCA self-implementing cleanup goal of 1 mg/kg for high occupancy site use is identified as a potential federal chemical-specific ARAR and was used as the basis for the remedial goal for sensitive user exposure to PCBs (total) in subsurface soil at Subarea 1. ARARs are summarized in Section 4.2 and discussed in detail in Appendix B. No other potential ARARs were identified that present a numerical cleanup goal for the COCs retained at the IR17 and Building 503 Area.

4.3.4 Background Concentrations

The third step in developing remediation goals involves identifying site-specific background concentrations for inorganic COCs. Background concentrations were identified for inorganic chemicals based on the 95th percentile ambient limit concentration for Mare Island (Tetra Tech 2002a). These ambient values were considered while developing remediation goals because CERCLA does not require a cleanup to below background concentrations.

4.3.5 Laboratory Practical Quantitation Limits

The fourth step in developing remediation goals involves identifying laboratory practical quantitation limits (PQL) for each COC listed in the RAOs. The PQL is the lowest concentration that can be reliably determined within specified limits of precision and accuracy by individual analytical methods under routine laboratory conditions. PQLs are estimated by the laboratory for each compound included in the analytical method. Table 5 presents the PQL for each chemical. The PQLs shown on this table were taken from the Final Work Plan for the Non-Tidal Wetland Investigation and Post-Removal Monitoring (ChaduxTt 2010), with the exception of the PQLs for total PCBs, which were taken from the EMAX laboratory basic ordering agreement with Tetra Tech.

4.3.6 Recommended Remediation Goals

The final step in developing remediation goals involves a comparison of the concentrations identified in the sections above. If there is a potential ARAR that presents a cleanup standard for a particular chemical, the remediation goal is set equal to that cleanup standard. If there is no ARAR-based cleanup standard, the remediation goal for each chemical is set at the higher of the human health RBC, background concentration, or the laboratory PQL. A comparison of the RBCs, background concentrations, laboratory PQLs, and potential chemical-specific ARARs and selection of final remediation goals is presented in Table 5.

Chemical concentrations measured in soil and soil gas samples from the IR17 and Building 503 Area were compared with the numerical remediation goals. COCs present at concentrations above these numerical goals will be addressed by remedial alternatives. Figures 9 and 10 show soil and soil gas sampling locations where concentrations of COCs exceed the numerical remediation goals for commercial/industrial workers; while Figures 11 and 12 show soil and soil gas sampling locations where concentrations of COCs exceed the numerical remediation goals for the hypothetical sensitive user.

4.4 DEVELOPMENT OF GENERAL RESPONSE ACTIONS

This section describes broad categories of remedial measures or GRAs that could be used to achieve the RAOs. GRAs are categories of actions that are made up of technologies. These GRAs are responses or remedies that would meet the RAOs to protect human health and the environment from the known COCs at the IR17 and Building 503 Area. GRAs related to remediation of soil gas are discussed together with soil because of the similarity of the actions and technologies. In addition, CERCLA requires that the no-action alternative be included among the GRAs evaluated in FS documents. The no-action alternative serves as a baseline for comparison with other alternatives. Section 4.5 presents the results of the analysis for the proposed GRAs and associated process options.

GRAs were derived from engineering judgment and experience with response actions proven successful for the COCs at the IR17 and Building 503 Area. Because the RAOs were developed

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
24	cost of each remedial alternative	Section 2.9.1	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Appendix C Tables C-1 through C-7.

TABLE C-1: REMEDIAL ACTION ALTERNATIVE COST SUMMARY

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

	Description	Capital Cost	O&M [a]	Total Future Value	Total Present Value [b]
Alternative 1	No Action	$0	$0	$0	**$0**
Alternative 2	Institutional Controls	$303,000	$430,000	$733,000	**$802,000**
Alternative 3	Excavation and Off-site Disposal, Monitored Natural Attenuation, and Institutional Controls	$5,837,000	$709,000	$6,546,000	**$6,842,000**
Alternative 4	Excavation and Off-site Disposal and Monitored Natural Attenuation (Future Unrestricted Reuse)	$10,551,000	$929,000	$11,480,000	**$11,976,000**

Note: Costs have been rounded to the nearest thousand dollars

a Future value O&M costs are presented above for the 30-year (Alternatives 2 and 3) or 10-year (Alternative 4) O&M periods.

b Present value costs are shown in Tables C-2, C-3, and C-4. Detailed capital and O&M costs are shown on Tables C-5, C-6, and C-7.

O&M Operation and maintenance

TABLE C-2: PRESENT VALUE COST ESTIMATE, ALTERNATIVE 2

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Discount Rate (30 years) at 1.10%

Year	Future Value of Costs for Alternative 2	Escalation Factor [a]	Escalated Value	Annual Discount Factor [b]	Present Value Cost for Alternative 2	Present Value Cost for Alternative 2
0	$302,741	1.0333	$312,822	1	Implementation of Institutional Controls	$312,822.44
1	$10,028	1.0508	$10,538	0.989	Annual Institutional Control Review	$10,423
2	$10,028	1.0687	$10,717	0.978	Annual Institutional Control Review	$10,485
3	$10,028	1.0869	$10,900	0.968	Annual Institutional Control Review	$10,548
4	$10,028	1.1053	$11,084	0.957	Annual Institutional Control Review	$10,610
5	$31,579	1.1241	$35,498	0.947	5-Year Review	$33,608
6	$10,028	1.1432	$11,464	0.936	Annual Institutional Control Review	$10,736
7	$10,028	1.1627	$11,660	0.926	Annual Institutional Control Review	$10,800
8	$10,028	1.1824	$11,858	0.916	Annual Institutional Control Review	$10,864
9	$10,028	1.2026	$12,060	0.906	Annual Institutional Control Review	$10,929
10	$31,579	1.2230	$38,621	0.896	5-Year Review	$34,619
11	$10,028	1.2438	$12,473	0.887	Annual Institutional Control Review	$11,059
12	$10,028	1.2649	$12,685	0.877	Annual Institutional Control Review	$11,124
13	$10,028	1.2864	$12,901	0.867	Annual Institutional Control Review	$11,190
14	$10,028	1.3083	$13,120	0.858	Annual Institutional Control Review	$11,257
15	$31,579	1.3305	$42,016	0.849	5-Year Review	$35,657
16	$10,028	1.3532	$13,570	0.839	Annual Institutional Control Review	$11,391
17	$10,028	1.3762	$13,801	0.830	Annual Institutional Control Review	$11,459
18	$10,028	1.3996	$14,036	0.821	Annual Institutional Control Review	$11,527
19	$10,028	1.4234	$14,274	0.812	Annual Institutional Control Review	$11,595
20	$31,579	1.4476	$45,714	0.803	5-Year Review	$36,730
21	$10,028	1.4722	$14,764	0.795	Annual Institutional Control Review	$11,733
22	$10,028	1.4972	$15,015	0.786	Annual Institutional Control Review	$11,803
23	$10,028	1.5226	$15,269	0.778	Annual Institutional Control Review	$11,872
24	$10,028	1.5485	$15,529	0.769	Annual Institutional Control Review	$11,943
25	$31,579	1.5748	$49,730	0.761	5-Year Review	$37,831
26	$10,028	1.6016	$16,061	0.752	Annual Institutional Control Review	$12,085
27	$10,028	1.6288	$16,334	0.744	Annual Institutional Control Review	$12,157
28	$10,028	1.6565	$16,612	0.736	Annual Institutional Control Review	$12,229
29	$10,028	1.6847	$16,895	0.728	Annual Institutional Control Review	$12,302
30	$31,579	1.7133	$54,104	0.720	5-Year Review	$38,967
					Total Present Value Cost	**$802,358**

Notes:

a Escalation factors from RACER Version 10.4 (2011 cost database).

b Annual discount factor = $1/(1+i)^t$, where i=0.011 and t=year (that is, the present value of $1 paid in year t at 1.10%). Annual discount rate obtained from OMB Circular No. A-94, 2012.

TABLE C-3: PRESENT VALUE COST ESTIMATE, ALTERNATIVE 3

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Discount Rate (30 years) at 1.10%

Year	Future Value of Costs for Alternative 3	Escalation Factor [a]	Escalated Value	Annual Discount Factor [b]	Present Value Cost for Alternative 3	Present Value Cost for Alternative 3
0	$1,353,724	1.0333	$1,398,803	1	Remedial Design and Implementation of Institutional Controls	$1,398,803
1	$4,493,483	1.0508	$4,721,752	0.989	Excavation, Off-Site Disposal, Installation of Vapor Points, Monitored Natural Attenuation (Semiannual), and Annual Institutional Control Review	$4,670,378
2	$79,725	1.0687	$85,202	0.978	Monitored Natural Attenuation and Annual Institutional Control Review	$83,358
3	$79,725	1.0869	$86,653	0.968	Monitored Natural Attenuation and Annual Institutional Control Review	$83,856
4	$79,725	1.1053	$88,120	0.957	Monitored Natural Attenuation and Annual Institutional Control Review	$84,347
5	$101,276	1.1241	$113,844	0.947	Monitored Natural Attenuation and 5-Year Review	$107,784
6	$10,028	1.1432	$11,464	0.936	Annual Institutional Control Review	$10,736
7	$10,028	1.1627	$11,660	0.926	Annual Institutional Control Review	$10,800
8	$10,028	1.1824	$11,858	0.916	Annual Institutional Control Review	$10,864
9	$10,028	1.2026	$12,060	0.906	Annual Institutional Control Review	$10,929
10	$31,579	1.2230	$38,621	0.896	5-Year Review	$34,619
11	$10,028	1.2438	$12,473	0.887	Annual Institutional Control Review	$11,059
12	$10,028	1.2649	$12,685	0.877	Annual Institutional Control Review	$11,124
13	$10,028	1.2864	$12,901	0.867	Annual Institutional Control Review	$11,190
14	$10,028	1.3083	$13,120	0.858	Annual Institutional Control Review	$11,257
15	$31,579	1.3305	$42,016	0.849	5-Year Review	$35,657
16	$10,028	1.3532	$13,570	0.839	Annual Institutional Control Review	$11,391
17	$10,028	1.3762	$13,801	0.830	Annual Institutional Control Review	$11,459
18	$10,028	1.3996	$14,036	0.821	Annual Institutional Control Review	$11,527
19	$10,028	1.4234	$14,274	0.812	Annual Institutional Control Review	$11,595
20	$31,579	1.4476	$45,714	0.803	5-Year Review	$36,730
21	$10,028	1.4722	$14,764	0.795	Annual Institutional Control Review	$11,733
22	$10,028	1.4972	$15,015	0.786	Annual Institutional Control Review	$11,803
23	$10,028	1.5226	$15,269	0.778	Annual Institutional Control Review	$11,872
24	$10,028	1.5485	$15,529	0.769	Annual Institutional Control Review	$11,943
25	$31,579	1.5748	$49,730	0.761	5-Year Review	$37,831
26	$10,028	1.6016	$16,061	0.752	Annual Institutional Control Review	$12,085
27	$10,028	1.6288	$16,334	0.744	Annual Institutional Control Review	$12,157
28	$10,028	1.6565	$16,612	0.736	Annual Institutional Control Review	$12,229
29	$10,028	1.6847	$16,895	0.728	Annual Institutional Control Review	$12,302
30	$31,579	1.7133	$54,104	0.720	5-Year Review	$38,967
					Total Present Value Cost	**$6,842,387**

Notes:

a Escalation factors from RACER Verison 10.4 (2011 cost database).

b Annual discount factor = $1/(1+i)^t$, where i=0.011 and t=year (that is, the present value of $1 paid in year t at 1.10%). Annual discount rate obtained from OMB Circular No. A-94, 2012.

TABLE C-4: PRESENT VALUE COST ESTIMATE, ALTERNATIVE 4

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Discount Rate (30 years) at 1.10%

Year	Future Value of Costs for Alternative 4	Escalation Factor [a]	Escalated Value	Annual Discount Factor [b]	Present Value Cost for Alternative 4	Present Value Cost for Alternative 4
0	$1,742,409	1.0333	$1,800,431	1	Remedial Design and Implementation of Temporary Institutional Controls	$1,800,431
1	$8,818,803	1.0508	$9,266,798	0.989	Excavation, Off-Site Disposal, Installation of Vapor Points, Monitored Natural Attenuation (semiannual), and annual Institutional Control Review	$9,165,972
2	$109,809	1.0687	$117,353	0.978	Monitored Natural Attenuation and Annual Institutional Control Review	$114,813
3	$109,809	1.0869	$119,352	0.968	Monitored Natural Attenuation and Annual Institutional Control Review	$115,498
4	$109,809	1.1053	$121,372	0.957	Monitored Natural Attenuation and Annual Institutional Control Review	$116,175
5	$131,360	1.1241	$147,661	0.947	Monitored Natural Attenuation and 5-Year Review	$139,801
6	$10,028	1.1432	$11,464	0.936	Annual Institutional Control Review	$10,736
7	$10,028	1.1627	$11,660	0.926	Annual Institutional Control Review	$10,800
8	$10,028	1.1824	$11,858	0.916	Annual Institutional Control Review	$10,864
9	$10,028	1.2026	$12,060	0.906	Annual Institutional Control Review	$10,929
10	$131,360	1.2230	$160,653	0.896	Monitored Natural Attenuation and 5-Year Review	$144,005
11	$10,028	1.2438	$12,473	0.887	Annual Institutional Control Review	$11,059
12	$10,028	1.2649	$12,685	0.877	Annual Institutional Control Review	$11,124
13	$10,028	1.2864	$12,901	0.867	Annual Institutional Control Review	$11,190
14	$10,028	1.3083	$13,120	0.858	Annual Institutional Control Review	$11,257
15	$31,579	1.3305	$42,016	0.849	5-Year Review	$35,657
16	$10,028	1.3532	$13,570	0.839	Annual Institutional Control Review	$11,391
17	$10,028	1.3762	$13,801	0.830	Annual Institutional Control Review	$11,459
18	$10,028	1.3996	$14,036	0.821	Annual Institutional Control Review	$11,527
19	$10,028	1.4234	$14,274	0.812	Annual Institutional Control Review	$11,595
20	$31,579	1.4476	$45,714	0.803	5-Year Review	$36,730
21	$10,028	1.4722	$14,764	0.795	Annual Institutional Control Review	$11,733
22	$10,028	1.4972	$15,015	0.786	Annual Institutional Control Review	$11,803
23	$10,028	1.5226	$15,269	0.778	Annual Institutional Control Review	$11,872
24	$10,028	1.5485	$15,529	0.769	Annual Institutional Control Review	$11,943
25	$31,579	1.5748	$49,730	0.761	5-Year Review	$37,831
26	$10,028	1.6016	$16,061	0.752	Annual Institutional Control Review	$12,085
27	$10,028	1.6288	$16,334	0.744	Annual Institutional Control Review	$12,157
28	$10,028	1.6565	$16,612	0.736	Annual Institutional Control Review	$12,229
29	$10,028	1.6847	$16,895	0.728	Annual Institutional Control Review	$12,302
30	$31,579	1.7133	$54,104	0.720	5-Year Review	$38,967
					Total Present Value Cost	**$11,975,939**

Notes:

a Escalation factors from RACER Verison 10.4 (2011 cost database).

b Annual discount factor = $1/(1+i)^t$, where i=0.011 and t=year (that is, the present value of $1 paid in year t at 1.10%). Annual discount rate obtained from OMB Circular No. A-94, 2012.

TABLE C-5: COST DETAILS, ALTERNATIVE 2
Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Project: Mare Island, IR17 and Building 503 Area
Alternative 2: Institutional Controls

Prepared by: D. MacMillan **Date:** 5/21/13 **Checked by:** **Date:**

RACER Database: System Costs
Cost Database Date: 2011

Assumed Start Date *May-13*
Location Modifier *1.275* (Vallejo, California)

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
INSTITUTIONAL CONTROLS								
Planning Docs								
33220102	Project Manager	70	HR	$0.00	$184.80	$0.00	$184.80	$12,936
33220105	Project Engineer	120	HR	$0.00	$164.52	$0.00	$164.52	$19,742
33220106	Staff Engineer	260	HR	$0.00	$218.01	$0.00	$218.01	$56,683
33220110	QA/QC Officer	39	HR	$0.00	$185.44	$0.00	$185.44	$7,232
33220114	Word Processing/Clerical	200	HR	$0.00	$95.32	$0.00	$95.32	$19,064
33220115	Draftsman/CADD	100	HR	$0.00	$104.61	$0.00	$104.61	$10,461
33220503	Attorney, Partner, Real Estate	30	HR	$0.00	$340.64	$0.00	$340.64	$10,219
33240101	Other Direct Costs	1	LS	$5,274.21	$0.00	$0.00	$5,274.21	$5,274
Planning Meetings								
33010202	Per Diem (per person)	8	DAY	$140.00	$0.00	$0.00	$140.00	$1,120
33220102	Project Manager	80	HR	$0.00	$184.80	$0.00	$184.80	$14,784
33220105	Project Engineer	64	HR	$0.00	$164.52	$0.00	$164.52	$10,529
33220114	Word Processing/Clerical	64	HR	$0.00	$95.32	$0.00	$95.32	$6,100
33220115	Draftsman/CADD	32	HR	$0.00	$104.61	$0.00	$104.61	$3,348
33240101	Other Direct Costs	1	LS	$936.46	$0.00	$0.00	$936.46	$936
Implementation								
33220102	Project Manager	40	HR	$0.00	$184.80	$0.00	$184.80	$7,392
33220105	Project Engineer	120	HR	$0.00	$164.52	$0.00	$164.52	$19,742
33220106	Staff Engineer	140	HR	$0.00	$218.01	$0.00	$218.01	$30,521
33220110	QA/QC Officer	34	HR	$0.00	$185.44	$0.00	$185.44	$6,305
33220114	Word Processing/Clerical	120	HR	$0.00	$95.32	$0.00	$95.32	$11,438
33220115	Draftsman/CADD	250	HR	$0.00	$104.61	$0.00	$104.61	$26,153
33220120	Computer Data Entry	200	HR	$0.00	$95.32	$0.00	$95.32	$19,064
33240101	Other Direct Costs	1	LS	$3,096.79	$0.00	$0.00	$3,096.79	$3,097
33990111	Local Fees	2	LS	$299.70	$0.00	$0.00	$299.70	$599
				Subtotal Institutional Controls - Base Year:				**$302,741**
ANNUAL INSTITUTIONAL CONTROL REVIEW								
Site Inspection								
33220102	Project Manager	9	HR	$0.00	$225.37	$0.00	$225.37	$2,028
33220105	Project Engineer	16	HR	$0.00	$200.64	$0.00	$200.64	$3,210
33220108	Project Scientist	12	HR	$0.00	$228.30	$0.00	$228.30	$2,740
33220109	Staff Scientist	13	HR	$0.00	$130.46	$0.00	$130.46	$1,696
Travel								
33010108	Sedan, Automobile, Rental	1	DAY	$74.24	$0.00	$0.00	$74.24	$74
33010202	Per Diem (per person)	2	DAY	$140.00	$0.00	$0.00	$140.00	$280
						Subtotal - Each Review:		**$10,028**
				Subtotal Years 1 through 30 (24 reviews):				**$240,681.36**
Five-Year Review								
Document Review								
33220102	Project Manager	8	HR	$0.00	$225.37	$0.00	$225.37	$1,803
33220105	Project Engineer	11	HR	$0.00	$200.64	$0.00	$200.64	$2,207
33220108	Project Scientist	8	HR	$0.00	$228.30	$0.00	$228.30	$1,826
33220109	Staff Scientist	16	HR	$0.00	$130.46	$0.00	$130.46	$2,087
Interviews								
33220102	Project Manager	12	HR	$0.00	$225.37	$0.00	$225.37	$2,704
Site Inspection								
33220102	Project Manager	9	HR	$0.00	$225.37	$0.00	$225.37	$2,028
33220105	Project Engineer	16	HR	$0.00	$200.64	$0.00	$200.64	$3,210
33220108	Project Scientist	12	HR	$0.00	$228.30	$0.00	$228.30	$2,740
33220109	Staff Scientist	13	HR	$0.00	$130.46	$0.00	$130.46	$1,696
Reports (each review)								
33220102	Project Manager	6	HR	$0.00	$225.37	$0.00	$225.37	$1,352
33220105	Project Engineer	16	HR	$0.00	$200.64	$0.00	$200.64	$3,210
33220108	Project Scientist	13	HR	$0.00	$228.30	$0.00	$228.30	$2,968
33220109	Staff Scientist	26	HR	$0.00	$130.46	$0.00	$130.46	$3,392
Travel								
33010108	Sedan, Automobile, Rental	1	DAY	$74.24	$0.00	$0.00	$74.24	$74
33010202	Per Diem (per person)	2	DAY	$140.00	$0.00	$0.00	$140.00	$280
						Subtotal - Each Review:		**$31,579**

TABLE C-5: COST DETAILS, ALTERNATIVE 2

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
				Subtotal Years 5 through 30 (6 reviews):				**$189,473.46**
				SUBTOTAL INSTITUTIONAL CONTROLS:				**$732,895.98**
SUMMARY								
							Base Costs:	$302,741
							O&M:	$430,155
					TOTAL ALTERNATIVE 2:			**$732,896**

Note:

All unit costs are from RACER Version 10.4 2011 database - adjusted for 2013 by escalation factor (see Table C-2).

TABLE C-6: COST DETAILS, ALTERNATIVE 3

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Project: **Mare Island, IR17 and Building 503 Area**
Alternative 3: Excavation and Off-site Disposal, Monitored Natural Attenuation, and Institutional Controls

Prepared by: D. MacMillan **Date:** 5/21/13 **Checked by:** **Date:**

RACER Database: System Costs
Cost Database Date: 2011

Assumed Start Date *May-13*
Location Modifier *1.275* (Vallejo, California)

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
EXCAVATION AND DISPOSAL								
Site Preparation								
33010101	Mobilize/DeMobilize Equipment	1.00	LS	0.00	2,279.91	1,334.25	3,614.16	$3,614
17020209	Demolish Rod Reinforced Concrete to 6" thick with Power Equipment	278	CY	$0.00	$117.31	$43.45	$160.76	$44,656
17020401	Dump Charges	417	EA	$22.48	$0.00	$0.00	$22.48	$9,367
17030220	910, 1.25 CY, Wheel Loader	12	HR	$0.00	$129.17	$55.42	$184.59	$2,215
17030284	8 CY, Dump Truck	31	HR	$0.00	$120.54	$81.22	$201.76	$6,255
						Subtotal Site Preparation:		**$66,106**
Excavation of Soil and Confirmation Samples								
33010101	Mobilize/DeMobilize Equipment	2.00	LS	0.00	2,279.91	1,334.25	3,614.16	$7,228
17020416	12 CY Dump Truck Haul/Hour	738	HR	$0.00	$120.54	$75.80	$196.34	$144,899
17030276	(Surrogate for vacuum excavation) Excavate and load, bank measure, medium material, 3/4 CY bucket,	130	BCY	$0.00	$5.39	$1.76	$7.15	$930
17030278	Excavate and load, bank measure, medium material, 3-1/2 CY bucket, hydraulic excavator	11,100	BCY	$0.00	$1.66	$1.33	$2.99	$33,189
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading and Compaction	12,400	CY	$13.83	$1.71	$1.48	$17.02	$211,048
17030902	Steel Sheeting, Install, Pull, and Salvage, to 20 ft	20,775	SF	$5.64	$6.68	$2.94	$15.26	$317,027
17031002	2" Diameter Contractor's Trash Pump, 75 GPM	9	DAY	$0.00	$0.00	$66.53	$66.53	$599
19040406	Wastewater holding tanks, above ground, steel, closed, stationary, monthly rental, 21,000 gal	1	MO	$1,975.98	$0.00	$0.00	$1,975.98	$1,976
18020332	8" Mesh Reinforced Slab on Grade	15,000	SF	$8.48	$4.98	$0.27	$13.73	$205,950
33260550	2" Polyethylene, flexible piping, SDR15,125 psi	100	LF	$2.10	$0.00	$0.00	$2.10	$210
33020303	Organic Vapor Analyzer Rental, per Day	10	DAY	$52.77	$0.00	$0.00	$52.77	$528
33020401	Disposable Materials per Sample	48	EA	$16.40	$0.00	$0.00	$16.40	$787
33021709	Testing, TAL metals (6010/7000s)	48	EA	$327.46	$0.00	$0.00	$327.46	$15,718
33021720	Testing, purgeable organics (624, 8260)	48	EA	$176.54	$0.00	$0.00	$176.54	$8,474
33021722	Polynuclear Aromatic Hydrocarbons (PAH) (SW 8310), w/prep, Soil analysis	48	EA	$293.84	$0.00	$0.00	$293.84	$14,104

TABLE C-6: COST DETAILS, ALTERNATIVE 3
Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
33021732	Testing, soil & sediment analysis, total petroleum hydrocarbons (TPH)	48	EA	$111.74	$0.00	$0.00	$111.74	$5,364
33021776	BTEX/MTBE/TVPH (EPA 8021B/8015B), Soil analysis	48	EA	$148.31	$0.00	$0.00	$148.31	$7,119
33170824	Operation of Steam Cleaner, Including Water, Soap, Electricity, Labor	95	HR	$0.00	$116.16	$0.00	$116.16	$11,035
33220112	Field Technician	600	HR	$0.00	$135.20	$0.00	$135.20	$81,120
						Subtotal Excavation:		**$1,067,304**
Off-site Transportation and Disposal								
33021705	Targeted TCLP (Metals, Volatiles, Semi-Volatiles only), Soil Analysis	4	EA	$859.84	$0.00	$0.00	$859.84	$3,439
	California WET analysis (assume same cost as targeted TCLP)	4	EA	$859.84	$0.00	$0.00	$859.84	$3,439
33190102	Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	14,000	CY	$1.96	$1.94	$0.63	$4.53	$63,420
33190205	Transport Bulk solid Hazardous Waste, Maximum 20 CY (per mile)	14,000	MI	$2.83	$0.00	$0.00	$2.83	$39,620
33190317	Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$733.07	$0.00	$0.00	$733.07	$733
33190807	32 Ft. Dump Truck, 6 Mil Liner, disposable	700	EA	$83.02	$0.00	$0.00	$83.02	$58,114
33197270	Landfill Nonhazardous Solid Bulk Waste by CY	14,000	CY	$156.18	$0.00	$0.00	$156.18	$2,186,520
					Subtotal Transportation and Disposal:			**$2,355,286**
				SUBTOTAL EXCAVATION AND DISPOSAL:				**$3,488,696**
Monitored Natural Attenuation								
Installation of Vapor Points								
33020303	Organic Vapor Analyzer Rental, per Day	1	DAY	$52.77	$0.00	$0.00	$52.77	$53
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	1	DAY	$39.63	$929.31	$0.00	$968.94	$969
33220112	Field Technician	16	HR	$0.00	$135.20	$0.00	$135.20	$2,163
33230201	2" PVC, Schedule 40, Well Screen	20	LF	$6.53	$7.75	$8.27	$22.55	$451
33230301	2" PVC, Well Plug	4	EA	$21.21	$23.24	$24.82	$69.27	$277
33231250	Sonic Drill 5"-6" OD borehole, boring depth <=100 feet, soil boring and continuous sampling, includes material, equipment, and labor	24	LF	$41.53	$0.00	$0.00	$41.53	$997
33231401	2" Screen, filter pack	28	LF	$14.45	$5.98	$6.39	$26.82	$751
33231811	2" Well, Portland Cement Grout	12	LF	$1.89	$0.00	$0.00	$1.89	$23
33232101	2" Well, Bentonite Seal	4	EA	$233.09	$154.50	$164.99	$552.58	$2,210
33232221	8" Well Finish, Cover, Flush w/Grade, Manhole, Lock Cap	4	EA	$91.02	$0.00	$0.00	$91.02	$364
33231182	DOT steel Drums, 55 gal., open 17C	3	EA	$181.87	$0.00	$0.00	$181.87	$546
33231261	Sonic Drill Rig - Mobilization/Demobilization	1	LS	$3,286.21	$0.00	$0.00	$3,286.21	$3,286
33231178	Move Rig/Equipment Around Site	3	EA	$145.01	$334.02	$195.48	$674.51	$2,024
33231504	Surface Pad, concrete, 2' x 2' x 4"	4	EA	$90.28	$25.97	$0.31	$116.56	$466
					Subtotal Installation of Vapor Points:			**$14,579**
Monitoring Events (Each Event)								
33020307	Soil Gas Investigation & Analysis, equipment rental	1.00	DAY	149.97	0.00	0.00	149.97	$150
33020345	Portable Air Sampler, Continuous Daily Rental	1.00	DAY	113.78	0.00	0.00	113.78	$114
33020401	Disposable Materials per Sample	4.00	EA	16.09	0.00	0.00	16.09	$64
33020620	Soil Gas Vapor Probe, Stainless Steel Manual, Nonremovable Tip	1.00	EA	531.64	0.00	0.00	531.64	$532
33021803	Testing, non-rad lab tests, tentative id of compounds, GC/MS 30/5040/8240	6.00	EA	93.49	0.00	0.00	93.49	$561

TABLE C-6: COST DETAILS, ALTERNATIVE 3

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
33021808	Testing, non-rad lab tests, semivolatiles 10/3550/8270	6.00	EA	678.97	0.00	0.00	678.97	$4,074
33010104	Sample Collection, vehicle mileage charge, car or van	20	MI	$0.58	$0.00	$0.00	$0.58	$12
33220102	Project Manager	4	HR	$0.00	$225.37	$0.00	$225.37	$901
33220105	Project Engineer	30	HR	$0.00	$200.64	$0.00	$200.64	$6,019
33220108	Project Scientist	180	HR	$0.00	$228.30	$0.00	$228.30	$41,094
33220109	Staff Scientist	80	HR	$0.00	$134.60	$0.00	$134.60	$10,768
33220112	Field Technician	40	HR	$0.00	$135.20	$0.00	$135.20	$5,408
							Subtotal Monitoring (per Event):	**$69,697**
							Subtotal Years 1 through 5 (6 Events):	**$418,180.74**
							SUBTOTAL MONITORED NATURAL ATTENUATION:	**$432,760**
Institutional Controls								
	Same as Alternative 2						**Subtotal (Base Year):**	**$302,741**
Annual Institutional Controls Review								
	Same as Alternative 2						**Subtotal - Each Review:**	**$10,028**
							Subtotal Years 1 through 30 (24 reviews):	**$240,681.36**
Five-Year Review								
	Same as Alternative 2						**Subtotal - Each Review:**	**$31,579**
							Subtotal Years 5 through 30 (6 reviews):	**$189,473.46**
							SUBTOTAL INSTITUTIONAL CONTROLS AND 5-YEAR REVIEWS:	**$732,896**
PROFESSIONAL LABOR MANAGEMENT [a]								
33220149	Lump Sum Percentage Labor	1	LS	$0.00	$840,786.09	$0.00	$840,786.09	$840,786
							SUBTOTAL PROFESSIONAL LABOR MANAGEMENT:	**$840,786**
REMEDIAL DESIGN								
						Total Capital	**%**	**Design**
						$3,503,275	30.00	$1,050,983
							SUBTOTAL DESIGN:	**$1,050,983**
SUMMARY								
							Base Costs:	$5,837,179
							O&M:	$708,942
							TOTAL ALTERNATIVE 3:	**$6,546,121**

Note:

All unit costs are from the RACER 10.4 2011 database - adjusted for 2013 by escalation factor (see Table C-3).

[a] Costs for professional labor management were generated by RACER based on 24% of construction costs.

TABLE C-7: COST DETAILS, ALTERNATIVE 4

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Project: **Mare Island, IR17 and Building 503 Area**
Alternative 4: Excavation and Off-site Disposal and Monitored Natural Attenuation (Future Unrestricted Reuse)

Prepared by: D. MacMillan **Date:** 5/21/13 **Checked by:** **Date:**

RACER Database: System Costs
Cost Database Date: 2011

Assumed Start Date *May-13*
Location Modifier *1.275* (Vallejo, California)

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
EXCAVATION AND DISPOSAL								
Site Preparation								
33010101	Mobilize/DeMobilize Equipment	1.00	LS	0.00	2,279.91	1,334.25	3,614.16	$3,614
17010101	Selective clearing, brush, light clearing, with dozer and brush rake, excludes removal offsite	1.00	ACR	$0.00	$159.45	$154.60	$314.05	$314
17010501	Grub and stack, 140 HP dozer	1,000	CY	$0.00	$4.96	$2.95	$7.91	$7,910
17020209	Demolish Rod Reinforced Concrete to 6" thick with Power Equipment	278	CY	$0.00	$117.31	$43.45	$160.76	$44,656
17020401	Dump Charges	420	EA	$22.48	$0.00	$0.00	$22.48	$9,442
17030220	910, 1.25 CY, Wheel Loader	16	HR	$0.00	$99.97	$43.18	$143.15	$2,290
17030284	8 CY, Dump Truck	33	HR	$0.00	$120.54	$81.22	$201.76	$6,658
						Subtotal Site Preparation:		**$74,884**
Excavation of Soil and Confirmation Samples								
33010101	Mobilize/DeMobilize Equipment	4.00	LS	0.00	2,279.91	1,334.25	3,614.16	$14,457
17020416	12 CY Dump Truck Haul/Hour	1,522	HR	$0.00	$120.54	$75.80	$196.34	$298,829
17030276	(Surrogate for vacuum excavation) Excavate and load, bank measure, medium material, 3/4 CY bucket,	5,300	BCY	$0.00	$5.39	$1.76	$7.15	$37,895
17030278	Excavate and load, bank measure, medium material, 3-1/2 CY bucket, hydraulic excavator	11,100	BCY	$0.00	$1.66	$1.33	$2.99	$33,189
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading and Compaction	12,400	CY	$13.83	$1.71	$1.48	$17.02	$211,048
17030902	Steel Sheeting, Install, Pull, and Salvage, to 20 ft	20,775	SF	$5.64	$6.68	$2.94	$15.26	$317,027
17031002	2" Diameter Contractor's Trash Pump, 75 GPM	9	DAY	$0.00	$0.00	$66.53	$66.53	$599
19040406	Wastewater holding tanks, above ground, steel, closed, stationary, monthly rental, 21,000 gal	1	MO	$1,975.98	$0.00	$0.00	$1,975.98	$1,976
18020332	8" Mesh Reinforced Slab on Grade	15,000	SF	$8.48	$4.98	$0.27	$13.73	$205,950
33260550	2" Polyethylene, flexible piping, SDR15,125 psi	100	LF	$2.10	$0.00	$0.00	$2.10	$210
17030278	Excavate and load, bank measure, medium material, 3-1/2 CY bucket, hydraulic excavator	7,350	BCY	$0.00	$1.33	$1.66	$2.99	$21,977
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading and Compaction	16,445	CY	$13.83	$1.71	$1.48	$17.02	$279,894
17030901	Steel Sheeting, Install, Pull, and Salvage, to 15 ft	15,682	SF	$4.65	$6.01	$2.65	$13.31	$208,727
18050416	Seeding, Vegetative Cover, Per Square Yard (SY)	43,560	SF	$1.15	$1.60	$0.27	$3.02	$131,551
33020303	Organic Vapor Analyzer Rental, per Day	25	DAY	$52.77	$0.00	$0.00	$52.77	$1,319
33020401	Disposable Materials per Sample	140	EA	$16.40	$0.00	$0.00	$16.40	$2,296
33021709	Testing, TAL metals (6010/7000s)	140	EA	$327.46	$0.00	$0.00	$327.46	$45,844
33021720	Testing, purgeable organics (624, 8260)	140	EA	$176.54	$0.00	$0.00	$176.54	$24,716

TABLE C-7: COST DETAILS, ALTERNATIVE 4
Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
33021732	Testing, soil & sediment analysis, total petroleum hydrocarbons (TPH)	140	EA	$111.74	$0.00	$0.00	$111.74	$15,644
33021776	BTEX/MTBE/TVPH (EPA 8021B/8015B), Soil analysis	140	EA	$148.31	$0.00	$0.00	$148.31	$20,763
33170824	Operation of Steam Cleaner, Including Water, Soap, Electricity, Labor	100	HR	$0.00	$116.16	$0.00	$116.16	$11,616
33220112	Field Technician	1,200	HR	$0.00	$135.20	$0.00	$135.20	$162,240
						Subtotal Excavation:		**$2,047,767**
Off-site Transportation and Disposal								
33021705	Targeted TCLP (Metals, Volatiles, Semi-Volatiles only), Soil Analysis	10	EA	$859.84	$0.00	$0.00	$859.84	$8,598
	California WET analysis (assume same cost as targeted TCLP)	10	EA	$859.84	$0.00	$0.00	$859.84	$8,598
33190102	Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	30,000	CY	$1.96	$1.94	$0.63	$4.53	$135,900
33190205	Transport Bulk solid Hazardous Waste, Maximum 20 CY (per mile)	30,000	MI	$2.83	$0.00	$0.00	$2.83	$84,900
33190317	Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$733.07	$0.00	$0.00	$733.07	$733
33190807	32 Ft. Dump Truck, 6 Mil Liner, disposable	1,400	EA	$83.02	$0.00	$0.00	$83.02	$116,228
33197270	Landfill Nonhazardous Solid Bulk Waste by CY	30,000	CY	$156.18	$0.00	$0.00	$156.18	$4,685,400
					Subtotal Transportation and Disposal:			**$5,040,358**
					SUBTOTAL EXCAVATION AND DISPOSAL:			**$7,163,009**
Monitored Natural Attenuation								
Installation of Vapor Points								
33020303	Organic Vapor Analyzer Rental, per Day	2	DAY	$52.77	$0.00	$0.00	$52.77	$106
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	2	DAY	$39.63	$929.31	$0.00	$968.94	$1,938
33220112	Field Technician	32	HR	$0.00	$135.20	$0.00	$135.20	$4,326
33230201	2" PVC, Schedule 40, Well Screen	60	LF	$6.53	$7.75	$8.27	$22.55	$1,353
33230301	2" PVC, Well Plug	12	EA	$21.21	$23.24	$24.82	$69.27	$831
33231250	Sonic Drill 5"-6" OD borehole, boring depth <=100 feet, soil boring and continuous sampling, includes material, equipment, and labor	72	LF	$41.53	$0.00	$0.00	$41.53	$2,990
33231401	2" Screen, filter pack	84	LF	$14.45	$5.98	$6.39	$26.82	$2,253
33231811	2" Well, Portland Cement Grout	36	LF	$1.89	$0.00	$0.00	$1.89	$68
33232101	2" Well, Bentonite Seal	12	EA	$233.09	$154.50	$164.99	$552.58	$6,631
33232221	8" Well Finish, Cover, Flush w/Grade, Manhole, Lock Cap	12	EA	$91.02	$0.00	$0.00	$91.02	$1,092
33231182	DOT steel Drums, 55 gal., open 17C	9	EA	$181.87	$0.00	$0.00	$181.87	$1,637
33231261	Sonic Drill Rig - Mobilization/Demobilization	1	LS	$3,286.21	$0.00	$0.00	$3,286.21	$3,286
33231178	Move Rig/Equipment Around Site	11	EA	$145.01	$334.02	$195.48	$674.51	$7,420
33231504	Surface Pad, concrete, 2' x 2' x 4"	12	EA	$90.28	$25.97	$0.31	$116.56	$1,399
					Subtotal Installation of Vapor Points:			**$35,330**
Monitoring Events (Each Event)								
33020306	Monitoring Gas Vents	12	EA	$25.79	$0.00	$0.00	$25.79	$309
33020605	Screw augers, hand auger rental	1	DAY	$53.50	$0.00	$0.00	$53.50	$54
33021720	Testing, purgeable organics (624, 8260)	7	EA	$160.49	$0.00	$0.00	$160.49	$1,123
33021744	Testing, soil & sediment analysis, pH, electrometric (9045)	7	EA	$18.27	$0.00	$0.00	$18.27	$128
33021746	Testing, soil & sediment analysis, total organic carbon (16.3)	7	EA	$57.36	$0.00	$0.00	$57.36	$402
33021754	Testing, soil & sediment analysis, chloride, titrimetric (9252)	7	EA	$36.12	$0.00	$0.00	$36.12	$253

TABLE C-7: COST DETAILS, ALTERNATIVE 4

Feasibility Study Addendum for the IR17 and Building 503 Area, Mare Island Naval Shipyard, Vallejo, California

Assembly	Description	Quantity	Unit	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Total Loaded Unit Cost	Extended Cost
33021807	Testing, non-rad lab tests, BTEX/total volatile petro hydrocarbons 5040/8020/8015	14	EA	$134.83	$0.00	$0.00	$134.83	$1,888
33010104	Sample Collection, vehicle mileage charge, car or van	40	MI	$0.58	$0.00	$0.00	$0.58	$23
33220102	Project Manager	8	HR	$0.00	$225.37	$0.00	$225.37	$1,803
33220105	Project Engineer	60	HR	$0.00	$200.64	$0.00	$200.64	$12,038
33220108	Project Scientist	240	HR	$0.00	$228.30	$0.00	$228.30	$54,792
33220109	Staff Scientist	120	HR	$0.00	$134.60	$0.00	$134.60	$16,152
33220112	Field Technician	80	HR	$0.00	$135.20	$0.00	$135.20	$10,816
						Subtotal Monitoring (per Event):		**$99,781**
						Subtotal Years 1 through 10 (7 Events):		**$698,465.88**
						SUBTOTAL MONITORED NATURAL ATTENUATION:		**$733,796**
Temporary Institutional Controls								
	Same as Alternative 2 (assume same level of effort for temporary ICs)					**Subtotal (Base Year):**		**$302,741**
Annual Institutional Controls Review								
	Same as Alternative 2					**Subtotal - Each Review:**		**$10,028**
						Subtotal Years 1 through 30 (24 reviews):		**$240,681.36**
Five-Year Review								
	Same as Alternative 2					**Subtotal - Each Review:**		**$31,579**
						Subtotal Years 5 through 30 (6 reviews):		**$189,473.46**
						SUBTOTAL INSTITUTIONAL CONTROLS AND 5-YEAR REVIEWS:		**$732,896**
PROFESSIONAL LABOR MANAGEMENT [a]								
33220149	Lump Sum Percentage Labor	1	LS	$0.00	$1,410,874.33	$0.00	$1,410,874.33	$1,410,874
						SUBTOTAL PROFESSIONAL LABOR MANAGEMENT:		**$1,410,874**

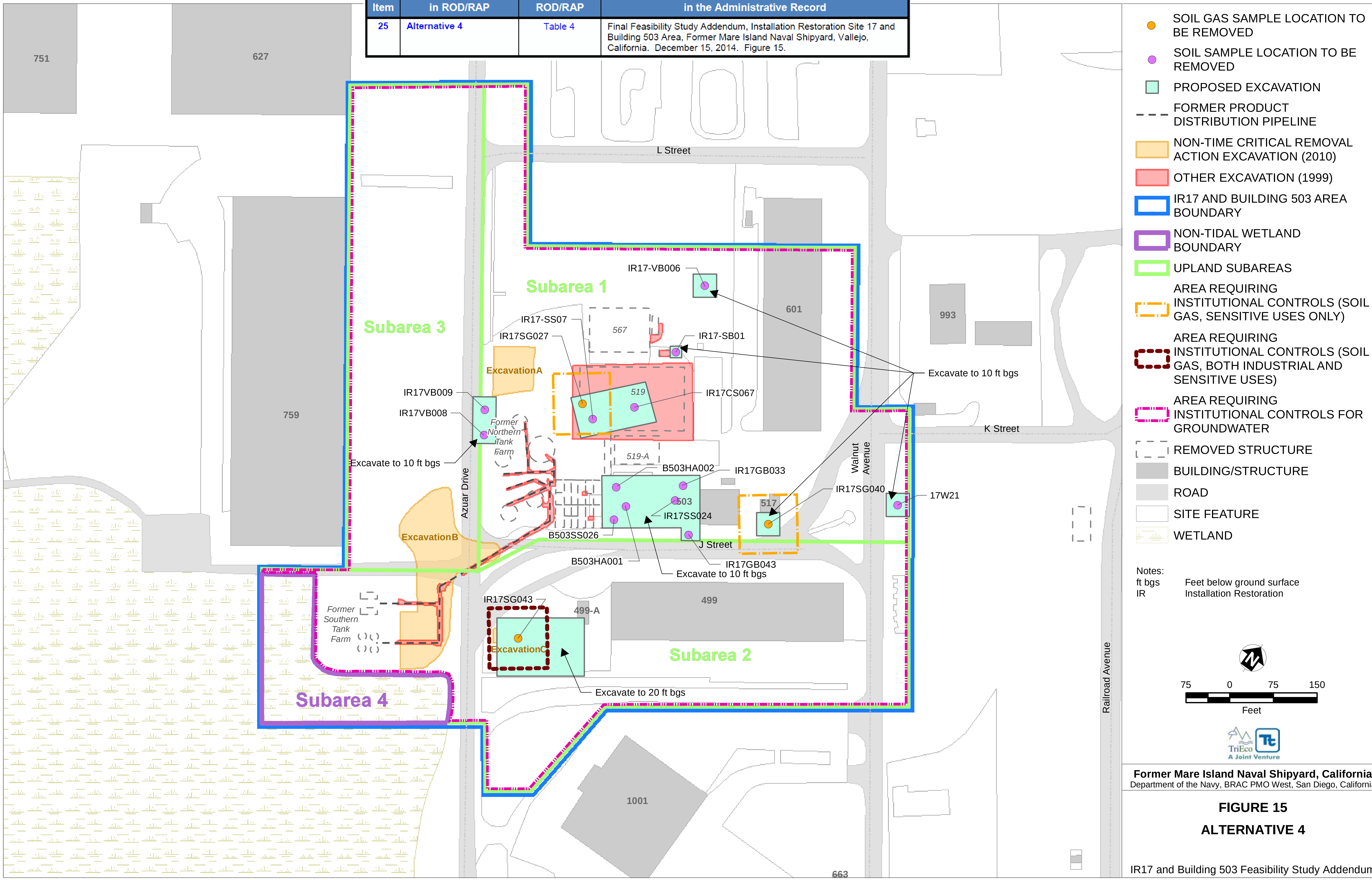
REMEDIAL DESIGN			
	Total Capital	**%**	**Design**
	$7,198,338	20.00	$1,439,668
		SUBTOTAL DESIGN:	**$1,439,668**
SUMMARY			
		Base Costs:	$10,551,183
		O&M:	$929,059
		TOTAL ALTERNATIVE 4:	**$11,480,242**

Note:

All unit costs are from the RACER 10.4 2011 database - adjusted for 2013 by escalation factor (see Table C-4).

[a] Costs for professional labor management were generated by RACER based on 19.6% of construction costs.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
25	Alternative 4	Table 4	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard, Vallejo, California. December 15, 2014. Figure 15.



Former Mare Island Naval Shipyard, California
Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 15
ALTERNATIVE 4

IR17 and Building 503 Feasibility Study Addendum

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Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
26	nine evaluation criteria	Section 2.9.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard Vallejo, California, December 15, 2014. Sections 6.0 and 6.1.

workers to contamination in soil gas until the RAOs are met. The lateral extents of the excavations were based on ASG or passive soil gas samples with concentrations of COCs below the remediation goals. The lateral extents of the excavations may be refined in the RD based on additional soil or soil gas samples collected before excavation. The depths of the excavations were estimated based on the concentrations of the COCs in soil samples, the nature and extent of the contaminant, and professional judgment to select the depth of the source of soil gas contamination. Approximately 1,000 cubic yards of soil would be excavated in Subarea 1 near sample locations IR17SG027 and IR17SG040 with a target depth of 10 feet bgs. Approximately 11,100 cubic yards of soil would be excavated in Subarea 2 around sample location IR17SG043 with a target depth of 20 feet bgs to expedite MNA of COCs in soil gas. ASG points would be installed around each excavation location after excavation is complete and the soil gas would be monitored semiannually for the first year, annually for the second through fifth years, and once every 5 years thereafter. It is assumed that concentrations of contaminants in soil gas will meet or approach remediation goals within 10 years. Additional assumptions made for the purposes of cost estimating are included in Appendix C.

6.0 DETAILED AND COMPARATIVE ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

This section provides a detailed analysis of each remedial action alternative developed in Section 5.0, followed by a comparative analysis. This information would be used to help select a preferred alternative for the IR17 and Building 503 Area. The alternatives are evaluated using criteria based on statutory requirements of CERCLA, as amended by the Superfund Amendments and Reauthorization Act, § 121; the NCP; and "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (EPA 1988).

The NCP specifies nine criteria to be used in the detailed analysis. The first two criteria are thresholds that must be satisfied for a remedy to be eligible for selection; the next five balancing criteria are used to evaluate the comparative advantages and disadvantages of the remedial alternatives; and the final two criteria are modifying, generally considered after regulatory agency and public comments are received on the PP/draft RAP. Each of the nine criteria is described in Section 6.1 below. As part of the Navy's emphasis on GSR, the sustainability of each alternative is also evaluated under the short-term effectiveness criterion.

6.1 EVALUATION CRITERIA

The evaluation criteria of effectiveness (in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness), implementability, and cost are described in the following sections.

6.1.1 Overall Protection of Human Health and the Environment

This criterion assesses whether a remedial action alternative adequately protects human health and the environment. The overall assessment of protection draws on evaluations of long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. Protectiveness focuses on how risks are reduced, eliminated, or controlled by each alternative. Risk reductions are associated with the effectiveness of an alternative in meeting the RAOs. This criterion is considered a threshold that the selected alternative must meet.

6.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

This criterion is used to evaluate whether each remedial action alternative meets identified federal and state ARARs (chemical-specific, location-specific, and action-specific), or whether justification exists for waiving one or more ARARs. This criterion is also a threshold that the selected alternative must meet unless an ARAR is waived. Section 4.2 and Appendix B identify potential ARARs for the IR17 and Building 503 Area.

6.1.3 Long-Term Effectiveness and Permanence

Each remedial action alternative is evaluated in terms of risk that would remain at the site after the RAOs have been met. The primary focus of this evaluation is the effectiveness of controls used to manage the risk posed by residual or untreated COCs. The following criteria are considered:

- Adequacy of mitigative controls
- Reliability of mitigative controls
- Magnitude of residual risk

6.1.4 Reduction in Toxicity, Mobility, and Volume through Treatment

This evaluation criterion addresses the statutory preference for treatment options that permanently and significantly reduce toxicity, mobility, or volume of the COCs. This preference is satisfied when treatment reduces the principal threats through the following:

- Destruction of contaminants
- Reduction in contaminant mobility
- Reduction of the total mass of contaminants
- Reduction of total volume of contaminated media

6.1.5 Short-Term Effectiveness

This evaluation criterion addresses the effects of the remedial action alternative during the construction and implementation phase until the RAOs are met. The following factors are considered:

- Potential exposure of the community during implementation
- Potential exposure of the workers during construction
- Potential environmental impacts
- Time required to achieve RAOs

In addition to these factors, the sustainability metrics of the remedial alternatives are evaluated. Metrics discussed in the NAVFAC GSR Fact Sheet (www.ert2.org/t2gsrportal) include:

- Energy consumption
- Greenhouse gas (GHG) emissions
- Air emissions of criteria pollutants
- Water impacts
- Ecological impacts
- Resource consumption (such as landfill space or volume of top soil used for backfill)
- Worker safety
- Community impacts

These metrics are described in more detail in Appendix D. The sustainability of the remedial alternatives was evaluated using the SiteWise™ program, which was developed jointly by the Navy, U.S. Army Corps of Engineers, and Battelle. While many of the GSR metrics may impact other NCP criteria, such as long-term effectiveness or community acceptance, the evaluation of GSR is summarized under the short-term effectiveness criterion to provide a concise evaluation of the sustainability of the remedial alternatives.

6.1.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing a remedial action alternative and the availability of various services and materials required during its implementation. The following factors are considered:

- Ability to construct the technology
- Reliability of the technology
- Monitoring considerations
- Availability of equipment and specialists

6.1.7 Costs

The cost estimate for each remedial action alternative is based on estimates of capital and operation and maintenance (O&M) costs. Capital costs consist of direct and indirect costs. Direct costs include the purchase of equipment, labor, and materials necessary to implement the alternative. Indirect costs include engineering, financial, and other services, such as testing and monitoring. Annual O&M costs for each alternative include maintenance materials, labor, and auxiliary materials, as well as operating costs.

The cost estimates for the remedial action alternatives are generally based on unit costs of implementing the technology options and remedial action alternatives at other sites published in the Remedial Action Cost Engineering and Requirements (RACER™) System model (AECOM 2010). The costs presented in this FS addendum have been developed using site-specific quantities and information for the IR17 and Building 503 Area.

A present value analysis of each alternative is presented in Appendix C. The present value analysis is a method to evaluate expenditures, either capital or O&M costs, that occur over different periods extending into the future. Real discount rates were used in the present value analysis because Mare Island is a federal facility. The real discount rates used for this project are from Appendix C of the Office of Management and Budget Circular A-94 (Office of Management and Budget 2012).

Accuracy of cost estimates for each alternative is intended to be within the range of 50 percent above and 30 percent below actual costs (EPA 2000a). The level of detail employed in developing these estimates is considered appropriate for making choices among alternatives, but the cost estimates are not intended for use in detailed budgetary planning. Costs for each alternative are compiled in Appendix C.

6.1.8 State Acceptance

The state's concerns regarding the proposed remedial action alternatives may not be assessed until comments on the FS addendum are received, but may be discussed to the extent possible in the PP/draft RAP issued for public comment [40 CFR 300.430(e)(iii)(H)]. The state's concerns that would be assessed include the following:

- The state's position and key technical and administrative concerns related to each remedial action alternative, and

- State comments on ARARs.

6.1.9 Community Acceptance

This assessment involves identifying community support for, reservations about, or opposition to various components of each remedial action alternative. This assessment may not be completed until comments on the PP/draft RAP and draft ROD/RAP are received [40 CFR 300.430(e)(iii)(I)].

6.2 INDIVIDUAL ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

This section evaluates each remedial alternative in comparison with the two threshold and five balancing NCP evaluation criteria. The remaining two modifying criteria of state and community acceptance will be evaluated later. State acceptance of the FS addendum will be considered and incorporated into the PP/draft RAP and final ROD/RAP. Community acceptance will be evaluated after the public comment period on the PP/draft RAP and will be documented in the ROD/RAP. Table 8 provides a summary of each alternative's rating under the seven evaluation criteria, and Table 9 presents the cost summary for each alternative. The ranking categories used in Table 8 and in the discussion of the alternatives are: (1) "protective" or "not protective", and "meets ARARs," "does not meet ARARs," or "not applicable" for the two threshold criteria; and (2) "excellent," "very good," "good," or "poor" for the five balancing criteria.

Four alternatives are being evaluated for the remedial action at the IR17 and Building 503 Area based on the RAOs, GRAs, and technology process option screening presented in Section 4.0, and the remedial action alternatives developed in Section 5.0.

- Alternative 1: No Action
- Alternative 2: ICs
- Alternative 3: Excavation and Off-site Disposal, MNA, and ICs
- Alternative 4: Excavation and Off-site Disposal and MNA (Future Unrestricted Reuse)

A detailed evaluation of each remedial action alternative is provided below. A comparative analysis of the remedial alternatives is provided in Section 6.3.

6.2.1 Alternative 1: No Action

The no-action alternative provides a baseline that can be compared with other alternatives. Under this alternative, no action would be taken to reduce the potential risk from COCs in soil and soil gas or prohibit the use of groundwater. No LUCs, containment, removal, or treatment would be implemented. Table 8 summarizes the analysis of Alternative 1 relative to the evaluation criteria.

Item	Reference or Phrase in ROD/RAP	Location in ROD/RAP	Identification of Referenced Document in the Administrative Record
27	Alternative 3	Section 2.10.2	Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area Former Mare Island Naval Shipyard Vallejo, California. December 15, 2014. Section 5.3.

within a portion of Subarea 2 and mitigation of the potential VI risk to future industrial workers if necessary;

(4) Prohibit the use of the groundwater in Subareas 1, 2 and 3 as a source of drinking water, and prohibit other uses of groundwater unless authorized by the Navy, DTSC, and the Water Board; and

(5) Notify future construction workers to implement practices to limit exposure to groundwater when excavating into saturated soil.

The proposed boundaries for the ICs are shown on Figure 13.

Surface soil samples from two Subarea 1 sample locations (B503HA002 and B503SS026) contain concentrations of lead above the remediation goal; both locations are under existing Building 503. Under this alternative, ICs would be implemented to limit exposure of future commercial/industrial workers to lead under Building 503 if the building is demolished and if new construction is conducted in the area (industrial soil IC on Figure 13).

COCs in soil and soil gas at Subarea 1 and TCE in soil gas at Subarea 2 pose a potential risk to hypothetical sensitive users. Under this alternative, hypothetical sensitive use of Subareas 1 and 2 would be prohibited with ICs (residential IC on Figure 13).

Concentrations of TCE in soil gas sample IR17SG043, located in Subarea 2, pose a potential risk to future commercial/industrial workers through VI in future buildings. An IC would require an assessment of potential VI risk prior to the construction of new industrial buildings in Subarea 2 within 100 feet of COCs in soil gas exceeding the remediation goals (industrial soil gas IC near IR17SG043 on Figure 13). If necessary, ECs, vapor mitigation systems, or other measures would be adopted by the landowner, to mitigate the potential risk in new buildings. The costs to mitigate potential VI risks in new buildings are not included in the cost estimate for this alternative.

The ICs would remain in place until it is demonstrated that the risk they were designed to protect against has been reduced to a level such that the IC was no longer required. The effectiveness of the ICs would be monitored annually and evaluated during the 5-year remedy review.

5.3 ALTERNATIVE 3: EXCAVATION AND OFF-SITE DISPOSAL, MONITORED NATURAL ATTENUATION, AND INSTITUTIONAL CONTROLS

Alternative 3 uses excavation and off-site disposal, MNA, and ICs to meet the RAOs. This alternative includes the following components:

- Excavation of surface soil at Subarea 1 containing concentrations of lead that exceed the remediation goal for future commercial/industrial workers;

- Excavation of soil that is the source of soil gas contamination at Subarea 2 (around soil gas sample IR17SG043), that poses a potential risk to future commercial/industrial workers;

- MNA of soil gas at Subarea 2 until chlorinated VOC concentrations are reduced to or approach remediation goals protective of future commercial/industrial workers through natural attenuation processes (such as biodegradation, sorption, dispersion, and volatilization);

- ICs to protect future commercial/industrial workers until remediation goals have been met through MNA of soil gas;

- ICs to prohibit use of groundwater for drinking water purposes and prohibit other uses of groundwater without proper authorization at Subareas 1, 2 and 3;

- ICs to prohibit sensitive reuses of Subareas 1 and 2;

- ICs to notify future construction workers to implement practices to limit exposure to groundwater when excavating into saturated soil; and

- Monitor the ICs to ensure the protectiveness of the remedy.

Surface soil underneath the south end of Building 503 contains concentrations of lead that pose a risk to future commercial/industrial workers. Building 503 is constructed on piers and is several feet above the ground surface. Under this alternative, soil near sample locations B503SS026 and B503HA002 would be excavated (see Figure 14). The soil would be excavated to 0.5 foot bgs to correspond with the anticipated exposure of future commercial/industrial workers to lead in surface soil (see Section 3.1). It is assumed that confirmation samples will be collected from the bottom of the excavation; however, these samples would be collected for informational purposes only to characterize the soil beneath the excavation, and it is assumed that the excavation would not extend below 0.5 foot. The lateral extent of the excavation was estimated based on the location of clean soil samples and professional judgment based on an assessment of the mobility, location, and anticipated release mechanism of the contaminant. The extent of the excavation would be defined in the RD (additional soil samples may be collected as part of the RD before excavation begins) and may be refined during excavation by collecting confirmation samples from the excavation sidewalls to determine whether the excavation removed lead above the remediation goals. Then the excavation would be expanded laterally and the confirmation sampling process would be repeated as necessary. It is assumed that the excavation area around sample locations B503SS026 and B503HA002 would be approximately 7,200 square feet, bounded by sampling locations IR17SS024, IR17-MW04, 17W09, IR17CS095, and IR17CS094, which contain concentrations of lead below the remediation goal.

It is assumed that the surface soil would be removed from under and around the building using vacuum excavation and that Building 503 would not need to be demolished. Vacuum excavation is commonly used to pothole around utilities or excavate in locations that cannot be accessed with conventional equipment. Soil is removed by suction through a pipe and contained in a spoil tank. Approximately 130 in place cubic yards of soil would be removed. Excavated soil would be disposed of at an off-site, appropriately licensed disposal facility and the excavations would be backfilled with clean soil from an off-site borrow source.

Contamination in soil gas posing a potential risk to future commercial/industrial workers at Subarea 2 would be addressed by excavation and off-site disposal of the source areas of VOC contamination in soil; followed by MNA until concentrations are reduced to or approach remediation goals through natural attenuation processes (chlorinated volatile organic compound [CVOC] excavation near IR17SG043 on Figure 14). Sampling location IR17SG043 is located between the two areas that were excavated as part of the NTCRA (Excavation C on Figure 14). The estimated lateral extent of the excavation was based on passive soil gas samples collected before the NTCRA. The vertical extent of the excavation was assumed to be 20 feet bgs to remove the impacted soil driving the VI risk. The actual extent of the excavation may be refined in the RD by collecting additional soil or soil gas samples before excavation begins. It is assumed that approximately 11,100 in place cubic yards would be excavated to remove the source and allow attenuation of remaining contaminants in soil gas. The soil would be excavated using conventional methods and transported off site to an appropriately licensed disposal facility. The excavation would be backfilled with clean soil from an off-site borrow source. Confirmation samples would be collected from the sidewalls and bottom of the excavation. The excavation area may be expanded if the results of the confirmation samples indicate that significant TCE concentrations remain in the soil.

ASG points would be installed around the excavated area after excavation is complete, and soil gas would be monitored semiannually for the first year and annually thereafter until remediation goals are met. It is assumed that concentrations of TCE in soil gas would reach or approach the remediation goal after excavation of the source material and 5 years of MNA. Additional assumptions made for the purposes of cost estimating are included in Appendix C.

ICs may be implemented to prevent exposure of future commercial/industrial workers to contamination in soil gas until the RAOs are met, and prohibit the use of the groundwater unless authorized by the Navy, DTSC, and the Water Board. ICs would remain in place until it is demonstrated that the risk they were designed to protect against had been reduced to a level such that the IC was no longer required. The effectiveness of the ICs would be monitored annually and evaluated during the 5-year remedy review.

5.4 ALTERNATIVE 4: EXCAVATION AND OFF-SITE DISPOSAL AND MONITORED NATURAL ATTENUATION (FUTURE UNRESTRICTED REUSE)

Alternative 4 includes excavation and off-site disposal and MNA of COCs in soil and soil gas that pose a potential risk to future commercial/industrial workers and hypothetical sensitive users. Alternative 4 includes the following components:

ATTACHMENT C
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

TABLE C-1: FEDERAL AND STATE CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Requirement	Prerequisite	Citation	ARAR Determination	Comments
SOIL AND WASTE				
Federal				
Resource Conservation and Recovery Act (Title 42 U.S.C. Chapter 82, §§ 6901-6991[i])[a]				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	Cal. Code Regs. tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	These regulations are applicable to activities that generate waste for off-site disposal. The Navy will generate waste in implementing the selected remedy. The Navy will determine whether the waste meets the definition of RCRA hazardous waste when it is generated.
Toxic Substances Control Act (Title 15 U.S.C. Chapter 53, §§ 2601-2692)[a]				
Regulates storage and disposal of PCB remediation waste. There are three options: (a) self-implementing on-site cleanup and disposal; (b) performance-based disposal using existing approved disposal technologies; and (c) risk-based disposal.	Soil, debris, sludge, or dredged materials contaminated with PCBs at concentrations greater than 50 mg/kg.	40 CFR § 761.61(a)(4)(i)	Relevant and appropriate	The Navy has identified TSCA as an ARAR for Subarea 1. TSCA is applicable to waste contaminated with PCBs at concentrations of 50 mg/kg or greater. Concentrations of PCBs at Subarea 1 are not 50 mg/kg or greater; therefore, TSCA is not an applicable ARAR. The Navy has identified TSCA as a relevant and appropriate ARAR. Specifically, the Navy has identified the TSCA self-implementing cleanup goal for high occupancy areas and has used that goal as the basis for the remediation goal for PCBs at Subarea 1.

Requirement	Prerequisite	Citation	ARAR Determination	Comments
State				
Department of Toxic Substances Control[a]				
Definition of non-RCRA hazardous waste	Waste	Cal. Code Regs. tit. 22, § 66261.22(a)(3) and (4), 66261.24(a)(2)-(a)(8), 66261.101, 66261.3(a)(2)(C) 66261.3(a)(2)(F)	Applicable	These regulations are applicable to activities that generate waste. The Navy will generate waste in implementing the selected remedy. The Navy will determine whether the waste meets the definition of state regulated non-RCRA hazardous waste when it is generated.
State and Regional Water Quality Control Boards[a]				
Definitions of designated waste, nonhazardous solid waste, and inert waste	Waste	Cal. Code Regs. Tit., 27, §§ 20210 and 20220	Applicable	These regulations are applicable to activities that generate waste. The Navy will generate waste in implementing the selected remedy. The Navy will determine whether the waste meets the definition of designated or nonhazardous solid waste when it is generated.

Requirement	Prerequisite	Citation	ARAR Determination	Comments
GROUNDWATER				
Federal				
No federal ARARs for groundwater were identified.				
State				
State and Regional Water Quality Control Boards[a]				
Describes the water basins in the San Francisco Bay region, establishes beneficial uses of groundwater and surface water, establishes WQOs, including narrative and numerical standards, establishes implementation plans to meet WQOs and protect beneficial uses, and incorporates statewide water quality controls plans and policies.	Waters of the State	Comprehensive Water Quality Control Plan for the San Francisco Region (Basin Plan) Chapter 2 and Narrative Toxicity Objective, (California Water Code § 13000 *et seq.* and § 13240, *et seq.*)	Applicable	The Navy accepts the substantive requirements of Chapter 2 of the Basin Plan as ARARs for the groundwater at the IR17 and Building 503 Area. The groundwater is identified as a potential source of drinking water in Chapter 2; however, naturally occurring poor groundwater quality make it unlikely to be used as a source of drinking water. The Water Board concurred with the Navy's determination that shallow groundwater meets an exception to SWRCB Resolution 88-63 (Sources of Drinking Water Policy).

Requirement	Prerequisite	Citation	ARAR Determination	Comments
Establishes the policy that high-quality waters of the state "shall be maintained to the maximum extent possible" consistent with the "maximum benefit to the people of the State." It provides that whenever the existing quality of water is better than that required by applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge.	Waters of the State	Statement of policy with respect to maintaining high quality of waters in California, SWRCB Res. 68-16	Navy and State disagree on whether SWRCB Resolution 68-16 is a potential ARAR	The preferred remedial alternative does not involve discharges to land, surface water, or groundwater. The remedial alternative consists of a combination of remedies for Subareas 1 and 2. These include: excavation of soil for off-site disposal, soil gas monitoring, and institutional controls (restriction of soil disturbance, evaluation and mitigation [if needed] for potential vapor intrusion, prohibition of residential and sensitive use, and prohibition of well installation. On May 15, 2014, the RWQCB concurred with the Navy's determination that shallow groundwater between 3 and 15 feet below ground surface at the IR17 site meets an exception to the Source of Drinking Water Policy as TDS in the shallow groundwater is greater than 3,000 ppm.

TABLE C-1: FEDERAL AND STATE CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)

Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Requirement	Prerequisite	Citation	ARAR Determination	Comments
Incorporated into all regional board basin plans. Designates all groundwater and surface water in the state as existing or potential sources of drinking water except where concentrations of TDS exceed 3,000 mg/L, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonable be treated for domestic use using either best management practices or best economically achievable treatment practices.	Waters of the State	SWRCB Resolution 88-63 (Sources of Drinking Water Policy)	Applicable	On May 15, 2014, the RWQCB concurred with the Navy's determination that shallow groundwater between 3 and 15 feet below ground surface at the IR17 site meets an exception to the Source of Drinking Water Policy as TDS in the shallow groundwater is greater than 3,000 ppm.
Describes requirements for RWQCB oversight of investigation and cleanup and abatement activities resulting from discharges of hazardous substances. RWQCB may decide on cleanup and abatement goals and objectives for the protection of water quality and beneficial uses of water within each region. Establishes criteria for "containment zones" where cleanup to established water-quality goals is not economically or technically practicable.	Discharge	Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304, SWRCB Res. 92-49	Navy and State disagree on whether California Water Code § 13304 and Resolution 92-49 is a potential ARAR	The preferred remedial alternative does not involve containment zones or discharges to land, surface water, or groundwater.

TABLE C-1: FEDERAL AND STATE CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)

Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Notes:

a Statutes and policies, and their citations, and state agencies are provided as headings to identify general categories of ARARs for the convenience of the reader. Listing the statutes, policies, and state agencies does not indicate that the Navy accepts the entire statutes or policies as ARARs. Specific ARARs are addressed in the table below each general heading and only the substantive requirements of the specific citations are considered ARARs.

§	Section	RCRA	Resource Conservation and Recovery Act
§§	Sections	PCB	Polychlorinated biphenyls
ARAR	Applicable or relevant and appropriate requirement	SWRCB	State Water Resources Control Board
Cal. Code Regs.	California Code of Regulations	TSCA	Toxic Substances Control Act
CFR	Code of Federal Regulations	TCLP	Toxicity characteristic leaching procedure
gpd	Gallons per day	TDS	Total dissolved solids
mg/kg	Milligrams per kilogram	tit	Title
mg/L	Milligrams per liter	U.S.C.	United States Code
MUN	Municipal and domestic water supply	WQO	Water quality objective

TABLE C-2: FEDERAL AND STATE LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
FLOODPLAIN RESOURCES					
Federal					
Executive Order Number 11988, Floodplain Management[a]					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values.	Action that will occur in a floodplain (such as lowland) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	Executive Order 11988	Relevant and appropriate	The selected remedy includes excavating soil for off-site disposal and temporarily storing the soil in a staging pile. The excavations will occur in the floodplain and the temporary staging pile may be constructed in the floodplain. However, no permanent structures will be constructed within the floodplain because the temporary staging pile will be closed after the soil is taken off site for disposal, and the excavation will be restored by backfilling with clean soil.
GEOLOGICAL FORMATIONS					
Federal					
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901-6991[i])[a]					
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	Cal. Code Regs. tit. 22, § 66264.18(b)	Relevant and appropriate	The selected remedy includes excavating soil and storing it temporarily in a staging pile for off-site disposal. The temporary staging pile may be constructed in the floodplain. If constructed in the floodplain, the staging pile will be designed, constructed, operated, and maintained to avoid washout.

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
BIOLOGICAL RESOURCES					
Federal					
Endangered Species Act of 1973 (16 U.S.C. §§ 1531-1543)[a]					
Location where endangered or threatened species are present or location designated as critical habitat	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat.	Presence of endangered species, listed, species, or critical habitat.	16 U.S.C. §§ 1531-1543	Potentially Relevant and appropriate	The substantive provisions of these requirements are ARARs if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under the Federal Endangered Species Act.
Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703-712)[a]					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 U.S.C. § 703	Relevant and appropriate	The substantive provisions of these requirements are ARARs if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under the Migratory Bird Treaty Act.
State					
California Endangered Species Act (Cal. Fish and Game Code §§ 2050-2116)[a]					
Area used by endangered or threatened species	No person shall take any endangered or threatened species.	Threatened or endangered species are present.	Cal. Fish and Game Code § 2080	Potentially Relevant and appropriate	Substantive provisions of this requirement are relevant and appropriate if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under Cal. Fish and Game Code § 2080.

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
California Fish and Game Code[a]					
Area with rare or endangered native plants	No person No person shall take, possess, or sell within this state, except as incident to the possession or sale of the real property on which the plant is growing, any native plant, or any part or product thereof, which the commission determines to be an endangered native plant or rare native plant.	Presence of a rare or endangered native plant.	Cal. Fish and Game Code § 1908	Potentially Relevant and appropriate	Substantive provisions of this requirement are relevant and appropriate if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under Cal. Fish and Game Code § 1908.
Area with birds or mammals	It is unlawful to take birds or mammals with any net, pound, cage, trap, set line or wire, or poisonous substance, or to possess birds or mammals so taken, whether taken within or without the state	Take or possess birds or mammals	Cal. Fish and Game Code § 3005	Not an ARAR	The Navy has determined that Cal. Fish and Game Code § 3005(a) is not a state ARAR because it is neither applicable nor relevant and appropriate. The State of California, through CDFW, asserts that Cal. Fish and Game Code §3005(a) is a state ARAR because it is relevant and appropriate. Whereas, the Navy and the State have not agreed upon whether Cal. Fish and Game Code §3005(a) is an ARAR, this ROD documents each party's position on the statute but does not attempt to resolve the issue (Tencate and Johnson, 2016).

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Area with bird nest or eggs	It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.	Bird nests or eggs on-site.	Cal. Fish and Game Code § 3503	Not an ARAR	The Navy has determined that Cal. Fish and Game Code § 3503 is not a state ARAR because it is not applicable or relevant and appropriate. The State of California, through CDFW, asserts that § 3503 is a state ARAR because it is relevant and appropriate. Whereas, the Navy and the State have not agreed upon whether Cal. Fish and Game Code § 3503 is an ARAR, this ROD documents each party's position on the statute but does not attempt to resolve the issue. Nonetheless, the Navy agrees that it will work cooperatively with CDFW to identify and undertake appropriate measures in order to generally avoid harm to nests and eggs when there is potential that they may be impacted by response action construction. The State will not dispute the selected remedy for failure to identify Cal. Fish and Game Code § 3503 as an ARAR because CDFW will collaborate in the process of crafting measures to generally avoid harm; the implementation of those mutually agreeable measures will result in substantive compliance with the state requirement. These measures will be documented in the Remedial Action Work Plan (Tencate and Johnson, 2016).

TABLE C-2: FEDERAL AND STATE LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Area used by fully protected birds	Fully protected birds may not be taken at any time.	A fully protected species must be potentially affected.	Cal. Fish and Game Code § 3511	Potentially Relevant and appropriate	Substantive provisions of this requirement are relevant and appropriate if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under Cal. Fish and Game Code § 3511.
Area used by fully protected mammals	Fully protected mammals may not be taken at any time.	A fully protected species must be potentially affected.	Cal. Fish and Game Code § 4700	Potentially Relevant and appropriate	Substantive provisions of this requirement are relevant and appropriate if the species are present and the Navy and CDFW agree that they may potentially be impacted by the response action construction. These species are protected under Cal. Fish and Game Code § 4700.
Waters of the state	Prohibits the passage of enumerated substances or materials into waters of the state deleterious to fish, plant life, or birds.	Discharge not authorized under Cal. Water Code § 13263 or a waiver issued pursuant to subdivision (a) of § 13269 of the Water Code.	Cal. Fish and Game Code § 5650(a), (b), and (c)	Not an ARAR	The CDFW-OSPR submitted Cal. Fish and Game Code § 5650 as relevant and appropriate. The Navy does not believe Cal. Fish and Game Code § 5650 is relevant and appropriate, however, a Stormwater Management Plan will be prepared and standard practices for stormwater management will be employed during the action to prevent runoff into state waters to achieve substantive compliance for this provision for this site (Tencate and Johnson, 2016).

TABLE C-2: FEDERAL AND STATE LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Notes:

a Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as ARARs. Specific ARARs are addressed in the table below each general heading and only the substantive requirements of the specific citations are considered ARARs.

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
Cal.	California
Cal. Code Regs.	California Code of Regulations
RCRA	Resource Conservation and Recovery Act
tit	Title
U.S.C	United States Code

TABLE C-3: FEDERAL AND STATE ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
REMEDY: EXCAVATION AND OFF-SITE DISPOSAL, MONITORED NATURAL ATTENUATION, AND INSTITUTIONAL CONTROLS					
Federal					
Excavation and Off-site Disposal and Waste Generation					
Resource Conservation and Recovery Act (Title 42 U.S.C., Chapter 82, §§ 6901-6991[i])[a]					
Generate waste for off-site disposal	Person who generates waste shall determine if the waste is a hazardous waste.	Generator of waste.	Cal. Code Regs. tit. 22, §§ 66262.10(a), and 66262.11	Applicable	These regulations are applicable to any operation that generates waste for off-site disposal. The Navy will generate waste during implementation of the remedy. The Navy will determine whether the waste is RCRA hazardous waste when it is generated.
Generate waste for off-site disposal	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	Cal. Code Regs. tit. 22, § 66264.13(a) and (b)	Applicable	These regulations are applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during implementation of the remedy. The Navy will determine whether the waste is RCRA hazardous waste when it is generated.
Generate waste for off-site disposal	Requirement to determine if waste needs to be treated before being land disposed.	Generator of waste.	Cal. Code Regs. tit. 22, § 666268.7(a)(1) -(4)	Applicable	These regulations are applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during implementation of the remedy. The Navy will determine whether the waste is RCRA hazardous waste when it is generated and will determine if it needs to be treated before being land disposed at the same time.

TABLE C-3: FEDERAL AND STATE ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Generate waste for off-site disposal	Requirement to determine the EPA hazardous waste code.	Initial generator of waste.	Cal. Code Regs. tit. 22, § 66268.9(a)	Applicable	These regulations are applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during excavation and construction of injection wells. The Navy will determine whether the waste is RCRA hazardous waste when it is generated. If the waste is RCRA hazardous, the Navy will identify the EPA hazardous waste code at the same time.
Stockpiling soil for off-site disposal in temporary pile	Allows generators to accumulate solid remediation waste in an EPA-designated pile for storage only up to 2 years during remedial operations without triggering LDRs.	RCRA hazardous waste temporarily stored in piles.	40 CFR, § 264.554(d)(1)(i-ii) and (d)(2), (e), (f), (h), (i), (j), and (k)	Relevant and appropriate	The Navy will temporarily stockpile excavated soil in staging piles for off-site disposal. The excavated soil may or may not meet the definition of RCRA hazardous waste. (This determination will be made at the time the soil is excavated.) However, the temporary staging pile will comply with these requirements even if the soil is not RCRA hazardous waste.
Close temporary soil pile	Minimize the need for further maintenance controls and minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to groundwater or surface water or to the atmosphere.	RCRA hazardous waste management facility.	Cal. Code Regs. tit. 22, § 66264.111(a) and (b)	Relevant and appropriate	The Navy will close the temporary soil pile in compliance with these ARARs.

TABLE C-3: FEDERAL AND STATE ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)

Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Close temporary soil pile	At closure, owner shall remove or decontaminate waste residue, contaminated components of the containment system, contaminated subsoil, structures, and equipment. Owner shall manage them as hazardous waste. If waste is left on site, owner shall perform post-closure care in accordance with the closure and post-closure care requirements that apply to landfills.	Waste pile used to store hazardous waste.	Cal. Code Regs. tit. 22, § 66264.258(a) and (b), except references to procedural requirements	Applicable	The Navy will close the temporary soil pile in compliance with these ARARs.
Store extracted groundwater waste in containers for off-site disposal	Containers of hazardous waste must be (1) maintained in good condition; (2) compatible with waste to be stored; and (3) closed during storage except to add or remove waste.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage.	Cal. Code Regs. tit. 22, §§ 66264.171, 66264.172, and 66264.173	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Store extracted groundwater waste in containers for off-site disposal	Inspect container storage areas weekly for deterioration.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage.	Cal. Code Regs. tit. 22, § 66264.174	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.
Store extracted groundwater waste in containers for off-site disposal	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage.	Cal. Code Regs. tit. 22, § 66264.175 (a) and (b)	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Store extracted groundwater waste in containers for off-site disposal	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line.	Ignitable or reactive waste.	Cal. Code Regs. tit. 22, § 66264.176	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.
Store extracted groundwater waste in containers for off-site disposal	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage.	Cal. Code Regs. tit. 22, § 66264.177	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Store extracted groundwater waste in containers for off-site disposal	At closure, remove all hazardous waste and residue from the containment system, and decontaminate or remove all containers and liners.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage.	Cal. Code Regs. tit. 22, § 66264.178	Applicable	The Navy will use techniques to minimize the chances that groundwater will be encountered in the soil excavation. However, if the Navy encounters groundwater, the Navy will extract it and store it in containers for off-site disposal. These container requirements are applicable to storing RCRA hazardous waste. The Navy does not know that the extracted groundwater will meet the definition of RCRA hazardous waste; the Navy will make the determination when the waste groundwater is generated. However, the Navy will comply with the regulation even if the extracted groundwater is not RCRA hazardous waste because the groundwater will be similar to RCRA hazardous waste because it will contain contaminants.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Clean Air Act (42 U.S.C. §§ 7401-7671)[a]					
Temporary soil pile	For active storage units, contaminated soil shall be kept visibly moist by water, treated with a vapor suppressant, or covered with continuous heavy-duty plastic sheeting or other covering to minimize emissions of organic compounds to the atmosphere. Covering shall be in good condition, joined at the seams, and securely anchored to minimize headspace where vapors may accumulate. The surface area not covered by plastic sheeting or other covering shall not exceed 6,000 square feet.	Active storage pile of contaminated soil containing organic compounds exceeding 50 ppmw.	BAAQMD Regulation 8-40-304	Applicable	The Navy will design and operate the temporary soil pile in compliance with these ARARs.
Temporary soil pile	Contaminated soil shall be covered during periods of inactivity longer than 1 hour. The contaminated soil shall be covered with continuous heavy-duty plastic sheeting or other covering to minimize emissions to the atmosphere. The covering shall be in good condition, joined at the seams, and securely anchored to minimize headspace where vapors may accumulate.	Inactive storage pile of contaminated soil containing organic compounds exceeding 50 ppmw.	BAAQMD Regulation 8-40-305	Applicable	The Navy will operate the temporary soil pile in compliance with these ARARs.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Excavate soil contaminated with VOCs	Provides requirements for excavating, stockpiling, and backfilling excavated soil contaminated with VOCs exceeding 50 ppmw.	Excavating soil with an organic content exceeding 50 ppmw.	BAAQMD 8-40-306	Applicable	The Navy will comply with these requirements when excavating, stockpiling, and backfilling contaminated soil.
Clean Water Act of 1977, as Amended (33 U.S.C. chapter 26, §§ 1251-1387)[a]					
Excavation	Regulates storm water discharges associated with construction activity	Construction that affects more than 1 acre.	40 CFR Section 122.44(2) and (4) SWRCB Order No. 2009-0009-DWQ, as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ	Not an ARAR	The Navy does not accept these storm water requirements as ARARs for the construction associated with the remedial action because the construction will impact less than 1 acre; however, the Navy will implement a plan to manage storm water and apply standard best management practices during the remedial action construction to comply with the substantive provisions of SWRCB Order No. 2009-0009-DWQ, as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ for discharge to surface water.
Monitored Natural Attenuation of Soil Gas					
No federal ARARs were identified for the monitored natural attenuation of soil gas.					
Institutional Controls					
No federal ARARs were identified for institutional controls.					

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
State					
Remediation					
State Water Resources Control Board[a]					
Remedial action taken by the Navy at the IR17 and Building 503 Area	Actions taken by or at the direction of public agencies to clean up or abate conditions of pollution or nuisance resulting from unintentional or unauthorized releases of waste or pollutants to the environment shall implement SWRCB-promulgated provisions to the extent feasible, provided that wastes, pollutants, or contaminated materials removed from the immediate place of release shall be discharged according to the SWRCB-promulgated sections of Article 2, Subchapter 2, Chapter 3, Subdivision1.	Action taken by or at the direction of a public agency to clean up release of pollutant.	Cal. Code Regs. tit. 27, § 20090(d)	Relevant and appropriate	The Navy accepts the substantive provisions of these requirements as state ARARs. The Navy will implement SWRCB-promulgated provisions accepted as ARARs to the extent feasible. In addition, any waste generated in implementation of the remedy will be characterized and discharged at an appropriate off-site facility.
Excavation and Off-site Disposal and Generation of Waste					
State Water Resources Control Board and Regional Water Quality Control Board[a]					
Generate waste for off-site disposal	Dischargers shall be responsible for accurate characterization of wastes.	Waste.	Cal. Code Regs. tit. 27, § 20200(c)	Applicable	This regulation is applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during implementation of the remedy. The Navy accepts the substantive provisions of this regulation as ARARs and will characterize the waste when it is generated.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Dispose of soil and waste off site	Requires that designated waste as defined at California Water Code § 13173 be discharged to Class I or class II waste management units.	Discharge of designated waste after July 18, 1997 (non-hazardous waste that could cause degradation of surface or ground waters), to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20210	Applicable	This regulation is applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during implementation of the remedy. The Navy accepts the substantive provisions of this regulation as ARARs and will determine if the waste meets the definition of designated waste when it is generated.
Dispose of soil and waste off site	Requires that nonhazardous solid waste as defined at § 20220(a) be discharged to a classified waste management unit.	Discharge of nonhazardous solid waste after July 18, 1997, to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20220(b), (c), and (d)	Applicable	This regulation is applicable to any operation that generates waste for off-site disposal. The Navy will generate waste for off-site disposal during implementation of the remedy. The Navy accepts the substantive provisions of this regulation as ARARs and will characterize the waste when it is generated.
Generate waste for off-site disposal	Requirement to limit the idling of diesel-fueled commercial motor vehicles.	Diesel-fueled commercial motor vehicle with a gross vehicular weight rating greater than 10,000 pounds.	Cal. Code Regs. tit. 13, § 2485	Relevant and appropriate	Waste will be transported off site using commercial diesel vehicles. While on site, the idling of these trucks will be limited according to this ARAR.

TABLE C-3: FEDERAL AND STATE ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)

Record of Decision/Final Remedial Action Plan for the Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Monitored Natural Attenuation of Soil Gas					
Cal/EPA Department of Toxic Substances Control[a]					
Monitor the natural attenuation of soil gas	The owner or operation shall institute a corrective action monitoring and response program whenever there is a statistically significant increase of constituents or when a specific soil gas concentration is exceeded.	Owners and operators of permitted facilities that treat, store, recycle, or dispose of hazardous waste.	Cal. Code Regs. tit. 22, § 66264.701(a)	Relevant and appropriate	The Navy accepts these as state ARARs for monitoring the natural attenuation of COCs in soil gas.
Monitor the natural attenuation of soil gas	Concentration limits for soil gas at background or a concentration limit greater than background if the concentration limit greater than background does not pose a substantial present or potential hazard to human health or the environment.	Owners and operators of permitted facilities that treat, store, recycle, or dispose of hazardous waste.	Cal. Code Regs. tit. 22, § 66264.704(b), (d), and (e)	Relevant and appropriate	The Navy accepts these as state ARARs for monitoring the natural attenuation of COCs in soil gas.
Monitor the natural attenuation of soil gas	The owner or operator shall implement a corrective action program to prevent hazardous constituents from exceeding their soil gas concentration limits, to demonstrate the effectiveness of the corrective action, and to determine compliance with the soil gas concentration limit.	Owners and operators of permitted facilities that treat, store, recycle, or dispose of hazardous waste.	Cal. Code Regs. tit. 22, § 66264.708(b) and (d)	Relevant and appropriate	The Navy accepts these as state ARARs for monitoring the natural attenuation of COCs in soil gas.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Institutional Controls					
Cal/EPA Department of Toxic Substances Control[a]					
Place ICs	Provides the conditions under which land use restrictions will apply to successive owners of real property.	Transfer of property from the Navy to a nonfederal entity.	California Civil Code § 1471	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.
Place ICs	Allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses.	Transfer of property from the Navy to a nonfederal entity.	California Health and Safety Code § 25202.5	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.
Place ICs	Provides a streamlined process to be used to enter into a written agreement to restrict specific uses of property. The agreement should be irrevocable, recorded by the property owner, and run with the land.	Transfer of property from the Navy to a nonfederal entity.	California Health and Safety Code §§ 25221	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.
Place ICs	Provides a process for obtaining a written variance from a land use restriction. Provides a process for removing a land use restriction.	Transfer of property from the Navy to a nonfederal entity.	California Health and Safety Code §§ 25233(c) and 25224	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Place ICs	Provides a process for entering into corrective action agreements with PRPs that provide for executing and recording a written instrument that imposes an easement, covenant, restriction, or servitude on the present and future uses of the site. The easement, covenant, restriction, or servitude will run with the land and is binding on all owner, heirs, successors, and assignees.	DTSC issues an order for corrective action or an order establishing a schedule for removing or remedying a release of a hazardous substance at a site, or for correcting the conditions that threaten the release of a hazardous substance.	California Health and Safety Code § 25355(a)(1)(c)	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.
Place ICs	A land use covenant imposing appropriate limitation on land use shall be executed and recorded when facility closure, corrective action, remedial or removal action, or other response actions are undertaken and hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels that are not suitable for unrestricted use of the land.	Corrective, removal, or remedial action that leaves hazardous materials or waste on site above levels that are not suitable for unrestricted use.	Cal. Code Regs. tit. 22, § 67391.1	Relevant and appropriate	The Navy accepts this statutory provision as a state ARAR for the ICs that will be placed at the IR17 and Building 503 Area.

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
State Water Resources Control Board[a]					
Place ICs	If the RWQCB finds the property is not suitable for unrestricted land use and that a land use restriction is necessary for the protection of public health, safety, or the environment, then the RWQCB may not issue a closure letter, or make a determination that no further action is required with respect to a site that is subject to a cleanup or abatement order pursuant to § 13304 and that is not an underground storage tank site, unless a land use restriction is recorded or required to be recorded pursuant to § 1471 of the Civil Code.	Waters of the state	Porter-Cologne Water Quality Act (California Water Code § 13307.1[c]) and California Civil Code § 1471	California Civil Code § 1471 is an ARAR. Navy and State disagree on whether California Water Code § 13307.1 is an ARAR.	The Navy recognizes that California Civil Code § 1471 governs covenants to restrict the use of land. Land use controls will be applied to manage future use at Subareas 1 and 2 of the site. The Navy disagrees that California Water Code § 13307.1 is an ARAR.

Notes:

a Statutes and policies, and their citations, and state agencies are provided as headings to identify general categories of ARARs for the convenience of the reader. Listing the statutes, policies, citations, and state agencies does not indicate that the Navy accepts the entire statutes, policies, or state promulgations as ARARs. Specific ARARs follow each general heading, and only the substantive requirements of the specific citations are considered ARARs.

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
Cal. Code Regs.	*California Code of Regulations*
CFR	Code of Federal Regulations
COC	Chemical of concern
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
IC	Institutional controls
IR17	Installation Restoration Site 17
LDR	Land disposal restrictions
ppmw	Parts per million by weight
PRP	Potentially responsible party
RCRA	Resource Conservation and Recovery Act
SWRCB	State Water Resources Control Board
tit.	Title
U.S.C.	United States Code
UST	Underground storage tank
VOC	Volatile organic compound

ATTACHMENT D
PUBLIC MEETING NOTICES AND PUBLIC MEETING TRANSCRIPT

'SOCIAL REVOLUTION'

Ireland votes to legalize gay marriage in landslide

By Shawn Pogatchnik
The Associated Press

PETER MORRISON — THE ASSOCIATED PRESS

Yes supporters celebrate at Dublin castle, Ireland, on Saturday. Ireland has voted resoundingly to legalize gay marriage in the world's first national vote on the issue.

DUBLIN » Ireland's citizens have voted in a landslide to legalize gay marriage, electoral officials announced Saturday — a stunningly lopsided result that illustrates what Catholic leaders and rights activists alike called a "social revolution."

Friday's referendum saw 62.1 percent of Irish voters say "yes" to changing the nation's constitution to define marriage as a union between two people regardless of their sex. Outside Dublin Castle, watching the results announcement in its cobblestoned courtyard, thousands of gay rights activists cheered, hugged and cried at the news.

"With today's vote, we have disclosed who we are: a generous, compassionate, bold and joyful people," Prime Minister Enda Kenny proclaimed as he welcomed the outcome. Beside him, Deputy Prime Minister Joan Burton declared the victory "a magical moving moment, when the world's beating heart is in Ireland."

Ireland is the first country to approve gay marriage in a popular national vote. Nineteen other countries have legalized the practice through their legislatures and courts.

The unexpectedly strong percentage of approval surprised both sides. More than 1.2 million Irish voters backed the "yes" side to less than 750,000 voting "no." Only one of Ireland's 43 constituencies recorded a narrow "no" majority, Roscommon-South Leitrim in the boggy midlands.

Analysts credited the "yes" side with adeptly employing social media to mobilize young, first-time voters, tens of thousands of whom voted for the first time Friday. In addition, a series of searing personal stories from prominent Irish people — either coming out as gays or describing their hopes for gay children — convinced voters to back equal marriage rights.

Both Catholic Church leaders and gay rights advocates said the result signaled a social revolution in Ireland, where only a few decades ago the authority of Catholic teaching was reinforced by voters who massively backed bans on abortion and divorce in the 1980s.

Voters first legalized divorce only by a razor-thin margin in 1995 and now, by a firm majority, they have rejected the Catholic Church's repeated calls to reject gay marriage. Abortion, still outlawed, looms as the country's next great social policy fight.

Dublin Archbishop Diarmuid Martin said the "overwhelming vote" against church teaching on gay marriage meant that Catholic leaders in Ireland need to urgently find a new message and voice for reaching Ireland's young.

"It's a social revolution. ... The church needs to do a reality check right across the board," Martin said.

David Quinn, leader of the Catholic think tank Iona Institute, said he was troubled by the fact that no political party and only a half-dozen politicians backed the "no" cause.

"The fact that no political party supported them must be a concern from a democratic point of view," he said.

Fianna Fail party leader Michael Martin, a Cork politician whose opposition party is traditionally closest to the Catholic Church, said he couldn't in good conscience back the anti-gay marriage side.

"It's simply wrong in the 21st century to oppress people because of their sexuality," he said.

After the result was announced, thousands of celebrants flooded into the Irish capital's pubs and clubs — none more popular Saturday night than the city's few gay venues.

Political analysts who have covered Irish referendums for decades agreed that Saturday's landslide marked a stunning generational shift.

"We're in a new country," said gray-haired political analyst Sean Donnelly. "When I was reared up, the church was all powerful and the word 'gay' wasn't even in use in those days. How things have moved from my childhood to now."

SYRIA

SANA VIA AP, FILE

The general view of the ancient Roman city of Palmyra, northeast of Damascus, Syria, is seen. Islamic State militants have seized most of the ancient town of Palmyra in central Syria.

Official: IS militants in Palmyra's museum

By Albert Aji and Sarah El Deeb
The Associated Press

DAMASCUS, SYRIA » Islamic State fighters broke into the museum of Palmyra, though a Syrian official said its artifacts have been removed and are safe while the U.S.-led coalition conducted airstrikes on the group's installations near the captured ancient town — the first such reported attack in the central province of Homs.

The Department of Defense said in a statement that U.S.-led coalition aircraft had attacked an IS position near Palmyra, which goes by the modern name Tadmur, destroying six anti-aircraft artillery systems and an artillery piece.

The Islamic State group captured Palmyra on Wednesday, raising concerns around the world they would destroy priceless, 2,000-year-old temples, tombs and colonnades located in the town's south.

The strikes would appear to help the embattled forces of forces of President Bashar Assad, which have had a succession of recent defeats to IS group and other rebels. But experts and archeologists said the airstrike, coming days after the group overwhelmed the city, was too little too late.

A picture circulated on Twitter accounts of Islamic State supporters showed the black flag used by the extremists raised over the town's hilltop Islamic-era castle, a structure hundreds of years old. Al-Azm said the fact that the castle dates back to an Islamic civilization may protect it from the kind of destruction IS members have inflicted on pre-Islamic heritage sites such as the ancient cities of Hatra and Ninevah in Iraq.

The group says the ancient relics promote idolatry, but, it also maintains a lucrative business by excavating and selling such artifacts on the black market, according to antiquities authorities.

One activist in the city of Palmyra, who goes by the name of Khaled al-Homsi, said that the militants smashed a statue in the museum's foyer — a replica that depicts ancient residents of Palmyra.

So far, the IS militants have been primarily concerned with consolidating their control over the city, conducting house-to-house searches for government soldiers and pro-government militiamen and, in some cases, publicly killing those that they find, according to activists and government officials.

CATHOLICISM

Salvadorans rejoice as slain Archbishop Oscar Romero beatified

By Any Cabrera and Marcos Aleman
The Associated Press

MOISES CASTILLO — THE ASSOCIATED PRESS

A man holds up a painting of Roman Catholic Archbishop Oscar Romero during his beatification ceremony in San Salvador, El Salvador, on Saturday.

SAN SALVADOR, EL SALVADOR » Archbishop Oscar Romero was beatified by Roman Catholic officials Saturday in an emotional ceremony elevating the once-controversial cleric to the ranks of the blessed 35 years after his assassination.

Underneath a rainbow halo ringing the sun, Cardinal Angelo Amato, the prefect of the Vatican's saint-making office, called on the crowd of some 260,000-plus to rejoice in a "feast of peace, fraternity and forgiveness."

"Romero's spirit remains alive and gives comfort to the marginalized people of the world," Cardinal Amato said. "His preference for the poor was not ideological, but evangelical. His charity extended to his persecutors."

Beatification is the first step toward possible canonization, although many of those who packed the Salvadoran capital's Savior of the World Plaza and the surrounding streets already credit Romero with miracles and refer to him as "Saint Romero of the Americas.

Worshippers from across the nation, many of them bused in from the countryside, held up poster-size images of Romero and carried white and yellow flags of the Vatican.

"They can kill the prophet, but not the voice of justice," intoned pilgrims from the Our Lady of the Assumption parish in a San Salvador suburb.

"His words will remain for eternity," said Marlene Sanchez, 26.

In life, Romero was loved by the poor, whom he defended passionately, and loathed by conservatives who considered him too close to left-leaning movements in the tumultuous years ahead of El Salvador's 1980-92 civil war.

The archbishop was shot through the heart by a sniper while celebrating Mass in a cancer hospital chapel on March 24, 1980. The day before, he had delivered a strongly worded admonition to the U.S.-backed military to stop abusing civilians. Those words were read aloud Saturday: "I beg you, I beseech you, I order you, in the name of God, cease the repression."

The trigger man has never been identified, and no one has been prosecuted for the killing. Alleged paramilitary death squad leader Roberto d'Aubuisson, who was named by a U.N. truth commission after the war's end as the mastermind of the assassination, died in 1992 having maintained his innocence to the end.

Romero's beatification was held up for years by church politics until then-Pope Benedict XVI "unblocked" the case in late 2012, after it was determined he had not been an adherent of revolutionary liberation theology as many claimed. Earlier this year, Pope Francis declared that Romero was martyred out of hatred of his faith, clearing the way for beatification.

NOTICE OF AVAILABILITY, PUBLIC COMMENT PERIOD, AND PUBLIC MEETING
PROPOSED PLAN / DRAFT REMEDIAL ACTION PLAN FOR
INSTALLATION RESTORATION SITE 17 & BUILDING 503 AREA AT
FORMER MARE ISLAND NAVAL SHIPYARD, VALLEJO, CALIFORNIA

The Department of the Navy (Navy), in coordination with the California Department of Toxic Substances Control (DTSC) invites the public to comment on the Proposed Plan (PP) / Draft Remedial Action Plan (RAP) for the Installation Restoration (IR) Site 17 & Building 503 Area at the Former Mare Island Naval Shipyard (MINS). The Former MINS is located in Vallejo, California west of Mare Island Strait.

This PP/Draft RAP recommends excavation and off-site disposal, monitored natural attenuation (MNA), and the use of institutional controls (ICs) as the preferred remedial alternative. The Navy in conjunction with the federal and state regulatory agencies has determined that the preferred alternative is protective of human health and the environment and achieves the Remedial Action Objectives developed for the IR Site 17 & Building 503 Area.

PUBLIC COMMENT PERIOD

The Navy invites the public to review and comment on the PP/Draft RAP during the 30-day public comment period held from May 26, 2015 through June 25, 2015. Public comments must be submitted in writing and postmarked or e-mailed no later than June 25, 2015. Please send all comments to the Navy Base Realignment and Closure (BRAC) Environmental Coordinator, Ms. Janet Lear, 1455 Frazee Road, Suite 900, San Diego, California 92108-4310, (619) 532-0780 (fax), or janet.lear@navy.mil.

PUBLIC MEETING

The Navy will host a public meeting to discuss the PP/Draft RAP for the IR Site 17 & Building 503 Area and accept public comments.

Thursday, May 28, 2015 at 7:00 PM
Mare Island Conference Center
375 G Street, Vallejo, California

FOR MORE INFORMATION

Copies of the PP/Draft RAP and other site documents are available for review at www.bracpmo.navy.mil and the following public information repositories:

John F. Kennedy Library
505 Santa Clara Street
Vallejo, California 94590
Phone (866) 572-7587

Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, California 94710
Phone (510) 540-3800
(by appointment only)

CSC

Continued from Page A1

to pick up the tab for first year of the proposed contract extension that will be more costly since Porteshawver has changed employers.

Thursday night, the CSC sweetened its proposal to the City Council, offering to pay for 75 percent of the second year of the contract, as well, and asking the Council to find $25,000 in city funds for the balance.

City employees are developing a "status-quo" two-year budget that would start July 1 and end June 30, 2017. Unless other money is saved elsewhere and applied to the expenditure, the city's share of Porteshawver's budget — and any other new expenses — would come from the city's reserves, Community Development Director Christina Ratcliffe said.

The CSC's proposal is to spend $150,000 in Valero-Good Neighbor Steering Committee Settlement Agreement funds in Fiscal Year 2015-

face of a team from Sonoma State University that initially won the CAP coordinator's position in 2011.

That contract was extended and expanded, costing the city $80,000 for the two-year extension that will end June 30.

Last year, she joined the environmental consulting firm PMC that recently was acquired by Michael Baker International.

PMC has proposed a $250,000, two-year contract that would reduce Porteshawver's physical presence in Benicia, but would give the city access to the company's expanded array of services, such as monitoring the city's progress in sustainable matters, previously unavailable through the current contract.

In addition, the proposed two-year contract would task Porteshawver to work with city employees who might be able to take on some of her duties when her contract ends in 2017.

At the Council's May 5 meeting, members expressed interest in the

.Since then, seven agencies, including the city Public Works Department and the commission itself, have applied for a combined $399,264 in Valero-Good Neighbor Steering Committee Settlement Agreement funds which the commission can distribute with Council permission.

In the past, Commissioner Bruce Barrow has expressed concerns about the operation of the award-winning Benicia Resource Incentive Program (BRIP), a CSC grantee that helps Benicia Industrial Park companies reduce consumption of water and energy and production of garbage.

At first he suggested the commission pay for Porteshawver's contract by pulling BRIP funding. "That money should come from Economic Development," he said.

Porteshawver differed, saying BRIP is not only a significant economic development tool that is underutilized, it also could aid in achieving the city's CAP goals.

But Barrow concurred with the

GRANDPA POTTS (Jeff Lowe) in the Bay Area Stage production of "Chitty Chitty Bang Bang," now showing at the Empress Theatre. Visit bayareastage.org for more infor-

COUNCIL

Continued from Page A1

the number of Mills Act contracts based on losses the city would experience through the reduced property tax revenues and in staff time associated with managing the program.

In previous years, the loss ceiling was set at $30,000, but in recent years that was increased to $35,000.

That ceiling could be breached periodically with the addition of the 37th Mills Act contract, approved Nov. 8, 2014.

The Historic Preservation Review Commission and, later, the Council heard city employees' reports that variations in property tax revenue assessments were making the ceiling of $35,000 — or any other dollar amount — a limitation that would be difficult to observe.

Among the multiple alternatives offered, the Council asked staff to write a resolution that would limit the number of contracts to 40.

That resolution, which also postponed this year's application deadline to Sept. 30, was approved in the consent calendar vote.

In other business, Benicia police Chief Erik Upson, who earlier Tuesday was sworn in and received his Benicia badge, also received authorization to buy 28 Taser X2s for his officers, as well as new holsters and cameras as accessories to the nonlethal weapons.

The department's current model Tasers are X26s, and they are so outdated that replacement parts can't be bought when the instruments need repairs.

However, officers won't need extensive training on the new models, Upson told the Council, because they operate in a manner similar to the ones currently in use.

However, the new models have better ergonomic designs, weatherproofing, data collection, reliability and durability, he said.

The anticipated cost, $52,498.40, is less than what the city budgeted for the purchase, $59,460. The balance of $2,938.52 would be left in the Citizens Option for Public Safety (COPS) Supplemental Safety Equipment fund, Upson said.

In the same vote as the other two items, the Council agreed with a request from Parks and Community Services Director Michael Dotson to spend $198,711.08 in Measure C, voter-approved sales tax funds for playground equipment for Benicia Community Park.

The new structure would replace equipment installed in 1994, when the park was built. When it's installed the surrounding sand will be replaced with engineered fiber.

The cost to remove the old equipment is included in the price, Dotson said.

The Council also approved the quarterly Budget to Actual Report for All Funds that ended March 31.

NOTICE OF AVAILABILITY, PUBLIC COMMENT PERIOD, AND PUBLIC MEETING
PROPOSED PLAN / DRAFT REMEDIAL ACTION PLAN FOR
INSTALLATION RESTORATION SITE 17 & BUILDING 503 AREA AT
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NAVFAC

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505 Santa Clara Street
Vallejo, California 94590
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Ohio patrolman acquitted in 2 deaths amid 137-shot barrage

THE ASSOCIATED PRESS


The Associated Press
Michael Brelo weeps as he hears the verdict in his trial in Cleveland, Saturday.

CLEVELAND — A white patrolman who fired down through the windshield of a suspect's car at the end of a 137-shot barrage that left the two unarmed black occupants dead was acquitted Saturday of criminal charges by a judge who said he could not determine the Cleveland officer alone fired the fatal shots.

Michael Brelo, 31, put his head in hands as the judge issued a verdict followed by angry, but peaceful, protests: Outside the courthouse police blocked furious protesters from going inside while across the city others held a mock funeral with some carrying signs asking, "Will I be next?"

The acquittal came at a time of nationwide tension among police and black citizens punctuated by protests over deaths of black suspects at the hands of white officers – and following a determination by the U.S. Department of Justice that Cleveland police had a history of using excessive force and violating civil rights.

Before issuing his verdict, Cuyahoga County Common Pleas Judge John P. O'Donnell reflected on the unrest. "In many American places people are angry with, mistrusting and fearful of the police," he said. "Citizens think the men and women sworn to protect and serve have violated that oath or never meant it in the first place."

But O'Donnell said he would not offer up Brelo to an angry public if the evidence did not merit a conviction.

"I will not sacrifice him to a public frustrated by historical mistreatment at the hands of other officers," O'Donnell said.

Brelo – who fired a total of 49 shots, including 15 while standing on the hood of the suspects' vehicle – faced as many as 22 years in prison had the judge convicted him of voluntary manslaughter in the shooting that happened after Timothy Russell's beat-up Chevy Malibu backfired while speeding by police headquarters.

Russell's sister, Michelle Russell, said she believed Brelo would ultimately face justice.

"He's not going to dodge this just because he was acquitted," she said. "God will have the final say."

The U.S. Justice Department, U.S. Attorney's Office and the FBI will review the testimony and evidence and examine all available legal options, said Vanita Gupta, head of the Justice Department's Civil Rights Division.

After the verdict, sheriff's deputies stood in front of the courthouse carrying clear shields as protesters chanted "Hands up! Don't shoot!" – a rallying cry linked to the death of 18-year-old Michael Brown in Ferguson, Missouri. One demonstrator bowed his head, hands folded, in front of the phalanx of deputies, praying in silence.

About 200 people walked in a mock funeral procession that had already been planned to mark six months since another deadly shooting that sparked anger in Cleveland: the killing of Tamir Rice, a black 12-year-old carrying a pellet gun who was shot by a white rookie officer.

Protesters carried a black, plywood coffin and softly sang "I'm going up yonder, we're marching, we're marching."

Some carried signs saying "I Can't Breathe" and "Freddie Gray Lynched," references to a pair of deadly police encounters: the chokehold death of Eric Garner in New York City and the death of a Baltimore man who suffered a spinal injury while in custody.

The unusual timing of the verdict – a Saturday morning on a holiday weekend – was intentional. The county's top judge said it was meant to prevent traffic issues downtown.

Missouri suspect in killing of woman, teen son is dead

THE ASSOCIATED PRESS


The Associated Press/ Missouri Police Department
Authorities shot and killed James Barton Horn Jr. after a search starting in late April when he was accused of kidnapping 46-year-old Sandra Kay Sutton.

KANSAS CITY, Mo. — A man accused of holding his former girlfriend captive in a crate at their home in western Missouri then fatally shooting her and her teenage son, was shot and killed Saturday, authorities said.

Law enforcement officers killed James Barton Horn Jr., 47, at a state wildlife area in western Missouri, south of Knob Noster, Henry County Sheriff Kent Oberkrom said.

Authorities have been searching for Horn since late April when he was charged in the kidnapping of 46-year-old Sandra Kay Sutton. Prosecutors said Sutton told police that Horn kept her in a wooden crate off-and-on for four months at their home in Sedalia, some 90 miles southeast of Kansas City, Missouri.

Sutton and her 17-year-old son, Zachary Wade Sutton, were found dead Thursday at a relative's home in Clinton, about 45 miles from Sedalia, where she had moved after escaping the home she had shared with Horn.

Oberkrom said officers found Horn hiding in a closet in an abandoned building at the J. N. Turkey Kearn Memorial Wildlife Area, about 70 miles southeast of Kansas City. He said officers were led to the area by a tip they received Saturday morning.

When officers told him to surrender, Horn threatened the officers with a handgun, said Sgt. Bill Lowe, spokesman for the Missouri State Highway Patrol. Lowe said it was unclear if Horn fired his weapon.

Lowe said the investigation will focus on matching the weapons Horn had with him with evidence taken from the scene of the Suttons' murders.

Horn's death was a relief for the community, Oberkrom said.

"A lot of folks are very scared of this individual," he said. "There's a huge amount of relief."

Police say Horn, a former Marine, locked Sutton inside the box whenever he was leaving the house. The box – 100 inches long, 48 inches wide and 52 inches tall – was kept in a bedroom and contained a bucket full of urine and feces along, with several layers of insulation, padding and sleeping bags, and a small air hole.

Sutton escaped April 30 and ran to the home of a neighbor who called police. Horn was gone by the time police arrived.

Police on Friday announced a $5,000 reward for information leading to Horn's arrest.

Horn served about three years in prison in Tennessee in the early 1990s in connection with a kidnapping and sexual attack. Records also show he pleaded guilty in 1997 in Mississippi to unlawfully kidnapping and abducting his estranged wife. He was sentenced in that case to 12 years and 11 months in prison, plus five years supervised release.

Harvey Girls recognized for role in history

THE ASSOCIATED PRESS

SANTA FE, N.M. — New Mexico recognized the legacy of the Harvey Girls on Saturday, the thousands of women credited with helping transform the West by taking waitressing jobs along the Atchison, Topeka and Santa Fe Railway line.

Gov. Susana Martinez and the mayors of Santa Fe and Albuquerque declared the day as Harvey Girls Day. Harvey Girls was the nickname given women who began answering help wanted ads in the 1880s from Fred Harvey Co. establishments. According to historians, more than 100,000 women were waitresses in dining rooms at stops along what was then a new railway route.

Lesley Poling-Kempes, who published "The Harvey Girls: Women Who Opened the West" in 1989, said these were ordinary women who took on extraordinary tasks for the terms of their employment.

"It was a terrifying ordeal in the beginning, certainly, for many of the young women who were coming out of small towns or off of small farms," Poling-Kempes said. "There were a lot of immigrant women. They needed to work, so they came out here."

Over the years, Poling-Kempes researched the history through interviews with former Harvey Girls across seven states who were in their 80s and 90s. She also relied on handwritten letters, the Santa Fe New Mexican reported.

The women were usually between ages 18 and 30. They typically signed contracts to work at least six months. Then they would have to go through training in Kansas City or Chicago before being sent to an unknown territory, according to researchers. Some of the places in New Mexico where Harvey Girls ended up working included La Fonda, a lodge and Harvey House in Santa Fe, as well as the Kachina Room restaurant at the old Albuquerque airport.

Harvey Girls typically had to work amid a social stigma, Poling-Kempes said. Some people equated a single woman working and living in a hotel with being a prostitute. They also drew attention because they were well-dressed and well-traveled. Besides earning wages, Harvey Girls got free railroad passes. Despite the stigma, their work allowed them to be independent and share money with their families.

In brief

Sea lion problem prompts unusual approach

BELLINGHAM, Wash. — An Oregon community is bringing in some unusual help to try to fix their sea lion problem. They're hoping a fake killer whale from Bellingham, Washington, will do the trick.

KING-TV reports that Terry Buzzard of Island Mariner Cruises has used the life-size mock orca to promote his business during parades and events. He heard about Astoria's sea lion problems and offered to help.

Hundreds of sea lions have taken over the docks in Astoria, preventing boat owners from using their slips.

Buzzard says he doesn't know if the fake orca will scare away the sea lions. The Port of Astoria has tried using electrified mats, but those aren't working. They've also considered fences.

At worst, Buzzard says the fake orca will be an amusing distraction for the humans.

— The Associated Press

MARE ISLAND NAVAL STATION

RESTORATION ADVISORY BOARD

TRANSCRIPT OF PROCEEDINGS

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MARE ISLAND CONFERENCE CENTER

375 G STREET

VALLEJO, CALIFORNIA

ORIGINAL

THURSDAY, MAY 28, 2015

7:10 P.M.

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REPORTED BY:

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A P P E A R A N C E S

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RAB MEMBERS:
MYRNA HAYES (Community Co-Chair)
MICHAEL COFFEY
PAULA TYGIELSKI

NAVY, DEVELOPERS, REGULATORY & OTHER AGENCIES:
JANET LEAR (Navy Co-Chair)
JESUS CRUZ
STEVE FARLEY
SHARA CHURCHWELL-FETTERS
DWIGHT GEMAR
ERIN HANFORD
PATRICK HSIEH
JANET NAITO
REGINALD PAULDING
SHEILA ROEBUCK
ELIZABETH WELLS

COMMUNITY MEMBERS, GUESTS & INTERESTED PARTIES:
PATRICIA FIGUEROA
GEORGE HIGGINS
JIM PORTERFIELD
HEATHER WOLLENBURG

SULLIVAN SUPPORT STAFF:
VIRGINIA DEMETRIOS
LUCAS VERRET
JOHN NEVILLE

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I N D E X

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May 28, 2015 7:10 P.M.

P R O C E E D I N G S

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CO-CHAIR LEAR: All right. So welcome, everyone, to the Mare Island Restoration Advisory Board.

We usually start the meeting with introductions. My name is Janet Lear, I'm the Navy co-chair.

CO-CHAIR HAYES: And without a microphone --

MR. COFFEY: I was going to say, no microphone, microphone. Busted.

CO-CHAIR HAYES: I'm Myrna Hayes, the community co-chair. I live in Vallejo.

MR. GEMAR: Dwight Gemar with Weston.

MR. PAULDING: Reggie Paulding with the Navy.

MS. ROEBUCK: Sheila Roebuck, LMI.

MR. FARLEY: Steve Farley, Helios.

MS. FETTERS: Shara Fetters, Helios.

MR. HIGGINS: George Higgins, guest, city of Vallejo.

MS. FIGUEROA: Patricia Figueroa, guest, city of Vallejo.

MS. WOLLENBURG: Heather Wollenburg, EERG, guest.

MR. PORTERFIELD: Jim Porterfield, ex-Mare

Islander.

MS. HANFORD: Erin Hanford with the city of Vallejo.

MS. WELLS: Elizabeth Wells with the Water Board.

MR. HSIEH: Patrick Hsieh with the Department of Toxic Substances Control.

MR. CRUZ: Jesus Cruz with the State of California Department of Toxic Substances Control. And I'm the new public participation specialist, for a while at least, taking the place of Richard Perry, formerly with my department. And I am out of Sacramento.

MR. COFFEY: Mike Coffey, RAB member from American Canyon.

MS. TYGIELSKI: Paula Tygielski, RAB community member from Benicia.

MS. DEMETRIOS: Virginia Demetrios with CES. We're taking over coordination for the meetings now. Lucas is who you're going to see in the future.

MR. VERRET: Lucas Verret with CES.

MR. NEVILLE: John Neville helping with Wally.

CO-CHAIR LEAR: Okay. So once again, welcome everyone.

Tonight our meeting also serves as our proposed plan public meeting for the Installation Restoration

Site 17 and Building 503.

To start the proposed plan public meeting portion of tonight, Jesus Cruz with DTSC was going to say few words about the process.

MR. CRUZ: I have a very strong voice unless you're recording it --

CO-CHAIR HAYES: No, no, no, you have to use it, I say so.

MR. CRUZ: All right. All right. I've been -- I have the privilege of opening up the public comment session and asking for your comments here tonight on the draft plan, the proposed plan. And tonight we will be accepting your comments, you know, orally here in writing or verbally.

You can step up to the microphone. Hopefully you'll have signed in. You will introduce yourself. I ask that you introduce yourselves, speak slowly and clearly if you're going to comment.

We also have a comment form that we'd like you to fill out so that we know how to introduce you and what organization you may represent, or if you are a interested resident, citizen, community member.

And the public comment period is from May 26th through June 25th. Comments are accepted during the whole comment period in writing during the 30 day public comment period May 26th through June 25th. And tonight, of course, you can submit your comments, you know, orally or in writing.

And that's about it.

CO-CHAIR LEAR: And to follow up on that, there are extra copies of the proposed plan on the table. Most of you should have gotten a copy of that in the mail. If you're not on our mailing list and you would like to be, there's a sign-up sheet on the table as well.

And Reggie Paulding with the Navy is going to present the proposed plan, and then we will take your questions at the end of the presentation, your questions and comments. So if you'd hold those till the end, that would be great.

So Reggie, you're up.

MR. PAULDING: All right. Good evening. Does everyone have a copy of the presentation?

CO-CHAIR HAYES: You're going to get tired of bending down, you better lift that up.

MR. PAULDING: I will.

CO-CHAIR HAYES: Or lift it up a little bit maybe.

MR. PAULDING: Does everybody have a copy that wants one? And as Janet said, we do have copies of the proposed plan here also.

One second here. All right. There we go.

So welcome everyone. As has been introduced, we're here tonight for the IR-17 Proposed Plan Public Meeting. I'm going to introduce or will talk about the proposed plan, summarize it, and then we'll take questions at the end.

So the agenda for tonight, as we said we'll go over the proposed plan draft RAP -- or I'm sorry -- Remedial Action Plan.

CO-CHAIR HAYES: Thank you.

MR. PAULDING: Yeah, I'll try not to use acronyms. We'll also discuss the Comprehensive Environmental Response Compensation and Liability Act process which is the law, the basis for doing the environmental cleanup.

We'll talk about site location and history.

Our conceptual site model for the site.

Previous investigations and removal actions.

Nature and extent of contamination at the site.

We'll review site risks.

Future site use.

Remedial Action Objectives.

The summary of remedial alternatives that we've identified for the site. Remedial alternatives are the plans to clean up the property.

Then we'll go over the -- how the alternatives were evaluated.

We'll present our preferred alternative.

Talk about next steps, timing.

And then we'll take questions.

So to go over the legal process. What you're looking at is the proposed plan is the part in the stage in the process where we present the Navy's preferred alternative to the public, which is happening tonight, and also through the proposed plan which you should have received in the mail, and we do have copies here again.

We're open for public comment, as was previously stated. And we'll respond to comments in what's called a responsiveness summary which will be published in the Record of Decision which is a follow-up document.

The Draft Remedial Action Plan portion of the proposed plan is required by the State of California and it identifies specifically -- what is it? -- potential responsible parties.

Okay. So here's a graphic that shows the process, I think it might be a little bit clearer on your handout there.

But you can see there's the preliminary

assessment site inspection where you initially identify a site based on, you know, previous history, activities that happened at a site. You would -- environmentally there would be some questions, concerns about if there were some contamination at that site. You go out and collect, you might do a historical research, some historical research on the site. Then you would go out and collect some initial samples as part of a site inspection.

Then you would go out and do a more in-depth sampling as part of a remedial investigation. And then as part of a feasibility study you would identify legal requirements at a site as well as remedial alternatives.

Here in the proposed plan stage is where we are today, this blue on the handout. You identify the remedial alternatives, you go over the history of the site, and receive public comments.

Then you move next again to the Record of Decision and the final Remedial Action Plan.

Then we go into remedial design where we'll talk about some actual physical remedial activities that we're going to do at the site. So in that document you would design those and then you would implement the remedial action.

In this case we envision having some extended monitoring at the site following the remedial action. Then at some point, hopefully once the sampling shows that the remedial action was successful, we would then go into response complete phase.

And then ultimately receive site closure.

Okay. So here we have the site location. You're all familiar with Mare Island. This is where we are today in San Francisco Bay, San Pablo Bay, I guess more specifically.

And IR-17 is here in the north end of the island off of Azuar Drive, and Railroad Avenue here is off to the east.

Here we have a photo of Building 503, and I think this is 610, I think, six something, one of the 600 buildings off in the distance. I think this is J Street running across here.

Okay. Some of the history on IR-17. It was originally part of the tidal marshlands near the shoreline of Mare Island Strait and northwest of Mare Island upland area.

It was filled in over time between 1911 and 1938 with dredge material from Mare Island Strait.

And it remained undeveloped until, you know, pre-World War II era, 1938 to 1944.

And at that point several buildings were, as well as tanks and other infrastructure were built to support paint manufacturing that was ultimately used in painting the ships and vessels that were manufactured here at Mare Island.

And that facility closed down in the mid 1950's.

So here we have a couple historic pictures from the records. This one here was taken in September of 1940 and it shows building 503. A couple of classic cars out there.

Then this one, June 1941, it shows some of the tank farm, obviously the railroad and a lot of activity happening ramping up for World War II.

Okay. Here is our site conceptual model or a picture of it. So what you'll see, you see the tanks. You see we had two tank farms, we had a southern tank farm, a northern tank farm.

Here's Building 503 which was the main shop.

We had a couple storage areas here. Building 499 is a storage area.

We had a plant here. I can't see the numbers there, I think it's 579.

MR. COFFEY: 519.

MR. PAULDING: 519, thank you. So you have a lot of activity in the forties and fifties here. You can see we also identify some leaks, so here there's a pipeline that ran from the southern tank farm up to the various plants and manufacturing facilities, so we can --

CO-CHAIR HAYES: Reggie, I know we're not supposed to ask questions right now, but how many acres is this? It looks like a big facility. Do you have any clue?

MR. PAULDING: I do not have the actual number offhand. I can definitely look it up after I finish this presentation. I have a couple reference materials. And I can give that to you.

But here you see a leak here. Down here in this southern area which we're, we identified a chlorinated solvents leak, we had some -- we envisioned drum storage down in this area.

We had some more different sewer lines running in here.

We also had some oil water separators up in this area.

So all -- and then obviously the train track lines which were bringing raw materials in and the finished product out.

So here this, we have two pages that list out previous investigations. If you remember from the earlier slides where we talked about things like preliminary assessments, we had several stages of early investigations here at IR-17 beginning back in 1985, what they called a verification study, which obviously someone expected, you know, thought there might be an issue and went out and collected some samples and found something, contamination.

Then we had a follow-up study in 1986.

What they called a phase one remedial investigation in 1992.

Base-wide groundwater monitoring began in 1994.

Did a phase two remedial investigation in 1996.

Baseline human health risk assessment in 1996.

Now, see here where they call, group two and three accelerated study. So this was right around the time that the base closed and the Navy identified numerous -- well, sites, IR's, so how we got IR-17 there was IR one through --

CO-CHAIR HAYES: Why don't you say what IR stands for?

MR. PAULDING: I'm sorry, yes. IR is an investigation -- I'm sorry, I'm drawing a blank here. Actually, luckily, we have a page at the end.

CO-CHAIR HAYES: Installation restoration.

MR. PAULDING: Installation restoration, thank you.

On the back page of the presentation there's an acronym page. Installation restoration sites. And in those sites, once those sites were identified going through historical records, they identified them in groups one, two, and three. And IR-17 fell into group two and three. And that study was done in 1997.

We also had a base-wide polychlorinated biphenyl confirmation Sampling, also known as PCBs. And those samples were collected everywhere that there were electrical equipment that may have PCBs or polychlorinated biphenyls.

And then continuing on into 1999, did a confirmation and characterization sampling at IR 17, and then a removal action for those pipelines that I showed you in that site conceptual model. So there was a lot of excavation work done, which we're going to -- we'll get into on the next slide.

Then there was a chemical oxidation injection treatability study also in 1999 following that excavation work.

Did groundwater data gaps investigation in 2002.

Onshore ecological risk assessment in 2002, looking at risks to different eco-receptors.

And then in 2006 did a remedial investigation.

That was followed up with a document, a feasibility study was performed in 2006. And at that point there was some input from the regulatory agencies, DTSC and Water Board along with EPA, that identified some data gaps in the assessment work.

We went back, the Navy, in 2009 and collected additional soil groundwater and soil gas samples.

Which then took us to a non-time critical removal action in 2010 and additional sampling.

Then we did a post removal groundwater monitoring event in 2012.

We did a non-tidal wetland investigation in 2012.

We did a -- completed a chlorinated solvents investigation in 2013.

And then collected, I believe it was two additional polychlorinated biphenyls or PCB samples outside of Building 499 in 2013.

So quite an extensive list of different sampling projects.

So in late 1988 and through mid -- through June of 1999 there was this time critical removal action. So time critical means that the Navy and the regulators have identified that this is something that should happen in a pretty timely period.

So then at that point we write a work plan and so forth.

And then we conducted excavations to reduce the threat to human health from the polychlorinated biphenyls or PCBs that were identified at the site, along with polycyclic aromatic hydrocarbons or PAHs, metals in the surface soil. So there were -- the soils were excavated and removed from the following areas.

So there's these buildings here beneath the entire footprint of former building 519. And there's a photo on the next slide of that excavation.

Along the eastern and southern sides of the former electrical substation, that's building 567 which is adjacent to building 503.

At the other isolated -- so there were other excavations that were done, smaller excavations at Building 503 and 519.

Product distribution pipelines that ran along Azuar Drive were removed and there was excavations done there.

Oil water separator just north of building 519 was removed and -- along with contaminated soil. And that excavation removed approximately 8,900 cubic yards of soil.

We collected confirmation samples and verified that the time critical removal action goals were met.

So here on, I think we're on slide 16, this shows the footprint of the excavation from building 519.

Then in 2010 we did a follow-up non-time critical removal action in response to the results of the 2009 additional soil groundwater and soil gas sampling. This covered three areas known as excavations A, B, and C..

And you have a -- those are on the next slide, they're shown there, but then they're also shown here on this poster board we have up here, which you can all come up and take a look at, which shows the three -- well, actually it's this large area here just adjacent to Azuar Drive, this box, square area here off of Azuar Drive, and then these two smaller areas, this is excavation C.

And those were done to remove coal tar distillates which were one of the key ingredients in the paint manufacturing process. As well as at excavation C, that was done to remove chlorinated solvents which were identified as -- during the soil gas investigation in 2009.

And then here on this slide we have some photos of the work in action. And you'll see where it shows excavation C, A, and B. B is the larger of the three excavations, or largest.

So then here, this slide, slide 19 shows, well, the nature and extent. What we're trying to show here is all of the samples that were collected as part of those various investigation activities that were done starting in 1985 going through 2013.

So -- and then the thing that you'll see here, these subareas that were broken out, this was something that we did to identify, evaluate risk in the feasibility study.

So subarea one includes the northern tank farm, Building 503, most of the manufacturing activities that happened.

You have subarea two includes the southern tank farm, and Building 499, and the storage facilities.

Subarea four here is the wetland that's adjacent to IR-17.

And subarea three here is a parking lot, it's west of Azuar Drive, and the parking lot is for building 759.

So then the chemicals that have been identified at IR-17, the chemicals of potential concern in soil, soil gas, and groundwater include heavy metals, specifically lead for the most part; polychlorinated biphenyls, PCBs; semi-volatile organic compounds; total petroleum hydrocarbons, and those are mostly represented by the coal tar distillates in Benzene and Xylenes. Volatile organic compounds again which would be the Benzene and the Xylenes. And polycyclic aromatic hydrocarbons or PAHs.

All right. So site risks. So then if you remember, we broke the site up into four areas based on site use mostly. So -- and those are also again shown on this poster board here, and you have that figure in your -- I think there's also, there should be like an eleven by seventeen in the back of your packet.

So subarea one again includes the paint manufacturing areas and the northern tank farm.

Subarea two was the southern tank farm, the chlorinated solvents area, and the storage areas.

Subarea three includes again that parking lot adjacent to building 759.

Subarea four is the adjacent non-tidal wetland area. And subarea four was sampled and investigated and was found to not be impacted by activities and IR-17, and is not a part of the feasibility study or the proposed plan.

So human health risks in subareas one and two were, unacceptable risks were identified for future commercial and industrial workers and a hypothetical future resident.

So we evaluated a hypothetical future resident just to see if it was possible to get unrestricted use for the property, although that is not the current proposed future use for the site. But it's something that the Navy does as part of policy when evaluating risk at a site.

So then subarea three, no unacceptable risks were identified for hypothetical future users.

So ecological -- no ecological risk was identified at any of the subareas across IR 17.

And there's an exception to -- excuse me, Elizabeth, cause I'm sure I'll get this wrong -- but to domestic and municipal beneficial use for groundwater, we have an exception to that, drinking water policy from the Water Board due to -- I guess to complete that thought, due to high dissolved solvents, high dissolved solids --

MR. COFFEY: Say that three times fast.

MR. PAULDING: -- in the water. Okay.

So here we have another photo. This is the back side of the Building 503. The anticipated future land use in this area, IR-17 and Building 503 is commercial industrial.

Okay. To go into the details of the risk assessment and Remedial Action Objectives on this slide, it's a dense slide so I'll take my time and go through this. You guys can follows along.

So our goals here, this pretty much lays out our goals for subarea one; right? What we want to do is we want to prevent direct contact by future commercial industrial workers with lead in surface soil.

So we've identified an area beneath Building 503 that has high lead content, such that it could potentially be a danger to future workers in the area. So one of our goals is to mitigate that risk. Okay.

So second goal or remedial action objective is to prevent direct contact by hypothetical future residents or other sensitive users which include, you know, students or daycare, toddlers, that kind of a thing, young children, and lead in surface soil as well as subsurface soil. So down to ten feet below ground surface.

Prevent -- third remedial action objective is to prevent exposure of hypothetical future residents or other sensitive users to PCBs in subsurface soil. Subsurface soil is soil from the surface to ten feet below ground surface.

Prevent -- fourth, fourth remedial action objective is to prevent exposure of hypothetical future residents or other sensitive users to concentrations of -- very long here -- 1,2,4-Trimethylbenzene, Ethylbenzene, meta and para-xylene, ortho-xylene in soil gas that may pose a potential risk through vapor intrusion into indoor air.

So one of our concerns in subarea one is, there's pockets of VOC's that can potentially cause vapor intrusion issues.

In subarea two we have -- we have two Remedial Action Objectives. The first is to prevent exposure of future commercial industrial workers to concentrations -- from concentrations of TCE, trichloroethene in soil gas that may pose a potential risk through vapor intrusion to indoor air.

And prevent exposure of hypothetical future residents or other sensitive users with concentrations of TCE, vinyl chloride in soil gas that may pose a potential risk through vapor intrusion to indoor air.

Okay. And then we also have what we -- we want to prevent the use of groundwater for drinking water, and prohibit other uses of groundwater without authorization from regulatory agencies in subareas one and two.

So that covers the Remedial Action Objectives for the site.

And then at this point -- okay. So we have, we've identified the contamination; we've identified the risks from the contamination; and then we move into, okay, so what are we going to do about it? So that's here.

The remedial alternatives is our attempt to mitigate those risks and allow the site to be redeveloped. So we've identified -- more or less we've identified three remedial alternatives, excavation, monitored natural attenuation, and institutional controls. And the alternatives are some combination of these different remedial options.

Alternative one is no action which is a basic requirement of the law just it gives you a baseline, something to compare to, what if you did nothing, right.

Alternative two is institutional controls saying, okay, well we know where the risks are, can we just prevent people from entering those areas.

Alternative three, excavation and off-site disposal of contaminated soil; monitoring of the contaminated areas; monitored natural attenuation; and then institutional controls.

Alternative four excavation, additional excavation, much more than is identified for alternative three. Again, off-site disposal and future monitored natural attenuation.

And then there's some short-term IC's until if and when the monitoring shows that the risks have been mitigated to a point where there's sufficiently reduced risk to sensitive receptors.

Okay. So to step through them in a little bit more detail. Again, as we said, alternative one is basically the no further action, and it's just a necessary alternative to review.

Alternative two with the institutional controls, this basically, like I said, keeps sensitive receptors, people out of the areas where there's contamination and they could be negatively impacted. So it would prevent sensitive uses including residents, hospitals, schools, daycare facilities within, what is it, subareas one and two.

IC's will require an evaluation and, if needed, mitigation of vapor intrusion into buildings. So this would be for commercial uses. So if for a commercial use in a, in identified areas. So on this poster board those areas are identified with the black dashed line, this box. This specific area here in subarea two would have an IC for future industrial/commercial uses.

IC's are implemented to restrict soil

disturbing activities. Essentially you can't dig without proper approval.

The effectiveness of IC's would be verified through annual inspections and five year reviews.

The restrictions run with the land and are enforceable by DTSC. And all of these, again, are applicable to subareas one and two under alternative two.

Okay. Alternative three is a little bit more nuanced. We would be looking at, you know, excavation with monitoring and institutional controls. So under alternative three we would excavate contaminated surface and subsurface soil to protect future commercial industrial workers in subareas one and two.

So if you look on the poster board, these like seafoam green squares here, these would be the areas of excavation.

So this area here under Building 503 is the surface, would be the zero to, I believe it's, I think it's one foot where we would go in and remove this surface soil that has shown high lead concentrations.

This area here in subarea two we would remove soil down to 20 feet, because that's where we've identified the chlorinated compounds, and that's the soil vapor issue. This would address the soil vapor issue here.

Okay. Then we would also have the monitored natural attenuation following the excavation for approximately five years. That's a rough estimate.

IC's would be required, and mitigation of vapor intrusion into buildings in subarea two would be required.

Say if a building was constructed in this area here, kind of at this Azuar Drive, J Street intersection, there would be a requirement for the developer to sample for soil gas and look at impacts, potential impacts to any workers that would be in this area.

And there would also, again there would be IC's to prevent, you know, the IC's would require the sampling. And then the IC's would also prevent sensitive uses within either subareas one or two. I'm sorry, IC'S are institutional controls.

Okay. Alternative four which would be a much more aggressive excavation in both subareas one and two, it would target a lot of those other compounds that we discussed, identified in the previous slide that showed, you know, the Benzene, the Xylenes, the 1,2,4-Trimethylbenzene, all those types of compounds, the PCBs, we would go after and remove those compounds so that the subareas one and two would be essentially usable for not only commercial industrial uses, but also sensitive uses including residential.

So that's what, yeah, this second bullet where it talks about more extensive both depth and locations. So we would have excavations, the one underneath the building, for example, under, beneath Building 503, this excavation would go to ten feet instead of one foot.

There would be multiple other excavations that are shown, I believe. They're in the proposed plan, they're not in the actual tonight's presentation, but those excavations are shown in the proposed plan.

So here table three, which is on slide 30, it shows how the various remedial alternatives were evaluated. So we go through -- this is somewhat of an art, I guess you could say. It's subjective. But then we also tie some hard, try to put some numbers to the different alternatives here in this last column.

So what you'll see, the no action alternative is the cheapest, okay, which is obviously one of the things you look at.

But then you're also looking at how effective would it be; right? Is it going to get the job done? I mean, are you going to be able to use the site? Is it going to reduce contamination at the site? So forth;

right?

So what you see here is we have four different circles. The kind of like the -- what do you want to call this? -- like a quarter shaded circle shows that you have a poor outcome, half shaded is good, three-quarter shaded is very good, and a fully shaded circle is excellent.

So you kind of go down and you can compare these. And you weigh, you know, the various alternatives against each other. Keeping in mind, you know, public health, future uses, and so forth.

And we've identified what you can see here is that alternative three is shaded blue because we've identified this as the most reasonable and preferred alternative for activities at IR-17 building 503 area.

So yeah, I mean I think it's -- and I guess the final thing I'll say is you'll see like -- so for like long-term effectiveness, it's very good. It's not excellent, alternative four is excellent; but again, you're weighing all of the different criteria when you're trying to pick your, pick an alternative.

So to go a little bit more in depth on alternative three and why we selected this one as our preferred alternative.

It provides protection to human health and the environment by removing contaminated soil, the shallow soil that's beneath Building 503 that has the lead contamination. And it also addresses the source of the soil gas contamination down in subarea two.

It meets the federal and state applicable or relevant and appropriate requirements, also known as ARARs. The legal requirements basically; right? It's saying that it's in full compliance with legal requirements for the site.

Bullet three here says, right, provides long-term protection of the environment through permanent removal of contaminated soil.

Its short-term risk to the environment is low. I mean, we know how to do excavations, we can handle the risks, dust mitigation, those kinds of things.

And it allows the redevelopment of the site in a manner most consistent with the city of Vallejo's 2008 Mare Island specific plan.

And here this slide 32 is a smaller version of the poster board that I've been referring to. And again it just, it shows you the areas that would have institutional controls, the areas that would be excavated and, yeah, that's what it shows in the subareas.

Okay. So as was said earlier, we're accepting, we're almost there to the point of verbal comments, but we're also accepting mail, fax, e-mail, however you want to get your comments to Janet Lear. If you want to -- we're accepting those up until June 25th.

And you have the contact information also for Patrick and Jesus there.

All right. So next steps. Well, tonight is step one, we're having our public meeting which is part of the public comment period.

Then we're also -- then following the close of the public comment period we would prepare a responsiveness summary to answer and address public comments.

Then we'll produce a Record of Decision Remedial Action Plan, and that would be reviewed by regulatory agencies. In that plan we would select the selected alternative, so the preferred alternative or some alternative that is modified based on public comment would be documented in the Record of Decision.

So that the record -- and then we would move to the remedial design, remedial action work plan phase where we would actually provide the details on how the work would be done.

Then the remedial action would be implemented. We would have -- and then move onto annual IC's and five year reviews.

So kind of the short-term schedule is, again, the public comment period runs from Tuesday, this past Tuesday through June 25th.

Public meeting tonight.

We envision having the Draft Record of Decision at the regulators sometime in around July, August time frame, summer 2015.

Final ROD, Record of Decision going to regulators for review fall, sometime November, 2015.

And then again you have the acronyms page.

And that's the end of the formal, I guess, presentation. And open for any questions.

MR. COFFEY: Reggie, when was building 519 demolished?

MR. PAULDING: 519, I do not, I don't know. It was -- I don't believe -- it was not demolished as part of that 1998-99 excavation.

MR. COFFEY: That's what I was assuming because it was vague and it just kind of said between that period of time, so --

Did it have anything to do with the remediation?

MR. PAULDING: Again I do not know. Sorry. But we will -- I mean as we're taking comments here, I think that's something that we can definitely get back to you on. I don't know if it's in the feasibility -- it's not in the feasibility study, but it's definitely something we can get back to you on. I don't know. It's unfortunate I don't know the history.

MR. COFFEY: And the drawing kind of shows that there's something beneath Building 503. Are there any plans for 503?

MR. PAULDING: We, the Navy does not have any plans to demolish 503. So right now --

MR. COFFEY: How about getting into the floor?

MR. PAULDING: So Building 503 is on piles, so what the plan, the -- kind of the rough plan is to do what you call vacuum excavation. We would go -- so you can get -- there's enough space beneath Building 503 to get in there with hoses and vacuum out the top foot of soil.

MR. COFFEY: Has the ground been sampled underneath there?

MR. PAULDING: Oh, it has, yeah. There are --

MR. COFFEY: To any depth?

MR. PAULDING: It's been sampled, yeah. I mean we do have sample data down to approximately ten feet. That's what why we know that we do have an issue beneath Building 503.

I'm trying -- if you go to slide -- I'm trying to find the actual slide that shows, you know, the sample points.

MR. COFFEY: Uh-huh.

MR. PAULDING: Here it is. Slide 20 or slide 19, I guess it's number 19. So we have -- so here's Building 503, right. You see there's these three samples that are beneath the western end of 503. So these samples got down to some depth, and we have metals results, and it shows that there's lead contamination at those locations.

MR. COFFEY: Light contamination?

MR. PAULDING: Lead.

MR. COFFEY: Lead?

MR. PAULDING: Yes, lead.

MR. COFFEY: Oh, lead.

Mr. PAULDING: So no, the Navy has no plans for demolishing 503.

MR. COFFEY: Okay.

CO-CHAIR LEAR: Any further comments? Questions?

MR. PAULDING: There's a much more extensive what we call glossary in the actual proposed plan on some of the acronyms. So the acronyms are only, I guess, spelled out in the presentation, but if you look in the back, pages ten and eleven of the proposed plan, you can see more, some more detail.

CO-CHAIR HAYES: Paula, do you have questions? Comments?

MS. TYGIELSKI: I'm writing one down.

CO-CHAIR HAYES: Okay. Shall I ask a few questions while you're writing it down?

MS. TYGIELSKI: Sure.

CO-CHAIR HAYES: Cause I can see you're doing something there.

Can you, on slide twenty, can you tell us what the source of the PAH's, polyaromatic hydrocarbons was?

MR. PAULDING: It's -- I mean there's many sources. It's not necessarily easy to say. It can come from burning various things, I mean different woods, plastics, those kinds of things. It could have been --

CO-CHAIR HAYES: That's what I'm familiar with on other sites, like at area H-1, so I'm just curious what might have, they might have been doing.

MR. PAULDING: Well there was, I mean it's -- in that period between 1911 and 1938 when they were filling in, you know, the soil, it could have been, who knows, you know, just from the fill.

CO-CHAIR HAYES: In concentrations?

MR. COFFEY: Didn't you say that was dredge material?

MR. PAULDING: Yeah, it is dredge material.

MR. COFFEY: So why would there be --

CO-CHAIR HAYES: And why would it be in certain concentrations? I mean, is it ubiquitous then or is it in specific locations?

MR. PAULDING: It was definitely in specific locations.

CO-CHAIR HAYES: Probably wouldn't be from the dredge material.

MR. COFFEY: No.

MR. PAULDING: We don't -- unfortunately I don't, we didn't -- we found PAHs, there were some elevated concentrations, but they weren't necessarily risk drivers. So when we evaluated human health risk and we looked at the various compounds at the site, although PAHs were identified as being elevated in certain areas, they weren't really driving health risk as far as cancer or non-cancer risk.

The ones that were driving cancer and non-cancer risks were the specific compounds that we identified on -- let me see here what slide that was. I don't see it here exact -- oh, this slide here where it talks about 1,2,4-Trimethylbenzene, Ethylbenzene, M and P-xylene, O-xylene, as well as the lead and PCBs were the ones that were really driving human health risks.

CO-CHAIR HAYES: Okay. Then on slide 22 would you have been able to achieve unrestricted use if you'd spent into alternative four -- I'm just trying to remember -- you spent like an extra $5 million is what you'd need to do to get to that?

MR. PAULDING: That's our estimate, yes. And again, it would be -- I mean, yeah, it would be additional money, additional excavation.

CO-CHAIR HAYES: And how high is the -- in -- on slide 24, how high is the lead content below 503 that you're trying to reduce in, by removing the first, looks like half a foot, not a foot.

MR. PAULDING: Okay, half a foot. Right, the surface soil zero to a foot. It's -- so the remediation goal is 346 milligrams per kilogram, and that's in the proposed plan.

The concentrations beneath the building were, that's on page six in the proposed plan, the remediation goal. But I think the concentrations were between 500 and a thousand beneath the building.

CO-CHAIR HAYES: So you think, you're fairly confident that just taking a half a foot away would reduce it down to acceptable level for commercial industrial?

MR. PAULDING: Yes, because we would remove -- we would remove that half foot a soil, but then we would also replace the soil. So we would put clean fill. I didn't -- you're right, I did not mention that as part of the remedial alternative. Not only would there be the removal, but there would be replacement with clean fill.

CO-CHAIR HAYES: Lennar had a similar situation I think under this building that's just down Railroad a couple of doors. Steve, you were there. Did you use similar technology and how deep did you have to go? Do you know by any chance, Sheila or Steve? Sorry to put you on the spot there.

MS. ROEBUCK: It really varies but --

CO-CHAIR HAYES: I'm sorry, you might have to use the microphone. Sorry to put you on the spot, I know this is totally informal what I'm asking you to answer because I know you're not, you don't have, you're not prepared to --

MS. ROEBUCK: No, I'm not. But I would say is that when we've done remediation of soil for lead, we also take confirmation samples so we know that we've met the commercial industrial standard.

So I'm not sure but I would assume that that half a foot would be what your expectation is, but if after that half a foot is excavated, if samples show that you haven't met the goals, you continue.

CO-CHAIR HAYES: Is that so?

MR. PAULDING: I mean those -- that level of detail would be included in the remedial action, in the plan. So I mean, no, that is definitely standard practice, you would, I mean, you wouldn't -- once you did your excavation you would absolutely collect confirmation samples following the confirmation sampling.

If it did show that there was continued elevated concentrations we, I mean, we may or may not, because it depends on, see, the future risk or the future use of the site would determine how we would proceed. I mean, like, it depends on concentrations and what the future use of the site is. So at that point it would really have to go to, I guess, some kind of decision tree, and we would evaluate it.

CO-CHAIR HAYES: Well, it looks to me like the future use of the site is for the city of Vallejo to squander that building like they have every other building, the north end of the island, and spend exorbitant amounts of money breaking up perfectly good buildings. But -- so it sounds like you should -- it's sort of difficult situation because your future uses just --

MR. COFFEY: Sit there.

CO-CHAIR HAYES: -- sit there and be wasted, and then you have the difficulty of going in under a building that they're probably planning to tear down, and try to snoop around with a little vacuum cleaner and clean up when, you know -- have you considered the cost of just tearing it down for them? Is that $5 million?

MR. PAULDING: We have not. No, the Navy doesn't evaluate cost for demolishing buildings.

CO-CHAIR HAYES: Well, unless it's part of the environmental cleanup. All right. Well, I won't get into that. It's probably something political or something outside of the scope of this meeting or the Restoration Advisory Board, which I feel like I can talk about at the same time because you're using our Restoration Advisory Board meeting for a public meeting, so --

So it sounds like from your preferred alternative that your bullet on exposure of hypothetical future, I might as well not ask that question, you say you would go to as deep as ten feet, so you're not going to do that because you're not going to do alternative four, that's pretty obvious, with the five million dollar additional price tag on it.

Vapor intrusion into indoor air. You say you have VOC pockets. How are you going to, how are you going to address those? Was I not clear on that? I don't -- just ask the question here because I guess I didn't, I didn't understand what you were going to do about that.

MR. PAULDING: Right. So the plan for, so there's -- the major VOC pocket or chlorinated is down in subarea two right here in this -- so if you remember, excavation C that was performed in 2010 was targeted at trying to address the chlorinated solvents that were identified in this area. Unfortunately, it didn't address it.

And we followed that up in 2013 with a pretty aggressive sampling. We placed, I think it was, fifteen or so soil gas monitoring points. We collected groundwater samples, additional soil samples to try and bound the extent of the chlorinated compounds, that plume.

We believe we did that, and that's identified by this, by this, again, seafoam green rectangle here which is also in the presentation.

But, so that -- the plan to address this area of contamination is to excavate to 20 feet under alternative three so that -- and then fill it with clean fill material so that it will be usable for commercial industrial uses.

But then there's also, to use the pocket term, there's pockets of contamination along Azuar Drive. If you remember, there's a pipe, there was a pipeline that ran north-south here and connected over. So there's some here.

There's other areas that are in, outside of the previous excavation that we've identified, there's still some areas of contamination here.

There's some areas north of Building 503 and so on.

So in order to have the site appropriate for residential use we would also have to go in and excavate those additional areas.

CO-CHAIR HAYES: But they won't be, there won't be -- those will not be a factor for industrial/ commercial?

MR. PAULDING: Right, that's correct. Based on the modeling, you know, based on the time spent at the site and so forth, those areas were not identified as producing elevated risk for a commercial industrial worker.

CO-CHAIR HAYES: On slide 26, can you explain a little bit more maybe for the audience and also, I mean, for people who are not Restoration Advisory Board members, but also just where do you, because it is a part of the alternative three package, what evidence you have and what, what contaminants would be suitable for monitored natural attenuation?

MR. PAULDING: So the monitoring, the future monitoring is targeted specifically to soil gas, and it would be specifically in subarea two under alternative three. And it would target vinyl chloride and trichloroethene compounds.

And the wells, I mean the design has not been -- I mean, that's something that would be, you know, designed down the road, like actual locations of wells and that kind of a thing --

CO-CHAIR HAYES: You're proposing to use that as alternative three, which is your preferred alternative, and it would be curious -- I would be -- I'm curious to know whether you have any data that leads you to believe that natural attenuation has already been taking place?

MR. PAULDING: Well, I mean, I guess we -- unfortunately, no, we don't. We've done two sampling events specifically for chlorinated compounds in this area. They haven't necessarily shown any attenuation.

But we're envisioning, I guess -- I mean I wouldn't call it necessarily natural attenuation, we're monitoring attenuation based on the removal of the source, right. So we -- so this again, this rectangle here, we envision that that is the source material that's below ground. Once we go in and we remove that material we envision, I mean I think it's reasonable to expect that concentrations would significantly drop. But again, that's why we would have the institutional controls that would remain in place until we actually proved that there was a reduction in contamination.

CO-CHAIR HAYES: All right. I'm very curious about number, on slide 28 you mentioned something, maybe you could embellish your comments, stating that you would be requiring the developer to do something, monitoring something or removing something?

MR. PAULDING: So, yes. As part of the institutional controls, once the property is transferred, it would be the responsibility of the transferee, I guess I should use a more generic term. But the transferee, whoever that would be, to -- so if you wanted to build in, for example, right, you wanted to build inside this area, right. This is a defined area. It would be, you know, in the deed, and they would be identified as an area that would require sampling and some form of, I mean there's multiple different ways you could do it.

You could place barriers, you could have passive forms of air that would allow, say, the vapor to disperse before it entered the building; you could have blowers; you could have more active forms of engineered controls that would prevent contamination to enter the building. So there's different ways that you could mitigate the, say, risk to workers that would be in a space that was over this area. But that would all be, there would be some requirement in the documents that, the legal documents that would require whoever took possession of the property, they would be responsible for looking into the risks and addressing them in some form.

MS. TYGIELSKI: That sounds --

MR. COFFEY: That's insane. Who in the world would do this?

CO-CHAIR HAYES: This brings up the same topic we had about two months ago or four months ago or whatever.

MS. TYGIELSKI: Over and over again, institutional controls.

CO-CHAIR HAYES: Where you're leaving something for somebody else to try to figure out.

MR. COFFEY: To take responsibility.

CO-CHAIR HAYES: When it's your responsibility.

MR. PAULDING: Well, we're not recommending alternative two, keep in mind, right. We're --

CO-CHAIR HAYES: This is in alternative three where I have the notes.

MS. TYGIELSKI: This is in alternative three.

CO-CHAIR HAYES: Vapor intrusion in the buildings under subarea two, and that's under alternative three on page -- I already noted that I'm referring to page 28.

MR. PAULDING: Oh, I'm sorry. Okay. So on slide 28, so alternative three, we are proposing to remove this area of contamination. I'm sorry, I thought you were talking about alternative two.

CO-CHAIR HAYES: No.

MR. PAULDING: Sorry. Alternative three, this would be removed. And what we were talking about, that wouldn't, that's not a part of alternative three. Alternative three the Navy is going in, proposing to go in, excavate this material, sample and do post excavation sampling to identify, to confirm that the material has been removed and the contamination has been reduced.

CO-CHAIR HAYES: Okay.

MR. COFFEY: So clarify. So what she was talking about, those restrictions will not be present in three?

MR. PAULDING: Not -- no, no, not in three. So in three, alternative three, the way we envision alternative three playing out, right, is we -- the plan is to remove the soil, to follow the soil removal up with five years of monitored natural attenuation, or monitored attenuation, okay.

If at the end of that five year period this area has not been sufficiently reduced, then there would be options; either A, right, continued monitoring; and/or B, there would have to be some additional, right, there would have to be something else done, but that else has not been defined.

CO-CHAIR LEAR: I think that we should probably address this in more detail in the responsiveness summary. But I also would like to note that for the Navy to design and implement a program for a building that we don't know how it's going to be constructed is --

MR. COFFEY: Or used.

CO-CHAIR LEAR: -- or used is really not something we can do. But we will go into more detail in the responsiveness summary and provide some examples of, in more detail, if that would be -- I think that probably would be best. Cause this seems to be a. --

MR. PAULDING: An issue.

CO-CHAIR LEAR: An issue. So we'll talk about this in detail.

MR. PAULDING: We have a question in the back.

MS. FIGUEROA: I am Patricia Figueroa. And on page 22 it says there's no risk to ecological, no ecological risks on the site. And then on the table three there's a, the first category, overall protection of human health and the environment; how do you define environment and ecological?

MR. PAULDING: Okay. So in table three human health and the environment is grouped together. So it is -- it's kind of an all, this is an all-encompassing category, so it's not specific to -- it's not an either/or, and it's, it's not saying -- I mean, the two statements are not contradictory, first of all.

And what we're saying, this is trying to get at something slightly different than the statement that you identified. This here is saying is there -- would the activity protect future use for humans and the environment.

And what we're saying is is that alternative one in this case, the no action alternative, which also includes, it doesn't include IC's, right, or institutional controls; alternative one implies that the Navy would just walk away from the property, do nothing, have no future plans to do anything and, you know, whatever happens, happens; right? That's alternative one.

And that is not -- because of the lead contamination, because of the volatile organic contamination at the site, for those two reasons alone alternative one is not protective of human health.

MS. FIGUEROA: How can that be no ecological risk and contamination?

MR. PAULDING: So ecological risk is evaluated differently than human risk or human health risk. And the contaminants -- so there, I mean, there's a lot of detail that goes into things like slope factors for cancer risk.

And when you look at things, when you look at the compounds and the constituents you look at different things or different impacts on humans versus on what they call target animals, target species.

And, I mean, there's numerous and a very, you know, a lot of work that went into evaluating ecological risk versus human risk. And there was -- I mean, the risk levels just don't show up for the target species with these compounds at the depths that they are at and the concentrations that they are at.

So, for example, the VOC contamination that's identified in subarea two, it's at a pretty deep depth; right? That's why we're saying, we're targeting a 20 foot excavation. And typically when you look at, say, like animals, they're not burrowing, say, to 20 feet, and that's why we don't foresee that as a risk to animals.

CO-CHAIR HAYES: I just had a couple more questions. I just want to state that, concerning alternative three in this whole building, Janet's statement that the Navy says they can't design a long-term remedy if you don't know what the building's going to look like on the site or something like that, then that's not your responsibility; I would think that you could consider in alternatives for the Remedial Action Plan, or the remedial plan or whatever that is. You could consider making that area a parking lot or a park or something like that where you wouldn't have to address some actual building over that property as part of an institutional control in my opinion. So I'm just going on the record with that.

MR. PAULDING: Okay.

CO-CHAIR HAYES: And then on page 29 -- okay.

Well, forget it cause alternative four you're not going to do, I already know that, so --

Yeah. Similar to -- I think for consistency, probably you want to be consistent, you stated in alternative three on page 31 that at 503 you would remove lead to one foot on this slide, whereas in the previous slide it says up to half a foot. So you should probably be consistent. And then -- or else I misunderstood what you said. So just go over the notes and confirm that.

And then this is the first time, on page 31, that the word "environment" as far as I can tell comes up, protection of human health and the environment. So I didn't see where you had done any analysis of the impact to the environment, so maybe you could explain that. Again, maybe, maybe I didn't understand what you just --

MR. PAULDING: No.

CO-CHAIR HAYES: Maybe you were answering her question ahead of my question, so is that the same thing?

MR. PAULDING: I mean, we did evaluate impacts to the environment. We specifically -- so the work that was done in the wetlands, the adjacent wetlands, subarea four, was -- all that work was done specifically to evaluate risks to the environment. We've also collected all of the soil samples, all the groundwater samples that were done are collected, were evaluated to look at risks to targeted species in the environment.

So what we had said was, very early on in the presentation, was that based on the work that was done that there was no identified risk. See, so here on slide 20 -- 22, I guess it is, "Ecological risk assessment identified no ecological risks associated with the site."

CO-CHAIR HAYES: Even if you had, I can see that you have an exception for groundwater, but even if the groundwater had a contaminant in it that would reach the river, which there's a very shallow groundwater there.

MR. PAULDING: There is. There is shallow groundwater at the site, but based on -- so there are, so there's tables, there's all kinds of things that you can look at, the Water Board provides guidance for this exact situation.

And based on the concentrations that we have at the site, comparing those to the tables and the guidance from the Water Board, there's no -- there's no reason for concern, right. There's no evidence that what's at this site is reaching -- is reaching the Mare Island

Strait. And further, I mean we do have downgradient wells that also support that.

CO-CHAIR HAYES: Okay. Great. And my last question is on slide 32. How did you evaluate subarea three and conclude that there was no, no future requirement to do anything? Because you indicated that it's a parking lot now. But how do you know there's nothing under it?

MR. PAULDING: Okay. So if you go to slide 19 in your packet.

CO-CHAIR HAYES: Yeah.

MR. PAULDING: You'll see that there's quite a number of samples here in subarea three. So again, what we did -- so the way we approached the site was we broke it up into different -- these different subareas. And one of the reasons to do that was to -- was to look at kind of sites based on or the areas based on use, historic use and future use. And so what we did was we -- I mean -- and we had a very, we had a very good number of samples in here, and we evaluated risk just the same as we did in the, in subareas one and two, we also evaluated risk in subarea three.

And based on -- based on review of, say, historical records, historical area photos and so on, there really wasn't, this area wasn't used for anything other than a parking lot going all the way back to World War II. And the samples also verified that. We didn't see any contamination in that area.

Sheila.

MS. ROEBUCK: Okay. I just have one sort of comment and question. With respect to slide number 32, which is also your preferred remedial alternative poster board that you have, you reference industrial IC and sensitive uses IC. And normally what I'm used to is, when I talk about commercial industrial controls through institutional controls, normally that restricts against sensitive uses.

So when I look at this I thought, when you said sensitive uses IC, that you were talking about having a restriction against sensitive uses; no hospitals, residences, daycare centers, and schools for kids under eighteen, those things would be restricted. And that's what you're talking about with the sensitive use IC.

MR. PAULDING: Yes.

MS. ROEBUCK: But then you have industrial IC in your legend. And I think from your discussion what your expectation is, and correct me if I'm wrong, that you're worried that even after your excavation you may have a soil vapor problem, and you're trying to address the potential for maybe an engineering control or something down the line. Is that right?

MR. PAULDING: Yes. Well, it's not that we're worried, it's that we want to be protective. So the plan as it's, you know, the rough plan right now is that the area identified in the black dashed line, that square, would have an IC that would have a way of, you would have a way of removing it; right? Once you hit like, say, a target with the -- cause remember, alternative three also has monitoring associated with it. So you would monitor it. Once you hit a point that showed that there was no longer a risk at that area, then that IC would go away.

MS. ROEBUCK: Yeah. And I guess what I would just ask that you consider is the IC's are usually imposed at the end, and what you're going to do in the interim is this excavation, which is great because it could remove the need for it.

So, you know, at this point this interior IC that you're proposing is, it just seems like you don't have the data to know you're going to need that, and you may, but it just seems like you're trying to decide about something that you may not actually need. And you say you're going to do five years worth of analysis of soil gas, so you're going to have a lot of information, and so, you know, I just don't know that that IC is something you could really decide on right now.

But, you know, consider it yourself. It just seemed odd to have the remediation and the IC in the same general place.

MR. PAULDING: Okay.

MR. PAULDING: All right. Any additional questions? Comments?

CO-CHAIR HAYES: Paula, you have some?

MR. PAULDING: Paula wrote hers down. You going to give us a written comment?

MS. TYGIELSKI: Yes.

MR. PAULDING: That brings the public presentation to a close.

(Thereupon the public meeting was concluded.)

MR. PAULDING: And I think, Sheila, are you next?

MS. ROEBUCK: I am. Neal was supposed to be here but he's on jury duty.

CO-CHAIR HAYES: They have night court?

CO-CHAIR LEAR: So you want to take a ten minute break?

(Thereupon there was a brief recess.)

CO-CHAIR LEAR: Okay. Let's go ahead and get started again. Our next presentation is the Eastern Early Transfer Parcel update and path forward, and Sheila Roebuck from Lennar will be doing that.

MS. ROEBUCK: Should we wait for Myrna? Oh, here she is. Okay. The answer is yes. Okay.

So Janet just gave you the title of the presentation. What I want to do here, and I know, I was just talking to Myrna, that you don't want to hear a lot of things about what we've already done, you would rather here more about what we're going to do. So as we go through this I'm just going to try to point out in the things that we have done how that contrasts with what we have left.

So we're going to talk about what we've done in 2014 in the field in terms of documents; what we've gotten completed; and then tell you what we're going to do in 2015; and our projected schedule for hopefully closing out the remainder of the environmental work on the Eastern Early Transfer Parcel.

This shows the areas where we did fieldwork in 2014. There are fifteen sites here, and they range from some pretty small sites, for example, building 144, what we did there is we put in one temporary well and we've been taking some samples. So it's very simple work. Contrast that with, you know, Building 637 where we had, you know, thousands of cubic yards of soil that we removed. So it's highly variable. But there were, as I said, fifteen sites. So remember that number as we go through to talk about 2015.

The next few slides are really just a short description of the work that was done at the various sites in 2014. And I'm not going to read all the words because you can do that.

But what I wanted to point out here is that most of the remaining -- most of the work that we've been doing has been in investigation areas C-1 and C-2. And in future years that's going to be the case as well. Investigation area B.2-2, that Building 637 work is the last physical remediation work that we expect in that investigation area.

In investigation area C-1 we've done a number of things, PCB sites, polychlorinated biphenyl sites, and fuel oil pipeline sites, FOPL sites.

We've also done some work on Installation Restoration site 03, and the sediments just east of the quay wall that are contaminated with some petroleum hydrocarbons.

In investigation area C-2 we've also done some work over the past year at five or six sites. So a lot of the work that we have been doing has related to either petroleum hydrocarbon contamination or PCB contamination.

In investigation area C3, as I mentioned, we did -- you know, I'm just going through this looking at my stuff and not even looking at yours. Okay. The building 144 that, again, I mentioned that was just a temporary well installation and sampling. We've done some regular groundwater monitoring at a number of sites. The Building 637 area work is done, there will be no more groundwater monitoring there. Fortunately we didn't have any contamination groundwater that exceeded the regulatory criteria.

The other three shown here will continue to have some additional monitoring, and you'll see that as we go through the 2015 work.

Myrna.

CO-CHAIR HAYES: To jump back to five. Can you tell us what you're monitoring for at Building 866? I know it's in C-2 and you already passed up C-2, but -- I've seen a lot of equipment out there when I drive by every day, but I don't know what the heck they're doing.

MS. ROEBUCK: Okay. Well Building 866, if you'll recall, was a giant building that's been taken down. And that area was cleaned up for commercial industrial reuse. And it was satisfactory for that. But LMI decided that we wanted to clean it up to unrestricted standards. And in the process of that, the Water Board asked that we install a well to evaluate petroleum hydrocarbon contamination that I think had been associated with an underground storage tank. And what we found was that there was significant contamination there.

And so what has been done is a continuing effort to, one, get the well in; and two, take groundwater samples. And with that work we are looking at it over time, and we've also looked at it a couple of ways. We looked at it without any silica gel cleanup and we looked at it with silica gel cleanup. And that -- the difference between those two has been really significant, but the Water Board has been not looking favorably at the silica gel cleanup method. So we're still working on that one.

CO-CHAIR HAYES: Well, I don't mean to just like dig in here.

MS. ROEBUCK: Okay.

CO-CHAIR HAYES: But this is an example of what I personally would find of interest. And I think that -- ooh, I'm so tired of this topic, you know that? Because I seem like the only person, maybe I will be the only community member after Mike moves to --

MR. COFFEY: Texas.

CO-CHAIR HAYES: -- Texas, and it will just be Paula and me unless we can conjure some more people up who want to put up with this kind of stuff.

But thank you, Mike, for sticking with us for so long.

I've been trying to say that surely you are doing something or thinking about doing something that you haven't done yet. And so here we are having this what we did do. But this sounds like it's kind of a juicy topic. And the Restoration Advisory Board is actually founded under a law that asks us to approach the responsible parties and the regulators with an eye towards thinking about early and often communication about environmental cleanup. That is before you have clearly defined what you're going to do on a site and begun doing it.

So I would remind my regulator friends that that is our purpose, and I would remind our RP friends, responsible party friends, that that is our purpose.

So while I don't mind, and I've said this so many times it's beginning to sound like I'm a wife of somebody's, but the fact is I really don't mind, you know, resting, sitting back after 21 years and saying, gee, we have done a fantastic job together. But I really don't want to sit here and disobey the law, which is what have we got ahead of us and how are we going to be helpful to you in helping you get the work done.

So, please, could I have that on the agenda for one of the upcoming Lennar Mare Island topics, please?

MS. ROEBUCK: I've noted that you're interested in that topic, Myrna.

CO-CHAIR HAYES: Thanks.

MS. ROEBUCK: Okay. So we already talked about this slide, so I'm just going to go past it.

This is the reports that we submitted in 2014. I'm not going to make you listen to every single word on this, on these slides, I'm just going to point out a couple of things.

We have, as you'll see in the next two slides, there are many reports that we've had submitted. We -- some of these have been reviewed and approved, and we'll talk about that. But a couple of them that are really important to us that we have to get through so that we can present them to the RAB and the public in a public forum are the C-1 and the C-2 RAP.

The Remedial Action Plans for those investigation areas are going through the review process, and the next step will be public review copy of those. And so those -- of all the reports that are here, those are probably the most important to get us to be able to move those areas through to completion.

As you'll see on the next slide, there are, as I mentioned, quite a few reports related to polychlorinated biphenyl sites and fuel oil pipeline sites. Those generally are, at this point, relatively simple and usually things that we think we've got cleaned up. There will be a few that we will be working on in 2015, and I'll talk about that as we go. But for most of these we think that the remediation that needed to be done has been done, and a number of those have been presented to the RAB over the years.

The other thing that I would point out is the land use covenants that we submitted for review in 2014, of the ones that have been submitted, we've gone back and forth with review with the regulators, only one of those has been executed, and that's the investigation area B.1 land use covenant. The others are in various stages of review. And they have related to three investigation areas, B.1, C3, and H-2.

We have got, gotten no further action certification on a number of sites here. Again, these are mostly petroleum hydrocarbon sites or PCB sites. So petroleum hydrocarbons at building 811 or associated with the fuel oil pipeline sites. There are also, as I mentioned, PCB sites.

The other thing that I wanted to point out was, and I'm not sure that everyone would know this, but investigation area D1.3 north, which is the success center, that area has gotten closed out. We've gotten no further action certification on that parcel. And the pre-decision covenant that was in place there has been removed. That's been cleaned up to unrestricted standards.

CO-CHAIR HAYES: What were you cleaning up?

MS. ROEBUCK: Oh, at investigation area D1.3 the cleanup that we did that was the last thing that we did was lead-based paint and soil. So we had actually done that in -- many years ago.

CO-CHAIR HAYES: Yeah.

MS. ROEBUCK: And the -- over time the paint had degraded, especially on the side that's associated with the weather, and so before repainting that the paint was tested and found to have some lead, even though it was scraped and repainted before, and so it was again scraped and repainted, and then the soil around the drip lines was tested.

And it was interesting when we were talking about the depth of remediation, when we initially did it years ago some of the remediation was, you know, a couple of feet. In this most recent remediation we had three inches. So anyway, that was the most recent one that we did.

CO-CHAIR HAYES: Have you -- I mean, having an old house that has lead paint on it, have you studied a lot why paint peels? It isn't just because it's weathered. It isn't just because it's shitty paint, which it is, American paint is not very good; but it's actually, actually has a lot to do with moisture in the building a lot of times, and how that's, its pathway is to come out of the siding. And it could be moisture that's from the, a roof or roof leaks, other pathways where moisture builds up and then it comes out. And it, no matter what you think you've done to prep, sometimes you aren't prepping for paint to stay on, you're prepping for paint to stay on for a few years until you can scoot. And that's most American paint and the way that it's applied.

So I'm just curious about what you did since this is the second time you've remediated that property for lead, what you did to make sure that that --

MR. COFFEY: Doesn't reoccur.

CO-CHAIR HAYES: -- that the job was done.

MS. ROEBUCK: Well, I think that the time before --

CO-CHAIR HAYES: That would be another good presentation. Hello. Thank you for bringing it up.

MS. ROEBUCK: Well that's, again, work that's been done many years ago.

CO-CHAIR HAYES: But then it had to be redone, and this would be a very interesting thing for those of us who have been here that long, as you have. Uh-huh. Uh-huh.

MS. ROEBUCK: Well, with that exercise we didn't expect that we were going to find lead-based paint because we had already remediated it.

MR. COFFEY: You thought.

CO-CHAIR HAYES: You hadn't stripped the paint.

MR. COFFEY: You thought.

MS. ROEBUCK: So when we looked back on it, you know, there are some contractors that do a better job than others. And I think, for example, we've gone through a similar exercise in investigation area H-2 because we want to be able to close that out. And we were concerned that there was some peeling paint there. So we went and inspected all the buildings there, and there were maybe eight of them that were of potential concern. And what we found is that a number of those buildings were in really good shape and they didn't have peeling paint, and none of the soil was contaminated. Cause we tested again because we wanted, after the experience we had at the success center we wanted to just feel more comfortable that H-2 is okay.

MR. COFFEY: Ironic that it's at the success center.

CO-CHAIR HAYES: Unsuccessful success center.

MS. ROEBUCK: But I think it's a combination that the work that was done on the success center building 733 and 737 could have been done better.

And this time we used a contractor that we have a lot of faith in, and they did, we think, a really good job. And we have repainted it with non-lead-based paint.

CO-CHAIR HAYES: Well, sure. I'm sure you have.

MS. ROEBUCK: So we don't have an expectation this problem is going to reoccur. I mean, will the paint peel? Maybe. But we don't expect it's going to have lead-based paint because we've remediated that building twice and we've repainted it with non-lead based paint. But it may yet peel.

But for you, for example, with your home, most homes that are older, you know, if they were painted before 1978, it's likely that there's lead-based paint there.

CO-CHAIR HAYES: Oh, sure.

MS. ROEBUCK: And, you know, HUD deals with that, it's usually not somebody like DTSC. So that's, you know, what most homeowners will deal with. And, you know, whether you deal with that at a property transfer or something, I don't know.

But for Mare Island, we dealt with lead-based paint on buildings, scraped, repainted, and cleaned up the soil in 2005. That work was done a long time ago.

CO-CHAIR HAYES: So what about like you've already, DTSC has already certified like captain's row and all of that, because you already did that work, how are those houses holding up and? I mean this is a topic, huh, and we better not waste our time tonight but, you know, I think that you bring up a good point.

If we hang around long enough we'll get to evaluate, you know, how well performing certain remedies are. And I think that would be a topic that would be of great interest.

MS. ROEBUCK: Well, in captain's row, for example, that's an area that has unrestricted reuse.

CO-CHAIR HAYES: Right.

MS. ROEBUCK: There is no, no role that the DTSC currently has unless there's a new problem that comes up. We've remediated that soil. We've remediated all the contamination that we found there.

So we would not go back to D1, D1.1 and D1.2 to look in that way. What we do is we deal with those things as asset management issues, so if something needs to be painted we repaint it. But we wouldn't, we wouldn't look at it from a lead-based paint standpoint because we've already cleaned that up.

Okay. So moving on. Okay. Just some photographs. This was Building 637. We've talked about that with the RAB. We did soil characterization, excavation, restored the site, did groundwater monitoring. We have done all of that, and we have submitted our report describing the implementation and requesting site closure for that. And that's in review with the regulatory agencies.

CO-CHAIR HAYES: And is that for unrestricted use?

MS. ROEBUCK: Yes.

CO-CHAIR HAYES: So that would be for housing and other sensitive uses?

CO-CHAIR HAYES: Yes.

MS. ROEBUCK: Yes.

CO-CHAIR HAYES: I think we should congratulate you if you can get it through the regulatory hurdle, that's an achievement.

MS. ROEBUCK: Well, we're working on it, so hopefully the Water Board is going to give us comments back on the report, you know, within the next month we hope.

And investigation area C-1, again I mentioned IR-03 which is the northeastern part of the Eastern Early Transfer Parcel. There are -- there's another photograph here in the lower right of pilot test implementation at industrial waste pump station four and C-1. And then there's at that couple of PCB sites that were worked on there.

Oh, that's weird. I don't know what happened to that.

MR. COFFEY: This page intentionally left blank.

MS. ROEBUCK: Well, I'm sorry, but the photographs are in your handout.

CO-CHAIR HAYES: Yep.

MS. ROEBUCK: But for some reason they are not on the slide. That's so strange.

CO-CHAIR HAYES: You want to borrow a handout?

MS. ROEBUCK: I have one, fortunately. This is just photographs of work that went on in 2014. Fuel oil pipeline sites. PCB sites. And the well installation I mentioned and we talked a little bit about it, the Building 866 area.

Again, no photo, but here it is on the slide. I don't know why that happened. I apologize for that.

This is the installation of the temporary well at building 144. I'm going to mention that a little bit as we talk about 2015. It's a temporary well that we are putting in, - that we have put in, and --

MS. TYGIELSKI: What does OWS stand for?

MS. ROEBUCK: Oil water separator.

MS. TYGIELSKI: Okay.

MS. ROEBUCK: I'm sorry, Paula, I should have said.

That there was an oil water separator in building 144 that was removed, but it created some contamination of groundwater by petroleum hydrocarbons, and so that's why the monitoring well got put in.

Okay. So now we're going to move to 2015, what we expect to do. And again, I mentioned that in 2014 we did fifteen sites where we had fieldwork. In 2015 we expect to do fieldwork at six sites. So it's less than in the past and that's -- we think that's really good news because it means we're getting the place cleaned up and ready for reuse. And we've done that with the input and help of the RAB. And I just think we should all, you know, celebrate that we're getting closer to the finish line.

Building 121 is a site that has petroleum hydrocarbon contamination that's being cleaned up on a concrete floor.

The next four sites noted here are all PCB sites that are being cleaned up.

And then the last bullet is just describing the groundwater monitoring program that we are using at a number of sites, some of which we've already talked about.

And let's go to the next slide, the reports that we expect to submit or have submitted.

The investigation areas B.2-2, D1.3 south, which is the southern part of that investigation area adjacent to the Marine Corps Firing Range, and then for investigation area H-2 we expect to submit the implementation reports for the investigation areas as a whole for those.

As I mentioned earlier, we're really working to try to get the RAPs done for investigation areas C-1 and C-2.

We've got various PCB site reports that we expect to submit; three of them in investigation area C-2, one in C-1. And what I'll point out is that with the Remedial Action Plans, we pretty much know what we believe the remedies are going to be for the remaining sites like these PCB sites, but until we have the RAPs done, you know, we can't -- we can't say we're finished because we haven't got the road map approved.

So in some of these other sites that are shown on this or the reports shown on slide seventeen are individual sites, not entire investigation areas. And I just want to point out a couple of things.

The land use covenants, there are eight documents that we're submitting related to land use covenants. So as I mentioned at the last RAB meeting, that's a big deal for us to get these land use covenants through in order to achieve closure.

And in investigation area C3 we do have a final Remedial Action Plan. So once we do these land use covenants and do one other site, which is the building 144 oil water separator site that I'll talk about, we think we're going to be ready for closure of that investigation area as well.

One of the things that we talked again about with the land use covenants is that we have to do the annual inspections. We do five year reviews as well to make sure that we evaluate the efficacy of the remedy, so that if there's any problem with the remedy we can have the best chance of identifying it and addressing it.

So moving forward. As I mentioned, we don't have a lot of sites left that we believe require physical remediation. There are some sites where, for example, investigation area C3, it says here on the fourth bullet, "Only one more site to close out IA-C3."

What that actually means is that with building 144, oil water separator, we have some groundwater contamination, and we have one well right beside the building that, beside the feature, the former oil water separator that had contamination. So we were going -- it's about, I don't know, about 150 feet from the strait, I think, maybe a little less than that. And we worked with the Water Board to try to say, okay, we have contamination in the building, do we have a problem potentially with contamination that could reach the strait? And so we put in another well.

And what we found is that the well inside the building looks good. In other words, the contamination has -- the concentrations have declined and there are -- it doesn't appear to be a problem. But the new well that's outside the building and a little closer to the strait has higher concentrations. But we only have a couple of rounds of sampling on that well, and so what we need to do is take some additional samples so that we can evaluate whether there's a trend, and then work with the agencies and use that data to say do we need to do more or not?

So, as I mentioned again, most of the sites, most of the physical remediation that needs to be done, that remains is in either investigation area C-1 or C-2. The goals that we have for 2015 are to get a no further action certification on investigation areas B.2-2, which is where Building 637 is, and investigation area H-2.

We will be submitting the investigation area-wide implementation reports to the regulatory agencies within, you know, the next month or couple of months. And we hope to be able to finish that process by the end of the year.

Again, we want to resolve the building 144 oil water separator groundwater quality issue and evaluate if there's anything more we need to do there; finalize the RAPs; and do whatever remediation remains in those investigation areas C-1 and C-2.

So our expectation in terms of schedule for no further action certifications is listed here. And everything is estimated. I mean it's all dependent on how quickly we get the reviews done and comments or responses to any regulatory comments made when our, you know, reports actually go into them. So there's definitely an uncertainty associated with some of these things. And we -- but we do hope in the next year that we can close out three sites.

For example, investigation area B.1, all that work is done, we're just waiting for a no further action certification letter from DTSC. Everything that we needed to do with the land use covenant, the remedy complete, you know, all those documents, the operation and maintenance plan, that's all done. So that, I think if we didn't get that done, I'd be shocked.

The other two, B.2-2 and H-2 will be a little bit more challenging, but we do hope to do them in the next year. The others are two to three years out.

But we hope that we're getting closer and closer to actually cleaning this up and being finished.

MR. COFFEY: I'm coming back for that day.

MS. ROEBUCK: So if you have any questions I can take them now.

CO-CHAIR HAYES: So when you say you have physical -- majority of sites requiring physical remediation are in C-1 and C-2, how many is that?

MS. ROEBUCK: We have six that we intend to do physical remediation on in the next year.

CO-CHAIR HAYES: If you have few required physical, few sites that require physical remediation, if not physical, then I would hope that you could come back to us and tell us what hurdles you do face which the RAB members might help you with.

MS. ROEBUCK: Okay. Thank you.

CO-CHAIR LEAR: Any other questions?

MS. TYGIELSKI: It's good to see progress.

MR. COFFEY: Light at the end of the tunnel.

CO-CHAIR LEAR: Thank you, Sheila.

MS. ROEBUCK: Thank you.

CO-CHAIR LEAR: All right. So we are at administrative business. And if you have any comments on the meeting minutes from last time, please get those to Myrna or myself.

So I'm just going to march through the focus group reports.

Community and natural resources we don't have a group leader right now, so skipping to technical.

MR. COFFEY: We don't have a group.

MS. TYGIELSKI: No report.

CO-CHAIR LEAR: No report. Okay.

City report. Erin.

MS. HANFORD: Sure. Thanks. I wrote a couple things down. Thanks. Let's see. Just an update. As you can probably all see, the demolition of building 755 in north Mare Island is nearing completion. It's been a long project but glad to see it go.

The next big project that I'm aware of is the western approach to the causeway bridge. I spoke with our folks on that and they're expecting to start the project in early July. It's a six month project. And they're going to keep one lane open, and that will be the lane -- let's see if I get it right because I didn't write it down -- the lane coming to Mare Island will be open and -- during most of that time. There will be a couple of small closures when they're doing pile drivings and things like that. But that was the concept.

And I asked the folks to try to put something on our website to update folks on what's going on with that project. There's already a project description, but I asked them to put, you know, more bridge closure, those kinds of things, updates on that site.

And then we're just continuing due diligence on north Mare Island.

That's all I have. Any questions? Okay. Thanks.

CO-CHAIR HAYES: Thank you.

CO-CHAIR LEAR: Next we have the Lennar update.

MS. ROEBUCK: Which I think I've already given.

CO-CHAIR LEAR: You've pretty much covered it all.

MS. ROEBUCK: Unless you want to listen to it again.

CO-CHAIR LEAR: Weston update, Dwight.

MR. GEMAR: Short and sweet.

MR. COFFEY: Very short.

MR. GEMAR: As Michael mentioned, yeah, it's a concise report this month.

Well, we have one document that's being reviewed by the regulators, and that's the investigation area H-1 annual remedy status report for the last year. This is the area that includes the historical landfill. And so we're expecting a concurrence or comment letter from DTSC pretty soon.

And then there's one document that's being internally reviewed by the Navy, that's the Remedial Action Plan Record of Decision for Investigation Restoration site -- or Installation Restoration Site 05 and the adjacent Dredge Pond 7 South and the Western Magazine Area. And those, again, are the sites that are west and south of the golf course. So that's under review by the Navy, and then will be going to the regulators pretty soon.

And then for investigation area H-1 itself, other than the usual monitoring of the groundwater collection system. We do have two wells that we're going to replace in June that have an obstruction in the casings, and we use those wells to monitor groundwater levels. So since we can't get the probe to the bottom of the well we need to replace those wells, so we're going to do that in June.

That's it. Any questions?

MR. COFFEY: Okie dokie.

CO-CHAIR LEAR: Okay. So regulatory agency update.

MS. WELLS: Okay. So let's see. The Water Board, we're trying to continue plowing through documents that are turned in because they keep coming in and they keep coming in..

But a couple things that I wanted to report. One was I had a about an hour and a half conversation last week, I think, with a professor, assistant professor I think she is, from Touro University. She called to ask about documents, where they're available, and to ask some general questions about Mare Island, because she teaches the environmental health and safety class and she wants her students to do a real life evaluation. And so she was asking about the history of Mare Island and that kind of thing.

So I referred her to the repository at the library and to EnviroStor, the Department of Toxic Substances Control database, and to Geotracker, and walked her through a few of those things.

So you may or may not get a phone call, all of you, every single one of you, from this particular professor.

And then the other thing is that we have at the Water Board, our meeting in June 10th, we have a rescission of a 1987 order that is going to be considered by the Board that covers about eighteen sites. And of those eighteen sites, the majority of them are either closed -- well, all of them are either closed or they're being done under other regulatory instruments.

So we haven't dropped any site, but we're trying to clean up some of the historical documents and activities that have been going on.

So then we finished a project where we went through what's going on with all of the underground storage tanks with Lennar Mare Island. We tried to clean up all our files and everything and make sure that when this entire project is done in, you know, six months, there won't be any underground storage tanks left.

And so our next project is going to be looking at all of the underground storage tanks that the Navy had out here just to make sure that we have them all tied up and ready to go.

And that's it. Any questions?

MR. HSIEH: So I don't think I have very much to report. Just working with the Navy and trying to review and turn around documents in a timely manner.

Working with the Water Board and Fish and Wildlife as appropriate.

And, you know, I'm just -- I'm still relatively new, and as we're working on the handoff from Janet, I'm working with her pretty closely and so she's been available. And so as the time goes on, you know, I'll have more and more responsibility and I'll know more about each piece as we go on.

CO-CHAIR LEAR: Okay. Co-Chairs' Report, that's me.

CO-CHAIR HAYES: And me.

CO-CHAIR LEAR: And you.

CO-CHAIR HAYES: And me.

CO-CHAIR LEAR: It's us. The monthly progress report from the Navy was over on the table. Not too much going on this last month.

We did start a PCB remediation, sampling and remediation project at one building, 743, which is within the Eastern Early Transfer Parcel.

The remaining buildings are down in investigation area one in the southern portion of the island, collecting some samples to assess the presence of polychlorinated biphenyls. And that project will be ongoing through the end of the summer.

We submitted three reports this last month, and we received comments back on three reports. So that's a good sign.

Anyway, that's all I have to report so I'm going to turn it over to Myrna.

CO-CHAIR HAYES: Okay. I had a call this evening, it was pretty extensive, and it brings up a question. An individual had apparently approached the city of Vallejo trying to learn when the south shore was going to be transferred. And that is slated to become part of the regional park, I might note.

And the city of Vallejo reported to the individual that it was slated to be transferred from the Navy in 2020, and that's five years from now. And it seems to me like there's a lot of work to be done yet. And if the Western Magazine, IR-05, and Dredge Pond 7 South, according to Heather at the last meeting, was about two years out, and its environmental work has been completed, I was just wondering how accurate a five year transfer time would be for the entire south shore and whether, if that's unrealistic -- which I kind of feel like it is -- where those numbers come from, those time frames come from, and whether they -- it might be time to update them. That's one question or comment topic.

The next one is I think that we're quite a bit past due for a Restoration Advisory Board tour, so we need to set a date for that. Might help us get a better feel for some of these sites that Sheila has brought up as well as, you know, Navy sites. Just generally kind of where we are.

MS. TYGIELSKI: Yeah.

CO-CHAIR HAYES: And then lastly, just to let you know that San Francisco Bay Osprey Days, the third annual, is scheduled for June 26th through 28th, so that's the very end of this next month coming up. And we have appreciated in the past the Navy arranging for access to some extent on the historic south shore.

And all I can say is we have a ton of baby great blue herons, great egrets, and we have osprey either on their nest, 16 total, in Mare Island and on the other side of the river, or having already hatched. So I cannot say how many, but a bunch, how about that?

And so we're really excited that once again Mother Nature seems to be making a place for herself and her young in our preserve. And I think it's demonstrating that as you have your land use decisions made, you know, maybe ten, fifteen, twenty years out, and then you begin to see how those are playing out, it's an exciting process, whether it is the natural world or the, you know, economic, historic, whatever. It's just very rewarding to see those shifts taking place in use.

CO-CHAIR LEAR: Okay. Well, I'll start looking into the RAB tour dates and maybe send some e-mails out and see if we can figure out a date that works for the group.

But in the meantime, thanks, everyone, for coming.

CO-CHAIR HAYES: And what about the date thing?

CO-CHAIR LEAR: I'm going to have to get back to you on that.

CO-CHAIR HAYES: Okay.

CO-CHAIR LEAR: And were you referring to the South Shore Area or PMA or both?

CO-CHAIR HAYES: Well, the person was asking for typically about the historic south shore, but I assume that you have a technology you're using to project on based on budget and technical difficulty. So I'm just -- I think it would be important for us to know how that --

CO-CHAIR LEAR: Sure.

CO-CHAIR HAYES: -- how you're generating that and whether it's on target or not.

CO-CHAIR LEAR: Okay. Very good. Thanks, everyone, drive safely.

CO-CHAIR HAYES: Oh, public comment period.

CO-CHAIR LEAR: Public comment period?

(No response.)

MR. COFFEY: Seeing none?

CO-CHAIR LEAR: Okay.

(Thereupon the proceedings ended at 9:32 p.m.)

CERTIFICATE OF CERTIFIED SHORTHAND REPORTER

I, DORIS M. BAILEY, a Certified Shorthand Reporter and Registered Professional Reporter, in and for the State of California, do hereby certify that I am a disinterested person herein; that I reported the foregoing proceedings in shorthand writing; and thereafter caused my shorthand writing to be transcribed by computer.

I further certify that I am not of counsel or attorney for any of the parties to said proceedings, nor in any way interested in the outcome of said proceedings.

IN WITNESS WHEREOF, I have hereunto subscribed my name as a Certified Shorthand Reporter and Registered Professional Reporter on JUNE 3, 2015 in Solano County.

Doris Bailey

DORIS M. BAILEY, CSR, RPR, CRR
Certified Shorthand Reporter
License Number 8751

ATTACHMENT E
RESPONSIVENESS SUMMARY

ATTACHMENT E: RESPONSIVENESS SUMMARY

Record of Decision/Final Remedial Action Plan, Installation Restoration Site 17 and Building 503 Area,
Mare Island Naval Shipyard, Vallejo, California

Verbal Comments Received During the Public Meeting Held May 28, 2015

No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
1	Mr. Coffey	32	When was Building 519 demolished?	Building 519 was removed from the site in the 1960s (SulTech 2006).
2	Mr. Coffey	32	Did it have anything to do with the remediation?	The removal of Building 519 appears to have been the result of closure of the paint manufacturing operations and did not have anything to do with the remediation of the IR17 and Building 503 Area.
3	Mr. Coffey	33	And the drawing kind of shows that there's something beneath Building 503. Are there any plans for 503?	The Navy does not have any plans for reuse or demolition of Building 503.
4	Mr. Coffey	33	How about getting into the floor?	Building 503 is constructed on piers and is several feet above the ground surface. There is enough space beneath Building 503 to excavate the top 0.5 foot of soil using vacuum excavation (a common technology used to pothole around utilities or excavate in locations that cannot be accessed by conventional equipment).
5	Mr. Coffey	33	Has the ground been sampled underneath there?	Yes, the Navy collected soil samples beneath Building 503 in the Group II and III Accelerated Study (PRC Environmental Management, Inc. 1997).
6	Mr. Coffey	33	To any depth?	Although the majority of the soil samples collected from underneath the building were surface soil samples, the Navy also collected two hand augered samples to a depth of 5 feet below ground surface (bgs) from beneath Building 503.
7	Co-Chair Hayes	35	Can you, on slide 20, can you tell us what the source of the PAHs, polyaromatic hydrocarbons, was? That's what I'm familiar with on other sites, like at Area H-1, so I'm just curious what might have, they might have been doing?	Polycyclic aromatic hydrocarbons (PAHs) in Mare Island soil and sediment are ubiquitous and most likely represent ambient conditions as a result of general depositional processes that are not related to site activities or may have been present in the dredge fill material placed during site development between 1911 and the early 1940s.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
8	Mr. Coffey	35-36	Didn't you say that was dredge material?	The fill material was that placed at Mare Island in conjunction with land reclamation activities included dredge material as well as other sources. PAHs are commonly found in urban and rural soil. Natural sources of PAHs include emissions from volcanoes and forest fires. Manmade sources include wood burning in homes, automobile and truck emissions, and other combustion sources. Investigations at Mare Island have determined ambient levels of PAHs in soil that are unrelated to chemical use or waste generation at the base. The PAHs at the IR17 and Building 503 Area appear to primarily be ambient concentrations.
9	Co-Chair Hayes	36	And why would it be in certain concentrations? I mean, is it ubiquitous then or is it in specific locations?	As noted above in the response to comment #7, PAHs in Mare Island soil and sediment are ubiquitous and most likely represent ambient conditions as a result of general depositional processes.
10	Co-Chair Hayes	37	Then on slide 22 would you have been able to achieve unrestricted use if you'd spent into Alternative 4—I'm just trying to remember—you spent like an extra $5 million is what you'd need to do to get to that?	Yes. Based on the cost estimates developed for the Feasibility Study (FS) addendum for IR17 and Building 503 Area, Alternative 3 (the preferred alternative) is estimated at $6.4 million and Alternative 4 (the unrestricted use alternative) is estimated at $11.98 million (TriEco-Tt 2015).
11	Co-Chair Hayes	37	And how high is the—in—on slide 24, how high is the lead content below 503 that you're trying to reduce in, by removing the first, looks like half a foot, not a foot.	Under Alternative 3, the lead excavation targets sample locations B503HA002 and B503SS026, both beneath Building 503, and a significant area to the northeast of those two samples based on information provided by other samples collected beneath the building and where we think the contamination may be bounded. The remediation goal for this excavation area is 346 milligrams per kilogram (mg/kg) and the Navy would remove the top half foot of soil.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
12	Co-Chair Hayes	37	So you think you're fairly confident that just taking a half a foot away would reduce it down to acceptable level for commercial/industrial?	Yes. These lead concentrations at sample locations B503HA002 and B503SS026 were reported in the top 0.5 foot of soil, the targeted excavation depth. Concentrations of lead in sampling location B503HA002 drop significantly (to 52 mg/kg) in the next sampling interval at 2 feet bgs. B503SS026 was a surface soil sample, so no additional samples were taken at lower depths. The Navy will collect confirmation samples from the excavation to determine if the remediation goal for industrial workers is met. The Navy will expand the excavation laterally if the excavation sidewall confirmation samples show concentrations above the industrial worker remediation goal for lead. Once the sidewall confirmation samples show lead concentrations meet the remediation goal, the Navy will backfill the excavation with clean soil.
13	Co-Chair Hayes	39-40	Well, it looks to me like the future use of the site is for the City of Vallejo to squander that building like they have every other building, the north end of the island, and spend exorbitant amounts of money breaking up perfectly good buildings. But—so it sounds like you should—it's sort of difficult situation because your future uses just sit there and be wasted, and then you have the difficulty of going in under a building that they're probably planning to tear down, and try to snoop around with a little vacuum cleaner and clean up when, you know—have you considered the cost of just tearing it down for them? Is that $5 million?	The Navy has not considered the cost of demolishing the building because the Navy is not legally allowed to demolish buildings under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unless it is the only way to implement the cleanup.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
14	Co-Chair Hayes	40	So it sounds like from your preferred alternative that your bullet on exposure of hypothetical future, I might as well not ask that question, you say you would go to as deep as ten feet, so you're not going to do that because you're not going to do Alternative 4, that's pretty obvious, which the $5 million dollar additional price tag on it.	The Navy's preferred alternative is Alternative 3. Alternative 3 cleans up the IR17 and Building 503 Area to industrial standards-- the planned reuse of the site. Alternative 4 would cost an estimated *additional* $5 million to clean up to a land use that is not planned for the IR17 and Building 503 Area.
15	Co-Chair Hayes	41	Vapor intrusion into indoor air. You say you have VOC pockets. How are you going to, how are you going to address those? Was I not clear on that? I don't—just ask the question here because I guess I didn't, I didn't understand what you were going to do about that.	Under Alternative 3, the Navy will excavate soil around sample location IR17SG043, which is believed to be the source of the volatile organic compounds (VOC) emissions in soil gas that pose a potential vapor intrusion risk for future industrial workers. The Navy anticipates that the excavation would reach a depth of 20 feet bgs to remove the VOC source. Once the VOC contaminated soil is removed, the VOC concentrations in soil gas will attenuate to meet soil gas remediation goals. While this attenuation is occurring, an estimated 5 years, institutional controls (IC) will be implemented to prevent exposure to potential vapor intrusion from trichloroethene (TCE) in the soil gas until the remediation goals have been met, and the ICs could be removed at that time. The ICs will be identified in the record of decision/remedial action plan (ROD/RAP) and further developed in the land use control (LUC) remedial design (RD) document. Also under Alternative 3, the Navy will implement an IC for Subareas 1 and 2 to prohibit sensitive reuses. This IC is necessary because there are additional areas of contamination that pose a potential risk for residential uses. These additional areas would need to be cleaned up to have the site appropriate for residential use.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
16	Co-Chair Hayes	42	But they won't be, there won't be--those will not be a factor for industrial/commercial?	That is correct. Investigation into the contamination at the site and assessment of potential risk identified only TCE in the vicinity of Excavation C and sample location IR17SG043 as posing a potential risk to industrial workers that needed to be addressed; no other areas need to be addressed for potential vapor intrusion risk to industrial workers.
17	Co-Chair Hayes	42-43	On slide 26, can you explain a little bit more maybe for the audience and also, I mean, for people who are not Restoration Advisory Board members, but also just where do you, because it is a part of the Alternative 3 package, what evidence you have and what, what contaminants would be suitable for monitored natural attenuation?	Under Alternative 3, the natural attenuation is specifically targeted for TCE in soil gas. TCE is the only volatile chemical identified as posing a potential vapor intrusion risk to future industrial workers. The Navy will remove the contaminated soil that is the source of the TCE emissions in soil gas, then soil gas concentrations are expected to attenuate to meet the soil gas remediation goal. The volatility of TCE combined with source removal and the conditions at the site make natural attenuation appropriate. The Navy has estimated that the TCE would attenuate to meet the soil gas remediation goal in 5 years – a short timeframe. Vinyl chloride and TCE emissions in soil gas at sample location IR17SG043 were identified as posing a potential risk to hypothetical future residents. The excavation planned under Alternative 3 will also remove the source of these vinyl chloride emissions and, as with TCE, the vinyl chloride emissions are expected to attenuate. However, the Navy will still implement an IC for Subarea 2 to prohibit sensitive uses.
18	Co-Chair Hayes	43	You're proposing to use that as Alternative 3, which is your preferred alternative, and it would be curious—I would be—I'm curious to know whether you have any data that leads you to believe that natural attenuation has already been taking place.	At this point, the Navy does not have any data suggesting that concentrations are attenuating. However, once the source of the contamination is removed, the Navy expects the concentrations in soil gas to drop significantly.

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<table>
<tr><th>No.</th><th>Commenter</th><th>Transcript Page Number(s)</th><th>Comment or Question</th><th>Navy Response</th></tr>
<tr><td>19</td><td>Co-Chair Hayes</td><td>44</td><td>I’m very curious about number, on slide 28 you mentioned something, maybe you could embellish your comments, stating that you would be requiring the developer to do something, monitoring something or removing something?</td><td>Alternative 3 includes ICs to prevent exposure of industrial workers to potential TCE vapor intrusion risk until TCE concentrations in soil gas meet the remediation goal. If the property is transferred before TCE concentrations in soil gas meet the remediation goal, the Navy will require the transferee to implement protective measures if the developer intends to use the area for industrial purposes. The Navy will not identify any specific protective measures at this time; the measures would be decided at the time of the reuse, if necessary, and will be based on the site-specific planned reuse.</td></tr>
<tr><td>20</td><td>Mr. Coffey</td><td>45</td><td>Who in the world would do this?</td><td rowspan="3">The Navy plans to excavate soil to remove any remaining source of VOC contamination in Subarea 2, then monitor the natural attenuation of soil gas concentrations in this area for 5 years. The ICs under Alternative 3 are not burdensome to implement and are fairly common at contaminated sites. There are four ICs that will be implemented as part of Alternative 3:
• ICs to prohibit hypothetical future residential and other sensitive uses across Subareas 1 and 2. These are common ICs and will be easy to monitor and enforce since the planned reuse of the property is industrial.
• ICs to prevent future industrial exposure to TCE soil gas vapors until TCE concentrations in soil gas meet the remediation goal. These ICs affect only a small portion of Subarea 2 and are expected to be necessary only for a short period of time. Once the TCE concentrations in soil gas meet the remediation goal, this industrial IC can be removed.
• ICs to prohibit the use of groundwater without proper</td></tr>
<tr><td>21</td><td>Co-Chair Hayes</td><td>45</td><td>This brings up the same topic we had about 2 months ago or 4 months ago or whatever. Where you’re leaving something for somebody else to try to figure out.</td></tr>
<tr><td>22</td><td>Ms. Tygielski</td><td>45</td><td>Over and over again, institutional controls.</td></tr>
</table>

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
				authorization. The groundwater is unsuitable for use as drinking water based on natural water chemistry and site hydrogeology. • IC to restrict soil disturbance in Subarea 1 without a soil management plan (SMP) approved by DTSC.
23	Mr. Coffey	47	So clarify. So what she was talking about, those restrictions will not be present in three?	Yes. Alternative 3 will have ICs as described in the preceding response. The IC to prevent future industrial exposure to TCE in soil gas vapors can be removed after natural attenuation has allowed the VOCs to meet remediation goals. This IC is intended to be temporary. However, if in the event a future transferee wants to use the property before the remediation goals have been achieved, they will be required to implement engineering controls (such as vapor barriers). As noted previously, the requirements of this interim IC would be fully described in the LUC RD.
24	Ms. Figueroa	48	On page 22 it says there's no risk to ecological, no ecological risks on the site. And then on the table 3 there's a, the first category, overall protection of human health and the environment; how do you define environment and ecological?	In order for an alternative to be chosen as a final remedy for a site, the alternative must be protective of human health and the environment. An alternative is protective of human health and the environment if it will achieve the remedial action objectives (RAOs). The RAOs, in turn, are developed based on the risks identified in the human health and ecological risk assessments and, if necessary, based on risk of further migration of contamination in the environment. The word "environment" in this threshold criterion includes both potential ecological risk and potential further migration of contamination. Ecological risk evaluates exposures of animal species present or potentially present at a site to the contaminants at the site. Further migration of contamination

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
				evaluates the potential impact from migration of contamination to other environmental media or natural resources at a site. For the IR17 and Building 503 Area, the Navy completed an ecological risk assessment (ERA) in 2002 and a screening-level ecological risk assessment (SLERA) in 2012. Both assessments concluded that no further action was warranted for ecological receptors (Tetra Tech 2002 and ChaduxTt 2012). The Navy also completed a fate and transport evaluation in the remedial investigation (RI) report that evaluated the potential for further migration of contamination (SulTech 2006). The fate and transport evaluation concluded that contamination was not likely to reach other environmental media or natural resources at the site – for example the Mare Island Strait and the nearby non-tidal wetland. No RAOs were developed for the “environment” at the IR17 and Building 503 Area because there are no potential ecological risks or risks of further migration that need to be addressed.
25	Ms. Figueroa	49	How can that be no ecological risk and contamination?	The site was evaluated following U.S. Environmental Protection Agency (EPA) and Navy guidance to determine whether there was unacceptable risk. This evaluation included assessments of: (1) whether there is wildlife habitat at the site or the site is used by wildlife; and, if so, (2) if there are actual or potential complete exposure pathways from the contamination to the ecological receptors at the site; and (3) whether chemicals at the site are present at concentrations that could cause adverse effects to ecological receptors. The evaluations concluded that there was no unacceptable ecological risk at the site.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
26	Co-Chair Hayes	50	I just want to state that, concerning alternative three in this whole building, Janet's statement that the Navy says they can't design a long-term remedy if you don't know what the building's going to look like on the site or something like that, then that's not your responsibility; I would think that you could consider in alternatives for the Remedial Action Plan, or the remedial plan or whatever that is. You could consider making that area a parking lot or a part or something like that where you wouldn't have to address some actual building over that property as part of an institutional control in my opinion.	The future reuse of the IR17 and Building 503 Area was determined as industrial by the City of Vallejo in the Mare Island Specific Plan. However, in order to allow for various industrial uses and site configurations, the Navy identified actions that protect industrial uses, including actions to protect future industrial workers in the event that a building is constructed in an area where there is potential vapor intrusion risk. The Navy will excavate the source of the potential vapor intrusion risk and will monitor the resulting attenuation of volatiles in soil gas until concentrations are acceptable for future industrial workers exposed to vapor intrusion.
27	Co-Chair Hayes	51	I think for consistency, probably you want to be consistent, you stated in Alternative 3 on page 31 that at 503 you would remove lead to one foot on this slide, whereas in the previous slide it says up to half a foot.	Yes, to clarify, the lead concentrations that exceed the remediation goal are in the top 0.5 foot under Building 503. So, the Navy expects to excavate only the top 0.5 foot of soil.
28	Co-Chair Hayes	51	And then this is the first time, on page 31, that the "environment" as far as I can tell comes up, protection of human health and the environment. So I didn't see where you had done any analysis of the impact to the environment, so maybe you could explain that.	In addition to an evaluation of the risk to ecological receptors from site contaminants (see the response to public comment 24), the Navy evaluated potential impacts to the environment through a fate and transport analysis (SulTech 2006) that looked at the potential for contamination at the IR17 and Building 503 Area to impact the Mare Island Strait and the non-tidal wetland. The evaluation concluded that the contamination was not likely to affect other resources at or near the site.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
29	Co-Chair Hayes	52	I can see that you have an exception for groundwater, but even if the groundwater had a contaminant in it that would reach the river, which there's a very shallow groundwater there.	The Navy evaluated the potential for groundwater at the IR17 and Building 503 Area to discharge to Mare Island Strait. Based on the groundwater concentrations found at the site, there is no evidence that the contamination in the groundwater is reaching Mare Island Strait.
30	Co-Chair Hayes	53	My last question is on slide 32. How did you evaluate subarea 3 and conclude that there was no, no future requirement to do anything? Because you indicated that it's a parking lot now. But how do you know there's nothing under it?	The Navy collected soil, groundwater, and soil gas samples from soil below the paved parking lot in Subarea 3. These samples were included in the updated human health risk assessment and were used to evaluate potential risk to future commercial/industrial workers, future construction workers, and hypothetical future residents (just like what was done on Subareas 1 and 2). Potential risks to these receptors were low enough that no remedial action is warranted (TriEco-Tt 2014).
31	Ms. Roebuck	54	With respect to slide number 32, which is also your preferred remedial alternative poster board that you have, you reference industrial IC and sensitive uses IC. And normally what I'm used to is, when I talk about commercial/industrial controls through institutional controls, normally that restricts against sensitive uses. So when I look at this I thought, when you said sensitive uses IC, that you were talking about having a restriction against sensitive uses; no hospitals, residences, daycare centers, and schools for kids under 18, those things would be restricted. And that's what you are talking about with the sensitive use IC.	Yes, the remedy includes ICs that will prohibit the sensitive reuse of Subareas 1 and 2. The Navy has not defined all uses that are included in a "sensitive" reuse; that will be done in the LUC RD. However, the Navy expects sensitive reuses to include residences, daycares, schools, and hospitals for humans.

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No.	Commenter	Transcript Page Number(s)	Comment or Question	Navy Response
32	Ms. Roebuck	54-55	But then you have industrial IC in your legend. And I think from your discussion what your expectation is, and correct me if I'm wrong, that you're worried that even after your excavation you may have a soil vapor problem, and you're trying to address the potential for maybe an engineering control or something down the line. Is that right?	The Navy is going to excavate the source of the soil vapor problems and the Navy expects that concentrations of contaminants in soil gas will decrease significantly. However, the decrease may not immediately meet industrial remediation goals. So the Navy will monitor the area as the contaminants continue to attenuate in the environment and decrease to meet industrial goals. The IC will control industrial worker exposure to vapor intrusion risk until the industrial goal is met, then the IC can be removed.
33	Ms. Roebuck	55	And I guess what I would just ask that you consider is the IC's are usually imposed at the end, and what you're going to do in the interim is this excavation, which is great because it could remove the need for it. So, you know, at this point this interior IC that you're proposing is, it just seems like you don't have the data to know you're going to need that, and you may, but it just seems like you're trying to decide about something that you may not actually need. And you say you're going to do five years worth of analysis of soil gas, so you're going to have a lot of information, and so, you know, I just don't know that that IC is something you could really decide on right now. But, you know, consider it yourself. It just seemed odd to have the remediation and the IC in the same general place.	Yes, confirmation sampling done after the excavation may demonstrate that the IC to protect against vapor intrusion risks is unnecessary. However, the Navy does not have this data at this point in time. So, in order to make efficient use of the CERCLA process, the Navy evaluated an IC to protect against vapor intrusion risks as part the alternatives evaluated in the FS Addendum and selected it as part of the remedy in case such an IC is necessary.

Written Comments Received During the Public Comment Period Held May 26 through June 25, 2015

RESPONSES TO COMMENTS FROM NORMA HARRISON (COMMUNITY MEMBER)		
No.	**Comment**	**Response**
1	I haven't any concern at this time about the work being done at Mare Island. I trust those who know more are doing what is just and right for the locality. Thanks for the info thus far. Send no more.	The Navy appreciates your comments and will remove you from the Mare Island community mailing list as requested.

RESPONSES TO COMMENTS FROM MYRNA HAYES (RESTORATION ADVISORY BOARD [RAB] CO-CHAIR)		
No.	**Comment**	**Response**
1	See my comments in RAB minutes.	Please see the public meeting table above that contains extracted comments from the public meeting transcript and provides responses from the Navy.

Written Comments Received During the Public Comment Period Held May 26 through June 25, 2015

RESPONSES TO COMMENTS FROM PAULA TYGIELSKI (RESTORATION ADVISORY BOARD MEMBER)

No.	Comment	Response
1	I understand choosing Alternative 3 due to lower cost, but I always am concerned when Institutional Controls are relied on. The annual reporting is critical. Perhaps considering the costs involved in the annual reporting causes Alternative 4 to be more cost effective in the long run. Your presentation was rather "mushy" (vague) about who the responsibility of the annual reporting fall to. I'm not real comfortable with that.	The Navy included costs of maintaining the ICs in Alternative 3 in its cost evaluation completed as part of the FS addendum (TriEco-Tt 2014). This cost evaluation takes into account costs for different remedial timeframes and different remedial components. This allows the Navy to derive a single cost value for each alternative and compare the cost values for all alternatives evaluated. So, the costs for Alternative 3 are directly comparable to Alternative 4; and costs associated with Alternative 4 are an estimated $5.1 million *more than* costs associated with Alternative 3, including the ICs that are a part of Alternative 3. As part of the remedy, the Navy will develop a LUC RD, which identifies the specific actions the Navy will take to implement the ICs, the monitoring and enforcement of the ICs, and the location of the ICs. This level of detail will be worked out with the Navy and the state and is typically not included in CERCLA documents at this point.

RESPONSES TO COMMENTS FROM ERIN HANFORD (CITY OF VALLEJO)

No.	Comment	Response
1	The proposed excavation beneath Building 503 (a three-story concrete structure) in Subarea 1 is planned to be completed using soil vacuum technology, without any demolition of the building. Although the depth of excavation is only 0.5 feet, the planned extent of the removal covers approximately one-third of the existing Building 503 footprint. The documents reviewed do not provide any detail on how this will be accomplished without	Building 503 is constructed on piers and is several feet above the ground surface, providing an accessible crawl space beneath the building's structural concrete slab floor. That crawl space provides sufficient access for the excavation of the 0.5 foot of soil beneath the building utilizing vacuum excavation technology. Vacuum excavation is commonly used to pothole around utilities or excavate in locations that cannot be accessed with

Written Comments Received During the Public Comment Period Held May 26 through June 25, 2015

RESPONSES TO COMMENTS FROM ERIN HANFORD (CITY OF VALLEJO)		
No.	**Comment**	**Response**
	compromising the integrity of the structure. Also, the Addendum states that the limits of the excavation will be ultimately determined by additional soil sampling to demonstrate the efficacy of the removal; however, there is no description of how these confirmation samples will be collected, or at what frequency. Thus, while the goal of removing soil containing lead at concentrations exceeding the commercial/industrial exposure limit is acceptable, it is not clear that the method identified will be successful in meeting the goal.	conventional equipment. Soil is removed by suction through a pipe and contained in a spoil tank. The limited depth of the excavation is not anticipated to structurally impact the building. Specific details on the excavation under Building 503 and the effect of the excavation on the structural integrity of the building will be evaluated as part of the RD. In addition, details on the confirmation samples to be taken after the excavation will be contained in the RD. For cost estimating purposes, the Navy assumed there would be 16 confirmation samples collected from the sidewalls of the excavation and an additional 4 samples from the bottom of the excavation. The Navy will submit the RD to the state and the City of Vallejo for review and comment.
2	The second concern is with the planned excavation in Subarea 2. This is a deep excavation (approximately 20 feet below ground surface) that is intended to remove a source of organic vapors in soil. The limits of this excavation will also be determined by confirmation sampling, but the method and frequency of sampling are not described. Also missing are the details regarding the installation and maintenance of the soil gas monitoring points following completion of the removal.	The details of confirmation sampling and the installation of soil gas monitoring points will also be described in the RD. The Navy will submit the remedial design to the state and the City of Vallejo for review and comment.
3	Provided that the above issues are addressed during the Remedial Design process, the City of Vallejo is in agreement with the selected alternatives and looks forward to the successful completion of the Remedial Action.	Comment noted.

Written Comments Received During the Public Comment Period Held May 26 through June 25, 2015

RESPONSES TO COMMENTS FROM ERIN HANFORD (CITY OF VALLEJO)		
No.	**Comment**	**Response**
4	The City reserves the right to comment on the specific details of the land use covenants following the remediation and site testing with more precise understanding of the magnitude of contamination remaining following the remedial action.	The details of the ICs will be contained in a LUC RD, which will be submitted to the state and the City of Vallejo for review and comment.

RESPONSES TO COMMENTS FROM TAMI NAKAHARA (CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE [CDFW])		
No.	**Comment**	**Response**
1	CDFW-OSPR did not receive the PP for review during the regulatory agency review period. This is the first time CDFW-OSPR has been provided the opportunity to review and comment on the PP, during the public comment period. In the future, we request to be included in the regulatory agency review on all PPs for remedial activities that may impact biological resources.	Per the Federal Facility Site Remediation Agreement (FFSRA), the Navy submitted the draft proposed plan (PP)/draft RAP to the state (Regional Water Quality Control Board [Water Board] and Department of Toxic Substances Control [DTSC]) for review and input on March 27, 2015. The Navy and the state worked together to develop the referenced document that serves as both the Navy's Proposed Plan under CERCLA and the DTSC's Draft Remedial Action Plan under *California Health and Safety Code* Section (§) 25356.1. The PP/draft RAP does not present new information but instead summarizes information already provided in previous CERCLA documents in an easily understood format to solicit public input.
2	Page 5, Section Ecological Risk Assessment. The text states, "Much of the site is covered by buildings, asphalt, and concrete, and does not provide suitable ecological habitat." Although the Navy does not consider suitable ecological habitat to be present at the site, CDFW-OSPR has previously observed the following bird species on site: Bushtit, Song Sparrow, American Crow,	The small area of non-tidal wetlands was evaluated separately at the request of the Base Realignment and Closure Cleanup Team (BCT), and a revised SLERA was performed in 2012. Based on this work, the state concurred with no further action for the area of non-tidal wetlands, and this area is not included in the proposed action. This non-tidal wetland area is separated from

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RESPONSES TO COMMENTS FROM TAMI NAKAHARA (CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE [CDFW])

No.	Comment	Response
	American Kestrel, hawk, Mourning Dove, Black Phoebe, Turkey Vulture, House Finch, Northern Mockingbird, and Northern Harrier. The non-tidal wetland area on the southern portion of the site contains potential habitat for the Federally and State endangered salt marsh harvest mouse and California Ridgway's Rail, and the State threatened California Black Rail, which are all State fully protected. All of these species are protected by several State and Federal natural resource regulations and have the potential to be adversely impacted by the remedial activities at the site.	the proposed excavation areas by Azuar Drive, a busy street that serves a large active manufacturing facility and is a main thoroughfare on Mare Island. The closest remedial action excavation is across Azuar Drive and about 85 feet away from the non-tidal wetland. The non-tidal wetlands are part of a former dredge pond and, as such, are also separated from the rest of the site by a raised berm. All staging, storage, and decontamination areas by necessity will be in the industrial area on the opposite side of Azuar Drive, and standard practices for stormwater management will be employed during the action to prevent runoff. These measures will be further clarified in the remedial action work plan (RAWP). In addition, the Navy agrees to visually inspect the site for the presence of the bird species listed in the comment prior to response action construction. If these species are present and potentially impacted by the response action construction, the Navy will collaborate with CDFW in the process of crafting measures to generally avoid harm as has previously been done successfully for multiple other sites on Mare Island. Navy and CDFW legal counsel are discussing CDFW proposed applicable or relevant and appropriate requirements (ARARs), and a determination about which CDFW-proposed ARARs will be accepted by the Navy shall be made prior to the production of the Final ROD/Final RAP.
3	Page 8, Section Summary of the Preferred Alternative; and Page 9, Table 3: Comparative Analysis of Soil and Soil Gas Remedial Alternatives. In regards to Alternative 2, the preferred alternative, the text states, "*It meets federal and state applicable or relevant and appropriate requirements (ARARs)*" (page 8). CDFW-OSPR	Please see the response to CDFW comment #2.

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RESPONSES TO COMMENTS FROM TAMI NAKAHARA (CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE [CDFW])		
No.	**Comment**	**Response**
	disagrees with this statement. As previously stated (see Specific Comment 1), several State and Federally protected bird species have been observed on site and may be adversely impacted by remedial activities, especially if nesting. Although work will not be conducted directly in the non-tidal wetlands, remedial activities may indirectly affect this area and the protected species within it (e.g., as the result of disturbance from noise and traffic; site runoff from staging, storage, excavation, and decontamination areas; etc.). The Navy has not accepted <u>any</u> State or Federal natural resource ARARs for the protection of these species during remedial activities. As a result, CDFW-OSPR is concerned that "take" may occur during the Navy's actions if CDFW-OSPE and the Navy cannot agree on appropriate avoidance and minimization measures to implement. CDFW-OSPR is again requesting that the Navy accept State and Federal natural resource regulations as ARARs for the protection of these species, and include these ARARs in the Record of Decision.	

REFERENCES

ChaduxTt. 2012. "Final Non-Tidal Wetland Investigation, IR17 and Building 503 Area, Mare Island, Vallejo, California." September 12.

PRC Environmental Management Inc. 1997. "Draft Final Group II and III Accelerated Study Field Sampling and Analysis Plan, Mare Island." August 5.

SulTech. 2006. "Final Remedial Investigation for Installation Restoration Site 17 and Building 503 Area, Investigation Area A1, Former Mare Island Naval Shipyard." January 27.

Tetra Tech Inc. 2002. "Final Onshore Ecological Risk Assessment, Mare Island, Vallejo, California." July.

TriEco-Tt. 2014. "Final Feasibility Study Addendum, Installation Restoration Site 17 and Building 503 Area, Former Mare Island Naval Shipyard." December 15.